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GEOTECHNICAL

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ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

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Guest Editor Prof. Jie Han

GEOTECHNICAL ENGINEERING

March 2011 Issue: Geosynthetics
Edited by Prof. Jie Han

Prof. Jie Han, the Guest Editor is a Professor at Department of Civil, Environmental, and Architectural Engineering at the University of Kansas in the United States. He received his Ph.D. degree in Civil Engineering from the Georgia Institute of Technology in 1997 and has been a professional engineer in Georgia since 1998. Dr. Han was a senior engineer and manager of technology development at Tensar Earth Technologies, Inc., a leading geosynthetic manufacturer in the world, from 1997 to 2001. Prof. Han's research and practical experiences have dealt with geosynthetics-reinforced earth structures, ground improvement, pile foundations, and pavement applications Prof. Han has coauthored three technical books, edited two ASCE Geotechnical Special Publications, and published more than 150 peer-reviewed journal papers and conference papers (a large portion on geosynthetics). Prof. Han is currently serving as the Technical and Proceedings Co-chair for the GeoFrontiers 2011 Conference to be held in Dallas, Texas, USA from March 13 to 16, 2011, which is jointly organized by the ASCE Geo-Institute, the Industrial Fabrics Association International, the North American Geosynthetic Society, and the geosynthetic industry. Prof. Han serves as a member on the editorial boards for four major international journals in geotechnical engineering, the ASCE Geosynthetic and Ground Improvement Committees, and TRB A2K07 Committee on Geosynthetics.

GEOTECHNICAL ENGINEERING

Foreword

Since the early use of fabrics to reinforce roads by the South Carolina Highway Department in the USA in 1920s, geosynthetics have been successfully adopted as reinforcements in many civil engineering applications, ranging from slopes, earth retaining walls, embankments, foundations, landfills, roads, earth structures for river and coastal protection, etc. This special issue focusing on geosynthetic-reinforced earth structures contains several technical papers contributed by a combination of internationally well-known experts and young, energetic researchers and/or engineers in these areas from China, Japan, Malaysia, Singapore, and the United States. They present past successes, recent developments, and/or issues in the design, modeling/analysis, construction, and performance evaluation of geosynthetic-reinforced earth structures.

Prof. Dov Leshchinsky at the University of Delaware in the USA, an internationally well-known expert in geosynthetics, slopes, and walls, offers his broad and in-depth views on some issues related to the design of mechanically-stabilized earth walls and slopes. Issues include discussion on the artificial separation between reinforced walls and slopes, deficient seismic design of reinforced earth structures, and difficulties associated with feedback from field data and its implications on design of reinforced earth walls. Prof. Leshchinsky offers the solutions to these issues including the adoption of reinforced slope design method for reinforced walls and reduced seismic coefficients with limit equilibrium analysis for seismic design of reinforced earth structures. Prof. Leshchinsky emphasizes the importance of following the principles of statics in the development of design methods from field data.

Dr. Teik Aun Ooi at TAO Consultant and Mr. C.H. Tee at Mega Geoproducts and Services have many years' practical experience in design and construction of geosynthetic-reinforced earth walls and steep slopes in Malaysia. They share their rich experience and knowledge accumulated through years of practice in their technical paper. They present various case histories of slope repair and the role of geosynthetic reinforcement in the slope reconstruction and performance.

Prof. Jinchun Chai at Saga University in Japan has developed a number of design methods well adopted in practice for ground improvement. In his paper included in this special issue, Prof. Chai proposed a method for predicting undrained shear strength of saturated clayey backfill in an embankment reinforced by dual function (reinforcement and drainage) geocomposites, which is used to calculate the factor of safety of the reinforced embankment. The proposed method considers the effects of discharge capacity of the geocomposite, spacing between geocomposite layers, construction speed, and the coefficient of consolidation of the backfill.

Dr. Jie Huang, an assistant professor at the University of Texas at San Antonia, Dr. Anil Bhandari, a project manager at Terracon (a major geotechnical firm in the USA), and Dr. Xiaoming Yang, a research associate at Louisiana Transportation Research Center, are three active young researchers and engineers in geotechnical engineering. They jointly contribute a technical paper to review and summarize the numerical modeling techniques (FEM, FDM, and DEM) to model and analyze geosynthetic-reinforced earth structures including MSE walls, reinforced slopes and embankments, and reinforced unpaved and paved roads.

Acknowledgement

A number of theme oriented special issues are introduced in 2011and the first one is released in March 2011 on Geosynthetic –reinforced earth structures. The Guest Editor of this issue is Prof. Jie Han of the Department of Civil, Environmental, and Architectural Engineering at the University of Kansas in the United States. He received his Ph.D. degree in Civil Engineering from the Georgia Institute of Technology in 1997 and has been a professional engineer in Georgia since 1998. Dr. Han was a senior engineer and manager of technology development at Tensar Earth Technologies, Inc., a leading geosynthetic manufacturer in the world, from 1997 to 2001. Prof. Han's research and practical experiences have dealt with geosynthetic-reinforced earth structures, ground improvement, pile foundations, and pavement applications. Prof. Han has co-authored three technical books, edited two ASCE Geotechnical Special Publications, and published more than 150 peer-reviewed journal papers and conference papers (a large portion on geosynthetics). Prof. Han is currently serving as the Technical and Proceedings Co-chair for the GeoFrontiers 2011 Conference to be held in Dallas, Texas, USA from March 13 to 16, 2011, which is jointly organized by the ASCE Geo-Institute, the Industrial Fabrics Association International, the North American Geosynthetic Society, and the geosynthetic industry. Prof. Han serves as a member on the editorial boards for four major international journals in geotechnical engineering, the ASCE Geosynthetic and Ground Improvement Committees, and TRB A2K07 Committee on Geosynthetics.

The papers in this issue are authored by well known researchers and practioners: *D. Leshchinsky; T.A. Ooi and C.H. Tee; J.-C. Chai, T. Hino, Y. Igaya, and Y. Yamauch;, J. Huang, A. Bhandari, and X. Yang; J. Chu,W. Guo, and S.W. Yan; Y.M. Chen,W.A. Lin, B. Zhu, and L.T. Zhan; and J. Han, Y. Zhang, and R.L. Parsons*

The papers contained in this issue by the well known authors will undoubtedly be of great interest to engineers and scientists. On behalf of the Association of Geotechnical Societies in Southeast Asia, the Southeast Asian Geotechnical Society and the Editorial panel of the Geotechnical Engineering Journal we express our sincere gratitude to the Guest Editor Prof. Jie Han and the contributing authors.

K.Y. Yong
D. Bergado
Teik Aun Ooi
A. S. Balasubramaniam

Prof. Jian Chu at Nanyang Technological University in Singapore and Prof. Shuwang Yan at Tianjin University in China are internationally well-recognized for their research in ground improvement, coastal protection, and land reclamation. Together with Prof. Chu's student, Wei Guo, they contribute a technical paper on recent advances in the research and practice using geosynthetic tubes and geosynthetic mats for the construction of river and coastal structures.

Prof. Yunmin Chen at Zhejiang University is a leading geotechnical engineering researcher in China. Prof. Chen and his colleagues have been involved in the research and consulting of several major landfills in China. Their technical paper addresses the issues related to the performance-based design of geosynthetic liner systems in landfills, including the breakthrough time, interface sliding failure, and liner tensile failure.

Prof. Jie Han at the University of Kansas in the USA is the guest editor of this special issue. He, his former graduate student, Mr. Yuze Zhang, and his colleague, Prof. Robert L. Parsons contribute a technical paper on laboratory evaluation of geosynthetic-soil confinement using a wheel tracking device. Their paper discusses a newly-developed performance-based laboratory test method to evaluate geosynthetic-soil confinement and distinguish the benefits of rut reduction among different types of geosynthetics and base course materials.

Jie Han

Guest Editor

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Special Issue on Geosynthetic-reinforced Earth Structures

Guest Editor: Jie Han

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Guest Editor

Prof. Tatsunori Matsumoto

Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 42 No.2 June 2011 ISSN 0046-5828

GEOTECHNICAL ENGINEERING

June Issue: Guest Editors on Foundations
Edited by Prof. Tatsunori Matsumoto

A special issue on Deep Foundations is also planned and to be edited by Prof. Tatsunori Matsumoto with the assistance of Dr. Der Wen Chang and this is expected in June 2011. Professor Harry G. Poulos, Prof. Bengt Fellenius and several others are expected to contribute in this issue together with Prof. Tatsunori Matsuoka.

Prof. Matsumoto is now with Kanazawa University in Japan for nearly 32 years. He was educated at the Kanazawa University and received his Doctoral Degree from Kyoto University for his work on steel pipe piles in 1989. He has extensive research and practical experience on piled foundations and piled raft foundations. Prof. Matsumoto has a Shake Table Facility for the study of dynamic and earthquake type of behaviour of piled foundations. He has also worked on the centrifuge with pile groups and piled raft foundations in collaboration with Taisei Corporation. His research work on piled raft foundations range from the simplified calculation methods of Poulos - Davis and Randolph (PDR Method), Burland's method to approximate computer based methods such as the strip on spring and plate on spring approaches and hybrid methods. He has also worked on more rigorous method using boundary elements and finite elements. Prof. Matsumoto also has wide experience in the seismic design of raft and piled raft foundations. Prof. Matsumoto is one of the authors of the computer software PRAB—Piled Raft Analysis with Batter Piles. With this software piled raft foundation can be analyzed with vertical and horizontal loads as well as moment.

GEOTECHNICAL ENGINEERING

FOREWORD

The Southeast Asian Geotechnical Society (SEAGS) was formed over 40 years ago and has been an important factor in the growth of geotechnical engineering in the Southeast Asian region. SEAGS has made a very important contribution to the dissemination of geotechnical knowledge by publishing the journal Geotechnical Engineering, which first appeared in 1970. A number of influential papers have appeared in this journal, generally dealing with regional issues and case histories but also with geotechnical problems on a global scale.

In recent years, several of the original countries comprising SEAGS have grown to such an extent that they have formed their own national geotechnical groups. A number of these countries have formed the Association of Geotechnical Societies of South East Asia (AGSSEA) which now interact and cooperate with SEAGS. Currently, the President of SEAGS and Chairman of AGSSEA are Dr. Ooi Teik Aun and Professor K.Y. Yong respectively, while the Secretaries General are Professor Dennes Bergado and Mr. Kenny Yee.

SEAGS and AGSSEA now cooperate in producing Geotechnical Engineering, and in order to respond to the growth of geotechnics in the region, the editors have decided to re-focus the journal and to produce a series of theme issues that deal with specific areas of geotechnical engineering.

This present issue deals with deep foundations, a subject that has been of abiding interest to engineering professionals in the region over many years. Indeed, with the remarkable growth in the number and height of structures, studies of deep foundations and their behaviour under various scenarios have become a matter not only of research interest, but also of intense practical and economic interest. It is being recognised increasingly that traditional methods of deep foundation design that may have been adequate in past times may not be suitable for today's circumstances, where much larger loads may be acting on the piles and where piles may be subjected not only to direct structural loads but to loads imposed by ground movements arising from such sources as earthquakes, excavations and tunnel construction. It is also being recognised that in such cases, the sources of movement may also change the stress state in the ground so that the ground conditions during and after construction may be different from those encountered during the site investigation. Such differences need to be recognised and allowed for in the design process. It must also be recognised that there may well be "side effects" that arise from construction-related ground movements that may adversely affect existing foundation

A further trend, and one that is to be applauded, is the increasing use of pile load testing, not only as a means of verifying the capacity and integrity of the as-constructed piles, but also as an adjunct to pile design. Many of the elements of uncertainty that are present in pile design may be reduced by carrying out tests on trial piles as part of the design process. However, in such cases, it is essential to understand the limitations of the test procedure being and to interpret the test results accordingly, taking into account the test configuration and test setup, the means of applying load and supplying reaction, and the means of measurement of the pile responses. In particular, care should be taken to allow for residual stresses that exist in the pile prior to testing, as failure to do so may lead to misinterpretation of the contributions to the pile resistance of the shaft and the base.

The nine papers in this issue cover a broad range of topics in deep foundations, including load testing (3 papers), analysis and design issues (2 papers), fundamental understanding of pipe pile behaviour (1 paper), piled raft foundations (2 papers), and two case histories, one involving the foundations for the Taipei 101 tower, formerly the world's tallest building, and the other a proposed 151 storey tower in South Korea.

Professor Tatsunori Matsumoto from Japan is the editor for this issue and has been instrumental in attracting the papers that appear here, and especially, in securing a number of papers from Japan. He has done a fine job in coaxing and encouraging the authors of the papers, arranging for the review of the papers, and editing the final manuscripts. He deserves the thanks of the journal readership for his untiring efforts. He has been assisted by

Professor Der-Wen Chang of Taiwan, and by Professor Balasubramaniam (Bala), from Australia, whose links with SEAGS extend over many years.

It is to be hoped that the readers of this issue will benefit from the information and knowledge that is contained within the papers, and that they may find occasion to apply this knowledge in their own professional practice.

H.G. Poulos

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

This Special Issue on Deep Foundations is edited by Prof. Tatsunori Matsumoto with the assistance of Prof. Der Wen Chang as co-editor. Prof. Matsumoto is with Kanazawa University for nearly 32 years and has made excellent contributions in Piled Foundations starting with his Doctoral Research at Kyoto University on steel pipe piles as early as 1989. He has extensive research and practical experience on piled foundations and piled raft foundations. Prof. Matsumoto has a Shake Table Facility for the study of dynamic and earthquake type of behaviour of piled foundations. He has also worked on the centrifuge with pile groups and piled raft foundations in collaboration with Taisei Corporation. His research work on piled raft foundations range from the simplified calculation methods of Poulos - Davis and Randolph (PDR Method), Burland's method to approximate computer based methods such as the strip on spring and plate on spring approaches and hybrid methods. He has also worked on more rigorous method using boundary elements and finite elements. Prof. Matsumoto also has wide experience in the seismic design of raft and piled raft foundations. Prof. Matsumoto is one of the authors of the computer software PRAB—Piled Raft Analysis with Batter Piles. With this software piled raft foundation can be analyzed with vertical and horizontal loads as well as moment. The co-editor Prof. Der Wen Chang is currently a Professor at the Tamkang University in Taiwan. Prof. Chang recerived his Doctoral Degree from University of Texas at Austin in 1991. His research interests are in soil-structure interaction, earthquake geotechnical engineering and soil dynamics. Prof. Chang is a valuable member of the Chinese Geotechnical Society in Taipei serving as Secretary General; he also played a key role in the 17th Southeast Asian Geotechnical Conference held in Taipei in May 2010.

The contributing authors in this issue are :Kiyoshi Yamashita**,** Junji Hamada and Takeshi Yamada; K. Watanabe**,** H. Sei, T. Nishiyama and Y. Ishii; N. Suzuki and T. Seki; K. Matsuzawa and T. Matsumoto; Suriyah Thongmunee**,** Shun-ichi Kobayashi and Tatsunori Matsumoto ; Ching-Han Yu; Bengt H. Fellenius ; H.G. Poulos, J.C. Small and H. Chow ; and Ahmad Abdelrazaq, Frances Badelow, Sung Ho-Kim, and Harry G. Poulos.

Special thanks are due to Prof. Harry G Poulos for his valuable advice and participation in the review of most of the papers; each paper is reviewed at least by two other reviewers. No doubt the papers contained in this issue will be of great interest to those in practices as well as in teaching and research. On behalf of the Association of Geotechnical Societies in Southeast Asia, the Southeast Asian Geotechnical Society and the Editorial Panel of the Geotechnical Engineering Journal, we express our sincere gratitude to the Editors Prof. Tatsunori Matsumoto, Prof. Der Wen Chang, Prof. Harry G. Poulos and the contributing authors and reviewers.

K.Y. Yong

D.T. Bergado

T.A.Ooi

A.S.Balasubramaniam

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Special Issue on Pile Foundations

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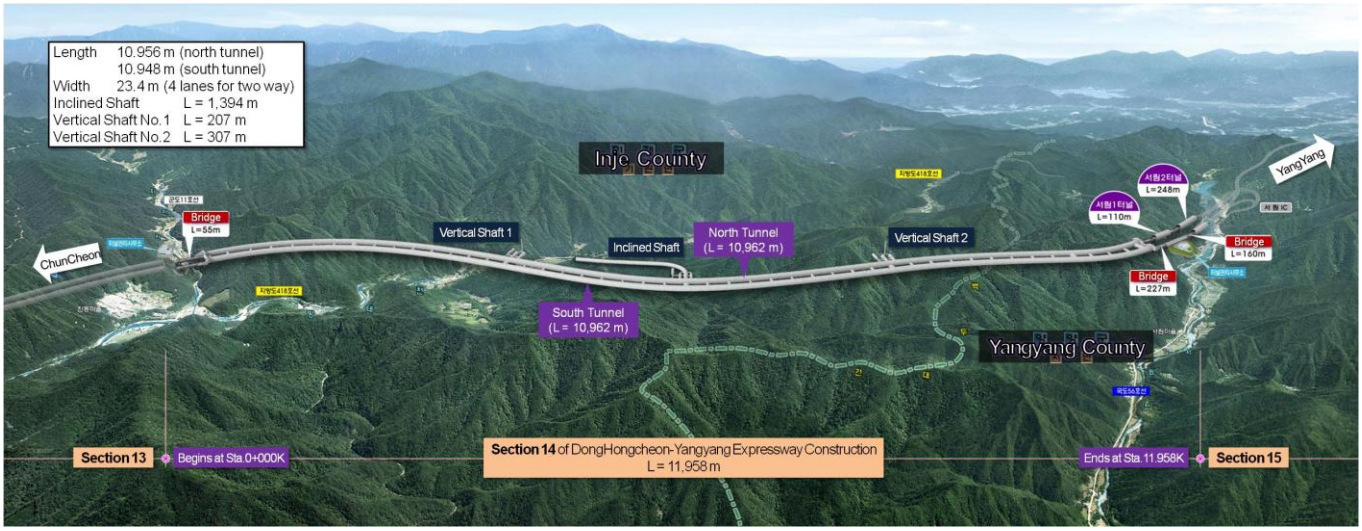
Guest Editor:
Prof. Chang Yu Ou



GEOTECHNICAL ENGINEERING

SEPTEMBER 2011 ISSUE ON DEEP EXCAVATIONS

Prof. Chang-Yu Ou
Guest Editor

This special issue has papers from China, Taiwan, Bangkok, Hong Kong, Singapore etc.

Prof. Chang-Yu Ou received his Bachelor's Degree in Engineering in 1977 from National Cheng-Kung University in Taiwan and his Masters and Doctoral Degrees from Stanford University in 1984 and 1987 respectively. He has focused on studies of soil behaviour and excavation problems since beginning to teach in a university and has published many journal and conference papers concerning the subjects. At the same time, working with industrial builders, he has also taken part in many large-scale excavation projects and accumulated experience in analysis and design. Supported by study results and analysis experience, he has opened a course on deep excavation at the university.

He is currently the Dean of engineering at the National Taiwan University of Science and Technology, Taipei, Taiwan. He was also the Director of Ecological and Hazard Mitigation Engineering Research Center of the National Taiwan University of Science and Technology, Taipei, Taiwan. He was also a Visiting Professor at University of California, Berkeley. His areas of interest are deep excavations, soil behaviour, soft ground tunnelling and ground improvement.

GEOTECHNICAL ENGINEERING

PREFACE

Asia currently is the most fast growing area in economy. Many high rise buildings and infrastructures including subway tunnels in urban areas and mountain tunnels connecting cities are under construction. Some of them are extraordinary in terms of scale and construction difficulty. The strength and stress-strain behavior of soils are seriously considered and monitoring systems are comprehensively implemented in projects. Therefore, as a guest editor of this special issue featuring the urban geotechnical construction, I am very happy to have the papers from distinguished investigators from China, Korea, Singapore and Taiwan. Many thanks for their contribution.

This special issue covers some important aspects of urban geotechnical construction. One of the biggest issues for underground construction in a densely built-up urban environment is the potentially adverse impact on buildings adjacent to deep excavations. Thanks for Mr. Goh and Prof. Mair who present the influence of building stiffness in the assessment of adjacent building safety. Excavation instability sometimes causes catastrophic collapse of the projects. Prof. Zheng and his group introduce the concept of redundancy into the design of retaining structure and develop a design methodology based on the concept of redundancy. Prof. Jeng and his colleagues give a very interesting case study of the largest excavation in Shanghai soft clay. In urban areas, excavations may have a significant impact on the stress and deformation of existing tunnels. Several construction techniques have been developed to reduce the movement of excavations in soft clay. Prof. Wang and his group made a comprehensive study of the effectiveness of these different methods and the interactive impact of the two adjacent excavations in Shanghai soft clay on the crossing tunnel using the numerical method. In the past studies of ground movement induced by deep excavations mostly focus on those due to main excavation, for example, excavation of soil, dewatering, strut installation and demolish and so on. Ground movement induced by diaphragm wall construction is seldom taken into account. Prof. Ou and his group present the behavior of ground movement induced by construction of diaphragm wall based on the monitoring results of the construction of the Taipei metro system. The envelope due to diaphragm wall construction is established in the paper. In the traditional pneumatic caissons, workers have to conduct excavation inside the working chamber under high pressure, temperature, and humidity while in the new pneumatic caissons, soil excavation and removal are completed by remotely controlled equipments. Prof. Peng and his colleagues report the monitored results for the new pneumatic caisson conducted in Shanghai soft clay and numerical approach considering the soil disturbance during construction. The agreement between field monitoring and numerical analysis results are discussed. In densely popular cities, construction of underground tunnels should be kept minimal impact on existing buildings. Instead of shield machines, use of hydraulic jacks to push pipes through the ground is an economic and minimal impact on the existing buildings. Prof. Ding and his coworkers introduce the technologies of pipe-jacking methods to reach micro disturbance to existing buildings. Inje Tunnel, an 11 km-long twin-tunnel, still under construction, will be the longest road tunnel in Korea. Director Cho introduces the details of the tunnel design, including geotechnical consideration, cross-section of the excavation, reinforcement, drainage, ventilation operation, safety facility corresponding with a tunnel fire, and portal planning.

Finally, I would like thank all of the reviewers, who gave excellent and in-depth reviews on the papers. Thanks to the editor-in-chief, Prof. Balasubramaniam, for his gracious invitation as the guest editor of this special issue.

Prof. Chang Yu Ou
Guest Editor

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

This September Issue of the Journal is on Urban Geotechnical Construction. This Issue has papers from China, Korea, Singapore and Taiwan. The Guest Editor of this Issue is Prof. Chang Yu Ou, who received his Bachelor's Degree in Engineering in 1977 from National Cheng-Kung University in Taiwan and his Masters and Doctoral Degrees from Stanford University in 1984 and 1987 respectively. Prof. Ou has focused on studies of soil behaviour and excavation problems since beginning to teach in a university and has published many journal and conference papers concerning the subjects. At the same time, working with industrial builders, he has also taken part in many large-scale excavation projects and accumulated experience in analysis and design. Supported by study results and analysis experience, he has opened a course on deep excavation at the university. He is currently the Dean of engineering at the National Taiwan University of Science and Technology, Taipei, Taiwan. He was also the Director of Ecological and Hazard Mitigation Engineering Research Centre of the National Taiwan University of Science and Technology, Taipei, Taiwan. He was also a Visiting Professor at University of California, Berkeley. His areas of interest are deep excavations, soil behaviour, and soft ground tunnelling and ground improvement. We are most grateful to have such an eminent person as Prof. Ou to be the Guest Editor of this Issue.

There are eight technical papers from: K.H. Goh and R.J. Mair; G. Zheng, X.S. Cheng, Y. Diao, and H.X. Wang; Y. M. Hou, J. H. Wang and D-S. Jeng; J. J. Chen, J. H. Wang, G. W. Xiang, S. L. Wen, and Y. Du ; C.Y. Ou and L.L. Yang; F.L. Peng and H.L. Wang; W. Q. Ding, B. Li, S. L. Yuan and J. K. Ge; S. M. Cho, S. D. Lee, and Y. J. Kwon. We are confident that this special issue would be of great interest to all those who are interested in urban geotechnical construction. The most valued help and the untiring efforts and meticulous work of the Guest Editor Prof. Chang Yu Ou and the authors are gratefully acknowledged.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

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GEOTECHNICAL ENGINEERING

Special Issue on DEEP EXCAVATIONS

Guest Editor: Prof. Chang-Yu Ou

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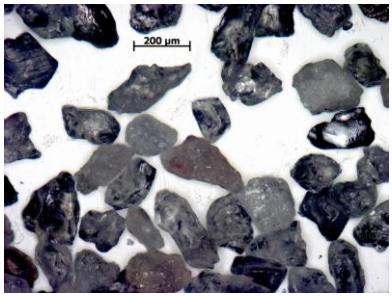
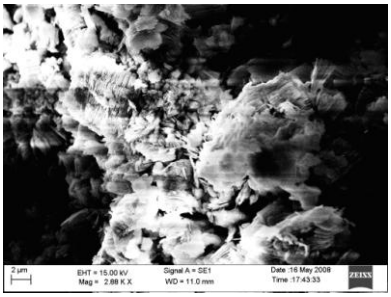
Guest Editor:
Dr. Dariusz Wanatowski



50 x SEM Image of a Sand (after Georgiannou, 2011)



SEM Image of Residual Soil of Singapore Bukit Timah Granite, (after Meng & Chu, 2011)

Local small strain measurement systems (after Ibraim *et al*, 2011)

Hollow Cylindrical Torsional Apparatus (after Ibraim *et al*, 2011)

GEOTECHNICAL ENGINEERING

DECEMBER 2011 ISSUE ON SOIL BEHAVIOUR

Dr. Dariusz Wanatowski
Guest Editor

Dr Dariusz Wanatowski is currently a lecturer in the Nottingham Centre for Gemechanics at the University of Nottingham in the United Kingdom.

Dr Wanatowski obtained his Master's Degree in Civil Engineering in 1999 from the Poznan University of Technology (PUT) in Poland and his Doctoral Degree in Geotechnical Engineering in 2006 from Nanyang Technological University (NTU) in Singapore. Prior to joining the University of Nottingham in February 2006, he worked as a lecturer and researcher in PUT in Poland and NTU in Singapore, respectively. In 2010, he was a Visiting Fellow at the University of New South Wales at Australian Defence Force Academy in Canberra and a Visiting Lecturer at NTU in Singapore. Most recently, in October 2011, he was also a Visiting Professor at University of Bologna in Italy.

Dr Wanatowski's general research interests are focused on experimental geomechanics, particularly strain softening and instability behaviour of granular soils, strain localization in sands, strength and stiffness anisotropy of geomaterials, and effects of intermediate principal stress on the strength and deformation characteristics of soils. He has published several journal and conference papers on these subjects. He has also consulting experience in the areas of advanced laboratory and in situ testing of soils.

Dr Wanatowski is a Member of two Technical Committees of the International Society for Soil Mechanics and Geotechnical Engineering, TC-208 on Stability of Natural Slopes and TC-303 Coastal and River Disaster Mitigation and Rehabilitation. He is a Member of American Society of Civil Engineers, Institution of Civil Engineering, Southeast Asian Geotechnical Society and Polish Geotechnical Society. He also serves as an Honorary Secretary for the East Midlands Geotechnical Group in the British Geotechnical Association.

GEOTECHNICAL ENGINEERING

PREFACE

Despite a remarkable research progress made in the last few decades in various aspects of geomechanics, understanding of soil as an engineering material is still a very challenging task. Consequently, our ability to model and predict the behaviour of geomeaterials in slopes, foundations, and earth structures is still limited. On the other hand, an enormous improvement in technical capabilities of soil mechanics laboratories in last few years allows researchers and engineers to investigate soil behaviour with greatest ever accuracy. As a result, advanced laboratory soil testing is more frequently used in geotechnical practice. For example, an accurate measurement of small strain stiffness is essential in the analysis of many geotechnical problems.

This Special Issue covers some very interesting aspects of soil behaviour and includes papers from Poland, Singapore, United States, Greece, Japan, Hong Kong, United Kingdom and Hungary. The Issue starts with the contribution of Prof. Sawicki from the Institute of Hydro-Engineering in Poland. His paper discusses possible links between pre-failure instability behaviour of sand and plastic dilation. The analysis presented by Prof. Sawicki is supported by high-quality experimental data obtained from triaxial compression tests. The second paper is written by Dr Meng from the University of Wollollong in Australia and Prof. Chu from Nanyang Technological University, who has recently taken up the Chair in Geotechnical Engineering at the Iowa State University in the United States. The authors present an experimental study on strength anisotropy of the intact residual soil of Bukit Timah granite in Singapore. The results obtained from K_0 consolidated undrained triaxial and simple shear tests carried out on specimens cut from large blocks of undisturbed samples are used to discuss the effects of inherent and induced anisotropy on the strength parameters of the residual soil in Singapore. Prof. Lade from the Catholic University of America in the United States and Dr Wang, his former PhD student at the Johns Hopkins University, present their work on shear banding in sand. The authors discuss several series of true triaxial tests performed on cubical and rectangular prismatic specimens of Santa Monica Beach sand. The analysis carried out by Prof. Lade and Dr Wang indicates that the occurrence of the critical conditions for shear banding in sand may be delayed in short specimens. The authors suggest that true triaxial experiments should be performed on tall specimens in which the shear banding occurs freely and strain softening behaviour is more pronounced. A very interesting study on behavioural patterns of fine sands is presented by Prof. Georgiannou from the National Technical University of Athens in Greece. In her paper, Prof. Georgiannou presents several series of hollow cylinder, triaxial compression and extension tests. She discusses the influence of various parameters such as particle shape, grading, addition of fines, consolidation history, stress level and loading conditions on the undrained behaviour of sand. Next paper of the Issue is written by Prof. Shibuya from Kobe University in Japan and his former researcher, Dr Jung, currently with the Korean Institute of Construction Technology. They discuss the effects of strain rate on undrained shear behaviour of seabed Holocene clay from the Kobe airport based on a few series of triaxial compression and extension tests carried out with different shearing rates. Prof. Yin and Mr Tong from the Hong Kong Polytechnic University together with Prof. Zhu from Wuhan University of Technology in China present an experimental investigation on sedimentation and self-weight consolidation behaviour of marine deposits from Hong Kong carried out in settling columns. Dr Ibraim and his colleagues from the Bristol University in the United Kingdom present their new hollow cylinder torsional apparatus equipped with an accurate strain measurement system. The authors demonstrate that their hollow cylinder apparatus is capable of measuring soil's stiffness in a wide range of strains and stresses. Two of my PhD students at the University of Nottingham and I contribute to the Special Issue with a paper on laboratory investigation of fibre reinforced sand at high pressures. We discuss results of drained compressions tests carried out in a high pressure triaxial cell and demonstrate that the effectiveness of fibre reinforcement at high confining pressures is very limited. Finally, Prof. Imre from Szent Istvan University and Budapest University of Technology and Economics in Hungary with her colleagues presents a technical note discussing the ratio of the maximum and minimum dry density for sands.

As a Guest Editor of this Issue I would like to thank all the authors for their valuable contributions. I would also like to thank the Editorial Team of the Journal for inviting me to edit this Special Issue. Last but not least, I would like to thank all the reviewers for assessing the papers in a timely and thorough manner. Their excellent assistance is greatly appreciated.

Dariusz Wanatowski,
Guest Editor
University of Nottingham, United Kingdom

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

This December Issue of the Journal is on Soil Behaviour and include papers from well known researchers as drawn from Poland, Singapore, United States, Greece, Japan, Hong Kong, United Kingdom and Hungary.

The Guest Editor of this Issue is Dr. Dariusz Wanatowski from the Nottingham Centre for Gemechanics at the University of Nottingham in the United Kingdom. Dr Wanatowski's general research interests are focused on experimental geomechanics; particularly strain softening and instability behaviour of granular soils, strain localization in sands, strength and stiffness anisotropy of geomaterials, and effects of intermediate principal stress on the strength and deformation characteristics of soils. He has published very widely in most well known journals in Geotechnics and the major conferences held on soil behaviour and its role in geotechnical engineering research and practice. Dr Wanatowski obtained his Master's Degree in Civil Engineering in 1999 from the Poznan University of Technology (PUT) in Poland and his Doctoral Degree in Geotechnical Engineering in 2006 from Nanyang Technological University (NTU) in Singapore. Prior to joining the University of Nottingham in February 2006, he worked as a lecturer and researcher in PUT in Poland and NTU in Singapore, respectively. In 2010, he was a Visiting Fellow at the University of New South Wales at Australian Defence Force Academy in Canberra and a Visiting Lecturer at NTU in Singapore. Most recently, in October 2011, he was also a Visiting Professor at University of Bologna in Italy.

Dr Wanatowski is a Member of two Technical Committees of the International Society for Soil Mechanics and Geotechnical Engineering, TC-208 on Stability of Natural Slopes and TC-303 Coastal and River Disaster Mitigation and Rehabilitation. He also serves as an Honorary Secretary for the East Midlands Geotechnical Group in the British Geotechnical Association. Dr Wanatowski is a Member of American Society of Civil Engineers, the Institution of Civil Engineers London, and the Southeast Asian Geotechnical Society and the Polish Geotechnical Society.

The nine technical contributions in this issue are from: A. Sawicki G. Meng and J. Chu ;P.V. Lade and Q. Wang V.N. Georgiannou M.-S. Jung and S. Shibuya; F. Tong, J.H.Yin and G.F. Zhu ; E. Ibraim, P. Christiaens and M. Pope ;S. Ud-din, A. Marri and D. Wanatowski ; and E. Imre, S. Fityus, E. Keszeyne and T. Schanz. Soil Behaviour is a most important topic in Geotechnical Engineering and the material contained here from these authors would be of great value to all those who are engaged in geotechnical engineering practice and research. Dr. Dariusz Wanatowski, the guest editor is thanked for his untiring efforts and meticulous work which made this special issue to be possible and released well in time.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 42 No.4 December 2011 ISSN 0046-5828

GEOTECHNICAL ENGINEERING

Special Issue on Soil Behaviour
Guest Editor: Dr. Dariusz Wanatowski

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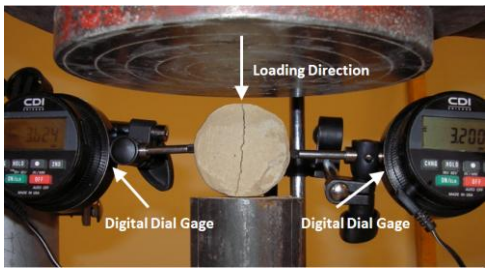
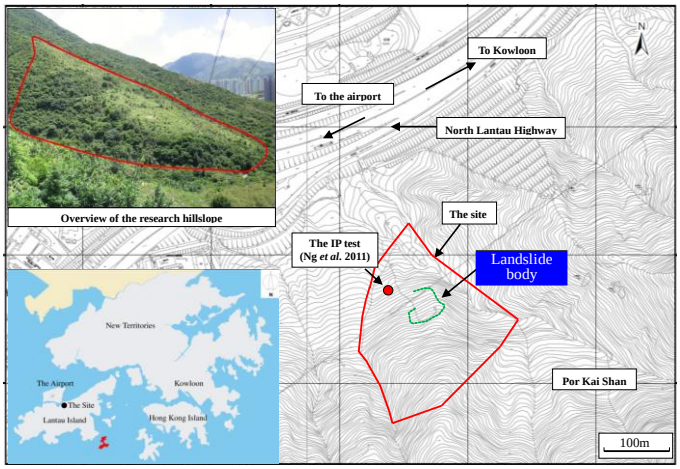
AIT Asian Institute of Technology

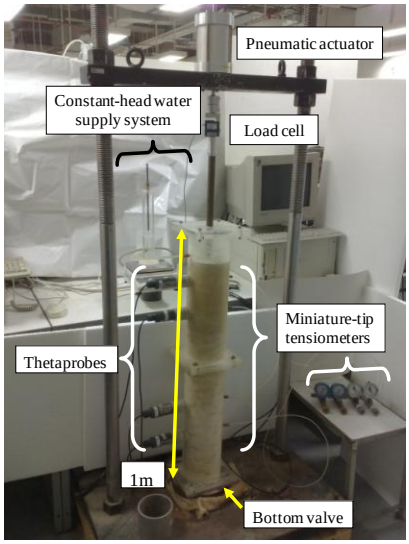
Guest Editors:
Charles W. W. Ng & Apiniti Jotisankasa



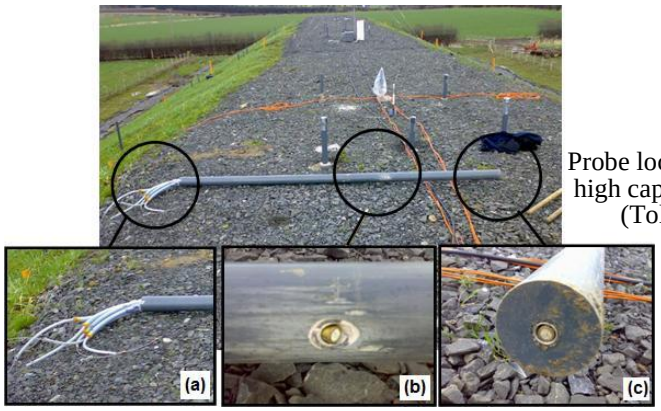
Indirect tensile strength testing on dry soil specimen (Puppala et al. 2012)



Saprolitic hillslope for full-scale field monitoring in Hong Kong (Leung *et al.* 2011)



Stress-controllable 1D soil column (Ng & Leung 2012)



Probe locator for installing high capacity tensiometer (Toll et al. 2012)

GEOTECHNICAL ENGINEERING

March 2012 ISSUE ON UNSATURATED SOIL MECHANICS AND ENGINEERING

Charles W. W. Ng & Apiniti Jotisankasa
Guest Editors

PROFESSOR CHARLES W.W. NG is Chair Professor at the Department of Civil and Environmental Engineering and the Director of Geotechnical Centrifuge Facility at the Hong Kong University of Science and Technology. He obtained his Ph. D from the University of Bristol, UK in 1992; and subsequently joined the University of Cambridge as a Research Associate before returning to Hong Kong in 1995. He was elected as an Overseas Fellow at Churchill College, Cambridge, in 2005. Professor Ng is a Charted Civil Engineer (CEng) and Fellow of the Institution of Civil Engineers (FICE), the American Society of Civil Engineers (FASCE), the Hong Kong Institution of Engineers (FHKIE) and the Hong Kong Academy of Engineering Sciences (FHKEng). He holds the title of Chang Jiang Scholar (Chair Professorship) by the Ministry of Education in China and he is an appointed Board Member of the International Society of Soil Mechanics and Geotechnical Engineering. Currently Professor Ng is Associate Editor of the Canadian Geotechnical Journal. _He has published widely on slope instability problems, behaviour and mechanics of saturated and unsaturated soils, soil-structure interaction problems such as tunnels, piles and deep excavations. He is the main author of two reference books including "Soil-Structure Engineering of Deep Foundations, Excavations" and "Tunnels and Advanced Unsaturated Soil Mechanics and Engineering".

DR. APINITI JOTISANKASA is currently an Assistant Professor at the Department of Civil Engineering, Kasestsart University Bangkok. After obtaining his BEng degree in Civil Engineering from Kasetsart University in 1999, he pursued his MSc and PhD in Soil Mechanics at Imperial College London with the generous support of the Anandamahidol Scholarship from Thailand. His research topics for the PhD degree was on the Collapse behaviour of a compacted silty clay: the work which culminated in several world-leading journal papers such as Geotechnique, and the ASCE Journal of Geotechnical and Geoenvironmental Engineering. After being awarded the PhD degree in 2005, he started working for Kasetsart University as a lecturer in geotechnical engineering and his research area has been mainly on application of unsaturated soil mechanics on practical geotechnical engineering problems, such as rainfall-induced landslide, excavation, embankment stability, bio-slope engineering, geohazard mitigation, etc. He also lead a team consisting of geotechnical as well as electrical engineers who develop a wireless system for monitoring of slope behaviour such as pore water pressure (negative/positive) and slope movement. Dr Apiniti is the recipient of the Best paper award (Geotechnical Engineering) in the National Convention in Civil Engineering 2009 from the Thai Geotechnical Society and Chai Mukthabhan foundation for his work on the behaviour of instrumented volcanic soil slope subject to rainfall. In 2011, he was awarded the Young Technologist Award from the Foundation for the Promotion of Science and Technology under the Patronage of His Majesty the King of Thailand. Dr. Apiniti has been secretary general of the Thai Geotechnical Society since 2009 and currently a member of the TC106 (Unsaturated soils) of the International Society of Soil Mechanics and Geotechnical Engineering.

GEOTECHNICAL ENGINEERING

PREFACE

Most of the Earth's land surface comprises unsaturated geomaterials, which often pose geotechnical hazards such as rainfall-induced landslides to societies and serviceability problems to high speed rail links founded on collapsible and expansive unsaturated soils. However, the vast majority of text books, conference proceedings and journal articles investigate mainly saturated soil mechanics, which is only a special case of unsaturated soil mechanics. With intensive building and construction activities in countries like China, India, Central and South America and Africa on foundation soils that are often unsaturated, geotechnical engineers can no longer ignore the complication of unsaturated soils and the challenges they present. In developed countries, many geo-environmental problems such as nuclear waste disposal also involve unsaturated soil mechanics heavily. Research on unsaturated soils has therefore been a major focus in many universities and research institutions over the last two decades.

This special issue contains eight keynote papers selected from the 5th Asia-Pacific Conference on Unsaturated Soils held in Pattaya, Thailand, between 29 February and 2 March 2012. The series of Asia-Pacific Conferences on Unsaturated Soils began in Singapore in 2000. With the continued support of the Technical Committee on Unsaturated Soils (TC106) of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), the 2nd, 3rd, and 4th conferences were held in 2003 in Osaka, Japan, in 2007 in Nanjing, China and in 2009 in Newcastle, Australia, respectively. These conferences have proven to be a fruitful forum where researchers and practitioners in the region and beyond gathered enthusiastically to present their latest research findings and development and to exchange ideas on the subject.

Guest Editors
Charles W.W. Ng
Apiniti Jotisankasa

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

This March 2012 Issue of the Journal is on Soil Behaviour of Unsaturated Soils and Engineering Applications and it includes papers from well known researchers as drawn from Thailand, United States of America, Hong Kong, Australia, Singapore and the United Kingdom.

The Guest Editors of this Issue are Prof. Charles W. W. Ng at the Department of Civil and Environmental Engineering in the Hong Kong University of Science and Technology and Dr. Apiniti Jotisankasa at the Department of Civil Engineering, Kasestsart University Bangkok. Both Editors are internationally well known for their research and professional activities in Unsaturated Soil Mechanics and Engineering.

We are fortunate to have eight excellent contributions by authors who have spent a life time with unsaturated soil mechanics and engineering from:W. Mairaing, A. Jotisankasa and S. Soralump; J.D. Nelson, K.C. Chao, D.D. Overton and R.W. Schaut; C. W. W. Ng and A. K. Leung; A.J. Puppala, T. Wejrungsikul, V. Puljan and T. Manosuthikij; H. Rahardjo, A. Satyanaga, E. C. Leong; J.R. Standing ; D.G. Toll1, J. Mendes1, P.N. Hughes, S. Glendinning and D. Gallipoli3; and D.J. Williams. Among other topics it deals with the development of unsaturated soil mechanics as a discipline; unsaturated expansive soils and foundation problems; unsaturated soil slopes and stabilization measures; some mining applications of unsaturated soil mechanics and finally the most important area of climate change and the role of unsaturated soil mechanics in engineering applications.

The material contained in this issue of the journal would be of great value to engineers as well as researchers dealing with engineering activities in unsaturated soils. The Guest Editors Prof. Charles W.W. Ng and Dr Apiniti Jotisankasa and the contributors are thanked for their untiring efforts and meticulous work which made this special issue to be possible and released well in time. We have had great guest editors for the 2011 Issues as: Jie Han; Tatsunori Matsumoto, Der Wen Chang; Chang Yu Ou and Dariusz Wanatowski. It is a pleasure to begin the Year 2012 with this excellent issue with such eminent persons like Prof. Charles W. W. Ng and Dr Apiniti Jotisankasa . Likewise we look forward to the most valued help from Prof. Ikuo Towhata, Prof Der Wen Chang, Dr. Ivan Gratechev; Prof. Malek Bouazza and Mr Tom Lunne and Prof de Groot for the June, September and December Issues.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

Geotechnical Engineering Journal of the SEAGS & AGSSEA **Vol. 43 No.1 March 2012 ISSN 0046-5828**

GEOTECHNICAL ENGINEERING

Special Issue on Unsaturated Soil Mechanics And Engineering

Guest Editors: **Charles *W. W. Ng & Apiniti Jotisankasa***

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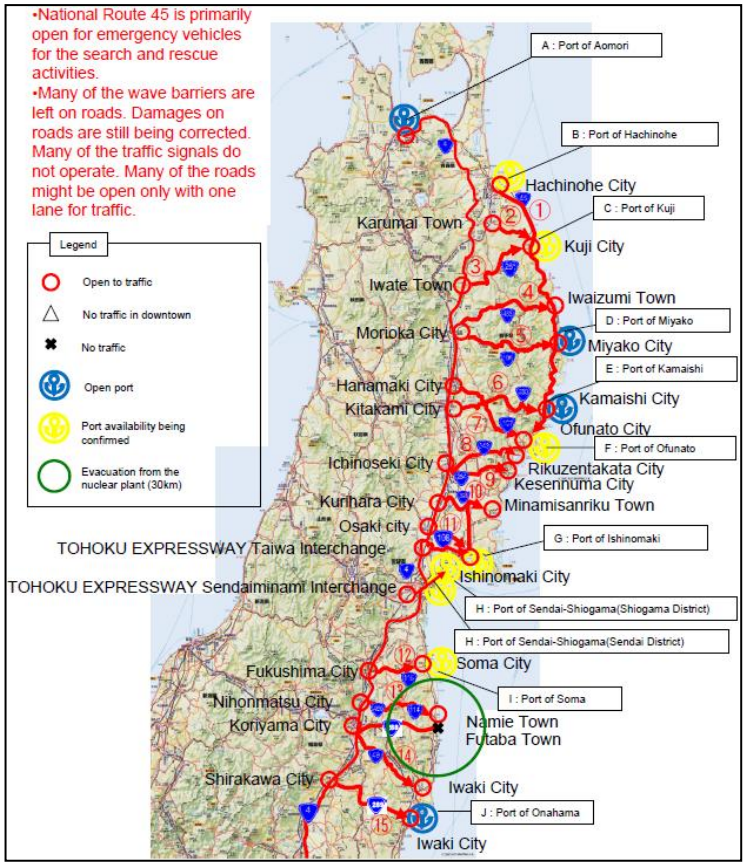
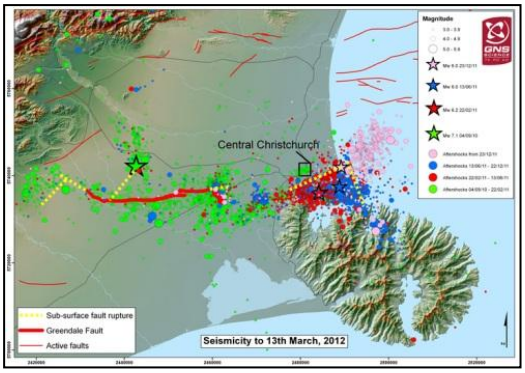
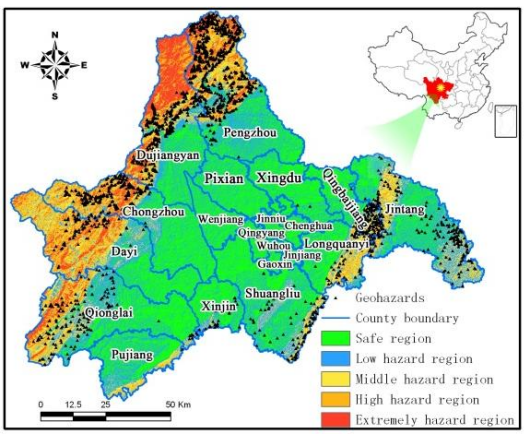
Guest Editors:
Prof. Ikuo Towhata, Prof. Der Wen Chang & Dr. Ivan Gratchev



Tohoku (after Kazama *et al*, 2012)



Christchurch (after Orense *et al*, 2012)



WenChuan (after Yang *et al*, 2012)

GEOTECHNICAL ENGINEERING

March 2012 ISSUE ON GEOTECHNICAL EARTHQUAKE ENGINEERING

Guest Editors:Prof. Ikuo Towhata, Prof. Der Wen Chang & Dr. Ivan Gratchev

Prof. IkuoTowhata

Prof. Ikuo Towhata had his engineering education at the prestigious Tokyo University in Japan and is currently a Professor in the Department of Civil Engineering. Tokyo University is traditionally very strong in Soil Dynamics, Machine Foundations and Geotechnical Earthquake Engineering now for several decades. Also recently, Prof. Towhata has written a comprehensive and scholarly book in this discipline (see Geotechnical Earthquake Engineering, 2008: publisher Springer). Prof. Towhata was also the Editor in Chief of the well-known Journal, Soils and Foundations. He is an active member of several national and international committee on landslides, earthquake engineering. Recipients of several prestigious awards, Prof. Towhata's interests in Geotechnics is very wide and are on deformation characteristics of sands, dynamic analysis of earth structures, soil improvement by densification and grouting, stability of slopes and seabeds under static and dynamic conditions, landslides and debris flows, seismic performance based design of geotechnical structures. Author of more than 250 publications, Prof. Towhata has lectured in many leading universities in most continents.

Prof. Der-Wen Chang

Prof. Der-Wen Chang teaches at The Department of Civil Engineering of Tamkang University (TKU), Taipei, Taiwan for over 19 years. He received Ph.D. in Civil Engineering at The University of Texas at Austin in 1991 and MS in Civil Engineering at Michigan State University in 1987. Prof. Chang has supervised there search work of over 60 Master Thesis and 3 Ph.D. Thesis at TKU, and published more than 160 articles as the Journal, Conf. papers and reports. Nearly all his research studies are related to numerical modeling and dynamic analyses for the geotechnical structures. His research experiences include NDT methods on pavements, seismic behaviors of the pile foundation, constitutive modeling of the soils, and recent study on the performance based design for the earth structures. Prof. Chang is also the visiting Professor at University of Washington at Seattle, US in 2008 and LN Gumilyov Eurasian National University at Astana, Kazakhstan for research studies in 2010. Other than there search works, Prof. Chang devotes himself a great deal to serve the communities. He involves heavily and indeed shows his good performance in the public works related to education and constructions. Prof. Chang is now serving as the Secretary General of Chinese Taipei Geotechnical Society, GC member of SEAGS, Editorial Panel for SEAGS/AGSSEA J. of Geotechnical Engineering, Committee members for Public Construction and Hazard Prevention in Taipei City and Taipei County governments. He will continue to work in the academia and hoping that his studies can better improve the civil engr. technologies.

Dr.Ivan Gratchev

Dr. Ivan Gratchev has spent the last ten years conducting research in the areas of geotechnical and geoenvironmental engineering in Japan, in particular earthquake-induced liquefaction and landslides. He qualified to receive a prestigious scholarship sponsored by the Japanese Government to complete his master and doctoral courses at Kyoto University. After receiving a PhD degree in 2007, he was selected for a highly competitive fellowship by the Japan Society for the Promotion of Science (JSPS) to conduct postdoctoral research at the University of Tokyo. His expertise in field investigation and laboratory testing led to his selection for several reconnaissance teams to assess structural damage and slope failures follow in recent earthquakes in Japan as well as the 2008 Sichuan Earthquake in China, and the 2009 earthquake in Sumatra. Since2010, Dr. Gratchev has been a lecturer at Griffith University, one of the fastest growing universities in Australia. He has produced more than 30 publications in refereed journals, international proceedings, as well as book chapters on research topics such as slope stability, liquefaction, and cyclic behavior of fine-grained soils as well as the effects of contamination on the geotechnical properties of soil.

GEOTECHNICAL ENGINEERING

PREFACE

I would like to express my deep respect to the geotechnical colleagues in Southeast Asia who have been publishing this prestigious journal for more than 40 years. It is very important that a regional engineering community maintains its own place of publication and is able to freely express its own idea of importance and value. I wish this journal to continue its contribution for a long time from now on.

When I was asked in 2011 to take care of a special issue on geotechnical earthquake engineering, I felt reluctant. This was because of my domestic situations after the gigantic earthquake on March11, 2011, after which I have been working on such a variety of urgent issues as liquefaction vulnerability of subsoil, causative mechanisms of river levee damage, and post-earthquake public appeal among many others. Then fortunately two capable people started to jointly work with me for all the aspects of the publication of this issue. Upon this occasion, I would like to express my sincere appreciation to my Co-Guest Editors, Prof. Der Wen Chang and Dr. Ivan Gratchev without whom the editing and publication of this issue will not be impossible.

The mitigation of natural disaster is an important but difficult task. This is partially because we do not fully understand what happens during disasters. We can scarcely eyewitness the occurrence of a natural disaster. We can only visit sites of damage after the event and report the observation to colleague engineers. It is certainly possible that important and essential keys for mitigation are still overlooked or unknown. In this regard, the study of disaster mitigation is important and fascinating to capable and ambitious people.

In my personal opinion, earthquake problems deserve attention of capable people most significantly in mountain areas. In the mountain areas where many slope failures are triggered by earthquake shaking, not only the seismic shaking but also the ground condition is uncertain or not well known for design purposes. Accordingly, many unexpected things happen. This is the reason why many papers in this issue address earthquake-rainfall interaction, which is called the combined effects, as well as the long-term effect of past earthquakes. These new problems are not studied in details yet and the practice does not know how to deal with them. Conventional approach of geotechnical engineering such as limit equilibrium and factor of safety is too expensive because the action is combined and rare. Consequently, there is no practical approach yet and ambitious people are waited to start positive action to solve the problem. As the chief editor of this issue, I strongly expect such people to read this issue and be stimulated. I am confident that there are many challenges in this field of study that deserve deep devotion of good people. It is desired that this special issue would pave a road to solution of geotechnical earthquake problems that appear abundant in Southeast Asia and have not been well investigated.

Guest Editor
Ikuo Towhata

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

The June 2012 Issue on Geotechnical Earthquake Engineering has Prof. Ikuo Towhata, Prof. Der Wen Chang and Dr. Ivan Gratchev as Guest Editors. Prof. Towhata has written a comprehensive and scholarly book in this discipline; see Geotechnical Earthquake Engineering, 2008: publisher Springer. We also had great guest editors for the 2011 Issues as: Jie Han; Tatsunori Matsumoto, Der Wen Chang; Chang Yu Ou and Dariusz Wanatowski. The March 2012 Issue had Prof. Charles W. W. Ng and Dr Apiniti Jotisankasa as Guest Editors.

We are most grateful to Prof. Ikuo Towhata, Prof Der Wen Chang and Dr. Ivan Gratchev for helping with the editorial works of the current issue. There are ten contributions as received from authors in Bangladesh, New Zealand, China, Iran, Japan and Chinese Taipei. The Authors are: Tahmeed M. Al-Hussaini, Tahsin R. Hossain and M. Hayeem Al-Noman; RP Orense, MJ Pender and LM Wotherspoon; Yingbin Zhang, Guangqi Chen, Jian Wu, Lu Zheng and Xiaoying Zhuang; Z. Yang, J. Qiao, H. Tian, D. Huang, M. Wang and H. Meng; Abbas Galandarzadeh and Alireza Ahmadi; Hirofumi Toyota M. Kazama, T. Noda, T. Mori and J. Kim; Meei-Ling Lin and Yu-Hung Shu; Ikuo Towhata; and Hongling Tian, Jianping Qiao, Taro Uchimura and Lin Wang.

The material contained in this issue relates to earthquakes in Canterbury (New Zealand), Tohoku, Chi-Chi in Taiwan and Northwest Chengdu, China. Geotechnical hazards including soil liquefaction and seismically induced slope failures are also the topics presented in this issue. Laboratory studies on soil liquefaction resistance and the role of tension-shear mechanism failure in numerical simulation of seismic slope stability are also presented. Changes to building codes incorporating geotechnical earthquake provisions are also described. These contributions will be of great interest to engineers and researchers who are dealing with challenges in geotechnical earthquake engineering.

The guest editors are thanked sincerely for their dedicated contributions. Prof. Der Wen Chang in co-ordination with Prof. Ikuo Towhata and Dr. Ivan Gartchev has worked in a meticulous manner in making this issue feasible and to be released in time. We now look forward to the September and December 2012 Issues as edited by Prof. Malek Bouazza and Tom Lunne and Prof. de Groot respectively.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

GEOTECHNICAL ENGINEERING

Special Issue on Geotechnical Earthquake Engineering
Guest Editors: **Prof. Ikuo Towhata, Prof. Der Wen Chang & Dr. Ivan Gratchev**

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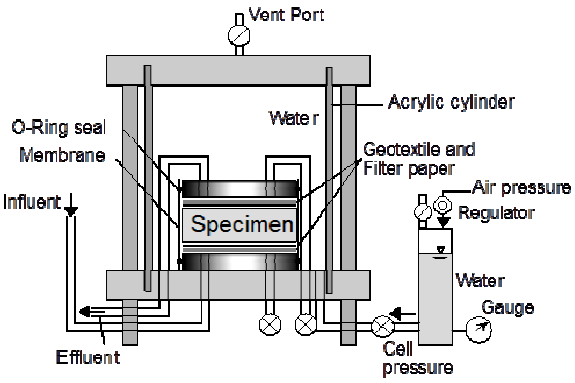
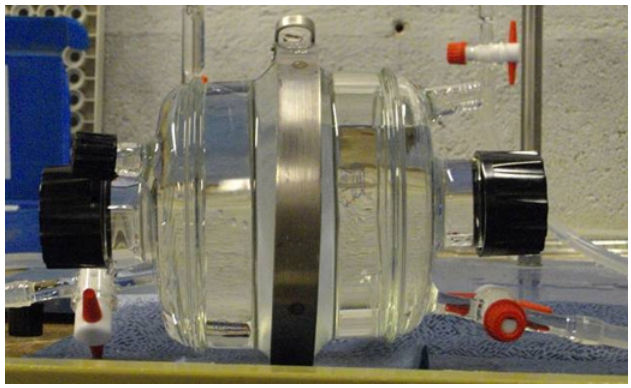
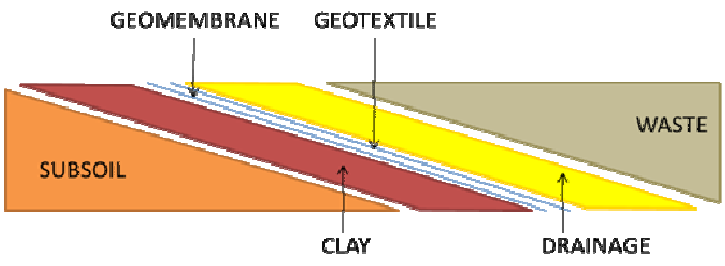
Guest Editor:
Prof. Abdelmalek Bouazza



Scheme of a flexible-wall permeameter (After Naka et al, 2012)



Diffusion cell (After Touze-Foltz*et al,2012)*



Typical lining system (After Dixon et al, 2012)

GEOTECHNICAL ENGINEERING

SEPTEMBER 2012 SPECIAL ISSUE ON GEOSYNTHETCS AND SANITARY LANDFILL

Guest Editor: Prof. Abdelmalek Bouazza

PROFESSOR ABDELMALEK BOUAZZA is very prominent in technical and professional society activities and serves on a number of international technical committees. Currently, he is a member of the International Geosynthetics Society (IGS) council and chair of the Asian Activities Committee of the International Geosynthetics Society. He is a core member of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee No5 (TC5) on Environmental Geotechnics, Vice-President of the Australasian Chapter of the International Geosynthetics Society (ACIGS), co-chair of the International Geosynthetics Society Education Committee and a member of the Standard Australia committee C20 on Geosynthetics. He is editorial board member of 5 International Journals and very active as a reviewer for several international journals.

Professor Abdelmalek Bouazza has published widely in international journals and refereed conferences and is the author or co-author of more than 180-refereed publications... His skills and experience in the area of waste containment facilities and geosynthetics are well recognized in Australia and abroad. He has been invited to deliver and contribute to several keynote lectures and state of the art reports in international conferences in Africa, Asia, Europe and North America, and delivers short courses on geosynthetics, and liners and cover systems for waste containment facilities on a regular basis locally and internationally. In addition to his academic commitments, Professor Abdelmalek Bouazza gives specialist advice for the industry both nationally and internationally.

GEOTECHNICAL ENGINEERING

PREFACE

Geosynthetics are extensively used in waste containment facilities either as part of cover or bottom lining systems. Their aim is to reduce water ingress into the containment, to control gas migration in the case of the cover liners, and to limit contaminant migration to levels that will result in negligible impact in the case of bottom liners. This special issue gives an overview of the research effort conducted in various part of the world on the theme of this special issue. It contains ten papers addressing important aspects related to waste containment design including the important interaction between waste or soil and lining systems, geomembrane wrinkles, hydrocarbon diffusion, geosynthetic clay liners and interaction with acid mine drainage and acidic solutions, settlement and its mitigation through the use of geosynthetics and finally concluding with an overview of the use of geosynthetics in landfills in Asia and in Perth, Australia.

Finally, I wish to express my appreciation to the authors for their effort and time in the preparation of a set of very high quality papers. I am very much indebted to the reviewers for their highly competent efforts. Last but not least, I would like to gratefully acknowledge the assistance and encouragement of Professor A. Balasubramaniam, Editor in Chief, during the preparation of this issue.

Abdelmalek Bouazza
Guest Editor

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

The September 2012 Issue of the journal has Prof. Abdelmalek Bouazza from Monash University as the Guest Editor. We are greatly indebted to Malek to bring this flavour of Geosynthetics and Sanitary Landfill to our Journal through the contributions from invited authors.

There are ten excellent papers authored by: N. Dixon, K. Zamara, D.R.V. Jones and G. Fowmes; R. K. Rowe, P. Yang, M.J. Chappel, R.W.I. Brachman and W.A. Take ; N. Touze-Foltz, M. Ahari, M. Mendes, C. Barral, M. Gardoni and L. Mazéas; P.J. Fox, C. Athanassopoulos, S. S. Thielmann and A. N. Stern; A. Naka, T. Katsumi, G. Flores, T. Inui, T. Ohta, T. Urakoshi and T. Ishihara; Y. Liu, W.P. Gates and A. Bouazza; S. Rajesh and B.V.S. Viswanadham; B.V.S. Viswanadham, S. Rajesh and A. Bouazza; H. B. Ng and B. Ramsey; and L. Du Preez, R. Beaman and I. Watkins. The topics covered waste/lining interaction systems; compacted clay liners in slopes; Diffusion of phenolic compounds through an HDPE geomembrane; Damages in Geomembranes due to Gravel in Underlying Compacted Clay; Mineral barriers against acid rock drainage; Geosynthetic Clay Liners Using Polymer Modified Geosynthetic Lining Systems for Modern Waste Facilities with Bentonite; Deformation Behaviour of Soil barriers of Landfill Covers; and Case studies in major metropolitan landfills These contributions will be of great interest to engineers and researchers who are dealing with Challenges in Geosynthetics and Sanitary Landfill Design Practice.
Prof. Abdelmalek Bouazza must be congratulated for single-handedly doing all the editorial works in bringing forth this Issue of the journal on an important and useful theme.
Sincere thanks are due to all the contributing authors.

The March, June and September 2012 Issues are all released well in time and the credits go to the Guest Editors and the in-house editorial teams.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

Geotechnical Engineering Journal of the SEAGS & AGSSEA **Vol. 43 No.3 September 2012 ISSN 0046-5828**

GEOTECHNICAL ENGINEERING

Special Issue on Geosynthetics and Sanitary Landfill
Guest Editor: Prof. Abdelmalek Bouazza

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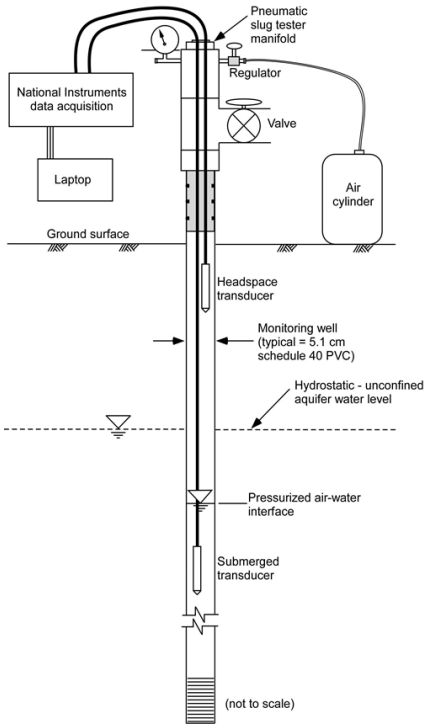
Guest Editors:
Tom Lunne & Don de Groot

CPT Testing in Peat (after Long &Boylan,2012)

Dilatometer Earth Pressure Cell
(after Lutenegger, 2012)



Hydraulic Conductivity Test
(After DeGroot et al, 2012;Dunaj et al. 2006)

GEOTECHNICAL ENGINEERING

DECEMBER 2012 SPECIAL ISSUE ON INSITU TESTING OF SOILS

Guest Editors: TOM LUNNE and Prof DON J. DEGROOT

TOM LUNNE

Tom Lunne was educated at Heriot-Watt University in UK and at University of California Berkeley. He is currently Technical Advisor and Manager of Offshore Soil Investigations at the Norwegian Geotechnical Institute (NGI), Oslo, Norway. He has a diverse geotechnical engineering background resulting from both his consulting and research and development activities. Major activities have included: laboratory testing, in situ testing, sampling and evaluation of sample disturbance, field observations, evaluation of soil parameters; and planning, specifying and managing large offshore soil investigations. Tom has worked on numerous major projects worldwide. Tom has given invited lectures and presentations at conferences and conducted short courses worldwide. He is an active member of several technical committees including: Core Member of Committee TC-16 on In Situ Testing, International Society of Soil Mechanics and Geotechnical Engineering (1982 - present); Scandinavian Committee on Field Investigations, 1993 - 2004; Chairman of the Norwegian Committee on Field Investigations, 1993 - 2004; Member of the Committee of European Standard of CPT, (2001 - present). He is the author or co-author of more than 100 papers, publications and technical notes to professional journals and conferences and is the lead author of the book Cone Penetration Testing in Engineering Practice.

Prof DON J. DEGROOT

Prof Don J. DeGroot is a professor in the Department of Civil and Environmental Engineering at the University of Massachusetts Amherst, Amherst, MA, USA and a registered Professional Engineer in the USA. He received his D.Sc. in geotechnical engineering at the Massachusetts Institute of Technology in 1989. His teaching, research, and consultancy experience is primarily in the area of soil behaviour and environmental geotechnics with an emphasis on site characterization practice. He has been a Principal Investigator on numerous sponsored research projects including the recently completed $2.4 million US National Science Foundation project on "Developing International Protocols for Offshore Sediments and their Role in Geohazards: Characterization, Assessment, and Mitigation." He has published refereed research findings in many of the major geotechnical engineering journals, ASCE Geotechnical Special Publications, ASTM Special Technical Publications and TRB publications. National and international conferences activities include several Keynote and State-of-the-Art papers, presentations, and short courses. He has served on the editorial boards of the Journal of Geotechnical and Geoenvironmental Engineering and the Geotechnical Testing Journal and served as Chair of the ASCE Geo-Institute Soil Properties and Modeling Committee. Teaching and research awards include the James L. Tighe Civil Engineering Distinguished Teaching Award, United Technologies Corporation Outstanding Laboratory Teaching Award, Research Council of Norway Guest Researcher Fellowship, University of Western Australia Gledden Visiting Senior Fellowship, and the CEE Research Excellence Award.

GEOTECHNICAL ENGINEERING

PREFACE

This special issue the journal is focused on in-situ testing of soils and covers recent developments in equipment and data interpretation, results from field programs conducted at research test sites, and case histories.

In-situ testing and soil sampling with subsequent laboratory testing are the key components of geotechnical site investigation practice. Because of the wide range of soils and soil behavioural response that can be encountered during a site investigation there is correspondingly a large variety of in-situ tools that have been developed and used in practice. Collectively, the eight papers in this special issue touch on aspects of many of the common devices including: standard penetration test, piezocone, seismic piezcone, field vane, seismic dilatometer, pressure-meter, full-flow penetrometers, and earth pressure cells. Topics include determination of key soil properties for design such as undrained shear strength, shear wave velocity, pre-consolidation stress, effective stress friction angle, lateral earth pressure, cyclic resistance, and hydraulic conductivity. Results presented in the papers cover the full spectrum of soils including low and high plasticity clays, sensitive clays, plastic and non-plastic silts, sands, gravels and peat. The data presented for the case histories and also that collected at the research test sites provide a valuable frame of reference for future investigations in similar soils.

The Guest Editors thank the authors for their contributions and all the reviewers for the time and dedication in reviewing the manuscripts. We also thank Prof A. S. Balasubramaniam and Dr T.A. Ooi for the opportunity to serve as Guest Editors and especially for their constant encouragement and assistance during the preparation of this issue and guiding its publication to fruition.

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

The December 2012 Issue of the journal have Tom Lunne from Norwegian Geotechnical Institute (NGI) and Prof. Don J De Groot from University of Massachusetts, Amherst, USA as Guest Editors. This Special Issue is devoted to In-situ testing of soils. NGI is in the forefront of in-situ testing and instrumentation from early 1950 with Arild Andressen, Gunar Aas and Dr. Elmo Dibiagio, with Tom Lunne and others.

There are eight excellent papers authored by: A. S. Bradshaw, A. C. Morales-Velez, and C.D.P. Baxter; A. Emdal, M. Long, A. Bihs, A. Gylland and N. Boylan; Alan J. Lutenegger; T. Ku and P.W. Mayne; M. Long and N. Boylan; K.H. Goh, K. Jeyatharan and D. Wen; D.J. De Groot, D.W. Ostendorf, and A.I. Judge; and F. A. B. Danziger and T. Lunne. The topics covered include: Evaluation of Existing CPT Correlations in Silt; Characterisation of Quick Clay at Dragvoll, Trondheim, Norway;
Field Response of Push-In Earth Pressure Cells for Instrumentation and Site Characterization of Soils; Frequent-Interval SDMT and Continuous SCPTu for Detailed Shear Wave Velocity Profiling in Soils; In Situ Testing of Peat – a Review and Update on Recent Developments; Understanding the stiffness of soils in Singapore from pressuremeter testing; In situ measurement of hydraulic conductivity of saturated soils; and Rate effect on cone penetration test in sand.

Tom Lunne and Prof. Don J De Groot must be congratulated in having such excellent articles from well known authors in in-situ testing of soils. Sincere thanks are due to all the contributing authors.

All the four Issues in March, June, September and December for the year 2012 are released well in time and the credits must go to the Guest Editors, reviewers and the in-house editorial teams. We now look ahead for the Issues of 2013 for which the Guest Editors are in advanced stage with the preparation. Special Issues on important topics are covered in the 2011 and 2012 Issues and the articles would be of great value to practitioners as well as researchers.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

Geotechnical Engineering Journal of the SEAGS & AGSSEA **Vol. 43 No.4 December 2012 ISSN 0046-5828**

GEOTECHNICAL ENGINEERING

Special Issue on In-situ Testing of Soils
Guest Editors: *Tom Lunne and Don J. DeGroot*

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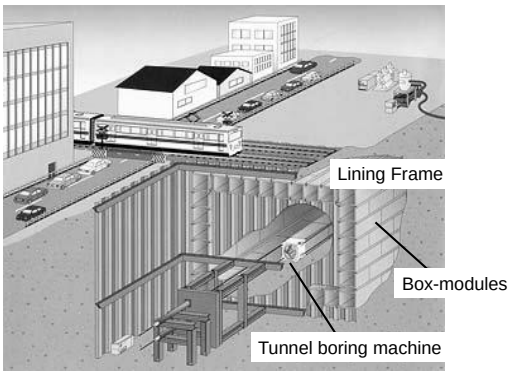
AIT Asian Institute of Technology

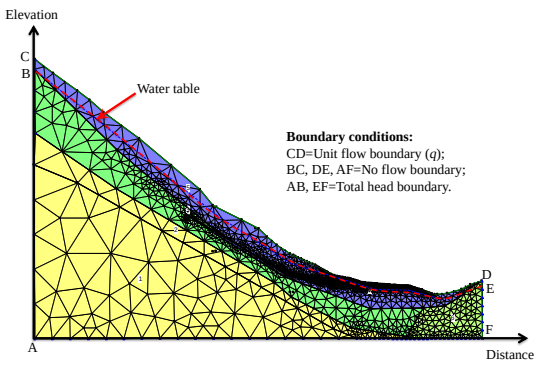
Editors:
Der-Wen Chang & Dariusz Wanatowski

Tunnelling under Shanghai "Chongsi"
(after Ge et. al, 2013)



Box Jacking Tunnelling
(after Komiya and Nakayama, 2013)

Pipe Jacking *(after Le et. al, 2013)*



Rainfall and Stability of Slope *(after Xu et. al, 2013)*

GEOTECHNICAL ENGINEERING

MARCH 2013 SPECIAL ISSUE ON CONTRIBUTED PAPERS

Editors: Prof. Der-Wen Chang and Dr. Dariusz Wanatowski

This issue has articles from researchers in Australia, Bangkok, Japan, Nottingham, UK, Singapore, Taiwan and many other countries. From Japan, Prof. Satoru Shibuya's group also made contributions.

Prof. Der-Wen Chang is a faculty member at The Department of Civil Engineering of Tamkang University (TKU), Taipei, Taiwan for over 21 years. He received his Ph.D. in Civil Engineering at The University of Texas, Austin in 1991 and MS in Civil Engineering at Michigan State University in 1987. Prof. Chang has supervised the research work of over 60 Master Thesis and 3 Ph.D. Thesis at TKU, and published more than 160 articles in Journal, Conference proceedings and reports. Nearly all his research studies are related to numerical modelling and dynamic analyses for the geotechnical structures. His research experiences include NDT methods on pavements, seismic behaviours of the pile foundation, constitutive modelling of soils, and recent study on the performance based design for the earth structures. Prof. Chang is also the visiting Professor at University of Washington at Seattle, US in 2008 and LN Gumilyov Eurasian National University at Astana, Kazakhstan for research studies in 2010 and 2011. Other than the research works, Prof. Chang devotes himself a great deal to serve the communities. He involves heavily and indeed shows his good performance in the public service related to education and constructions. Other than the Secretary General at Chinese Taipei Geotechnical Society (2009~2011), Prof. Chang is the current GC member of SEAGS, Editorial Panel for SEAGS/AGSSEA J. of Geotechnical Engineering, Committee members for Public Construction and Hazard Prevention in Taipei City and New Taipei City governments. He is also a TC212 member at ISSMGE who puts a lot of research efforts on seismic behaviours and performance of the pile foundations.

Dr Dariusz Wanatowski is a Lecturer in Geomechanics in the Department of Civil Engineering at the University of Nottingham, United Kingdom. He graduated in Civil Engineering from Poznan University of Technology, Poland in 1999. Between 1999 and 2001 he worked as a teaching and research assistant at the same university where he was lecturing soil mechanics and foundation engineering courses. He was also involved in several research projects, including effects of various improvements of subgrade on its bearing capacity and experimental investigation of engineering properties of various organic soils. He obtained his PhD from Nanyang Technological University in 2006. Prior to joining the Nottingham Centre for Geomechanics in February 2006 Dr Wanatowski also worked as a researcher at NTU on effects of strength and stiffness anisotropy of geomaterials on the stability and deformation of tunnels. Dr Wanatowski's general research interests are focused on experimental geomechanics, particularly strain softening and instability behaviour of granular soils, strain localization in sands, strength and stiffness anisotropy of geomaterials, and effects of intermediate principal stress on the strength and deformation characteristics of soils. He has consulting experience in the areas of laboratory and in situ testing of soils. He is also an Honorary Secretary for East Midlands Geotechnical Group in the UK.

GEOTECHNICAL ENGINEERING

FOREWORD

The SEAGS and AGSSEA Journal of Geotechnical Engineering has been growing tremendously since the SEAGC in Taipei in 2010. Thanks to all our Guest Editors and also the Editorial Team with Dr. Ooi and IEM Team from Malaysia, and Prof. Bergado and Team from AIT and Prof. Charles NG from the HK Society in using the HKUST Web. In 2010~2012, many important and representative topics had been selected and successfully presented. Apart from a series of special issues on subjects in geotechnical engineering, a considerable amount of contributed papers with wider spectrum have been received.

As a consequence, the 1st issue in 2013 collects eleven excellent papers on the fundamentals of soil behaviours and the lessons learned from different construction technologies. There are papers discussing the deep excavation in clay by Mabrouk and Rowe, a historical overview on consolidation and strength for Taipei clay made by Hwang et al.. Lime stabilization and the acid effects on organic clay was brought by Mohd Yunus et al.. Settlements of the compacted soils and the compaction for mudstones were discussed by Leong et al. and Puttiwonggrak et al., respectively. On the other hand, small-strain behaviour of sand was presented by Lai et al. considering the effects of stress paths.

Additionally, four papers discussing the observations from on-site construction technologies and/or relevant numerical simulation can be found. They are: Joint effect on Pipe Jacking method by Le et al., FE modelling on Box-Jacking tunnel work induced ground behaviours by Komiya and Nakayama, Deformations of historic building due to tunnelling by Ge et al., and Monitoring technology on slope with rainfall infiltration by Xu et al.. Papagiannakis discusses an overview of the state of the art of mechanistic-empirical pavement design, as established by NCHRP Study 1-37A in the United States. It is our belief that all the papers presented in this issue are highly valuable and useful to the engineering work. The editors would like to express their sincere gratitude towards the authors and the reviewers who make this publication possible.

Editors

Der-Wen Chang

Dariusz Wanatowski

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

We are fortunate to have all the material ready for the March 2013 Issue of the Journal. This Issue is on contributed papers as received from many authors worldwide. It is the intention of the editorial team to have a balanced between those papers which are directly contributed and those published under specific themes. We are most graterful, this issue in 2013 is made feasible with the contributions from Ahmed B. Mabrouk and R. Kerry Rowe (Canada); Richard N. Hwang, Za-Chieh Moh and I-Chou Hu (Taiwan); N.Z. Mohd Yunus, D. Wanatowski and L.R. Stace (UK); E.C. Leong, S. Widiastuti and H. Rahardjo (Singapore); A. Puttiwongrak, H. Honda, T. Matsuoka and Y. Yamada (Japan); Yong Lai, Jian-yong Shi, Xiao-jun Yu and Qiu-rong Cao (China); L.G. Le, M. Takise, M. Sugimoto and K. Nakamura (Japan); K. Komiya and T. Nakayama (Japan); Shi-ping Ge, Dong-wu Xie, Wen-qi Ding, Ya-fei Qiao, Jin-chun Chai (China & Japan); and Dongsheng Xu, Fei Tong, Huahu Pei, and Jianhua Yin(China) and Papagiannakis of United States. The number of papers has also increased to eleven in this Issue.

The geotechnical Engineering Journal has lately been published spot on time since 2010 and this is due to the untiring efforts of our inhouse technical editors, particularly Prof. Der Wen Chang of the Taiwan Geotechnical Society and Dr. Dariusz Wanatowski of University of Nottingham in UK; the Editorial team of IEM under Dr. Ooi; the Ediitorial team of SEAGS at AIT under Prof. Beregado; and last but not least the help of Prof. Charles Ng of the Hong Kong Geotechnical Society and HKUST in using their web.

The June and September Issues of 2013 will be under the Leadership of Prof. Akira Murakami and Prof. Fusao Oka repectively. Their editorial teams will include Prof. Muhunthan, Dr. Hossam Abuel-Naga, Dr. Suched Likitlersuang, and Prof. Helmut F. Schweiger. Finally, the December Issue containing papers to honour Prof. Bergado is expected to have fourteen papers and edited by Prof. Chai Jin-Chun and Prof. Dr. Shui-Long Shen.

It is a great pleasure to note that we now have papers and commitments till mid 2015 Issue.

K.Y. Yong
D.T. Bergado
T.A.Ooi
A.S.Balasubramaniam

GEOTECHNICAL ENGINEERING

March 2013: Contributed papers

Editors: D W Chang and Dariusz Wanatowski

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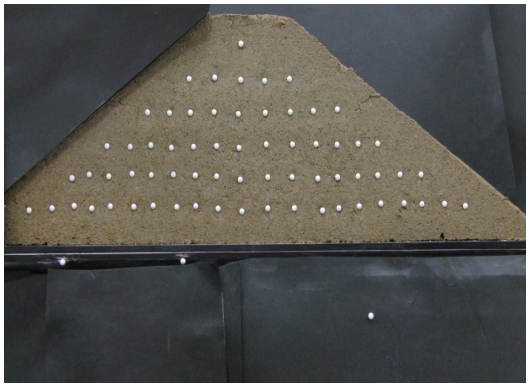
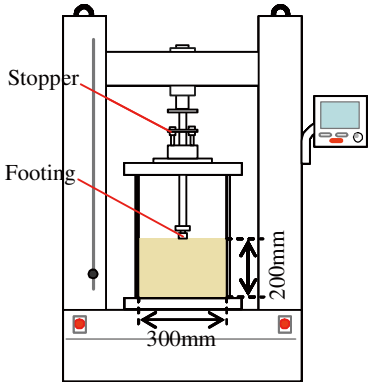
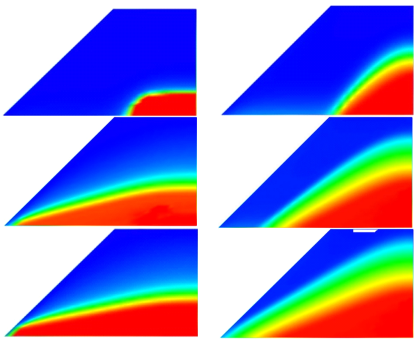
Editors: Akira Murakami
Dariusz Wanatowski



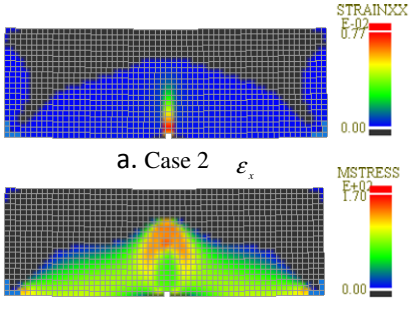
Large Model with guage points for shear and volumetric strain measurement (after Miyanaga, *et al,* 2013)



Schematic view of 3-D CT Imaging set-up (after Takano, *et al,* 2013)



Distribution of Saturation in numerical simulation Bending Stress of model test (after Xiong, *et al*, 2013)



Simulation in Cement Treated Soil (after Kaneda, *et al*, 2013)

GEOTECHNICAL ENGINEERING

JUNE 2013 SPECIAL ISSUE ON

MODELLING ASPECTS OF SOIL BEHAVIOUR

Editors: Akira Murakami

Dariusz Wanatowski

Prof. Akira Murakami received his BS (1978) at the Agricultural Engineering Department; MS (1980) at the Civil Engineering Department and Dr. Agr. (1991) from Kyoto University (KU), respectively. In 1982, he became an assistant professor at the Agricultural Engineering Department of KU, and was promoted to an associate professor of KU in 1994. He moved to the Graduate School of Environmental Science of Okayama University with a promotion to full professor in 1999. After joining Okayama University for just 10 years, he moved back to a full professor of KU in 2009. He has served as the Vice President of the Japanese Geotechnical Society (JGS), the Board Member of the Japanese Society of Irrigation, Drainage and Rural Engineering (JSIDRE), and the International Association for Computer Methods and Advances in Geomechanics (IACMAG), and also serves as a core member of TC103 of ISSMGE and a member of the Multidisciplinary International Society on Inverse Problems in Science and Engineering. He had acted as the Secretary of TC34 of ISSMGE for two terms and delivered a general report of 'Numerical Methods' at 16ICSMGE held in Osaka. He is the recipient of the Japanese Society of Civil Engineering (JSCE) Paper Award (1996), the JSIDRE Sawada Prize (2007), the JGS Best Accomplishment Award (2008), the JSIDRE Best Paper Award (2010), the JGS Paper Award (2011, 2013) and is a Fellow of JSCE. His research interests include the data assimilation, inverse problem, finite element methods, mesh free methods, and DEM in geomechanics.

Dr. Dariusz Wanatowski is an Associate Professor and Head of Department of Civil Engineering at the University of Nottingham Ningbo China (UNNC). He graduated in Civil Engineering from Poznan University of Technology, Poland in 1999. Between 1999 and 2001 he worked as a teaching and research assistant at the same university where he was lecturing soil mechanics and foundation engineering courses. He was also involved in several research projects, including effects of various improvements of subgrade on its bearing capacity and experimental investigation of engineering properties of various organic soils. He obtained his PhD from Nanyang Technological University in 2006. Prior to joining the Nottingham Centre for Geomechanics in February 2006 Dr. Wanatowski also worked as a researcher at NTU on effects of strength and stiffness anisotropy of geomaterials on the stability and deformation of tunnels. Dr. Wanatowski's general research interests are focused on experimental geomechanics, particularly strain softening and instability behaviour of granular soils, strain localization in sands, strength and stiffness anisotropy of geomaterials, and effects of intermediate principal stress on the strength and deformation characteristics of soils. He has consulting experience in the areas of laboratory and in situ testing of soils.

GEOTECHNICAL ENGINEERING

FOREWORD

It is a pleasure for me to be the Guest Editor for this Special Issue on Modelling Aspects of Soil Behaviour. There are seven excellent papers:

Soil-water-air coupled finite element analysis of model test on slope failure of unsaturated soil; Relation between seepage force and velocity of sand particles during sand boiling; A density-and stress-dependent elasto-plastic model for sands subjected to monotonic undrained torsional shear loading; 1-G Model Test with Digital Image Analysis for Seismic Behavior of Earth Dam; X-ray CT imaging of 3-D bearing capacity mechanism for vertically loaded shallow foundations; Modeling and Bending Test Simulations of Cement Treated Soil; and Modelling viscous effects during and after Construction in London Clay.

The authors of these papers are Y. L. Xiong, X. H. Bao and F. Zhang; K. Fujisawa, A. Murakami, S. Nishimura and T. Shuku; G. Chiaro, J. Koseki and L.I.N. De Silva; Y. Miyanaga, A. Kobayashi and A. Murakami; D. Takano, J. Otani, M. Nakamura and R. Mokwa; K. Kaneda, T. Tanikawa and S. Onimaru; and S. D. Clarke and C. C. Hird.

Appropriate modelling of the soil behaviour is now most important with all types of current analyses and design of the geotechnical aspects of Infra-structure and mining engineering projects. This Special Issue is the second of this type in this Journal since 2011 and the first one was in December 2011 as editted by the guest Editor Dr. Dariusz Wanatowski. The material contained in this issue will fit in very well with the next Issue in September 2013 on Geotechnical Analyses. Visco elasto-plastic modelling of soils has been the current trend in soil behaviour.

I must thank Dr. Hossam Abuel-Naga of the School of Mechanical, Aerospace, and Civil Engineering, The University of Manchester, in helping with the submission of the paper by S. D. Clarke and C. C. Hird. Also, the in-house editor of the Journal Dr. Dariusz Wanatowski for his meticulous and painful task of checking and making sure that the articles are indeed in the correct format as required in the production of the journal.

Akira Murakami

Guest Editor
Editorial Team, SEAGS/AGSSEA J. of Geotechnical Engineering
Professor of Kyoto University, Graduate School of Agriculture
Editor-in-Chief, Soils and Foundations

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

It is indeed a very great pleasure to have Prof. Akira Murakami of the Kyoto University and Editor in Chief of Soils & Foundations as the Guest Editor for this Special Issue on the Modelling Aspects of Soil Behaviour. Dr. Dariusz Wanatowski, our in-house Editor has assisted Prof. Murakami and us in the production of this important Issue. Additionally Dr. Hossam Abuel-Naga has been helpful in getting contributuions from the United Kingdom.

Grateful acknowledgement is made to the contributing authors : Y.L. Xiong, X.H. Bao and F. Zhang; K. Fujisawa, A. Murakami, S. Nishimura and T. Shuku; G. Chiaro, J. Koseki and L.I.N. De Silva; Y. Miyanaga, A. Kobayashi and A. Murakami; D. Takano, J. Otani, M. Nakamura and R. Mokwa; K. Kaneda, T. Tanikawa and S. Onimaru; and S.D. Clarke and C.C. Hird.

There are seven excellent papers related to slope failure in unsaturated soils; seepage force and velocity of sand particles during sand boiling; elasto-plastic model for sands subjected to monotonic undrained torsional shear loading; Digital Image Analysis for Seismic Behavior of Earth Dam; X-ray CT imaging of 3-D bearing capacity mechanism for vertically loaded shallow foundations; Modeling and Bending Test Simulations of Cement Treated Soil; and Modelling viscous effects during and after Construction in London Clay and they are of great value to engineering practice and research.

Also, the editorial works for the September and December Issues are now well advanced and the valuable assistance from our International Geotechnical Community is gratefully acknowledged.

K. Y. Yong
D. T. Bergado
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

June 2013: Modelling Aspects of Soil Behaviour

Editors: Akira Murakami

Dariusz Wanatowski

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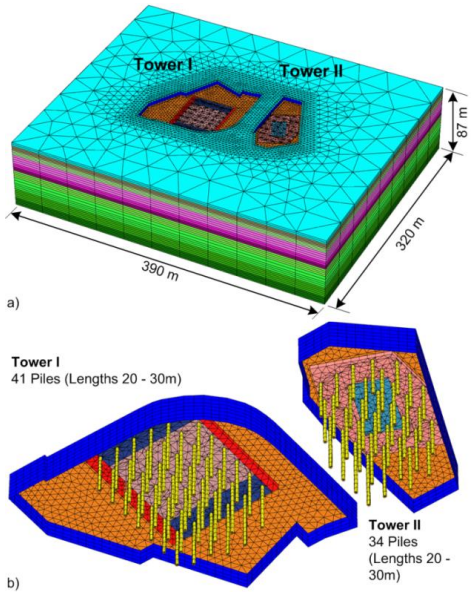
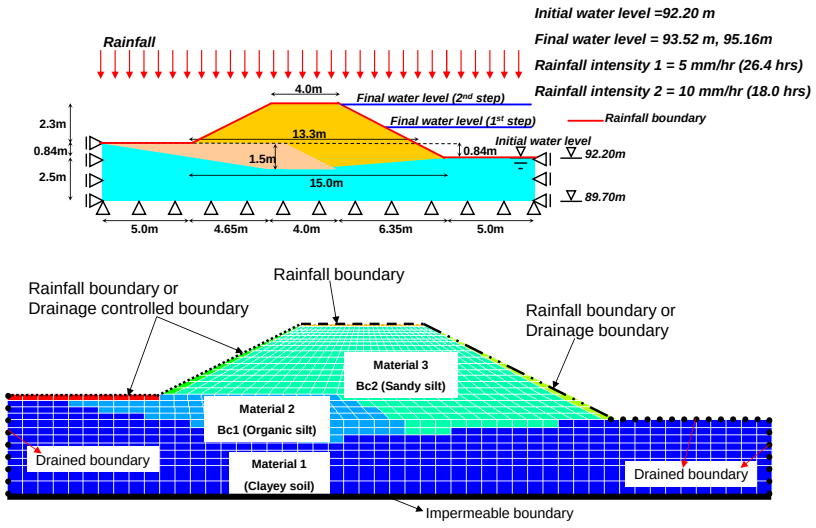
Guest Editors: Prof. Fusao Oka & Prof. Helmut F. Schweiger



Modelling of Pile Raft Foundation
(after Tschuchnigg & Schweiger, 2013)



Numerical Simulation of Rainfall Infiltration on
Unsaturated Soil Slope With Seepage Flow
(after S.Kimoto *et al*, 2013)

GEOTECHNICAL ENGINEERING

SEPTEMBER 2013 SPECIAL ISSUE ON NUMERICAL ANALYSES

Guest Editors:
Prof. Fusao Oka & Prof. Helmut F. Schweiger

Prof. Fusao Oka

Prof. Oka is Professor emeritus of Kyoto University and JSPS scientific researcher of Kyoto University. He had been Professor of Civil and Earth Resources Engineering at Kyoto University in Japan. He has many years of experience in geomechanics with special emphasis on constitutive modeling of geomaterials, liquefaction analysis, strain localization problems and experimental works, numerical modeling of multi-phase materials such as chemo-thermo-hydro-mechanical modeling of Methane hydrate containing ground. His research expertise covers engineering applications such as soil liquefaction, consolidation and excavation problems with theoretical and experimental approach. Prof. Oka has particular interest in the viscoplastic modeling of geomaterials and related strain localization behavior. He gave a special lecture at the plenary session of 16th ICSMGE on computational geomechanics in 2005. He has published more than 200 papers in this field and has received many awards from the Japanese Geotechnical society (2005), Japan Society of Civil Engineers (1993), and IACMAG (1997, 2006). He has been serving as a chair of TC34 of ISSMGE on Prediction and Simulation Methods in Geomechanics and chaired the 4th International Workshop on Strain Localization and Bifurcation Theory for Soils and Rocks (1997), the ISSMGE International Symposium on Deformation and Progressive Failure in Geomechanics (1997), and the International Symposium on Prediction and Simulation Methods for Geohazard Mitigation by JGS and ISSMGE (2009), the 46th. Japan National conference on geotechnical Engineering (2011). He is now chairing the organizing committee of the 14th ICIACMAG 2014 Kyoto. He is currently serving as EBM of the *International Journal of Numerical and Analytical Methods in Geomechanics, Computers and Geotechnics* and the *International Journal of Geomechanics and Geoengineering*.

Prof. Helmut F. Schweiger
(Graz University of Technology)

Prof. Helmut F. Schweiger is Head of the Computational Geotechnics Group at the Institute for Soil Mechanics and Foundation Engineering of the Graz University of Technology in Austria and has over 25 years of experience in developing and applying numerical methods in geomechanics. He obtained his Ph.D. form the University of Wales, Swansea, UK. His main research interests are the development of multilaminate models for soils, application of Random Set Theory to finite element analysis and the assessment of the influence of the constitutive model for solving practical problems, in particular deep excavations, deep foundations and tunnels. Application of numerical methods in accordance with the design approaches defined in Eurocode7 is another topic he is involved in. His group was a member of several research projects funded by the European Commission. His research is reflected in more than 130 publications in International Journals and Conference Proceedings and invitations to keynote and plenary lectures at International Conferences on Soil Mechanics and Computational Geotechnics. He serves on a number of editorial boards of international journals and was chairman of 6th European Conference on Numerical Methods in Engineering. As a member of several committees Helmut is involved in formulating guidelines and recommendations for the use of finite elements in practical geotechnical engineering. He lectures on courses on Computational Geotechnics around the world and has been a member of numerous Ph.D. committees.
In 2005 he received the "Excellent Contributions Award Regional" of the International Association for Computer Methods and Advances in Geomechanics and the "Best Paper Award" of the Japanese Geotechnical Society and in 2010 the "George Stephenson Medal" of the Institution of Civil Engineers, London, UK for a paper published in Geotechnique.

GEOTECHNICAL ENGINEERING

FOREWORD

I am very pleased to be the Leader of the Team of Guest Editors on this Special Issue on the Role of Analyses in Geotechnical Engineering. The co-editors are Prof. Helmut and Prof. Muhunthan in seeking contributions. Dr. Dariusz Wanatowski also helped in Proof Reading the articles.

There are nine papers in this issue and they are: Numerical Simulation of the Rainfall Infiltration on Unsaturated Soil Slope Considering a Seepage Flow; Seismic Response of Gravity-Cantilever Retaining Wall Backfilled with Shredded Tire;

Numerical modeling of lateral response of long flexible piles in sand; New Sampling Algorithm in Particle Fileter for Geotechnical Analysis; Comparison of deep foundation systems using 3D finite element analysis employing different modeling techniques; Application of a constitutive model for swelling rock to tunnelling; Finite element modelling of seismic liquefaction in soils; Random Wave-Induced Seabed Responses around Breakwater Heads; and Influence of brittle property of cement treated soil on undrained bearing capacity characteristics of the ground.

The authors of these papers are: S.Kimoto, F.Oka and E.Garcia; N. Ravichandran and E. L. Huggins; Md. Iftekharuzzaman and Bipul C Hawlader; T. Shuku, S. Nishimura, K. Fujisawa and A. Murakami ; F. Tschuchnigg & H.F. Schweiger; B. Schadlich, T. Marcher and H.F. Schweiger; V. Galavi, A. Petalas and R.B.J. Brinkgreve; Y Zhang, D-S Jeng, Z-W Fu and J Ou and S. Yamada, T. Noda, A. Asaoka and T. Shina.

Finally, I hope this Special Issue would be of great values to the Readers of Geotechnical Engineering Journal, whether they are in research or practice.

Fusao Oka
Guest Editor
Editorial Team, SEAGS/AGSSEA J. of Geotechnical Engineering
Professor Emeritus of Kyoto University
Kyoto, Japan

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

It is a pleasure to thank Prof. Fusao Oka the Team leader of our Guest Editors for this September Issue on the Role of Analyses in Geotechnical Engineering Practice. The co-editors are Prof. Helmut Schweiger and Prof. Muhunthan Balasingham for acquiring papers from Europe & North America respectively. Dr. Dariusz Wanatowski helped the proof reading at the final stage.

Grateful acknowledgement is made to the contributing authors : :S.Kimoto, F.Oka and E.Garcia; N. Ravichandran and E. L. Huggins; Md. Iftekharuzzaman and Bipul C Hawlader; T. Shuku, S. Nishimura, K. Fujisawa and A. Murakami ; F. Tschuchnigg & H.F. Schweiger; B. Schadlich, T. Marcher and H.F. Schweiger; V. Galavi, A. Petalas and R.B.J. Brinkgreve; Y Zhang, D-S Jeng, Z-W Fu and J Ou and S. Yamada, T. Noda, A. Asaoka and T. Shina.

There are nine excellent papers related: Numerical Simulation of the Rainfall Infiltration on Unsaturated Soil Slope Considering a Seepage Flow; Seismic Response of Gravity-Cantilever Retaining Wall Backfilled with Shredded Tire;

Numerical modeling of lateral response of long flexible piles in sand; New Sampling Algorithm in Particle Fileter for Geotechnical Analysis; Comparison of deep foundation systems using 3D finite element analysis employing different modeling techniques; Application of a constitutive model for swelling rock to tunnelling; Finite element modelling of seismic liquefaction in soils; Random Wave-Induced Seabed Responses around Breakwater Heads; and Influence of brittle property of cement treated soil on undrained bearing capacity characteristics of the ground.

Also, the editorial works for the December Issue is now well advanced and the valuable assistance from our International Geotechnical Community is gratefully acknowledged.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

September 2013: Numerical Analyses

Guest Editors:
Prof. Fusao Oka & Prof. Helmut F. Schweiger

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Journal of the

SOUTHEAST ASIAN GEOTECHNICAL SOCIETY

&

ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

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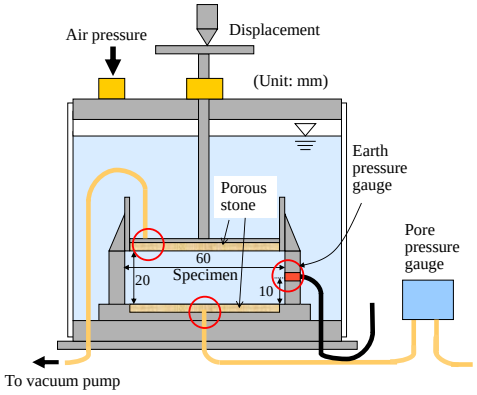
ASIAN INSTITUTE OF TECHNOLOGY

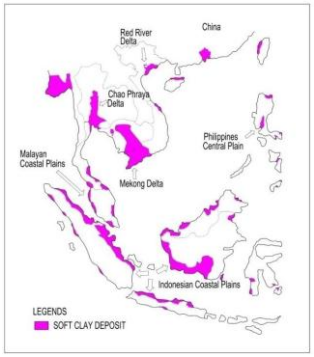
Editors: Prof. Jinchun Chai & Prof. Shui-Long Shen



(a) Vertical drainage test set up

(b)View of the consolidation cell

1. Vacuum and Surcharge Loadings in Oedometer Test (after Chai *et al*, 2013)



2. Distribution of Soft Clay Deposits in Southeast Asia (after Long *et al*, 2013)

3. Deep mixing using High Presure Jet Grout (after Kitazume, 2013)

GEOTECHNICAL ENGINEERING

DECEMBER 2013 SPECIAL COMMEMORATIVE ISSUE IN HONOUR OF PROF DENNES T. BERGADO ON HIS RETIREMENT FROM AIT

Editors: Jinchun Chai & Shui-Long Shen

PROF. JINCHUN CHAI

Prof. Chai got his bachelor of engineering degree from Tongji University in Shanghai, China in 1982; and master of engineering degree from the China Academy of Railway Science in Beijing, China in 1985. Then he got his Doctor of engineering degree from Asian Institute of Technology in Bangkok, Thailand in 1992 under the supervision of Prof. D. T. Bergado. Professor Chai is currently Professor of Geotechnical Engineering at the Department of Civil Engineering and Architecture, Graduate School of Science and Engineering, Saga University, Japan. His primary research interests are: (1) soft ground improvement; (2) geosynthetics; and (3) numerical analysis in geotechnical and geoenvironmental engineering.

He has written over 140 research papers (about 60 journal papers and over 80 conference papers) and two coauthored books, "Improvement techniques of soft ground in subsiding and lowland environment", by :Bergado/Chai/Alfaro/Balasubramaniam;, Balkema (1994); and "Deformation analysis in soft ground improvement", by Chai/Carter; Springer (2011). In Scopus database, his papers have been cited about 750 times, and his H-Index is 16. Professor Chai is a licensed Professional Engineer in Japan.

PROF. SHUI-LONG SHEN

Prof. Dr. Shui-Long Shen received his BSc. in Tunneling and Underground Space Technology from Tongji University in 1986 and his MPhil in Structural Engineering from the same university in 1989. He obtained his Ph.D. in Geotechnical Engineering from Saga University, Japan, in 1998. After Dr. Shen received his PhD, he worked in the Institute of Lowland Technology (ILT) as a lecturer from 1998 to 2001. During this period Dr. Shen served as an Associate Editor of Lowland Technology International-an International Journal. From 2001 to 2003, Dr. Shen worked in National Institute for Environmental Studies in Tsukuba-the Science City of Japan. In 2003, he joined the Department of Civil Engineering (DCE) of Shanghai Jiao Tong University (SJTU) as a faculty member. He is now the Department Head of DEC. From 2005 to 2010, Dr. Shen has been keeping collaboration with other international organization, e.g. Saga University, Virginia Tech, The University of Kansas, The University of Hong Kong, Suranaree University of Technology.

Dr. Shen's research interests focus on **soft ground improvement** and **land subsidence** due to withdrawal of liquid from underground. He published and/or edited five books, of which two conference proceedings published by ASCE. Dr. Shen published more than 150 technical papers in Journals and conferences, in which about 50 papers were published in International Journals.

Dr. Shen also serves as an editorial board member of four International Journals, e.g. ***Geotextiles and Geomembranes***, Elseveir, and **Geotechnical Engineering** – SEAGS etc. and two domestic journals, e.g. Chinese Journal of Geotechnical Engineering.

GEOTECHNICAL ENGINEERING

Preface

This special issue is dedicated to Professor Dennes T. Bergado to commemorate his retirement from the Asian Institute of Technology (AIT) in June, 2013. The general theme of this issue is: Soft Ground improvement and Geosynthetics, which has been the main area of Prof. Bergado's personal research activity over the past 3 decades and to which he has contributed enormously. The idea of having a special issue for Prof. Bergado's retirement came from Prof. A. S. Balasubramaniam in March 2012. When he asked us to be guest editors for this issue, we accepted the invitation happily and eagerly. Prof. Bergado was Prof. Jinchun Chai's supervisor for his Doctor of Engineering Degree in AIT (1992), and he is also a close friend of Prof. Shuilong Shen.

We were determined to make the issue one of very high standards and a lasting and memorable contribution to the subject area. We started to invite active researchers in the field to contribute their new research results or state-of-the-art papers in April 2012. All those we invited responded warmly and enthusiastically, and we believe this was because of Prof. Bergado's outstanding contribution to the field as well as his friendly personality. We informed all who agreed to contribute that all papers would be subject to strict critical review and only those papers that satisfactorily addressed all review comments would be finally included in this issue. Thirteen (13) full papers were received by the end of 2012. Review and revision works took about 4 months and in May 2013, the 13 high quality papers were finally accepted and ready for publication. Among these papers, 7 are review articles, i.e., state-of-the-art papers, and 6 contain essentially new and previously unpublished material.

In the meantime, we invited senior professors in the field of geotechnical engineering who know Prof. Bergado well to write their thoughts and reflections about him for this special issue. The notes penned by Prof. H.G. Poulos, Prof. S.K. Kim & Prof. N. Miura are included with this preface. It is hoped that these short notes will provide inspiration to young researchers and engineers working in the area of ground improvement and the application of geosynthetics.

Finally we would like to thank all the contributors and people who helped us to make this special issue a success. We wish Prof. Dennes T. Bergado a very happy retirement and at the same time urge him to continue to contribute professionally to the fields of soft ground improvement and the use of geosynthetics. We feel he still has much to offer to our profession.

Jinchun Chai , Saga, Japan
Shui-Long Shen Shanghai, China

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

It is a great pleasure to write this acknowledgement for the December 2013 Issue dedicated to honour Prof. Dennes T. Bergado's retirement from the Asian Institute of Technology. At the very first sincere thanks must go to the guest editors Prof. Jinchun Chai and Prof. Shuilong Shen. They really did a magnificent job in making this volume possible with thirteen excellent papers; all related to ground improvement and from world-wide reputed authors.

Grateful acknowledgement is also made to the contributing authors: J.-C. Chai, J. P. Carter, A. Saito and T. Hino; Ennis M. Palmira, André R.S. Feel and Gregorian. L. S. Araújo; X**.** Yang and J. Han;J. K. Lee and J.Q. Shang; P.V. Long, D.T. Bergado, L.V. Nguyen and A.S. Balasubramaniam; Han-Yong Jeon and Yuan Chun Jin;
P. Voottipruex and D.T. Bergado, and W. Wongprasan; C**.** Taechakumthorn and R.K. Rowe; C. Rujikiatkamjorn1 and B. Indraratna; Z.F. Wang, S.L. Shen, C.E. Ho and Y.H. Kim; Masaki Kitazume; Wei Guo, Jian Chu and Shuwang Yan; S**.** Horpibulsuk**,** C. Suksiripattanapong and A. Chinkulkijniwat; and H.M. Abuel-Naga, G.A. Lorenzo and D.T. Bergado.

There are fourteen excellent papers in this issue on: Behaviour of Clay Subjecting to Vacuum and Surcharge Loading in an Oedometer; Behaviour of Geogrid Reinforced Abutments on Soft Soil; Geocell-Reinforced Granular Fill under Static and Cyclic Loading: A Synthesis of Analysis; Electrical Vertical Drains in Geotechnical Engineering Applications; Design and Performance of Soft Ground Improvement Using PVD with and without Vacuum Consolidation; Reassessment of Long-Term Performance of Geogrids by Considering Mutual Interaction among Reduction Factors; Simulations of PVD Improved Reconstituted Specimens with Surcharge, Vacuum and Heat Preloading using Axisymmetric and Equivalent Vertical Flow Conditions; Reinforced Embankments on Soft Deposits: Behaviour, Analysis and Design; Current State of the Art in Vacuum Preloading for Stabilising Soft Soil; Jet Grouting Practice: an Overview; Deep Mixing Method in Japan; Recent Studies of Geosynthetic Tubes and Mattress: an overview; Design Method for Bearing Reinforcement Earth Wall; and Current State of Knowledge on Thermal Consolidation using Prefabricated Vertical Drains.

Prof. Bergado (Dennes) was in the Geotechnical Engineering batch that graduated from AIT in 1976. At that time, Dr. Moh, Dr. Brand, Dr. Peter Brenner and Prof. Prinya Nutalaya and Prof. A.S.Balasubramaniam were the Geotechnical Faculty Members at AIT. After working for a while in Philippines, Prof. Bergado studied at Utah State University in USA on a Full Bright Scholarship and worked with Prof. Loren Anderson. Prof. Bergado joined AIT as an Assistant Professor in 1982; early colleagues of Prof. Bergado at AIT include Prof. Hideki Ohta, Prof. Towhata, Late Dr. Tomiolo, Dr. Friedrich Prinzl, Prof. Ikuo Towhata, Prof. Yuhdbir and Dr. Sarvesh Chandra. Later, Dr Robert Whitely, Dr. Noppadol Phienwej, Dr. Rantucci, Prof. Buddhima Indraratna , Dr. Kuwano, Dr. Sugimoto, Dr. Honjo, Prof. Ohtsu, Prof. Shibuya and Dr. Takemura; just to name a few. Prof. Onodera and Prof. Toshinobu Akagi left AIT a little before Prof. Bergado joined AIT.

At AIT in the early years Prof. Bergado was involved with many major Sponsored Research Projects including the USAID Funded Welded Wire Mechanical Stabilized Earth and Geosynthetics in Embankments on Soft Clays. Prof. Bergado was also deeply involved with the PVD Soft Ground Improvement Project at the Second Bangkok (Suvarnabhumi) Airport Site with the Airport Authority of Thailand. The Doctoral Students of Prof. Bergado were: Prof. Shivashankar, Prof. Chai, Dr. Long, Dr Panich, Dr Lorenzo, Dr Sompote, Dr Lai, Dr Abuel-Naga, Dr Chairat, Dr. Pittaya, Dr Jaturonk, and Dr

Tawatchai to name a few. He successfully supervised a total of 17 doctor and 160 master graduates. Prof. Bergado wrote 2 books in soil/ground improvement, edited 22 conference proceedings with more than 140 journal and 280 conference papers. Prof. Bergado also edited the Volume on Geotechnical Engineering in SE Asia for the Golden Jubilee Conference at San Francisco in 1985. Prof. Bergado was associated with the Southeast Asian Geotechnical Society from the time he joined AIT, earlier as Editor of the Journal (1996-2000) and later became the Secretary General of SEAGS (2001-2012). He also initiated the Asian Center for Soil Improvement and Geosynthetics (ACSIG) and founded the International Geosynthetics Society (IGS)-Thailand Chapter. Currently, he is serving his second term as elected member of the IGS International Council.

Prof. Bergado spent his Sabbatical at Saga University. Emeritus Professor Norihiko Miura has also contributed an article here on Prof. Bergado's contributions and so were Prof. H G Poulos and Prof. Sag-Kyu Kim. These articles are included in the Preface as written by the Guest Editors.

It is a genuine pleasure to have this special issue to honour Prof. Dennes T. Bergado who has been an AIT Alumnus, a Colleague and friend of all of us over the last 35 years or so.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

December 2013: Commemorative Issue on Prof. D. T. Bergado's Retirement from AIT

Editors: Prof. Jinchun Chai & Prof. Shui-Long Shen

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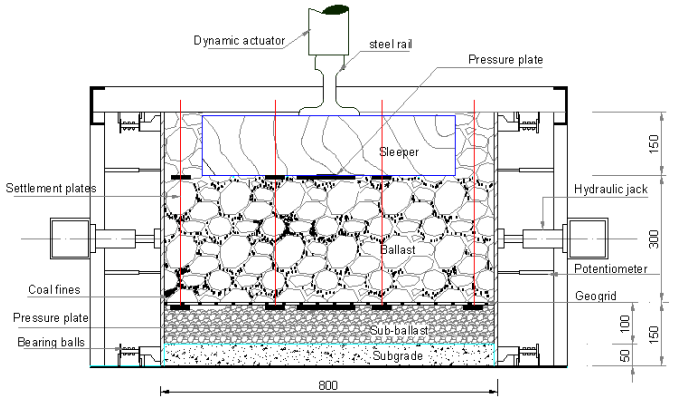
Editors: Prof Buddhima Indraratna

& A/Prof Cholachat Rujikiatkamjorn



1. High Speed Rail Process Simulation Apparatus, (Indraratna *et al*, 2014)

2. Track Displacement Monitoring (Indraratna *et al*, 2014)

a. GRS bridge abutment

b. GRS abutment at Mantaro for Hokkaido Shinkansen

3. Geosynthetic Reinforced Soil Structure (GRS) in High Speed Rail (after Tatsuoka *et al*, 2014)

GEOTECHNICAL ENGINEERING

MARCH 2014 SPECIAL ISSUE ON GEOTECHNICS FOR ADVANCING TRANSPORT INFRASTRUCTURE

Editors: Prof. Buddhima Indraratna & Dr. Cholachat Rujikiatkamjorn

Prof. Buddhima Indraratna

Prof. Buddhima Indraratna is currently Professor of Civil Engineering at the Faculty of Engineering, University of Wollongong. Concurrently, Buddhima is also the Research Director, Centre for Geomechanics and Railway Engineering; Program Leader, ARC Centre of Excellence in Geotechnical Science and Engineering; and Node Coordinator, CRC for Rail Innovation.

Since his PhD from the University of Alberta in 1987, his significant contributions to geotechnical and railway research have been acknowledged through numerous national and international awards, including the 2009 EH Davis Memorial lecture, regarded as one of the highest accolades within the Australian Geomechanics Society. Honoured as a Fellow of the Australian Academy of Technological Sciences and Engineering (FTSE) and as a recipient of the 2011 Engineers Australia Transport Medal and 2009 Business Higher Education Round Table (BHERT) award by Australian Commonwealth for Rail Track Innovations, his contributions to Transportation Geotechnics and Ground Improvement have been further acclaimed. He has published over 500 peer-reviewed articles (200+ Journal papers) and 5 research-based Books, and successfully supervised over 40 PhD graduates. His research income is approx. $1.2 M/year. He is the Founding Director of the Centre for Geomechanics and Railway Engineering (GRE). In this Centre, he is mentoring over a dozen full-time staff and overseeing the progress of over 30 PhD students. GRE is one of the three research centres forming the ARC Centre of Excellence in Geotechnical Sciences and Engineering (ARC-CGSE) funded recently (with Newcastle and UWA), of which he is a Program Leader. He is also the node coordinator of the CRC for Rail Innovation at UOW in charge of several rail track innovation projects including a real track design at Singleton, near Newcastle, NSW.The National Rail Testing Facility will be soon established at the University of Wollongong under his leadership through funding by the Australian Research Council.

Dr. Cholachat Rujikiatkamjorn

Dr Cholachat is an Associate Professor at the Centre for Geomechanics and Railway engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong. He received his B Eng (1st Class Honours) from the Khonkaen University, Thailand in 2000 with a Masters (M Eng) from the Asian Institute of Technology, Thailand in 2002. He obtained his PhD in Geotechnical Engineering from the University of Wollongong in 2006. He received the Australian Geomechanics Society Thesis Award in 2006. In 2009, he received an award twice from the International Association for Computer Methods and Advances in Geomechanics (IACMAG) for an outstanding paper by an early career researcher, and the 2006 Wollongong Trailblazer Award for innovations in soft soil stabilisation for transport infrastructure. Recently he received the 2012 DH Trollope award and the 2013 ISSMGE Young Member award for academic achievements and outstanding contributions to the field of geotechnical engineering. He recently secured an early Career Researcher Award through the ARC Centre of Excellence in Geotechnical Science and Engineering with a grant of $680k for 3 years. His key areas of expertise include ground improvement for transport infrastructure and soft soil engineering. He has published over 140 articles in international journals and conferences. While maintaining a strong focus on quality teaching, to date, he has secured over $2 Million in research funding, mostly from external sources. He is currently a CI of two ARC-DP projects, 3 ARC-LP projects and a CRC-Rail project. He is currently the supervisor/co-supervisor of 10 HDR students and 4 Research Associates.

GEOTECHNICAL ENGINEERING

PREFACE

This Special Issue of *the Geotechnical Engineering Journal of the Southeast Asian Geotechnical Society & Association of Geotechnical Societies in Southeast Asia* on the **Geotechnics for Advancing Transport Infrastructure** is the result of keen discussion among various experts, for highlighting the key geotechnical issues encompassing modern transport infrastructure. This special issue includes a dozen invited papers from around the globe, including numerical and analytical methods, design parameters, field and laboratory testing, and case studies.

The issue begins with an invited paper by Tatsuoka et al titled "Geosynthetic-Reinforced Soil Structures for Railways: Twenty Five Year Experiences in Japan." It draws our attention to the importance of the application of Geosynthetic-reinforced soil retaining walls constructed for high-speed train lines considering for both high seismic loads and subsequent over-topping tsunami current.

The article on the "Enhancement of Rail Track Performance through Utilisation of Geosynthetic Inclusions" by Indraratna et al. proposes the use of artificial inclusions such as polymeric geosynthetics and rubber shock mats with the aim of reducing particle breakage as a cost-effective option. The relative performance of different types of geogrids, geocomposites and shock mats installed in fully instrumented field tracks has been evaluated in the towns of Bulli and Singleton in the State of New South Wales, Australia.

In their study on "Railway Track Transition Dynamics and Reinforcement Using Polyurethane GeoComposites,", Woodward et al. investigate the application of a polyurethane reinforcement technique to control the ballast migration behaviour in the transition zone to reduce dynamic effects from problems like hanging sleepers. The paper demonstrates the effectiveness of the application through numerical simulation and a case study at Tottenham Hale Junction in the United Kingdom.

In the paper "How to Overcome Geotechnical Challenges in Implementing High Speed Rail Systems in Australia," Khabbaz and Fatahi summarise lessons learnt from other countries experienced with high speed rail. The challenges and the effective solutions associated with implementing HSR systems in Australia are explained including selection and design of proper tracks, geographical issues, environmental concerns, economics and project costs and construction procedures.

In their contributions "Maintenance Model for Railway Substructure," by Ebrahimi et al. propose a maintenance model for railway substructure to predict the deformation of railway track and to estimate a schedule for ballast maintenance and tamping. A mechanistic-based maintenance planning software program was developed by incorporating the mechanistic empirical deformation model for railway substructure.

In their study "Dynamic Behaviour of Railway Ballasted Track Structures in Shaking Table Tests and Seismic Resistant Performance Evaluation in Japan," Ishikawa et al. present an experimental and analytical study to explain the dynamic response of ballasted track structures subjected to horizontal seismic motions using small-scale model ballasted tracks with shaking table tests. They show that this technique could roughly assess the seismic performance of ballasted track structures for practical use.

The article "Mechanical Properties of Polyurethane-Stabilized Ballast," by Keene et al. presents the mechanical properties of Polyurethane-Stabilized Ballast (PSB) compared to other materials commonly used in transportation infrastructure. It is found that PSB has mechanical properties similar to cement-stabilized soil (i.e., displays flexural strength), but has much greater compressive strength than ballast, which is critical for stabilization of track substructure.

"Dependency of Cyclic plastic Deformation Characteristics of Unsaturated Recycled Base Course Material on Principal Stress Axis Rotation" is an experimental study by Inam et al. who present the strength-deformation characteristics of unsaturated recycled crusher-run material, under various loading conditions and saturation degrees using multi-ring shear apparatus. The results from the multi-ring shear tests during repeated axial and shear loading tests can produce the real permanent deformation behaviour inside the base course and such results can be incorporated in practical pavement design.

The paper "Quickness Test Approach for Assessment of Flow Slide Potentials" by Thakur and Degago introduces a novel and pragmatic test procedure referred to as the quickness tests to evaluate remoulded shear strength of the sensitive clays. Based on relevant Norwegian landslides data, a quickness based criteria is proposed to assess the potential for occurrence of flow slides.

"Cement Stabilization for Pavement Material in Thailand" presented by Horpibulsuk et al. is a detailed review on the application of lightweight cemented clay and recycled pavement material, which are commonly used in Thailand. The effects of water content, cement content, air content and curing time play a major role in controlling the field strength development.

The study on "Stone Columns Field Test: Monitoring Data and Numerical Analyses" Almeida et al. presents a case study of a field test performed on a set of sixteen stone columns loaded with iron rails for one month. The numerical calculations of vertical and horizontal displacements reproduced the field measurements with satisfactory accuracy up to limit state conditions. The yield of stone columns provided by 3D analysis appears to be more realistic than that provided by 2D analysis.

"Numerical Analysis of Response of Geocell Confined Flexible Pavement," by S. Babu and R. Babu investigates the behaviour of geocell reinforcement in the flexible pavement. The paper elaborates on the effects of secant modulus of geocell material, aspect ratio, thickness of geocell-reinforced layer, and type of subgrade material using a series of numerical analyses.

Our invitation to be Guest Editors of this Special Issue is gratefully appreciated. The 11 articles plus the technical note included in this Special Issue covers an array of issues from theory to practice in transport infrastructure development. We gratefully acknowledge the efforts of all Authors who accepted our invitation to submit high quality articles in a timely manner. All papers have been peer-reviewed according to journal guidelines to maintain high standards, and we acknowledge these efforts by all Reviewers.

It is hoped that this Special Issue on Transport Geotechnics would be of immense benefit to both researchers and practitioners alike.

Prof Buddhima Indraratna,

A/Prof Cholachat Rujikiatkamjorn

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

We are very fortunate to begin Year 2014 with this excellent Issue on Geotechnics for Advancing Transport Infrastructure. Also no one else can be better Guest Editors than Prof. Buddhima Indraratna and A/Prof Cholachat Rujikiatkamjorn. Prof. Buddhima Indraratna is currently Professor of Civil Engineering at the Faculty of Engineering, University of Wollongong. Concurrently, Buddhima is also the Research Director, Centre for Geomechanics and Railway Engineering; Program Leader, ARC Centre of Excellence in Geotechnical Science and Engineering; and Node Coordinator, CRC for Rail Innovation. Dr Cholachat is an Associate Professor at the Centre for Geomechanics and Railway engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong. In the Preface, the Guest Editors proudly say, " This special issue includes a dozen invited papers from around the globe, including numerical and analytical methods, design parameters, field and laboratory testing, and case studies". Indeed it is truely remarkable to have such an excellent set of papers, so eloquently presented in a systemmatic manner by the authors in an authoritative manner.

Appropriately the Issue begins with a novel contribution by Prof. Tatsuoka and co-authors on twenty five years of experiences in Japan on Geosynthetic reinfotrced soil structures for railways. The subsequent papers by Prof. Indraratna and Dr. Rujikiatkamjorn on enhancement of rail track performance through utilisation of geosynthetic inclusions; Railway Track Transition Dynamics & Reinforcement Using Polyurethane GeoComposites by P. Woodward, O. Laghrouche and A. El-Kacimi; How to Overcome Geotechnical Challenges in Implementing High Speed Rail Systems in Australia by by H. Khabbaz and B. Fatahi; Maintenance Model for Railway Substructure by Ali Ebrahimi, James M. Tinjum, and Tuncer B. Edil; Dynamic Behaviour of Railway Ballasted Track Structures in Shaking Table Tests and Seismic Resistant Performance Evaluation in Japan by T. Ishikawa, S. Miura and E. Sekine; and Mechanical Properties of Polyurethane-Stabilized Ballast and Infrastructure Materials by A. Keene, J.M. Tinjum, and T.B. Edil; all of them are invaluable contributions related to railways and use of geosynthetics.

The following four papers and a Technical note as described makes this Special Issue a special volume by itself on Geotechnics for Advancing Transport Infrastructure;
Dependency of Cyclic Plastic Deformation Characteristics of Unsaturated Recycled Base Course Material on Principal Stress Axis Rotation by A. Inam, T. Ishikawa, and S.A. Miura; Quickness Test Approach for Assessment of Flow Slide Potentials by V. Thakur and S. A. Degago; Cement Stabilization for Pavement Material in Thailand by S. Horpibulsuk, A. Chinkulkijniwat, A. Suddeepong, and A. Neramitkornburee; Stone Columns Field Test: Monitoring Data and Numerical Analyses by Marcio Almeida, Bruno Lima, Mario Riccio, Holger Jud, Maria Cascão, Felipe Roza ; Numerical Analysis of Response of Geocell Confined Flexible Pavement by G. L Sivakumar Babu and Ram Babu.
Grateful thanks are due to all the contributing authors for their dedicated contributions.
A very high standard is maintained in the contributions in this Issue and the subsequent three Issues are also expected to be of great value. They will form a very useful contribution to our profession.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

March 2014: Geotechnics for Advancing Transport Infrastructure

Editors: Prof. Buddhima Indraratna & Dr. Cholachat Rujikiatkamjorn

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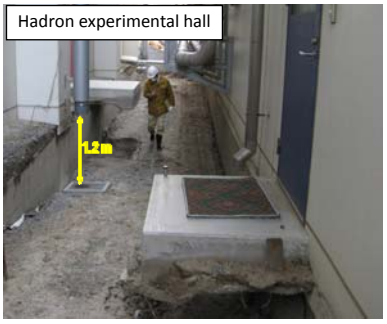
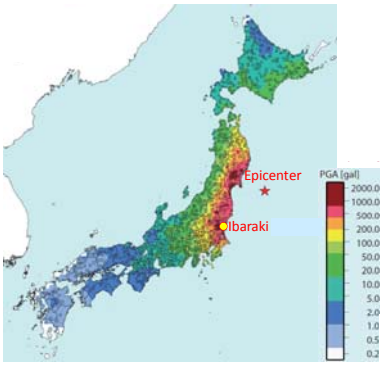
AIT Asian Institute of Technology

Editors: Prof Tatsunori Matsumoto, Prof Jurgen Grabe & Prof Der Wen Chang

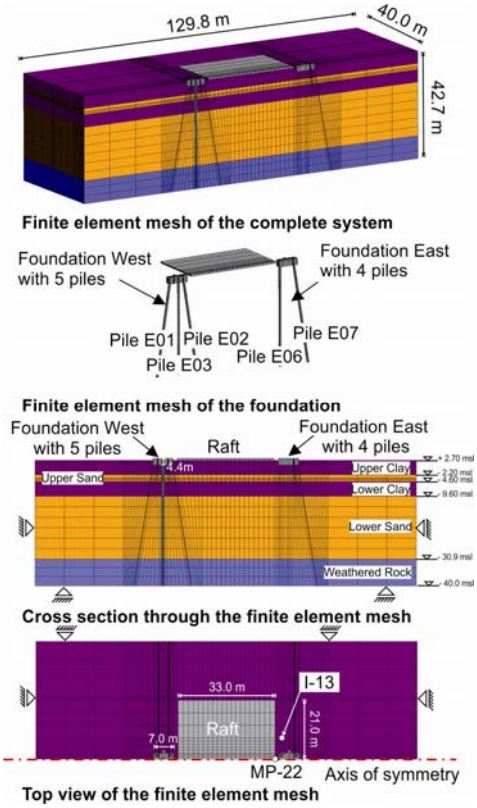


(a) Ground subsidence along building



(b) PGA map derived from strong motion records (Kunugi et al., 2012)

Piled Raft Foundation subjected to Strong Seismic Motion (After K. Yamashita *et al*, 2014)



Numerical study on pile groups subjected to lateral soil movements (After O. Reul *et al, 2014)*

GEOTECHNICAL ENGINEERING

. JUNE 2014 SPECIAL ISSUE ON DEEP FOUNDATION

Editors: Tatsunori Matsumoto, Jurgen Grabe & Der Wen Chang

Prof. Tatsunori Matsumoto

Prof. Matsumoto is now with Kanazawa University in Japan for nearly 34 years. He was educated at the Kanazawa University and received his Doctoral Degree from Kyoto University for his work on steel pipe piles in 1989. He has extensive research and practical experience on piled foundations and piled raft foundations. Prof. Matsumoto has a Shake Table Facility for the study of dynamic and earthquake type of behaviour of piled foundations. He has also worked on the centrifuge with pile groups and piled raft foundations in collaboration with Taisei Corporation. Prof. Matsumoto also has wide experience in the seismic design of raft and piled raft foundations. Prof. Matsumoto is one of the authors of the computer software PRAB—Piled Raft Analysis with Batter Piles. With this software piled raft foundation can be analyzed with vertical and horizontal loads as well as moment.

Univ.-Prof. Dr.-Ing. Jürgen Grabe

Prof. Grabe was educated in civil engineering at Hannover University/Germany and received his Doctoral Degree from Karlsruhe University/Germany for his work “Experimental and theoretical investigation of entire area compaction control using vibratory rollers” in 1992. Afterwards he worked in geotechnical consulting and construction companies for six years. In 1998 he became head of the Institute of Geotechnical Engineering and Construction Management at Hamburg University of Technology in Germany. He has extensive research and practical experience in physical, theoretical and numerical modelling in geotechnical engineering, especially in pile foundations, and marine geotechnics. Prof. Grabe has a complete soil mechanics laboratory and worked also on physical modelling in centrifuge in collaboration with University of Western Australia.

Prof. Grabe’s main research topics are geotechnical engineering in general, and marine geotechnics in particular. His methodical background covers physical modelling (1g model tests and ng model tests in collaboration with UWA), theoretical modelling (single and multiphase models for saturated and unsaturated soils based on continuum approach), numerical modelling (grid and mesh-based methods like FDM, FVM and FEM for continuum approach; meshfree methods like SPH for continuum approach, and DEM for discontinuum approach). Prof. Grabe and his research group produced 257 publications in national and international journals and conferences since 1998. From 2011 Prof. Grabe is vice president of Hamburg University of Technology, and is responsible for research in this function.

Prof. Der-Wen Chang

Prof. Chang has been the Geotechnical faculty member at The Department of Civil Engineering of Tamkang University (TKU), Taipei, Taiwan for over 22 years. He received Ph.D. in Civil Engineering at The University of Texas at Austin in 1991 and MS in Civil Engineering at Michigan State University in 1987. Prof. Chang has supervised the research work of over 60 Master Thesis and 3 Ph.D. Thesis at TKU, and published more than 190 articles as the Journal, Conf. papers and reports. Nearly all his research studies are related to numerical modeling and dynamic analyses for the geotechnical structures. His research experiences include NDT methods on pavements, seismic behaviors of the pile foundation, constitutive modeling of the soils, and recent study on the performance based design for the earth structures. Prof. Chang is also the visiting Professor at University of Washington at Seattle, US in 2008 and LN Gumilyov Eurasian National University at Astana, Kazakhstan for research studies in 2010 and 2011. Other than the research works, Prof. Chang devotes himself a great deal to serve the communities. He involves heavily and indeed shows his good performance in the public works related to education and constructions. Prof. Chang is currently serving as the Int. Secretary General of Chinese Taipei Geotechnical Society, GC member at SEAGS and Editorial Panel for SEAGS/AGSSEA J. of Geotechnical Engineering, and TC212 member at ISSMGE.

GEOTECHNICAL ENGINEERING

FORWARD

The theme of the 2014 June issue is Deep Foundations. Prof. Tatsunori Matsumoto at Kanazawa University, Japan and Prof. Jurgen Grabe at Hamburg University of Technology, Germany are the guest editors while Prof. Der-Wen Chang at Tamkang University, Taiwan is the in-house editor. Prof. Der Wen Chang also undertook all the administrative works related to the review of the articles and co-coordinating with the Guest Editors, Authors and Reviewers. After 18-month of preparations, thirteen papers were finally selected and are published in this Issue.

The content of this issue covers up mainly the task force studies 1~5 of ISSMGE TC212. More than half of the technical papers are based on observations of the experimental works. Axial Bearing Capacity and Static Cyclic Loading Behaviours of the Model Piles and/or Pile Group are respectively examined by Aoyama *et al.,* Hwang *et al.* and Ünsever *et al.* Case studies on Response of Laterally Loaded Nonlinear Piles are shown by Wei Dong Guo. Seismic Performance of the Piles from Field Measurements is discussed by Yamashita *et al.* Seismic Soil-structure-foundation Behaviours with Liquefaction concerns from the Shaking Table Test with Numerical Comparisons are discussed in the study made by Zhang *et al.*. An Overview of the Deep Foundation Systems of the High-rise Buildings can be found by Katzenbach and Dr. Leppla.

On the other hand, a number of numerical studies can be found on simulating the pile foundation behaviors. The topics include: Energy Pile with Feasible Material Modeling by Ma *et al.*, Passive Loading Effects on Piles by Moormann and Aschrafi, Dynamic Load Testing on Pipe Piles Compared to Case Study by Phan Ta *et al.*, Laterally Loaded Nonlinear Piles by Wei Dong Guo, Seismic Performance of the Piles using Reliability Method by Chang *et al.*, and Bearing Behaviours of Pile Group and/or Piles respectively discussed by Wu and Yamamoto, Reul *et al.* and Ünsever *et al.*

It is the sincere wish of the editors that this issue can provide a good record for the advanced works on deep foundation research. Sincere gratitude is expressed by the editors to the delegates and the reviewers who have contributed tremendous time and efforts in making this Remarkable Issue feasible and to complete the work within very strict timelines.

Tatsunori Matsumoto
Jurgen Grabe &
Der Wen Chang

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

This special Issue on Deep Foundations as edited by Prof. Tatsunori Matsumoto, Prof. Jurgen Grabe and Prof. Der Wen Chang have thirteen excellent papers. Each paper being reviewed by at least two reviewers and some by more than two. The authors of the papers as per the Table of Contents and in that order are: C. Moormann and J. Aschrafi; Xiaolong Ma, Gang Qiu and Jürgen Grabe; L. Phan Ta , T. Matsumoto and H. Nguyen Hoang; K. Yamashita, T. Hashiba, H. Ito and T. Tanikawa; Y.S. Unsever, T. Matsumoto, S. Shimono and M.Y. Özkan; J.H. Hwang, Z.X. Fu, P.Y. Yeh and D.W. Chang; D.W. Chang, Y.H. Lin, H.C. Chao, S.C. Chu and C.H. Liu; Wei Dong Guo; Y. Wu and H. Yamamoto; F. Zhang, R. Oka, Y. Morikawa, Y. Mitsui, T. Osada, M. Kato and Y. Wabiko; S. Aoyama, L. Danardi, L. Bangan, W. Mao, S. Goto and I. Towhata; O. Reul, J. Bauer and C. Niemann; and R. Katzenbach and S. Leppla

Indeed the papers are excellent and deal with: Numerical Investigation of Passive Loads on Piles in Soft Soils; Simulation of an Energy Pile using Thermo-hydro-mechanical Coupling and a Visco-hypoplastic Model; Studies on Dynamic Load Testing of an Open-ended Pipe Pile with a Case Study; Performance of Piled Raft Foundation Subjected to Strong Seismic Motion; Static Cyclic Load Tests on Model Foundations in Dry Sand; Axial Bearing Behaviour of a Model Pile in Sand under Multiple Static Cycles; Seismic PBD of Piles from Monte Carlo Simulation using EQWEAP Analysis with Weighted Intensities; Case Studies on Response of Laterally Loaded Nonlinear Piles; Analysis of the Effect of Pile Tip Shape on Soil Behaviour Around Pile; Shaking Table Test on Superstructure-foundation-ground System in Liquefiable Soil and its Numerical Verification; Model Loading Tests on the Bearing Behaviour of a Group Pile and Ground Deformation; the Bearing Behaviour of Pile Groups Subjected to Lateral Pressure due to Horizontal Soil Movements; Deep Foundation Systems for High-rise Buildings in Difficult Soil Conditions.

Thus this Issue is unique in its own way in covering, theory, and practice via laboratory and field tests on model piles and under full scale conditions. Both static and dynamic loading conditions as well as earthquake type of loading; also the laboratory tests also include shaking table tests.

The authors of the papers and the editors are to be congratulated for this master-piece of work . Both Prof Tatsunori Matsumoto and Prof Der Wen Chang are also the guest editors of our June 2011 Issue of the journal and this Issue have seen the contributions of Prof. Jurgen Grabe as well as a Guest Editor.

We hope this Issue of the Journal will be of immense value to researchers and practitioners.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

JUNE 2014: SPECIAL ISSUE ON DEEP FOUNDATION

Editors: Tatsunori Matsumoto, Jurgen Grabe & Der Wen Chang

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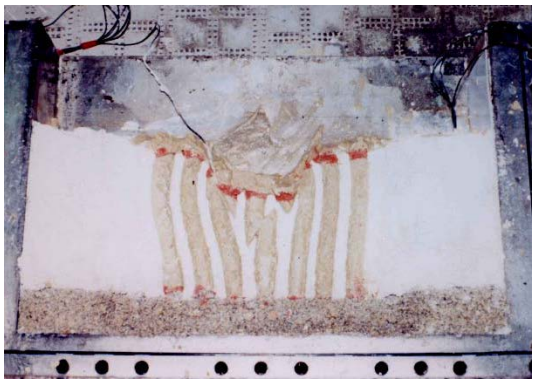
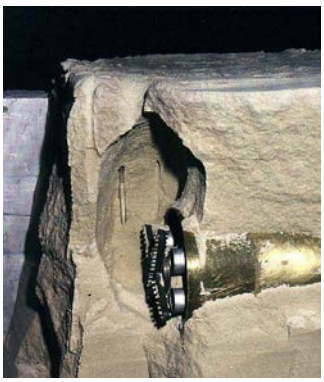


Failure mode of compacted sand piles
(After Kitazume et al., 2014)



Unsupported cavity (After König et al., 2014)

View of a soil confined coal ash embankment
(After Viswanadham & Mathur, 2014)

Run-out modelling of Byneset landslide
(After Thakur & Nigussie, 2014)

GEOTECHNICAL ENGINEERING

September-2014 Issue : Centrifuge Modelling of Geotechnical Infrastructures

Edited By Prof. B.V.S. Viswanadham, Prof. Christophe Gaudin & Prof. Tom Schanz

Prof. B.V.S. Viswanadham

Prof. Viswanadham obtained his PhD (Dr.-Ing.) from the Ruhr-University of Bochum, Germany in November 1996. He obtained his Bachelor degree in Civil Engineering from the Andhra University, Visakhapatnam, India in 1987 and thereafter did his Master of Technology in Civil Engineering with Geotechnical Engineering as a specialization from the Indian Institute of Technology Madras (IIT Madras), Chennai, India in 1989. Before joining the Indian Institute of Technology Bombay (IIT Bombay) in December 1998, he worked as a Senior Project Officer, Department of Ocean Engineering, IIT Madras and as a Scientist, Geotechnical Engineering Division, Central Road Research Institute, New Delhi for about eleven years. Currently, Prof. Viswanadham is working as a Professor in the department of Civil Engineering with geotechnical engineering as a specialization. The research interest of Prof. Viswanadham is on: (1) Centrifuge model studies on the behaviour of geotechnical structures; (2) Environmental Geotechnics with a special reference to landfill waste containment systems; (3) Ground improvement using Geosynthetics and studies on the behaviour of geosynthetic reinforced soil structures; (4) Natural hazard mitigation – landslides and slope protection; (5) Bulk utilization of waste materials especially coal ash. He has published 120+ technical papers in peer-reviewed international journals/International conferences/National conferences.

Prof. Viswanadham is a Co-ordinator of the National Geotechnical Centrifuge Facility available at IIT Bombay. He has focused in disseminating knowledge on centrifuge modelling to Students/Professionals through courses (for both undergraduate and post-graduate levels) and continuing education programme courses at IIT Bombay with an aim to establish centrifuge modelling technique as an essential tool for studying problems in geotechnical and Geoenvironmental Engineering. Prof. Viswanadham is the Member of the Technical Committee for Physical Modelling on Geotechnics (TC104) of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), and the Chair of the Ist Asian regional workshop on the Centrifuge Modelling for Geotechnical Infrastructure to be held in IIT Bombay in November 14-16, 2012.

Prof. Christophe Gaudin

Prof. Gaudin graduated with a Doctorate in Engineering Science from the Ecole Centrale de Nantes in November 2002. He subsequently joined the Centre for Offshore Foundation Systems (COFS) in July 2003 and was appointed as Manager of the UWA centrifuge facilities. He was promoted Research Professorial Fellow in 2009 and hold since the position of Deputy Director of COFS. His research interests cover offshore anchoring systems and shallow foundations, pipeline-soil interaction and similitude principles associated with centrifuge modelling, for which he has authored 90+ referred publications.

As manager of the UWA centrifuge facilities and a team of 8 technicians, Prof Gaudin has focused on establishing centrifuge modelling techniques as an essential tool to assist the offshore industry in developing and designing foundation solutions. He has built a strong relationship with the offshore industry, raising over $3.5M of research funding and producing 50+ consulting reports.

Since 2010, Prof. Gaudin is the Chair of the Technical Committee for Physical Modelling on Geotechnics (TC104) of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), and the Chair of the 8th International Conference on Physical Modelling in Geotechnics to be held in Perth in 2014. His goals as TC Chair for the current term are notably to increase awareness of centrifuge modelling techniques and capabilities in the geotechnical engineering community, both in academia and industry, and to support the emergence of new centrifuge centres around the world.

Prof. Tom Schanz

Prof. Tom Schanz received his PhD at ETH Zurich on the mechanical behavior of granular mixture. This period followed a PostDoc stay at Kagoshima University (Japan). Thereafter he received his habilitation at University Stuttgart (Germany). After ten years as Professor at Bauhaus-University Weimar (Germany) he is nowadays head of the Laboratory of Foundation Engineering, Soil- and Rock Mechanics at Ruhr-University Bochum, Germany. The laboratory is running currently two geotechnical centrifuges since about 30 years. Research projects involving these equipments cover all subjects from environmental engineering, natural hazard assessment and nowadays problems involving unsaturated soil mechanics. Beside the centrifuge center the laboratory is running an excellent equipped soil dynamics and clay lab. Tom's research papers cover a wide range of theoretical, experimental and numerical subjects, as unsaturated soil mechanics, physico-chemical clay behavior, constitutive models, earthquake engineering and application of numerical methods to geomechanical problems. Tom is member of international committees as Unsaturated soils and European Numerical methods, he is chairman of the German committee for Numerical Methods in Geotechnics.

GEOTECHNICAL ENGINEERING

FORWARD

By Prof Viswanadham, and Dr.Ooi Teik Aun & Dr. Hanh Quang Le

A growing number of papers were received from time to time by authors who have an active interest in the journal. It is the only journal and SE Asia and we need to cater well for all authors.

As such, this Issue of the Journal is in two parts. The First Part is edited by Prof. Viswanadham and his team on Centrifugal Model Tests. The second part is edited by the in-house editors of the Journal.

Part 1: Centrifuge-based Physical Modeling

It is a pleasure for us to be Guest Editors for this Special Issue on Centrifuge-based Physical Modeling. There are seven excellent papers:

Centrifuge Modelling of Improved Ground; Simulation of Soil Movement in Geotechnical Centrifuge Testing – Deep Excavations, Tunnelling, Deposit; Run-out of sensitive clay debris: significance of the flow behaviour of sensitive clays; Verification of the Generalized Scaling Law for Flat Layered Sand Deposit; Performance of Rail Embankments Constructed with Coal Ash as a Structural Fill Material: Centrifuge study; Centrifuge Model Tests on the Use of Geocomposite as an Internal Drain in Levees; Field scale tests for determination of pullout capacity of suction pile anchors under varying loading conditions.

The authors of these papers are M. Kitazume, Y. Morikawa and S. Nishimura; D. König, O. Detert andT.Schanz; V. Thakur and D. Nigussie; T. Tobita, S. Escoffier, J. L. Chazelas and S. Iai; B.V.S. Viswanadham and V.K. Mathur; Vijaya Ravichandran, R. Ramesh, S. Muthukrishna Babu, G.A.Ramadass, M.V.Ramanamoorthy and M.A. Atmanand

With an aim of disseminating knowledge and expertise about the centrifuge based physical modelling techniques, the Technical committee TC 104 on Physical Modelling in Geotechnics of the *International Society of Soil Mechanics and Geotechnical Engineering* (ISSMGE) is organizing regional workshops first in Europe and Asia. The first Asian workshop on Physical Modelling in Geotechnics (Asiafuge2012) was held in Mumbai, India in November 14-16, 2012 and was organised in association with Indian Institute of Technology Bombay, Mumbai, India, and the Indian Geotechnical Society Delhi with an emphasis on the application of centrifuge-based physical modelling for infrastructure development. Selected themes included *soft ground problems, foundations, deep excavations, slopes and embankments, earthquakes, climate change, ground improvement techniques, tunnels, offshore foundation systems, environmental geotechnics, geosynthetics and novel construction techniques in infrastructure geotechnics*. The above papers were selected by a scientific committee consisting of delegates, who attended Asiafuge 2012.

B.V.S. Viswanadham (Lead Guest Editor)
C. Gaudin
T. Shanz

Part 2: Contributed Papers

In this part there are 7 contributed papers on mobile information system for risk management in urban underground construction; Design methods in Segmental Tunnel Linings; Challenges in constructing urban tunnels; Bulk compression of dredges soils; Energy piles; Bored piles in residual soils and Centrifugal shaking table tests on reinforced earth embankments.

The authors of the papers are: Hanh Quang Le and Bin-Chen Benson Hsiung; N.A. Do, D. Dias, P.P. Oreste, I. Djeran-Maigre; R. Katzenbach and S. Leppla; Hiroshi Shinsha and Takahiro Kumagai; A.M. Tang, J.M. Pereira, G. Hassen, N. Yavari; Mutiasani Dianmarti Kusuma and Eng-Choon Leong; W.Y. Hung , J.H. Hwang, C.J. Lee.

The editorial team of the contributed papers are most grateful to the authors and the reviewers for their excellent job. Most papers in Part 2 were presented in Geotech Hanoi 2013, but were modified significantly and had been subjected to extensive review.

Ooi Teik Aun (Lead Editor Part 2)
Hanh Quang Le
Noppodol Phienwej

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

A growing number of contributed papers are now received for the journal. As such this Issue is in two parts; Part 1 is on Centrifuge based Physical Modelling with Prof. B.V.S. Viswanadham as lead editor. There are six papers contributed in this part. Part 2 of the Issue is on contributed papers as edited by In-house Editors Dr. Ooi Teik Aun and Dr. Hanh Quang Le. The future Issues of the Journal will also have papers edited by Guest Editors on theme Issues and contributed papers on a wide range of topics which are of great interest to our Geotechnical Community in SE Asia and elsewhere.

The topics and the authors are adequately described in the Foreword. The reviewers are not named here. But most papers had more than two reviewers. Special thanks are extended to the Editors, authors and reviewers for their excellent work.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

SEPTEMBER 2014: SPECIAL ISSUE ON CENTRIFUGE MODELLING OF GEOTECHNICAL INFRASTRUCTURE

Editors: B.V.S. Viswanadham, Christophe Gaudin & Tom Schanz

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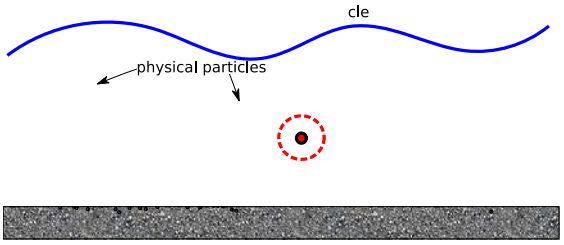
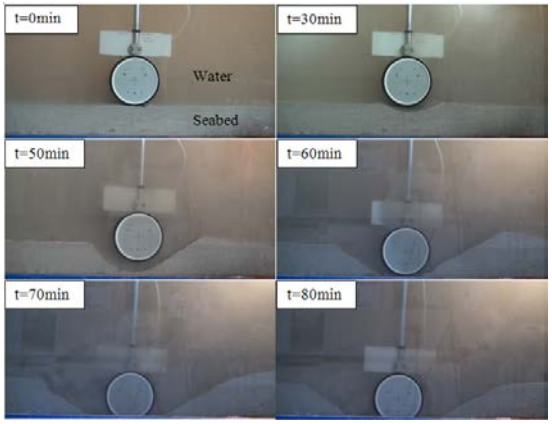
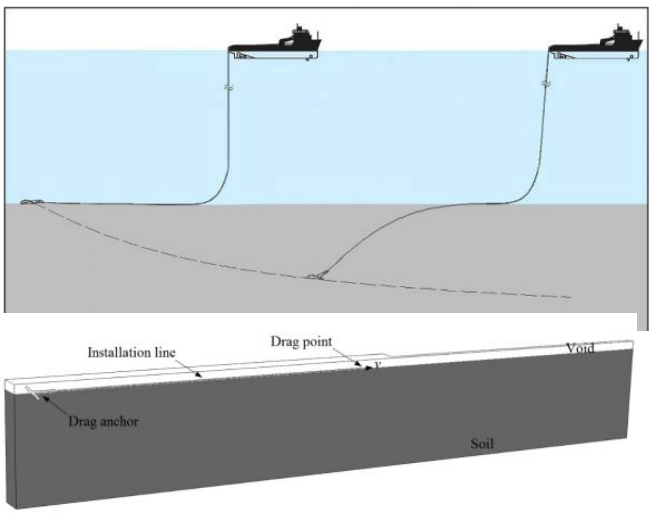
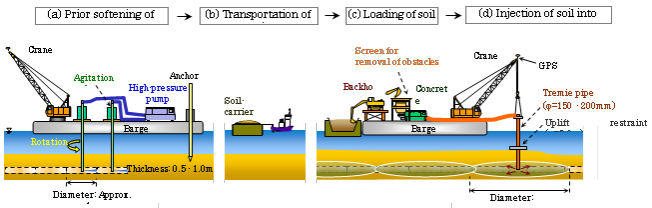


Computational representation of sand particles in the Eulerian -Lagrangian Modeling of coastal sediment transport (After Sun et al., 2014)





Sketch of the drag anchor installation and its FE model (After Liu and Zhao, 2014)



GEOTECHNICAL ENGINEERING

December-2014 Issue: Offshore and Coastal Geotechnics

Edited By Shinji Sassa, Poul V. Lade, Lizhong Wang, Yean K. Chow, Dong S. Jeng, Chiristophe Gaudin & Fuping Gao

Dr. Shinji Sassa

Dr. Shinji Sassa is Head of Soil Dynamics Group and Research Director of Asia-Pacific Center for Coastal Disaster Research (APaC-CDR) at Port and Airport Research Institute, Japan. He obtained his Dr. Eng. from Kyoto University. He is best known for his seminal works on wave-induced seabed liquefaction that have been extensively cited worldwide. His main research areas are Waterfront and Coastal Geotechnics, Subaqueous Sediment Gravity Flows and Ecological Geotechnics. These pioneer and address the multidisciplinary research encompassing Geotechnics, Hydraulic/Coastal Engineering, Geophysics and Ecology. He was an invited panelist, twice, at the 15th and 17th International Conference on Soil Mechanics and Geotechnical Engineering, ISSMGE. He has been a member of the International Geoscience Programme of United Nations Educational, Scientific and Cultural Organization on Submarine Mass Movements and Their Consequences, and served as a panelist leader at the UNESCO SMMTC conference in Kyoto 2011. He is also the Technical-Oversight-Committee nominated member of TC213 on Scour and Erosion of ISSMGE. He is the recipient of several distinguished awards, including the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, the Best Paper Award twice and the Best Technical Development Award from the Japanese Geotechnical Society and the Presidential Award from PARI. His selected papers have been published in the world-leading journals in the diverse fields of geotechnics, geophysics and ecology such as Géotechnique, Journal of Geophysical Research, Geophysical Research Letters and Marine Ecology Progress Series concerning liquefaction, sediment transport and geomorphodynamics, submarine landslides, and benthic ecology in estuarine, coastal and marine area.

Prof. Poul V. Lade

Dr. Poul V. Lade joined The Catholic University of America (CUA) in Washington, D.C. in 2003. He was educated at the Technical University of Denmark in Copenhagen and received his Ph.D. degree at University of California at Berkeley in 1972. Before coming to CUA, he was on the faculty at UCLA for 21 years (1972-1993) before moving to The Johns Hopkins University in Baltimore (1993-1999) and to Aalborg University in Denmark (1999-2003). He was a member of Geotechnical Engineering Technical Group in Los Angeles from 1974 and he served as chairman in 1978-79.

Professor Lade's research interests in Geomechanics include experimental methods, three-dimensional stress-strain and strength behavior of soils during monotonic loading and large three-dimensional stress reversals, stability, instability and liquefaction of granular materials, time effects in soils, constitutive modeling of frictional materials such as soil, rock, and concrete employing elasticity and work-hardening, isotropic and kinematic plasticity theories, and deformation and stability analyses of foundation engineering problems. He has given numerous conference presentations and short courses on stress-strain behavior and constitutive modeling of soils in North America, Europe, Asia, and Australia/New Zealand. He has nearly 300 publications based on research performed with support from the National Science Foundation (NSF) and from the Air Force Office of Scientific Research (AFOSR). His Science Citation Index is approximately 3000 and his H-index is currently 29.

Professor Lade is a member of several geotechnical engineering societies and he currently serves as Editor for the Americas of Geomechanics and Engineering (Techno Press, Korea), and he serves on the Editorial Boards of six other journals dealing with Geomechanics and Geotechnical Engineering. He was awarded "Professor Ostenfeld's Gold Medal for original contributions to engineering science research on behavior and constitutive modeling of soils" from the Technical University of Denmark in 2001, and he was elected member of the Danish Academy of Technical Sciences in 2001.

Prof. Li-zhong Wang

Prof. Lizhong Wang is a vice dean of Civil Engineering and Architecture College, Zhejiang university, China. He earned his Phd in Zhejiang University in 1995 and became a Professor in 2000. He was a visiting scholar in NGI in 2006. Prof. Lizhong Wang has been long engaged in the research on marine soil mechanics and marine geotechnology. His research includes the constitutive behavior of marine soils,offshore pipelines, mooring systems, subsea tunneling,seabed geohazards and offshore wind turbine foundations.

Prof. Lizhong Wang was granted the first prize in Scientific and Technological Progress Award of Chinese Universities in 2011(Rank No.1). His research achievements were successfully applied in more than 20 major projects both at home and abroad. He was granted one national invention patent and four utility patents. Besides, he participated in establishing standards and engineering design guide. He has published 108 Journal papers, including 34 SCI-indexed and 60 EI-indexed papers. His research achievements were recognized by the international peers and he was appointed as an international external evaluator in the joint project of Bangladesh and Norway.He organized International symposium of coastal & offshore geotechnics in 2012.

Prof. Y.K. Chow

Professor CHOW Yean Khow joined the National University of Singapore (NUS) as a in 1982 and became a Professor in 1999. Prior to joining NUS, he practised as an offshore geotechnical engineer with Fugro Limited (UK), mainly involved in the design and installation of offshore foundations in the North Sea. He served as the Head of the Division of Geotechnical and Transportation Engineering from 1995 to 1998. He was the Deputy Head (Administration) of the Department of Civil Engineering from 1998 to 2000. From 2000 to 2003, he was Vice-Dean (Graduate Studies) and from 2003 to May 2008 Vice-Dean (Academic Affairs & Graduate Studies) of the Faculty of Engineering. He is the Executive Director of the Centre for Offshore Research & Engineering (CORE) from July 2008.

Professor Chow's main research interests are in offshore foundation engineering, offshore pipelines/risers, computational geomechanics, soil-structure interaction, piles and piled raft foundations, and effects of construction activities such as deep excavations and tunnelling on pile foundations. He has published extensively, with over 200 technical publications including over 80 in international refereed journals. He is on Editorial Board of the following international journals: International Journal of Geomechanics (ASCE), Computers and Geotechnics (Elsevier), and Geomechanics and Geoengineering (Taylor & Francis). He is a member of the Board of Directors of the International Association for Computer Methods and Advances in Geomechanics. He is a Registered Professional Engineer (Civil) and a Specialist Professional Engineer in Geotechnical Engineering in Singapore. He has served as geotechnical consultant to numerous projects in Singapore and the region.

Prof. Dong Sheng Jeng

Prof. Dong Sheng Jeng is currently at Division of Civil Engineering, the School of Engineering, Physics and Mathematics, University of Dundee. He was educated in National Chung-Hsing University in Taiwan and received his Doctoral Degree from the University of Western Australia. Prof. Jeng was also at the Griffith University and University of Sydney before as a staff member. Prof. Jeng has been working in the area of offshore geotechnics since 1993. His most significant contributions have been in the field of coastal geotechnical engineering, specifically issues associated with wave–seabed–structure interaction (WSSI), which have a major bearing on the understanding and construction of coastal structures. He established the first analytical solutions for the inherent problems of WSSI in 3D short-crested wave systems and revised the conventional consolidation equation for anisotropic seabeds with variable permeability to obtain closed-form solutions. His 3D models allow the determination of wave-induced oscillatory liquefaction in front of breakwaters under obliquely incident wave; this represents the most dangerous condition and one that cannot be dealt with using either 1D or 2D models. My analytical solutions have been widely used for verifying numerical simulations and for determining wave surface profiles using measured pore pressure in marine sediments. These solutions were the basis of a major chapter in 'The mechanics of scour in the marine environment' (Chapter 10, Sumer & Fredsøe, 2002) and have been widely used by coastal engineers for the prediction of wave-induced oscillatory liquefaction around marine structures and the installation of *in situ* facilities.

Currently, Prof. Jeng and his students are working on the development of poro-elastoplastic models for post-liquefaction and densification in marine sediment under dynamic loadings (such as waves, currents and earthquakes etc.). This is also part of his current EU project—MERMAID (2012-2016). They are also establishing new conceptual model for pore pressure accumulations in marine sediment with instant cyclic shear stresses, unlike the existing models based on the maximum cyclic shear stresses.

Prof. Jeng has won a large number of competitive research grants in offshore and coastal geotechnics and has published in most of the leading Geotechnical Engineering and other journals; His journal publications exceed over one hundred.

Prof. Christophe Gaudin

Prof. Gaudin graduated with a Doctorate in Engineering Science from the Ecole Centrale de Nantes in November 2002. He subsequently joined the Centre for Offshore Foundation Systems (COFS) in July 2003 and was appointed as Manager of the UWA centrifuge facilities. He was promoted Research Professorial Fellow in 2009 and hold since the position of Deputy Director of COFS. His research interests cover offshore anchoring systems and shallow foundations, pipeline-soil interaction and similitude principles associated with centrifuge modelling, for which he has authored 90+ referred publications.

As manager of the UWA centrifuge facilities and a team of 8 technicians, Prof Gaudin has focused on establishing centrifuge modelling techniques as an essential tool to assist the offshore industry in developing and designing foundation solutions. He has built a strong relationship with the offshore industry, raising over $3.5M of research funding and producing 50+ consulting reports.

Since 2010, Prof. Gaudin is the Chair of the Technical Committee for Physical Modelling on Geotechnics (TC104) of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), and the Chair of the 8th International Conference on Physical Modelling in Geotechnics to be held in Perth in 2014. His goals as TC Chair for the current term are notably to increase awareness of centrifuge modelling techniques and capabilities in the geotechnical engineering community, both in academia and industry, and to support the emergence of new centrifuge centres around the world.

Prof. Fuping Gao

Prof. Fuping Gao is a Principal Investigator at the Key Laboratory for Mechanics in Fluid Solid Coupling Systems (LMFS) and serving as the Director of Division of Science-Technology & Finance, Institute of Mechanics, CAS. He obtained his Master degree in Geotechnical Engineering from Beijing Jiaotong University, and PhD in Offshore Engineering Mechanics from Institute of Mechanics CAS. He was a visiting Research Assistant at Hong Kong University of Science and Technology (HKUST) in 2000; a Post-doctoral Research Fellow at the Griffith University, and the University of Western Australia (2001-2002).

His research activities involve offshore seabed/soil dynamics and fluid-structure-soil interaction modeling with applications in the offshore engineering, with recent focuses on stability analyses of submarine pipeline and riser systems, foundations for offshore renewable energy exploitation, etc. He serves as Vice Chair of the Technical Committee of Geotechnics of Soil Erosion, International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), TPC member of the International Society of Offshore and Polar Engineering (ISOPE); also serves on the editorial board of the Journal of Hydrodynamics, Theoretical and Applied Mechanics Letters, Chinese Journal of Geotechnical Engineering.

SPECIAL FEATURE STORY ON "Challenges in the Design of Tall Building Foundations"
by Prof Harry G Poulos

Prof Harry G. Poulos

Harry Poulos obtained a Civil Engineering degree from the University of Sydney in 1961, and then went on to do a PhD degree in Soil Mechanics, graduating in 1965. He worked with the consulting firm of McDonald Wagner and Priddle for a year before joining joined the Department of Civil Engineering at Sydney University in 1965. He was appointed a Professor in 1982, a position which he held until his retirement in 2001. In 1989, he joined the consulting firm of Coffey Partners International, and is currently a Senior Principal with Coffey Geotechnics. He is also an Emeritus Professor at the University of Sydney, and an Adjunct Professor at the Hong Kong University of Science and Technology.

He has published books and technical papers on foundation settlements, pile foundations, and offshore geotechnics. His main research interests continue to be in deep foundations and their application to high-rise buildings, and to problems relating to ground movements near foundations.

He has been involved in a large number of major projects in Australia and overseas including the Docklands Project in Melbourne, the Crown tower development in Sydney, Egnatia Odos highway project in Greece, high-rise foundation problems in Hong Kong, the Emirates twin Towers in Dubai. the Burj Khalifa tower in Dubai, the Incheon 151 Tower in Korea, and the Dubai tower in Doha, Qatar.

He was elected a Fellow of the Australian Academy of Science in 1988 and a Fellow of The Australian Academy of Technological Sciences and Engineering in 1996, and in 1999 was made an Honorary Fellow of the Institution of Engineers Australia. In 2010, he was elected a Distinguished Member of the American Society of Civil Engineers, the first Australian to receive this honour, and in 2014, he was elected as a Foreign Member of the US National Academy of Engineering.

He has received a number of awards and prizes, including the Kevin Nash Gold Medal of the International Society of Soil Mechanics and Geotechnical Engineering in 2005. He was the Rankine Lecturer in 1989 and the Terzaghi Lecturer in 2004, and was selected as the Australian Civil Engineer of the Year for 2003 by the Institution of Engineers Australia. In 1993, he was made a Member of the Order of Australia for services to engineering.

GEOTECHNICAL ENGINEERING

Preface

The theme of the 2014 December issue is Offshore and Coastal Geotechnics. The guest editors for this special issue are Dr. Shinji Sassa at Port and Airport Research Institute, Japan, Prof. Poul V. Lade at The Catholic University of America, USA, Prof. Li-zhong Wang at Zhejiang University, China, Prof. Yean K. Chow at National University of Singapore, Prof. Dong Sheng Jeng at Griffith University, Australia, Prof. Christophe Gaudin at University of Western Australia and Prof. Fuping Gao at Chinese Academy of Sciences. Dr. Dariusz Wanatowski at The University of Nottingham Ningbo, China contributed to the editorial management. Prof. Bala as the Editor-in-Chief and Dr. Teik A. Ooi as the President of SEAGS strongly supported the launch of this special issue on Offshore and Coastal Geotechnics.

The topics and scope covered in this special issue are comprehensive and interdisciplinary, ranging from Offshore Foundations, Seabed Liquefaction, Scour and Erosion, Marine Slope Stability and Geotechnical Aspects of Dredging and Reclamation Works to Tsunami-Seabed-Structure Interaction. The issue is comprised of twelve papers with a selection of the authors from eight countries involving Asia, Australia, Europe and USA.

Sumer summarizes recent research advances in seabed liquefaction through the use of standard wave-flume tests and centrifuge wave-soil modelling and mathematical approaches together with their implications for the stability of marine structures. Sun et al. develops and validates a new hybrid Eulerian-Lagrangian modelling framework of coastal current-induced sediment transport and sand dune migration. Liu and Zhao presents a numerical study of the penetration mechanism and kinematic behaviour of the drag anchor in soils by performing a large deformation finite element analysis. Wang et al. describes and discusses the results of a series of specially designed water flume tests on the response of silty soils under the action of combined waves and currents. Luo et al. proposes a new pipeline stability analysis method that takes into account the three-dimensional scour and pipe sinkage that were observed in an innovative large experimental facility, named the O-tube. Kohan et al. describes an improved analytical method for accurately predicting the offshore spudcan extraction resistance in soft clay and validates the method against a large database of centrifuge model tests. Jostad et al. develops and validates a new finite element procedure that accounts for 3D cyclic undrained degradation of soils with its application to a foundation design of offshore structures. Monkul et al. proposes volumetric compressibility (m_v) as an indicator of liquefaction potential for sands and silty sands that are ubiquitous in offshore and coastal deposits on the basis of a series of isotropic compression and undrained triaxial tests. Lee et al. investigates the seismic responses of a gently sloped liquefiable sand deposit confined within parallel walls of different geometry using centrifuge modelling and assesses the wall effects in relieving the excess pore pressures and the lateral spreading. Chen et al. numerically investigates the pullout behaviour of circular plate in normally consolidated clay and presents a direct design method for obtaining the uplift capacity of a circular plate anchor embedded in soils with a linearly increasing shear strength. Kumagai et al. presents and validates a new restoration method of artificial tidal flats by use of pressure injection of slurry dredge clay through the combined use of laboratory and field experiments and the finite element analyses. Sassa reports some recent research advances on tsunami-seabed-structure interaction and discusses the stability assessment for the design of tsunami-resistant structures from geotechnical and hydrodynamic perspectives.

We consider that this special issue presents and illustrates the outcome of some of the state-of-the-art research on Offshore and Coastal Geotechnics, and hope that it will make an important contribution to this growing field in the years to come.

Shinji Sassa
Poul V. Lade
Lizhong Wang
Yean K. Chow
Dong S. Jeng
Christophe Gaudin
Fuping Gao

Acknowledgement

The Year 2014 had been very successful in many ways. We were very fortunate to have an excellent Issue in March 2014 as edited by Prof. Buddima Indraratna and A/P Cholachat Rujikiatkamjorn. Prof. Buddhima Indraratna is currently Professor of Civil Engineering at the Faculty of Engineering, University of Wollongong. Concurrently, Buddhima is also the Research Director, Centre for Geomechanics and Railway Engineering; Program Leader, ARC Centre of Excellence in Geotechnical Science and Engineering; and Node Coordinator, CRC for Rail Innovation. This June Issue on Deep Foundations as edited by Prof. Tatsunori Matsumoto, Prof. Jurgen Grabe and Prof. Der Wen Chang have thirteen excellent papers. The authors of the papers and the editors of the June Issue are to be congratulated for that master-piece of work. A growing number of contributed papers were received for the journal. As such the September 2014 Issue was in two parts; Part 1 is on Centrifuge based Physical Modelling with Prof. B. Viswanatham as lead editor. There are six papers contributed in this part. Part 2 of the Issue is on contributed papers as edited by In-house Editors Dr. Ooi Teik Aun and Dr. Hanh Quang Le. We have always been keen to have a Special Issue on Centrifuge based Physical modelling. This December Issue on Offshore and Coastal Geotechnics is edited by Prof Shinji Sassa, Prof Poul V. Lade, Prof Lizhong Wang, Prof Yean K. Chow, Prof Dong S. Jeng, Prof Chiristophe Gaudin and Prof Fuping Gao. A Feature Story on "Challenges in the Design of Tall Building Foundations" by Prof Harry G. Poulos is also included for the first time in the Journal.

The Authors of the March 2014 Issue are from: Tokyo University of Science; University of Tokyo; Hokkaido Shinkansen Construction Bureau in Japan; University of Wollongong; Herriot-Watt University in UK; University of Technology Sydney; Geosyntec Consultants, Kennesaw; University of Wisconsin-Madison; Hokkaido University, Hokubu Consultants in Tokyo; University of Texas at Austin; National Highway Authority in Pakistan; Norwegian Public Roads Administration; Suranaree University of Technology in Thailand; Federal University of Rio de Janeiro, Brazil; Fluminense Federal University in Brazil; Fugro In-situ Geotechnica, Brazil; Smoltczky Partner, Germany; Indian Institute of Science, Bangalore in India;

The authors of the June Issue are from: University of Stuttgart, Germany; DB ProjectBau GmbH, Hannover, Germany; Hamburg University of Technology, Germany; HAMC University of Architecture, Vietnam; Kanazawa Graduate School of natural Science & Technology, Japan; South Vietnam Bridge Road Building Institute in Vietnam; Takanaka Corporation in Japan; Middle-East Technical University in Turkey; National Central University, Taiwan; National Tamkang University Taiwan; Hiroshima University in Japan; Nagoya Institute of Technology in Japan; University of Kassel, Germany; Technical University of Darmstart, Germany;

September 2014 Issue Authors are from: Tokyo University of Technology; Port and Airport Research Institute of Japan; Ruhr University of Bochum, Germany; Husker Geosynthetics GmbH, Gescher, Germany; Kyoto University, Japan; IFSTTAR at Nantes in France; IIT Bombay in India; NTPC Limited, Noida in India; National Institute of Ocean Technology, Chennai, in India; University of Transport & Communication, Vietnam; National Kaohsiung University of Applied Sciences, Taiwan; University of Lyon, France; Grenoble Alpes University, France; Polytecnico di Torino, Italy; Hanoi University of Mining & Geology, Vietnam; Ecole des Ponts Paris Tech, France; Nanyang Technological University, Singapore.

The December 2014 Issues have authors from: 1: Technical University of Denmark, Virginia Tech, Blacksburg, USA; Karlsruhe Institute of Technology Tianjin University, China; Chinese Academy of Sciences, China; University of Western Australia, Perth, Australia, Norwegian Geotechnical Institute, Norwegian University for Science and Technology, NTNU, Trondheim, Norway NGI Inc., Houston, Texas, USA; GS Engineering & Construction Corp., Seoul, South Korea; Yeditepe University, Istanbul, Turkey; The Catholic University of America, USA; Istanbul Technical University, Turkey; National Central University, Jhongli City, Taiwan, National University of Singapore; Fugro Singapore Pte Ltd, Singapore; Hiroshima University, Japan; Port and Airport Research Institute, Yokosuka,Japan

We have had remarkable Guest Editors since 2011. They all have done excellent job and so are the 2014 Issues. The Preface is excellent and Dr. Shinji Sassa and the co-editors are thanked for all their contributions and also summarised contents of the papers. This Issue and others in 2014 will be of great use to our Geotechnical Community in SE Asia and elsewhere.

Additionally, an attempt is made to have Feature Stories in the Issues starting with December 2014 Issue. These feature stories are to be written by invited authors as drawn from our international community with extensive and authoritative experience. Prof. Harry G Poulos accepted our invitation to have an article in the December 2014 Issue. This is to be followed by Prof. Robert Mair of Cambridge University on "Geotechnical Challenges encountered in the London Metropolitan Subway System", followed by Prof. Ikuo Towhata on "Coping with the Natural Hazards, Challenges in Japan and elsewhere". The subsequent one is by Dr. John Endicott of his "Decades of experience in Major Projects in Hong and Singapore". Prof. Harry G Poulos is thanked for helping to start this feature stories in our journal.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 45 No.4 December 2014 ISSN 0046-5828

GEOTECHNICAL ENGINEERING

DECEMBER 2014: SPECIAL ISSUE ON Offshore and Coastal Geotechnics

Editors: Shinji Sassa, Poul V. Lade, Lizhong Wang, Yean K. Chow, Dong S. Jeng, Chiristophe Gaudin & Fuping Gao

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ASIAN INSTITUTE OF TECHNOLOGY (AIT) and
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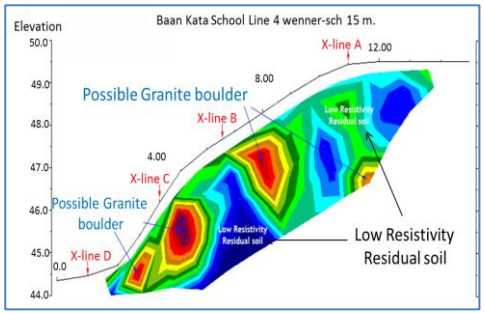
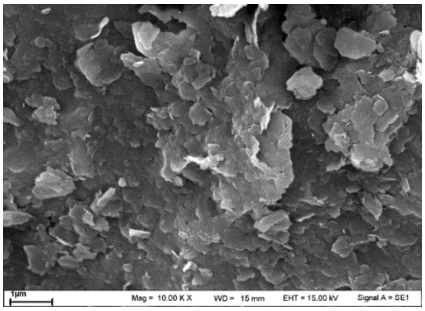
Editors: Suched Likitlersuang, Suksun Horpibulsuk, Suttisak Soralump, Tirawat Boonyatee Suchatvee Suwansawat, and Thanakorn Chompoorat

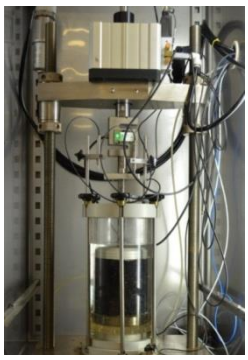
Embankment completed construction works at AIT (After Otha, 2015)



Results of electrical prospecting from resistivity test (After Ohtsu et al., 2015)



SEM photograph of Bangkok clay (After Por et al., 2015)



Dynamic creep test setup in wet condition (After Chompoorat and Likitlersuang, 2015)

GEOTECHNICAL ENGINEERING

March 2015 Issue: Special Country Issue of Thailand – Dr. Surachat Sambhadharaksa Memorial Issue Advances in Geotechnical Engineering for Infrastructure Developments in Thailand

Edited by : Suched Likitlersuang, Suksun Horpibulsuk, Suttisak Soralump, Tirawat Boonyatee Suchatvee Suwansawat, and Thanakorn Chompoorat

Suched Likitlersuang

Suched Likitlersuang graduated with a bachelor degree in civil engineering from Chulalongkorn University in 1998 and received a master in geotechnical engineering from Asian Institute of Technology in 2000. He attained a doctorate in civil engineering from the University of Oxford in 2004. Suched is currently a full professor at the Department of Civil Engineering, Chulalongkorn University. He is members of the Thai Geotechnical Society and the Engineering Institute of Thailand. He is also an Editorial Board member of Geotechnical Research and serves as a Guest Editor of the Southeast Asian Geotechnical Society Journal special issue for Thailand. Suched has published over 70 articles in international conference proceedings and international journals. His research interests include constitutive modelling for geomaterial and asphaltic concrete, stress-strain characteristic of soils, numerical analysis in geomechanics, geo-environments, geotechnical earthquake engineering and soil bioengineering.

Thanakorn Chompoorat

Thanakorn Chompoorat was born in Thailand in 1980. He graduated the Bachelor degree in Civil Engineering from Srinakharinwirot University in 2003. He also received the Master and the Doctoral degrees in Geotechnical Engineering from Chulalongkorn University in 2005 and 2009 respectively. He is currently an Assistant Professor and Assistant Dean for Research and Academic Service of the Department of Civil Engineering, University of Phayao. Thanakorn is a member of the Thai Geotechnical Society as well as the Engineering Institute of Thailand and presently also serves as an Editorial Secretary of the Southeast Asian Geotechnical Society Journal special issue for Thailand. His main research interests are soil behaviour and pavement material behaviour, numerical analysis for soil and pavement material, and constitutive modelling and plasticity.

GEOTECHNICAL ENGINEERING

PREFACE

Welcome to Geotechnical Engineering Journal of the Southeast Asian Geotechnical Society (SEAGS) and the Association of Geotechnical Societies in Southeast Asia (AGSSEA). It is our great pleasure to serve as the editors for the first issue of 2015 and also the special country issue of Thailand. Our editorial team consists of Prof. Suched Likitlersuang from Chulalongkorn University, Prof. Suksun Horpibulsuk from Suranaree University of Technology, Dr. Suttisak Soralump – President of Thai Geotechnical Society, Dr. Tirawat Boonyatee – Vice president of Thai Geotechnical Society, Prof. Suchatvee Suwansawat – President of Engineering Institute of Thailand, and Dr. Thanakorn Chompoorat from Univerisity of Phayao. We are also supported by Prof. A.S. Balasubramaniam as the editor-in-chief and Dr. Teik Aun Ooi as the president of SEAGS to launch this special issue. The rigorous blind peer-review process has been carried out by international reviewers, while every effort was carefully made to ensure the technical quality of the journal. We highly appreciate our reviewers for their time and effort.

The theme of this special issue is *Advances in Geotechnical Engineering for Infrastructure Developments in Thailand*. The articles cover a wide range of topics from theoretical soil mechanics to geotechnical applications for Thailand's infrastructure developments. This special issue of Geotechnical Engineering Journal of the SEAGS & AGSSEA is comprised of fourteen articles with a selection of authors from four countries including Australia, China, Japan and Thailand.

The first invited paper by Ohta (2015) presents consolidation settlement due to the embankment construction on soft Bangkok clay. The paper also acknowledges the technical communication with Dr. Surachat Sambhandaraksa related to consolidation settlement. Two papers (Ohtsu et al., 2015 and Jotisankasa et al., 2015) present field studies of slope stability due to rainfall in Thailand. The topics related to ground improvement for soft soil are still interested in this issue such as using chemical stabilisation (Horpibulsuk, et al., 2015, Fan, et al., 2015 and Julphunthong, 2015) and vacuum consolidation technique (Shibata et al., 2015). Two papers (Ukritchon and Boonyatee, 2015 and Horpibulsuk and Liu, 2015) related to soil modelling and its parameter calibration are included in this issue as well. Chompoorat and Likitlersuang (2015) summaries mechanical properties of hot mix asphalt for pavement design. Undrained shear strength of Bangkok clays from various laboratory techniques are discussed by Ratananikom et al. (2015). A review of pile foundation design on Bangkok subsoils is presented by Boonyatee et al. (2015). 3D finite element analysis of the potential use of piled raft foundation on Bangkok subsoils is proposed by Watcharasawe et al. (2015). Lastly, Por et al. (2015) presents a laboratory investigation of expansive soil behaviour.

We consider that this special issue summaries some recent advances in geotechnical engineering for infrastructure developments in Thailand. We also hope that it could make an important contribution to other countries in the Southeast Asia.

Suched Likitlersuang
Thanakorn Chompoorat

ACKNOWLEDGEMENT

At the very outset, we would like to acknowledge the skill of Prof. Suched Likitlersuang, who headed the team of Guest Editors in producing this excellent issue. This issue honours the late Dr. Surachat Sambhandaraksa a very long time friend of ours and a past president of the SEAGS. This is also the Thai country issue produced in such a short time, while some other country issues will only appear in 2016. The topics and the authors are adequately described in the Preface. The SEAGS and the AGSSEA as well as the Thai Geotechnical Society (TGS) are very grateful to the Editors, authors and reviewers for their excellent work.

A good teacher is often measured by the quality of his students. Dr. Surachat had graduated from Chulalongkorn University going to almost all the good universities to do doctoral studies. It is appropriate to have a brief biodata of Dr. Surachat.

Dr. Surachat Sambhandharaksa, a past president of the Southeast Asian Geotechnical Society (SEAGS) from 1996 to 1999. A modest and clever achiever, Surachat was the earlier colleague of late Dr. Chai Muktabhant and Prof. Vichien Tengamnuey at Chulalongkorn University. Surachat always had an international outlook with his early education at the University of New South Wales in Australia in 1967; then his master degree from the Asian Institute of Technology (AIT) in 1970; later Surachat went to the Northwestern University and finally obtained his Sc.D. degree from the Massachusetts Institute of Technology (MIT), the United States of America in 1977. When he returned to Chulalongkorn University, Surachat was also a lecturer much in demand at the AIT. He was actively involved in most of the major projects in Bangkok and Thailand. He has real world experience in geotechnical engineering practice with sound knowledge on the fundamentals of soil behaviour. His practice is in embankments and piled foundations. He was a much sort out consultant in Bangkok. At AIT, we needed a person like Surachat to teach our design courses. Surachat also taught a popular course for non-soil engineers and this is really popular. Surachat, received the Outstanding Award of the Teaching from Chulalongkorn University and was voted as the best Geotechnical Engineer in Thailand in 2006. He was also, the chairman of the organizing committee of the 15th Southeast Asian Geotechnical Conference held in Bangkok in November 2004. Popularly called as Sam at MIT, Surachat has a charming personality always joyful and friendly in nature. Surachat hails from a good family with his father as the professor of surgery at the Faculty of Medicine in Chulalongkorn University. We all miss him a lot and his premature death is a great loss to his family and friends.

Finally, Dr. Surachat is highly respected internationally, Prof. Harry Poulos made the comment as follows:

"Dr Surachat was a leading figure in Geotechnical engineering in Thailand for many years, and a person who was vastly experiencing in identifying and solving problems related to foundations in the often-challenging ground conditions in Bangkok. I first met him at one of the early Southeast Asian Geotechnical conferences, and it was quite clear that his knowledge of the characteristics of Bangkok soils was second to none, and that he was well-placed to advise clients on foundation design in these soils. He was also was a congenial host and dinner companion at a number of conferences held in Bangkok. Apart from his practical geotechnical skills, he was able to pass on his knowledge to many students who had the privilege of studying under him at Chulalongkorn University and at AIT. He was very proud of his educational background, first in Australia, and then at MIT, where he studied with some of the pioneers of soil mechanics such as Lambe, Ladd and Whitman. He achieved recognition for his expertise both in Thailand and in Southeast Asia more generally, and with his passing, the Southeast Asian region has lost one of its elder statesmen in the geotechnical profession."

Finally, We thank the Guest Editors, the authors of the papers and the reviewers , who made the most valued contribution in making this Issue feasible.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

March 2015 Issue: Special Country Issue of Thailand – Dr. Surachat Sambhadharaksa Memorial Issue Advances in Geotechnical Engineering for Infrastructure Developments in Thailand

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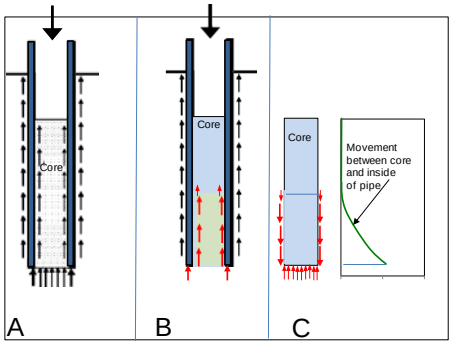
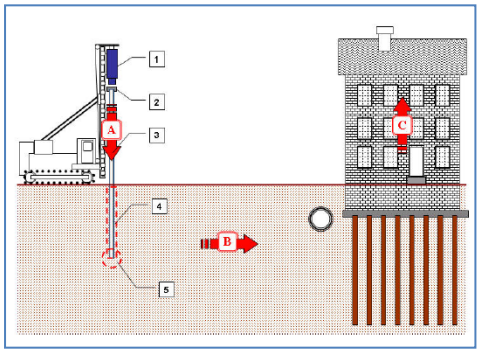
Editors: San-Shyan Lin, Charng Hsein Juang, and Robert Liang



Advancing an open-toe pipe pile
(After Fellenius 2015)



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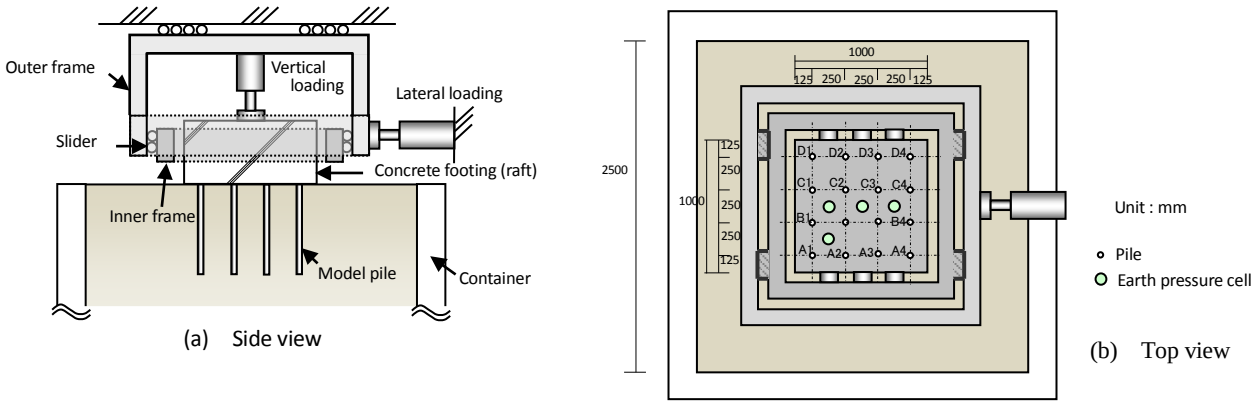
(After Massarsch and Fellenius 2015)

75 MN pile loading test
(After Lin et al. 2015)



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GEOTECHNICAL ENGINEERING

June-2015 Issue: Pile Foundation
Edited By San-Shyan Lin, Charng Hsien Juang and Robert Liang

Prof. San-Shyan Lin

Professor Lin is a Professor at Department of Harbor and River Engineering of National Taiwan Ocean University in Taiwan. He received his Ph.D. degree in Civil Engineering from Washington University in St. Louis, Missouri USA in 1992. Dr. Lin was an engineer at Taiwan Area National Expressway Engineering Bureau from 1992 to 1994. Prof. Lin's research and practical experiences have dealt with drilled shaft foundations, earth reinforced structures and effects of scouring on bridge foundations. Prof. Lin has published more than 110 peer-reviewed journal papers and conference papers. In 2012, Prof. Lin served as chairman of organization committee of 5th Taiwan-Japan workshop of earthquake and heavy rainfall held in Tainan, Taiwan; member of international organizing committee of 7th Asian young geotechnical engineer conference held in Tokushima, Japan; and member of both international advisory committee and technical committee of Geosynthetics Asia 2012 in Bangkok, Thailand. Prof. Lin is currently serving as the member of conference advisory committee of 18th Southeast Asian Geotechnical Conference and member of international advisory committee of International Symposium on Advances in Foundation Engineering. In addition, Prof. Lin is serving as the President of Taiwan Geotechnical Society and the CEO of Sino-Geotechnics Research and Development Foundation in Taiwan. Prof. Lin also served TRB A2K03 Committee on Foundations of Bridges and Other Structures between 1995 and 2004 and serves as a member on the editorial boards for four major international journals in geotechnical engineering.

Prof. Charng Hsein Juang

Dr. Juang received his Ph.D. degree in Civil Engineering from Purdue University in 1981. He joined the faculty of Clemson University in 1982 and has been with Clemson University ever since. Dr. Juang has a broad research interest in the field of geotechnical engineering. His past research work dealt with slope stability, soil-buried pipes interaction, soil and rock properties, pile foundations, fuzzy sets and uncertainty modeling in geotechnical engineering. His current research work deals with liquefaction, site characterization, braced excavation, reliability and probabilistic methods in geotechnical engineering, and fuzzy and neural network applications in geotechnical engineering.
Dr. Juang has received a number of awards and honors. He was proud to be selected by his students through Chi Epsilon for Outstanding Teacher Award in 1985. Among his awards and honors are the Outstanding Research Paper Award by the Chinese Institute of Civil and Hydraulic Engineering (1976), the TK Hseih Award by the Institution of Civil Engineers of the United Kingdom (2001), the Clemson University Board of Trustees Award for Faculty Excellence (2002), election to ASCE Fellow (2007), and appointment to Chair Professor at National Central University, Taiwan.
His professional services include:

- Chair, ASCE/GI Committee on Risk Assessment and Management (2009-2012); Secretary, (2003-2009); Member (1993-present)
- Co-Editor in Chief, Engineering Geology (2012-present)
- Associate Editor & Editorial Board Member, ASCE Journal of Geotechnical and Geoenvironmental Engineering (2004-2012)
- Editorial Board, Journal of GeoEngineering (2006-present)
- Editorial Board, Georisk (2009-present)
- Conference Chair, ASCE Geo Institute Specialty Conference, GeoRisk 2011, Geotechnical Risk Assessment and Management, Atlanta, June 26-28, 2011.

Prof. Robert Liang

Dr. Robert Liang holds a title of University Distinguished Professor in the Department of Civil Engineering at the University of Akron. He also serves as the Director for the Center for Infrastructure Materials and Rehabilitation. Since receiving his Ph.D. in 1985 from the University of California in Berkeley, Dr. Liang has been with the University of Akron. From 1994 to 2000, he served as Civil Engineering Department Chair. Dr. Liang has conducted research in areas such as geotechnical engineering, pavement engineering, and infrastructure materials and rehabilitation technologies. His research has resulted in more than 300 journal and conference papers, with practical impacts on design and construction practices. Dr. Liang is active in ASCE (American Society of Civil Engineers), TRB (Transportation Research Board), and DFI (Deep Foundation Institute) committee works. He serves as associate editor for the ASCE's Journal of Engineering Mechanics and Journal of Geotechnical and Geoenvironmental Engineering. Currently, he is on the editorial board for several international journals, such as Georisk, and Journal of GeoEngineering. Dr. Liang received Wendell R. Ladue award from ASCE Akron-Canton Section for his outstanding contributions to the profession. He also received Louis Hill award from College of Engineering in recognition of his exemplary achievements in both research and teaching. He received outstanding service award from the Great Lakes Geotechnical and Geoenvironmental Engineering Organization for his service as the president of the organization. In recognition of his contributions to civil engineering, Dr. Liang was elected to Fellow of ASCE in 2009.

Prof Ikuo Towhata
President, Japanese Geotechnical Society (2014-2016)
Vice President for Asia, International Society for Soil Mechanics and Geotechnical Engineering (2009-2017)

SPECIAL FEATURE STORY ON "Liquefaction Problems in the 21st Century"

by Prof Ikuo Towhata

Prof Ikuo Towhata

Prof Ikuo Towhata obtained his Bachelor of Engineering degree from the University of Tokyo in 1977. He obtained his Master of Engineering and Doctor of Engineering in 1979 and 1982 respectively from the same university. In 1985 he was Assistant Professor at the Asian Institute of Technology in Bangkok and in 1986 as Associate Professor at Chulalongkorn University in Bangkok. He returned to work in Tokyo University as an Associate Professor in 1987. In 1989 he was Associate research fellow at PWRI Ministry of Construction. He was Professor at Tokyo University from 1994 to 2014 and since 2015 he is Visiting Professor at Kanto Gakuin University, Department of Civil Engineering Yokohama Tokyo Japan. Professor Towhata has 32 years of research experience and his special areas of interest are Deformation characteristics of cohesionless soils; Dynamic analysis of earth structures during earthquakes; Permanent displacement of ground caused by seismic liquefaction; Soil improvement by densification and grouting; Stability of seabed in static and dynamic manners; Thermal effects on mechanical behavior of clays; Microscopic Observation of Granular Behavior of Sand Subjected to Shear; Dynamics of landslide and debris flow. Professor Towhata is active in public service and was Board member of Japanese Geotechnical Society for two terms; Board member of Japan Association for Earthquake Engineering for one term; Board member of Japan Landslide Society for two terms; Chairman of Editing Committee of Soils and Foundations Journal, the Japanese Geotechnical Society in 2005-2008; Chairman of Geotechnical Committee, Japan Society for Civil Engineers in 2007-2008; Vice President, Japan Association for Earthquake Engineering in June 2009-May 2011; President, Japanese Geotechnical Society in 2014-2016; Appointed Board Member and then Vice President for Asia, International Society for Soil Mechanics and Geotechnical Engineering in 2009-2017; Associate Member of Science Council Japan in 2014-2020. He is currently Member of the Japanese Geotechnical Society; Member of the Southeast Asian Geotechnical Society; Member of the International Society of Soil Mechanics and Geotechnical Engineering; Fellow member of the Japan Society of Civil Engineers and Member of the Japan Association for Earthquake Engineering. Professor Towhata has been invited to deliver Keynote Lectures and Special Lectures in many international conferences. He has published more than 600 papers and has published many books notably:

Towhata, I. (1999). Air photographs of the Niigata city immediately after the earthquake in 1964, Japanese Geotechnical Society, ISBN4-88644-054-1.

Towhata, I. (2008) Geotechnical Earthquake Engineering, ISBN 978-3-540-35782-7, pringer Verlag-Berlin Heidelberg.

Towhata, I. and Jiang, Y.-J., 2010. Geotechnical Aspects of 2008 Wenchuan earthquake, China, Chapter 8, Advances in Earthquake Geotechnical Engineering, Springer.

Professor Towhata has won many awards and among them the Japanese Geotechnical Society; Technological Development Award in 2015; Japan Society of Civil Engineers; Best book publication award in 2009; Japanese Geotechnical Society, Award for the Best Paper of the Year 2003; 2004 and the best twelve papers out of 600 at GeoEng2000 Conference at Melbourne in 2000

GEOTECHNICAL ENGINEERING

PREFACE

The theme of the 2015 June issue is Pile Foundations. The guest editors for this special issue are Professor San-Shyan Lin at National Taiwan Ocean University, Taiwan, Prof. Charng Hsein Juang at Clemson University, USA, and Prof. Robert Liang at Akron University, USA contributed to the editorial management. Prof. A.S. Balasubramaniam as the Editor-in-Chief and Dr. Teik Aun Ooi as the President of SEAGS strongly supported the launch of this special issue on Pile Foundations.

The topics and scope covered in this special issue are comprehensive and interdisciplinary, ranging from back-analysis of pile load test, piled-raft analysis, ground vibration caused by impact pile driving, analysis of bi-direction-cell test, effect of aging on barrette pile, comparison on dynamic response of a single pile using different approaches, response of "plug" in open-toe pipe pile, effect of toe grouting of IGM socketed drilled shaft, reliability-based design on foundation and ultimate resistance of drilled shaft by probabilistic approach. The issue is comprised of twelve papers with a selection of the authors from seven countries involving Canada, Japan, Lebanon, Sweden, Taiwan, Thailand and USA.

Niazi and Mayne develops new sets of shear stiffness reduction curves from the back-analyses of 299 static axial pile load tests from 61 sites towards the implementation of a non-linear load-displacement response method for pile foundations. Subsequently, the elastic continuum solution is exploited by them to present a methodology for drawing the stiffness reduction curves as functions of depth. These curves are further utilized in modeling the pile as a stack of smaller shaft segments embedded in multi-layered soils. Hamada et al. presents static cyclic lateral loading tests on large-scale piled raft foundations carried out to investigate the influence of vertical load and pile spacing ratios during earthquakes. Yamashita et al. applies and modifies the simple method proposed by Clancy and Randolph (1996) on piled raft analysis. Four case histories in Japan are examined through comparisons with the field monitoring results. Massarsch and Fellenius describe the application of the Swedish standard which regulates permissible ground vibrations caused by driving of piles, sheet piles, or ground compaction. Fellenius explains how to use the bidirectional-cell test data on a pile to establish the load distribution for the pile, which enabled determining the distribution of the effective-stress beta-coefficients for the pile response Teparaksa presents testing process and discusses the result of different barrette pile static load tests, especially on aging effect on pile capacity. Lu and Chang presents a case study on dynamic behaviors of coal ash soils obtained in a landfilled field in north Taiwan and also the dynamic interaction of a single pile foundation sitting in the landfills. Fellenius recommends how to analyze the response of an open-toe pile. A comparison is also provided between the results of a simulated static loading test on a closed-toe and an open-toe pipe pile. Lin et al. presents the axial performance of two heavily instrumented drilled shafts, with and without toe grouting, socket in intermediate geomaterials in Taipei city. Abdallah et al. presents the results of a comprehensive investigation that is conducted to study the effect of choosing different proof-load test programs on the reliability of piles. Luo et al. evaluates and compares existing probabilistic approaches for determining the ultimate resistance of drilled shafts in sands considering the spatial variability of soil properties.

We consider that this special issue presents and illustrates the outcome of some of the state-of-the-art research on pile foundations, and hope that it will make an important contribution to this growing field in the years to come.

San-Shyan Lin
Charng Hsein Juang
Robert Liang

ACKNOWLEDGEMENT

The lead editor of the June 2015 Issue on Piled Foundation is Prof. San Shyan Lin with team members Prof. Charng Hsein Juang and Prof. Robert Liang. Prof. San Shyan Lin is of immense help to the SEAGS-AGSSEA Journal as a Member of the Team of Editor in Chief. It is worthy to mention that the Taiwan Geotechnical Society is the most active supporter of all SEAGS-AGSSEA activities including the Journal. There were many Issues of the Journal editted by members of CTGS (Chinese Taipei Geotechnical Society). They also contribute many articles and this is a most welcome culture which should be a model example to follow by other AGSSEA member countries. Gradually, we have been very successful in engaging members of AGSSEA to contribute to the journal and take much of the responsibility in contributing articles, engaged in reviewing and other aspects related to the journal. The country issues in 2016 and the Anniversary Issues in 2017 will further enhance the success in the active participation of AGSSEA members in the journal.

In the preface , Prof. San Shyan Lin and his team has already covered adequately the contents of the papers from an international set of prestigious authors and all articles were also reviewed by experts in the field. Details of the reviewers will be assembled in the December Issue for all the articles published in 2015. SEAGS-AGSSEA Journal is always very practice oriented and this well reflected in the contributions contained in this issue as well.

There are twelve excellent papers written by well known authors from : USA, Japan, Sweden, Canada, Thailand, Taiwan and other countries. No doubt, this Issue will be most useful to our Profession and all those who are engaged in Pile Foundation Research and Practice. Sincere thanks to all who have contributed to the success of this issue of our journal under the able leadership of Prof. San Shyan Lin

We are grateful to Professor Ikuo Towhata for his contribution of Special Feature Story on “Liquefaction Problems in the 21st Century” in this issue**.**

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

JUNE 2015: SPECIAL ISSUE ON PILE FOUNDATIONS

Editors: San-Shyan Lin, Charng Hsein Juang, and Robert Liang

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Editors: Prof. Zhen-Yu YIN and Prof. Jian-Hua YIN

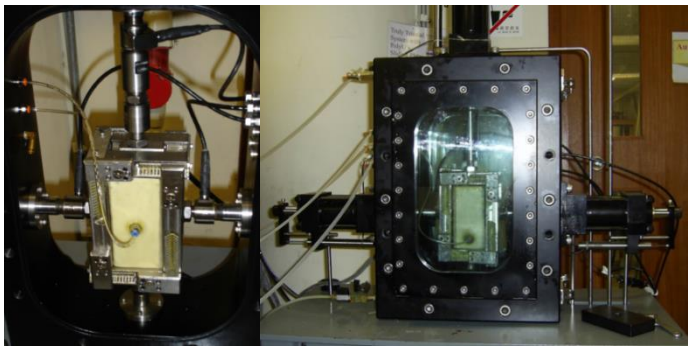


Photo 1 (a) Details of true triaxial loading and
(b) the water proof chamber (After Yin at al, 2010)

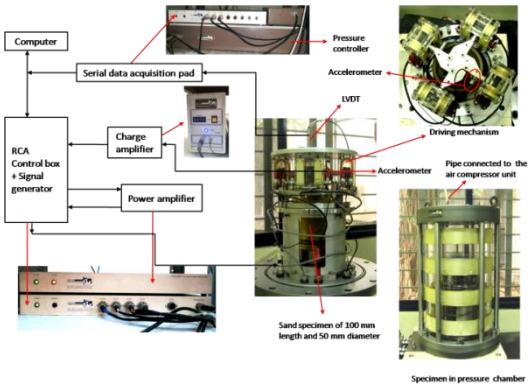
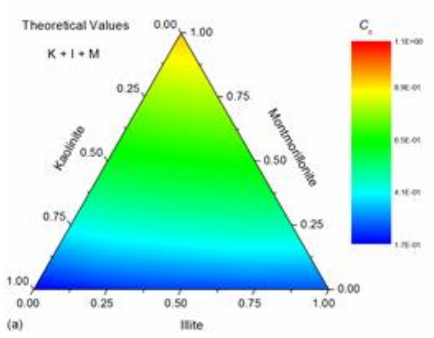
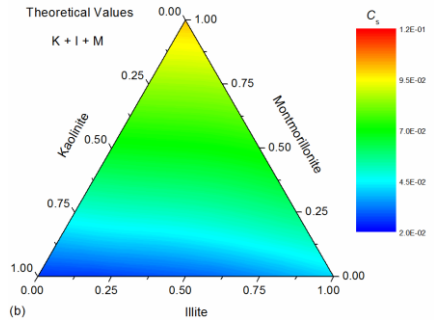


Photo 2 Resonant column apparatus
(After Kumar and Cherian, 2015)



(a) Compression test



(b) Swelling index

Photo 3 Triangle plot of theoretical results for mixtures of Kaolinite, Illite and Montmorillonite
(After Ye et al, 2015)

GEOTECHNICAL ENGINEERING

September-2015 Issue: Soil Behaviour and Modelling

Edited By Prof. Zhen-Yu Yin and Prof. Jian-Hua Yin

Prof. Zhen-Yu Yin

Prof. Yin graduated from Zhejiang University, China in 1997 for his bachelor degree and from Ecole Centrale de Nantes, France in 2003 for his master degree. He got PhD from Ecole Centrale de Nantes, France in 2006 in the field of geotechnical engineering. He was promoted as professor in 2010 at Shanghai Jiao Tong University in China. Prof. Yin's research topics include: (1) constitutive modeling for saturated soils; (2) microstructure and micromechanics for soils; (3) improvement technology for soft soils; (4) finite element analysis for geotechnical engineering. He has authored more than **50** papers in peer review journals such as Geotechnique, ASCE journals, IJSS, Nag etc.

In 2011, Prof. Yin was awarded "Professor of Exceptional Rank of Shanghai-Dongfang Scholar" by Shanghai Education Committee. Prof. Yin is now serving as committee member for both national and international associations (granular materials committee ASCE, Constitutive Relation and Strength Theory Committee of Chinese Society of Soil Mechanics and Geotechnical Engineering, Soil Mechanics Committee of Chinese Society of Theoretical and Applied Mechanics, Underground Engineering Committee of Shanghai Society of Civil Engineers). From 2010 up to 2012, Prof. Yin has received 8 research grants as main investigator, financed by European Union, Chinese National Science Foundation, Minister of Education of China, Shanghai Science and Technology Committee etc.

Prof. Jian-Hua Yin

Dr Jian-Hua Yin is currently a professor in the Department of Civil and Structural Engineering of The Hong Kong Polytechnic University. Professor Yin received a BEng degree in 1983 in Chinese Mainland, an MSc degree from Institute of Rock and Soil Mechanics of the Chinese Academy of Sciences in 1984, and a PhD from The University of Manitoba, Canada in 1990. Dr Yin has a mix of industrial and academic experiences. He joined Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University in 1995 as an Assistant Professor. He was promoted to an Associate Professor position in 1999, to a Professor position in 2002, and recently to the position of Chair Professor of Soil Mechanics in 2014. Professor Yin has a good track record in research and has played a leading role in development of advanced soil testing equipment, innovative fiber optical sensors, establishing a large-scale multi-purpose physical modeling facility for studying geo-hazards, organization of regional and international conferences. His research interests include (i) testing study of properties and behaviour of soils, (ii) elastic visco-plastic modeling, (iii) soft soil improvement, (iv) soil nails and slope analysis, (v) development and applications fiber optical sensors, (vi) soil-structure interface, and (vii) development of advanced/special lab test apparatus. Currently, Professor Yin serves as a Vice-President of International Association for Computer Methods and Advances in Geomechanics (IACMAG), Co-Editor of International Journal of Geomechanics, Co-Editor of Geomechanics and Geoengineering, and Associate Editor of Canadian Geotechnical Journal. He has received the honours of the prestigious "JOHN BOOKER Medal" in 2008, "Chandra S. Desai Excellence Award" in 2011 from IACMAG, and delivering the high-status 2011 "Huang Wenxi Lecture" in Chinese Mainland.

SPECIAL FEATURE STORY ON
"Soil Mechanics at Emmanuel College –Elegant, Rigorous and Relevant"
By John Burland

Professor John Burland

Born in the UK, Professor Burland was educated in South Africa and studied Civil Engineering at the University of the Witwatersrand. He returned to England in 1961 and worked with Ove Arup and Partners for a few years.

After studying for his PhD at Cambridge University, John Burland joined the UK Building Research Station in 1966, became Head of the Geotechnics Division in 1972 and Assistant Director in 1979. In 1980 he was appointed to the Chair of Soil Mechanics at the Imperial College London. He is now Emeritus Professor and Senior Research Investigator at Imperial College.

In addition to being very active in teaching (which he loves) and research, John Burland has been responsible for advising on the design of many large ground engineering projects world-wide including the underground car park at the Palace of Westminster and the foundations of the Queen Elizabeth II Conference Centre in London. He specialises in problems relating to the interaction between the ground and masonry buildings. He was London Underground's expert witness for the Parliamentary Select Committees on the Jubilee Line Extension underground railway and has advised on many geotechnical aspects of that project, including ensuring the stability of the Big Ben Clock Tower. He was a member of the international board of consultants advising on the stabilisation of the Metropolitan Cathedral of Mexico City and was a member of the Italian Prime Minister's Commission for stabilising the Leaning Tower of Pisa.

He has received many awards and medals including the Gold Medal for engineering excellence of the World Federation of Engineering Organisations and the Gold Medals of the UK Institution of Structural Engineers and of the UK Institution of Civil Engineers. In 1994 he was awarded the Kevin Nash Gold Medal of the International Society of Soil Mechanics and Geotechnical Engineering 'In recognition of outstanding services to ISSMGE, to International Goodwill and to International Geotechnical Practice and Education'. In 1996 he was awarded the Harry Seed Memorial Medal of the American Society of Civil Engineers 'for distinguished contributions as an engineer, scientist and teacher in soil mechanics'. He is a Fellow of both the UK Royal Academy of Engineering and of the Royal Society of London and was appointed Commander of the Most Excellent Order of the British Empire in 2005.

SPECIAL FEATURE STORY ON
"Ground Improvement Methods for Port Infrastructure Expansion"
By Indraratna B., Heitor, A and Rujikiatkamjorn, C.

Prof. Buddhima Indraratna, PhD

Buddhima Indraratna is a Civil Engineering graduate from Imperial College, London, and obtained his PhD from the University of Alberta in 1987. He has worked in industry in several countries before becoming an academic at AIT during the period 1988-1991, in which he was an Assistant Professor and then Associate Professor. He was involved in a number of major infrastructure projects in Thailand and Southeast Asia during that time. Subsequently, his contributions to the analysis of 2nd Bangkok International Airport (Suvarnabhumi) are well-known and published in major international journals.

Prof Indraratna's significant contributions to geotechnical and railway engineering have been acknowledged through numerous national and international awards, including the 2016 Inaugural Ralph Proctor Lecture by the International Society of Soil Mechanics and Geotechnical Engineering, the most prestigious award in Transport Geotechnics. In 2009, he delivered the prestigious E.H. Davis Memorial Lecture of Australian Geomechanics Society for distinguished contributions to theory and practice of geomechanics. In 2014, he received the C.S. Desai Medal from the International Association for Computer Methods and Advances in Geomechanics (IACMAG) for outstanding contribution to geotechnical research and education. For his pioneering contributions to Australian railway innovations, he was honoured with the prestigious Business and Higher Education award by the Australian Government in 2009, Engineers Australia Transport Medal in 2011 and 2015 Australasian Railway Society's Outstanding Individual Award. Over the past two decades, he has also received numerous best paper awards, for example Thomas Telford Premium Award by the Institution of Civil Engineers, UK amd Robert Quigley Award by the Canadian Geotechnical Society. He was instrumental in changing the Australian standards the use of vertical drains in soft foundations soils and for revising the standards for railway ballast.

Prof Indraratna currently leads numerous projects funded by the Australian Research Council with over $15 million dollars over the past decade, and he has been a geotechnical consultant worldwide, and a United Nations consultant. He was also an Advisor to the Ministry of Science and Technology (Thailand) for new railway network planning and design, and an Advisor to the Government of Sri Lanka on Post-tsunami rehabilitation of railways. He has more than 550 publications including over 230 reputed journal papers, 9 Books and over 45 invited keynote papers. He has supervised over 50 PhD graduates and 30 Postdoctoral Fellows.

Professor Indraratna is a Fellow of the most prestigious Australian Academy of Technological Sciences and Engineering (FTSE), as well as a Fellow of several professional organisations including the Institution of Engineers, Australia (FIEAust), American Society of Civil Engineers (FASCE), Australasian Institute of Mining & Metallurgy (FAusIMM) and the Geological Society of UK (FGS).

GEOTECHNICAL ENGINEERING

PREFACE

This September 2015 issue of the journal contains fifteen interesting research papers and the details are described below. The time-dependency of the soft clay behaviour is studied in two papers by Wu *et al* and Ye *et al* as overview and interpretation of rate dependency and stress relaxation in soft clays respectively. In these papers, the strain rate dependent behaviour and under 1D and 3D stress conditions under complex loading conditions is studied through triaxial compression and extension tests under different OCR by Wu *et al* and the pore pressure development during stress relaxation by Ye *et al*. The latter paper also used stress relaxation curves in double logarithmic plane resulting in the development of a stress relaxation coefficient useful in analytical solutions for the 1D stress relaxation. A third paper by Bian *et al* proposes a new stress strain model based on CSSM for re-constituted clays which considers the effects of initial water contents. The model describes the undrained shear behaviour. With the decrease of initial water contents, the reconstituted clays experience enhanced strength, stiffness and dilation, which are not involved in the Modified Cam Clay model. These features can be captured by introducing a new hardening parameter ('quasi-structure' strength) into the conventional critical state model. The 'quasi-structure' strength increases with the decrease of initial water contents. The available test data on the undrained shear behaviour of reconstituted clays at different initial water contents are used to verify the proposed model, and the comparisons between computed and measured results show that the proposed model is able to predict the overall pattern of stress-strain curves, pore pressure variations and effective stress paths reasonably well, especially the ultimate undrained strength and pore pressure response at large strain.

The fourth paper is on the engineering behaviour of Shanghai soft clay by Lu *et al* by statistical analyses of the test data. The goodness-of-fits of normal distribution, log-normal distribution, exponential distribution and uniform distribution are assessed for each parameter using the Kolmogorov-Smirnov (K-S) method. The results show that the normal distribution is suitable for initial water content, specific gravity, plasticity index, liquidity index and unit weight, the log-normal distribution is suitable for initial void ratio and plastic limit, the exponential distribution is suitable only for liquid limit, and the uniform distribution is not recommended.

Wang *et al* in the fifth paper deal with the dynamic behaviour of frozen soils. The dynamic response of frozen soils is one of the significant factors that should be taken into account when designing and constructing infrastructures in cold regions. This paper firstly reviews the state-of-the-art of dynamic testing techniques including dynamic uniaxial/triaxial test, resonant column test, wave velocity test and the SHPB test. Then the correlations of dynamic indexes for frozen soils with test conditions are analyzed i.e., dynamic modulus, dynamic strength, damping ratio as well as dynamic Poisson's ratio. The typical stress-strain relationships for frozen soils under dynamic loading are summarized such as empirical models, creep modelling and strength criterion for frozen soils. Finally promising prospects of the study in this paper is suggested.

Ye *et al* (in sixth paper) is on the mineral constituents of one dimensional compression behaviour of clayey soils. Only few data are available concerning the effect of the four main clay minerals, kaolinite (K), illite (I), montmorillonite (M) and chlorite (C), on the mechanical properties of clayey soils. This paper discusses the effect of different mineral contents on the compression and swelling indexes of clay mixtures in order to provide correlations between the mineralogical content of a clayey soil and its compressive properties. Four pure clay powders were used to prepare 34 clay mixtures (different proportions of K+I, K+I+M, K+I+C). Conventional oedometer tests were conducted on all the prepared samples. Based on the test results, the evolution of the compressive properties with the proportions of pure clays was estimated and relevant correlations are suggested. All the results demonstrate that the compression and swelling indexes are reasonably well correlated to the proportion of clay minerals. The content in montmorillonite influences significantly the compressive properties of clayey soils, and the contents of illite and chlorite are less influential when added to kaolinite based clayey soils. Moreover, 15 samples with different proportions of K+I+M+C were prepared and tested, and the proposed correlations were validated in light of the results obtained on these materials.

The seventh paper by Fan *et al*, investigates the addition of fine grained Zeolite on the compressibility and hydraulic conductivity of clayey soil treated with calcium bentonite and used as backfills for vertical cut off walls. Vertical cutoff walls, using backfill consisting of on-site sandy soil and Na-bentonite are widely used as engineering barriers for the purpose of achieving relatively low hydraulic conductivity and high contaminant sorption capacity. At some sites, locally available clayey soil, Ca-bentonite and natural zeolite may be considered as an alternate backfill. However, studies on the compressibility and hydraulic conductivity of zeolite-amended clayey soil/Ca-bentonite backfills for vertical cutoff walls are very limited. A series of one-dimensional consolidation tests is performed to evaluate the compressibility and hydraulic conductivity of fine-grained zeolite-amended clayey soil/Ca-bentonite backfills. Kaolin is used as the control clayey soil, and it is amended with various amounts of Ca-bentonite (5, 10, and 15%) and zeolite (2 - 40%) to prepare zeolite-amended kaolin-bentonite backfills. The results indicate that the addition of fine-grained zeolite has insignificant influence on the compressibility and hydraulic conductivity of clayey soil/Ca-bentonite and sandy soil/Na-bentonite backfills. The hydraulic conductivity of the zeolite-amended clayey soil/Ca-bentonite backfills is generally lower than the typical regulatory limit of 10-9 m/s. Two empirical methods, based on the Nagaraj's generalized void ratio (e/eL) and Sivapullaiah *et al*.'s method are assessed to predict the hydraulic conductivity of the backfills. The proposed method based on the Sivapullaiah *et al*.'s method is shown to estimate the hydraulic conductivity for the fine-grained zeolite-amended clayey soil/Ca-bentonite backfills with reasonable accuracy.

The eighth paper by Cheng and Saiyouri is titled effect of long term aggressive environments on the porosity and permeability of granular materials reinforced by nano-silica and sodium silicate. Colloidal nanosilica is a kind of new chemical grout materials for filling small pores of fine-grained soil. Compared to traditional sodium silicate material, the advantages and disadvantages of colloidal nanosilica are studied under laboratory conditions for pure gels and sand-gel mixtures for long-term volume stability. Samples of Fontainebleau sand injected by nanosilica and sodium silicate were conserved in dry air, water, salt solution and acid solution for 8 different time periods. The results show that pure gel of nanosilica is much more stable than pure gel of silicate sodium in all environments studied; from results of porosity, nanosilica does not has manifest advantages compared with sodium silicate; from results of permeability, nanosilica sand has more stable capacity of water-blocking in all environments.

The ninth paper by Deka *et al* is on strength of lime treated flyash using bentonite. The class "F" type Fly ash is non-cohesive and is normally strengthened or reinforced when used in structural fills. This paper deals with strength increase in unconfined compressive tests by pozzolanic reactions with lime and also bentonite.

The tenth paper is by Wang *et al* on soil deformation induced by underground tunnel construction. Development and utilization of underground railways can effectively ease the problem of urban traffic congestion. However, surrounding soil disturbance during tunnel excavation is likely to cause serious accidents. Thus, analyzing soil deformation during tunnel excavation is important. Through numerical simulation, this paper analyzes the influence of the step distance of a single-bore tunnel on the disturbance of the surrounding soil. Based on research on a single-bore tunnel, this paper further examines the effects of various spacing, locations, and excavation methods on the deformation of surrounding soils during parallel tunnel excavation. The results show that longer excavation steps lead to more intense disturbance to the surrounding soils. The most intense disturbance occurs at the ends of the tunnel. During new tunnel excavation, the tunnel crossing angle has stronger influence than the tunnel spacing on the original tunnel. Among the four excavation methods, single-bore advanced through is the most secure, whereas simultaneous excavation from opposite directions can cause the most intense disturbance to the surrounding soils. In practical operations, corresponding excavation methods can be employed according to specific conditions. Moreover, in-situ monitoring at key positions should be enhanced to avoid accidents.

The eleventh paper by Zhou *et al* is on full scale field tests on soil arching triggered during the construction of shallowly buried HDPE pipes. Soil arching significantly affects earth pressures around and above high-density polyethylene (HDPE) pipes in the construction phase. However, few studies have systematically addressed the change of soil arching with respect to soil cover thickness during the installation of HDPE pipes. This paper presents full-scale field investigations on the soil arching above and around three HDPE pipes buried shallowly in trenches. The results demonstrate that the soil arching developed in the backfill above the pipes is getting significant with increasing soil cover thickness. At a given soil cover thickness, more notable soil arching is found at a position closer to the pipe crown. The measured earth pressures acting on the pipe crown are compared with those estimated by the Marston load theory. It is found that the crown earth pressures estimated by the Marston's trench equation and embankment equation are 8% to 32% and 2% to 14% respectively higher than those obtained

from the field tests. The results suggest that a threshold trench width is likely to exist when the Marston load theory is used for calculating the earth pressures on the top of HDPE pipes buried in the trench.

The twelfth paper is on a pollutant migration model considering solute decay in layered soil by Yu and Cai. Organic pollutant solute undergoes significant decay during the migration process in clay liner systems and foundation clay. Liner and foundation soil have layered properties. A one-dimensional computational model is established to calculate pollutant migration by considering the decay in layered soil medium. The separation of variable method is used to obtain the analytical solution. To verify the capability of the developed method, a typical example is illustrated by applying this model. The calculated results are compared with the results obtained from the GAEA Pollute v7. Consistent results demonstrate the reliability and validity of the proposed migration model, which can be a promising tool for landfill liner design when considering the organic pollutant decay.

The thirteenth paper is on effect of cyclic strain history on shear modulus of dry sand using resonant column tests by Jyant Kumar and Achu Catherine Cherian. A number of resonant column tests were performed on dry sand specimens to examine the effect of cyclic shear strain history, by including both increasing and decreasing strain paths, on the shear modulus (G) for different relative densities (Dr) and confining pressures (σ_3). The specimen was subjected to a series of cycles of increasing and decreasing shear strain paths approximately in a range of 0.001-0.1%. For a particular cycle, with a given strain amplitude, the shear modulus during the increasing strain path becomes always greater than that during the decreasing strain path. For a given cycle, irrespective of relative density of sand, the difference between the values of G associated with the increasing and decreasing strain paths becomes always the maximum corresponding to a certain shear strain level. The maximum reduction in the shear modulus, due to the cyclic variation of the shear strain, was noted to be around one fourth of the maximum shear modulus (G_0). This reduction in the shear modulus on account of the cyclic variation of shear strain increases generally with decreases in the values of both relative density and confining pressure. The study will be useful to examine the response of sand media subjected to earthquake excitation.

Bhattacharya and Kumar are the authors of the fourteenth paper on vertical uplift capacity of circular anchor plates. Experimental and numerical investigations have been carried out to determine the vertical uplift resistance of circular anchor plates embedded in cohesionless soil media. Experimental studies are performed on model circular anchor plates placed at different depths in loose to medium dry sand deposit for two different relative densities, namely, 25% and 65%, respectively. The numerical work has been done by using an axisymmetric lower bound limit analysis in conjunction with finite elements and linear programming to compute the uplift resistance offered by circular anchor plates embedded horizontally in sand. In the case of numerical studies, the internal frictional angle of sand was varied from 20° to 45°. Both experimental and numerical studies clearly reveal that the uplift resistance of the circular plate increases considerably with increases in embedment ratio (H/D), and soil frictional angle (ϕ). The deformation of the anchor plate, corresponding to the failure load, increases with an increase in the values of H/D and relative density of sand. The values of the failure loads obtained from the computational analysis match well with the present experimental results as well with the available data from literature.

In this fifteenth paper by Benson Hsiung and Sy-Dan Dao, a simple method for predicting movements, especially the ground surface settlements, caused by deep excavations in sands is presented. The case history of deep excavation in thick layers of sand is adopted from Kaohsiung, Taiwan as the basis for numerical analyses. In order to improve the inconsistence in prediction of ground surface settlements induced by the deep excavation, the analysis using the simple constitutive model but with additional two factors, α and β is applied. The factor α defines the width of primary strain zone behind the retaining wall, and β indicates the difference of soil stiffness in two zones of the primary strain zone and small strain zone. It is concluded that changing α seems not to induce significant change, and values of β from 3 to 5 shall be taken once such approach intends to be adopted for predicting ground surface settlements caused by deep excavations in sands.

The editors are grateful to the authors and reviewers and are very pleased with the significant contributions made by them in making this Issue feasible to our SE Asian Geotechnical Community and others.

Zhen-Yu Yin
Jian-Hua Yin

ACKNOWLEDGEMENT

This September 2015 Issue is edited by Profs. Zhen-Yu Yin and Jian-Hua Yin. They are to be congratulated for acquiring fifteen excellent papers, which covers a wide range of topics which will be of great value to researchers and practitioners. Details of the contents are in the Preface as compiled by the editors. They cover strain rate effects and stress relaxation with a new Stress strain Model as based on CSSM; the engineering behaviour of Shanghai soft clay is statistically analyzed; the dynamic behavior of frozen soils is studied using dynamic uniaxial/triaxial test, resonant column test, wave velocity test and the SHPB test. The addition of fine grained Zeolite on the compressibility and hydraulic conductivity of clayey soil treated with calcium bentonite and used as backfills for vertical cut off walls is also presented. Additionally, effect of long term aggressive environments on the porosity and permeability of granular materials reinforced by nano-silica and sodium silicate is also presented. The strength of lime treated flyash using bentonite is also studied in detail; the class "F" type Fly ash is non-cohesive and is normally strengthened or reinforced when used in structural fills. Soil deformation induced by underground tunnel construction is of importance. Among the four excavation methods, single-bore advanced through is the most secure, whereas simultaneous excavation from opposite directions can cause the most intense disturbance to the surrounding soils. In practical operations, corresponding excavation methods can be employed according to specific conditions. Moreover, in-situ monitoring at key positions should be enhanced to avoid accidents.

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No doubt, this Issue will be most useful to our Profession and all those who are engaged in Pile Foundation Research and Practice. Sincere thanks to all who have contributed to the success of this issue of our journal under the able leadership of Profs. Zhen-Yu Yin and Jian-Hua Yin

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

SEPTEMBER 2015: SPECIAL ISSUE ON SOIL BEHAVIOUR AND MODELLING

Editors: Prof. Zhen-Yu Yin and Prof. Jian-Hua Yin

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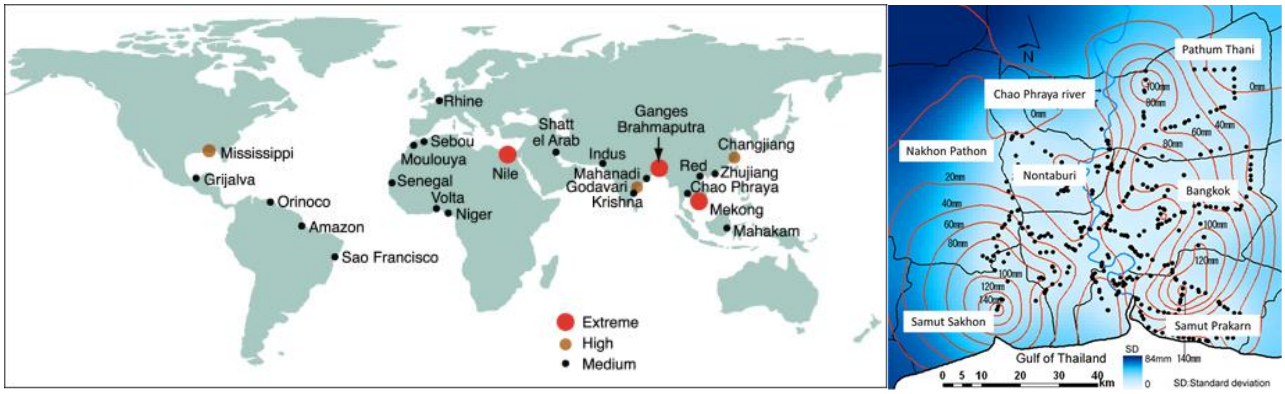
Editors: Prof. Jay Meegoda & Prof. Liming Hu



Inundation Caused by Sea-Level Rise Combined with Land Subsidence
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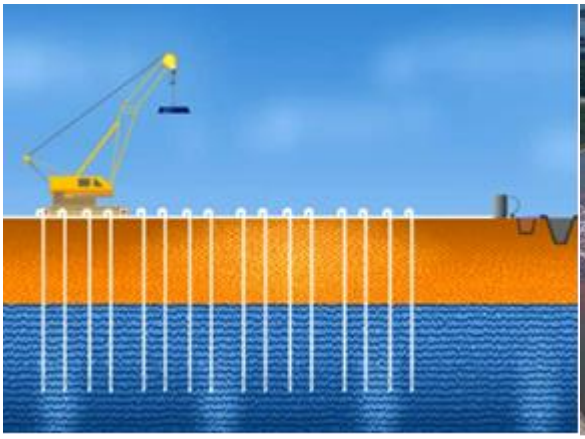

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GEOTECHNICAL ENGINEERING

December-2015 Issue: Problematic Soils including Contaminated Soils
Edited By Prof. Jay N. Meegoda and Prof. Liming Hu

Prof. Jay N. Meegoda

Dr. Meegoda is the director of Geotechnical Program and a Professor of Civil and Environmental Engineering at New Jersey Institute of Technology. He received his BS (Honors) from University of Sri Lanka and his M.S. and his Ph.D. from the University of California at Davis. He has been working as educator, consultant and researcher in engineering for over 35 years. He utilizes scientific concepts and engineering technologies in his research to provide solutions to real world problems. Dr. Meegoda has worked with state and local governments, and foreign governments to provide technical input for broad range of problems.

Dr Meegoda has worked on three major research areas. His primary research is in Mechanics of Geo-Environmental Engineering, which includes Engineering Properties of Contaminated Soils, Centrifugal Modeling of Contaminant Movement in Soils and Remediation of Contaminated Soils, Micro-mechanics of Soils, Reuse of Contaminated Soils, and Ultrasound. His second major research area is sustainable use of waste, which is still under the broad area of Geo-environmental Engineering. It includes Modeling of Bio-reactor Landfill performance, Sustainable Waste Management and Construction use of waste. Recently Dr. Meegoda initiated his third research area, the sustainable infrastructure initiative, which includes Performance of pipes and development of next generation of pipes, Management of underground infrastructure and Pavement texture and snow/ice management to limit accidents. He has offered numerous short courses worldwide, and teaches graduate and undergraduate courses at New Jersey Institute of Technology on Geotechnical and Geo-environmental Engineering.

Dr. Meegoda as PI has successfully concluded several multidisciplinary research projects worth over $7M from agencies such as NSF, USEPA, US Army, FHWA, NJDOT and NJDEP that provided broader impact to the society. Some of those technologies are now extensively used while others are to be commercialized. He has published over 150 papers. He has one patent and applied for one provisional patent. He received the research implementation award from the New Jersey Department of Transportation in 2011 for his Culvert Information Management Research, the best theoretical paper award from the Environmental and Water Resources Institute of ASCE in May 2012 for his research collaboration with China and the best practice paper award from the Environmental and Water Resources Institute of ASCE in May 2001 for the paper describing the results of one USEPA SITE demonstration project.

Dr. Meegoda currently serves Associate Editor of the ASCE Journal of Hazardous, Toxic, and Radioactive Waste Management, Editorial Board Member ASTM Geotechnical Testing Journal, Journal of Traffic and Transportation Engineering, Springer Journal on Waste and Biomass Valorization and The Scientific World Journal, Guest editor, Journal of Hazardous Materials, special issue on Contaminated Dredged Sediments and Associate Editor of the 4th International Symposium on Environmental Geotechnology and Global Sustainable Development. He is a guest/research/visiting professor/scholar of six different universities. He has research collaborations spanning all six continents. He was invited to deliver keynote lectures and invited lectures at numerous events around the world. At NJIT, he was instrumental in setting up the NJIT chapter of Engineers without Borders and is currently serving as the faculty advisor.

Prof. Liming Hu

Dr. Hu is an Associate Professor of Geo-environmental Engineering, and the Deputy Director of Institute of Geotechnical Engineering of Tsinghua University in China. He is also the senior Research Scientist at State Key Laboratory of Hydro-Science and Engineering (SKLHSE), and the director of the Geo-environmental Research Centre. He obtained double Bachelors in both Hydraulic Engineering and Environmental Engineering from Tsinghua University in 1995, and MEng and Ph.D. in Geotechnical Engineering from the same university in 2000. Then he worked as post-doctoral Research Associate at the Department of Civil Engineering of Hong Kong University of Science and Technology (HKUST) from 2000 to 2002. Since April 2002, Dr. Hu joined in Tsinghua University. He has supervised 15 Master students and 6 Ph.D. students.

Dr. Hu's research interests focuses on contaminant transport, soil/groundwater remediation, valorization of solid waste, and landfill design in field of Geo-environmental Engineering, as well as soft ground improvement and soil-structure interaction in field of Geotechnical Engineering. He has more than one hundred publications in peer-reviewed journals, and owns 12 invention patents and 3 software packages.
Dr. Hu obtained numerous notable honors and awards due to his outstanding research achievements, such as 2013 First-Class State Award for Inventions by Chinese Central Government, 2013 Outstanding Young Scholar at Tsinghua University, 2013 Scientific Research Award from Hubei Province, 2012 Best Theoretical-Oriented Paper by ASCE Environment and Water Resources Institute, and 2012 Outstanding Young Scholar by Chinese Society for Rock Mechanics and Engineering, 2007 New Century Excellent Talents in Chinese Universities by Ministry of Education, 2005 New Star in Science and Technology by Beijing Municipal Government, and so on.

Now Dr. Hu serves as Chair of Committee for Chinese Young Geotechnical Engineers; Chair of Technical Committee on Soil Contamination and Remediation, and Core Member of the Institution of Geo-Environmental Engineering under Chinese Society for Rock Mechanics and Engineering; and Vice-Chairman of Committee for Geo-Environmental Engineering under Chinese Institution of Soil Mechanics

and Geotechnical Engineering. He is also the life member of Southeast Asian Geotechnical Society (SEAGS), member of American Society of Civil Engineers (ASCE), Member of International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), and Member of International Society for Rock Mechanics (ISRM), Member of American Chemistry Society (ACS), etc. Dr. Hu also serves as a member of TC215 (Environmental Geotechnics) of ISSMGE.

GEOTECHNICAL ENGINEERING

L. John Endicott

As a professional engineer and adjunct professor, Dr. John Endicott is a recognized thought leader in geotechnics and tunneling.

Inspired by the research work of a professor, he converted from studying mechanical engineering to soils. Later, John received his Ph.D. and master's degree from Cambridge University in the United Kingdom.

He began working with AECOM (then Maunsell) in 1970 and moved to Hong Kong in 1975 to aid in the development of an extensive global network throughout the AECOM geotechnical and tunneling leaders in other geographies. In 1990, John was elected chief executive officer for the geotechnical and tunneling business in Hong Kong, serving 10 years and then served as chairman until 2009.

With more than 41 years of experience, he has worked on numerous iconic projects such as Hong Kong's Chek Lap Kok International Airport platform and the Lai Chi Kok Transfer Scheme project. He has been involved with more than 100 underground railway stations and a variety of tunnel assignments. As a guru in the industry, he has been recognized globally by several industry organizations and academia such as the 1971 Cooling Prize from United Kingdom's Institution of Civil Engineers and Adjunct Professor at Hong Kong's University of Science and Technology.

As an iconic symbol and pillar of excellence within the geotechnical group, he persistently seeks out opportunities to promote and nurture collaboration. It is this passion that has defined him in the field as a global leader.

He was recently appointed as technical expert for the Hong Kong government among other organizations. John is a member of the Academy of Experts – U.K., Fellow of the Institution of Civil Engineers, founding member of the Hong Kong Institution of Engineers' geotechnical division, and has served as adjunct professor at the Hong Kong University of Science and Technology since 2003. He is an avid and dedicated mentor and sought out by many young engineers for his insight, advice and guidance.

Burland

Professor Michele Jamiolkowski

Professor Michele Jamiolkowski has been the Emeritus Professor of C.E., Technical University of Torino since 2008. In addition, he has also been the Founder and Chairman of the Engineering Consultant Company, Studio Geotecnico Italiano; Foreign Member of the Polish Academy of Science; Member of the Lagrangian Academy of Science, Torino; and Editor in Chief of the International Journal Geomechanics and Geoengineering.

In addition to his outstanding academic record, Professor Jamiolkowski has also been involving in many world famous mega-projects such as Geotechnical Consultant for the Suspension Bridge over Messina Straits, Geotechnical Consultant for the Engineering Company Technital designer of the MOSE Project in Venice for Safeguarding Venice from high tides etc. He was also the President of the International Society for Soil Mechanics and Geotechnical Engineering between 1994 and 1997, and also the Chairman of the International Committee for Safeguard of the Leaning Tower of Pisa between 1999 and 2000. Currently, he is still serving as the Member of the International Advisory Group of the European Bank for Reconstruction and Development for the design and construction of the New Safe Confinement of the reactor in Chernobyl Nuclear Power Plant; the Chairman of the International Board Expert for Development of the Second World Largest Copper Mine Tailings Depository Zelazny Most in Poland; the Geotechnical Consultant for the Venice Defence System against Water; the Chairman of the Technical Committee for Safeguard of Rome Monuments During Construction of the New Subway Line C Underpassing Historical Town Centre; and the Foreign Associate US National Academy of Engineering.

For his outstanding achievement, Prof. Jamiolkowski is the recipient of numerous awards or honors, such as K. Terzaghi and R.B. Peck Awards from the ASCE; E. De Beer Awards from the Belgian Geotechnical Society; Honorary International Member of the Japanese Geotechnical Society; Doctor Honoris Causa: University of Bucharest, University of Ghent, SGGW, Life University (Warsaw); Recipient of the Italian Prize “Savior of the Art”; Honorable International Member of the Japanese Geotechnical Society since 1998; Honorary Professor Academia Sinica of Guangzhou, China; and Commendatore of the Italian Republic bestowed by the President of Italy.

Other distinctions of Professor Jamiolkowski include 1985 Theme Lecturer at the XI International

Conference SMFE, San Francisco, US; 1986 James Forrest Lecture, ICE, London, UK ; 1991 Cross Canada Lecture Tour. Canadian Geotechnical Society ; 1994 John Buchanan Lecturter, University of Texas at Austin ; 1997 Manuel Rocha Lecture in Lisbon; 2000 George Hendris Memorial Lecturer, University of Western Australia, Perth; 2001 Terzaghi Oration at the XV ICSMGE in Istanbul; 2002 Szechy Memorial Lecture in Budapest; 2002 Kersten Lecture. University of Minnesota US; 2004 Keynote Lecturer at the Skempton Conference at Imperial College in London; 2004 Keynote Lecturer 15th SEAGC, Bangkok; 2006 R.B. Peck Lecturer at the ASCE Geo-Institute in Atlanta; 2006 4th G.A. Leonards Lecture, University of Purdue, US; 2007 XIV ECSMFE, Madrid, Special Lecture; 2009 XVII ICSMGE, Great Project Lecturer, Alexandria; 2010 1st Za-Chieh Moh Lecturer, in Taipei, Taiwan; 2011 3rd V. De Mello Lecturer, in Lisbon; 2013 53rd Rankine Lecturer, in London;
2014 1st Tchebotarioff Lecturer in St. Petersburg; and 2014 6th J. K. Mitchell Lecture.

Professor Jamiolkowski is the author and co-author of more than 250 publications, journal with referee & international conference.

Professor Carlo Viggiani

Professor Carlo Viggiani graduated in Civil Engineering in 1960 at the University of Napoli; he got his PhD in Geotechnical En gineering in Napoli in 1969. He has been teaching in the Universities of Pavia, Cosenza, Potenza; from 1974 to 2011 he has been full Professor of Foundation Engineering at the University of Napoli Federico II. He is at present Emeritus Professor.

Professor Carlo Viggiani has lectured in a number of Universities in Europe, North and South America, Australia and Asia. He has been State of the Art Reporter at the ICSMFE in New Delhi, 1994 (Mitigation of Natural Hazards: Landslides and Subsidence) and at the ICSMGE in Osaka, 2005 (Pile foundations).

He has been Editor of the Italian Geotechnical Journal; component of the Editorial Board of the Journal of Numerical and Analytical Methods in Geomechanics; at present he is editor of the series “Argomenti di Geotecnica” (Issues in Geotechnics) of the publisher Hevelius.

Professor Carlo Viggiani is Author or Co-Author of 4 books and more than 200 technical papers; some of his papers have been awarded by journals as Géotechnique, Soils and Foundations, Case Histories of Geotechnical Engineering. His research topics include Theory of Consolidation, Soil-Structure Interaction for Shallow and Deep Foundations, Applications of Geotechnics to the Conservation of Monuments and Historic Sites. He is Chairman of TC19 (later TC301) (Preservation of Monuments and Historic Sites) of the ISSMGE, and has been involved in the conservation of a number of monuments affected by geotechnical problems.

From 1990 to 2002 he has been member of the International Committee for the Safeguard of the Leaning Tower of Pisa, and is presently member of the Monitoring and Surveillance Committee of the Tower. In fact, his interest to the Tower dates back to 1963.

Professor Carlo Viggiani has been involved, as geotechnical consultant, in the design and construction of a number of civil engineering structures; among them earth dams, civil and industrial buildings, bridges, tunnels and underground constructions, stabilisation of landslides. He acted as consultant for Italian Railways, Underground Transportation Systems in Rome, Napoli,Torino, Bologna, Firenze. He participated in the design of the foundations of the suspension bridge over the Messina Straits.

GEOTECHNICAL ENGINEERING

PREFACE

Welcome to Geotechnical Engineering Journal of the Southeast Asian Geotechnical Society (SEAGS) and the Association of Geotechnical Societies in Southeast Asia (AGSSEA). It is our great pleasure to serve as the guest editors for the last issue of 2015. It is also a special issue dedicated to on Problematic Soils including Contaminated Soils. This December 2015 issue of the journal contains fifteen interesting research papers and the details are described below.

First six papers are on contaminated soils or groundwater and their remediation. Next two papers are on electro-osmosis drainage. Next three are on ground improvement. Last four are on interesting or emerging topics such as education, impact of rise in sea level, numerical analysis and theoretical analysis.

We specifically requested Professor Chrysochoou to describe Geochemistry in Geotechnical Engineering Problems and set the tone for the issue. In this paper Professor Chrysochoou uses Ettringite, which is a problematic mineral found in soils as well as concrete, as case study to elaborate Geochemistry and how that is related to Geotechnical Engineering.

In the second paper Professor Meegoda and his team describes the Engineering Properties of Chromium Contaminated Soils. The chromite ore processing activities have over 2 million tons of processed chromium ore residue in Hudson County, New Jersey. This is a hazardous waste needing proper disposal. Professor Meegoda and his team explored the feasibility of using as construction material or to be used as brownfield type remediation.

Dr. Nithya and his team explored heavy metal sorption characteristics of two geo-materials in the third paper. The mobility of heavy metals into the environment as a result of mining, industrial and agricultural activities such as that described in the second paper is of major concern and engineers are exploring ways to absorb those heavy metals. Dr. Nithya and his team performed batch sorption experiments to evaluate suitability of two soils found in India as sorbents for heavy metals.

In the fourth paper Professor Mulligan and her student explored reduction of Chromium in water and soil using a biosurfactant "Rhamnolipid." Rhamnolipid is readily biodegradable biosurfactant with a very low environmental impact. Professor Mulligan and her student performed batch experiments to evaluate the feasibility of using Rhamnolipid for the removal and reduction of hexavalent chromium from contaminated soil and water.

Professor Barbosa and her team describe details of a reclamation project of a brownfield site containing 1.2 million cubic meters of mineral waste pile inside a 260,000 m^2 liquid waste pond in Rio de Janeiro State, Brazil, the fifth paper of this issue. Professor Barbosa and her team proposed technical solution that included the complete draining of the liquid pond, accompanied by on site treatment, a hydraulic barrier of pump & treat wells and the construction of an engineered waste containment facility using the mineral solid waste as compacted earth fill material combined with geosynthetics.

A review of acidic groundwater remediation in the Shoalhaven floodplain in Australia, is given by Professor Indraratna and his team in the sixth paper. Acidic groundwater generated from acid sulfate soils create

unfavorable environmental conditions. Professor Indraratna and his team installed a pilot-scale permeable reactive barrier showing that it is a promising technology for long-term remediation acidic groundwater.

Electro-osmosis is an effective technique for soft ground improvement. However with the continuous application of electrical energy the effectiveness of electro-osmosis decreases with increase in soil resistance. The intermittent application of the current is one way to overcome this problem. Hence Professor Hu and his team describe an experimental and a numerical study of electro-osmosis on kaolinite under intermittent current in the seventh paper.

A new type of electro-kinetic geo-synthetics (EKG) electrode to avoid the electrode corrosion and provide an effective drainage channel was developed for electro-osmosis drainage, and its performance was evaluated by Professor Shen and his coworker in the eighth paper.

The title of the ninth paper is innovative soft soil improvement method through intelligent use of vacuum dewatering and dynamic compaction. This research was performed by Professor Liang and his team.

Professor Shivashankar and his team provide the tenth paper entitled "Some Studies on Engineering Properties, Problems, Stabilization and Ground Improvement of Lithomargic Clays." They performed laboratory studies to determine engineering and strength properties of these lithomargic clays and stabilized soils. Then they reported ways to improve sites containing Lithomargic Clays.

The eleventh paper describes laboratory investigation of stone column reinforcement of a soft South African clay by Professor Kalumba and his coworker.

Professor Bouassida and his team describe the results of a numerical modelling study of Tunis soft clay in the twelfth paper.

A framework for the de-structuring of clays during compression, is the title of thirteenth paper and it is a theoretical study performed by Professor Horpibulsuk and his colleagues.

In the fourteenth paper Professor Yasuhara and his colleagues describe impact of inundation caused by sea-level rise combined with land subsidence, a modern day problem.

Last but not least is the fifteenth paper by Professor Scharle and his colleague. This is an invited paper on challenges of educating our younger generation in Geotechnical Engineering.

The guest editors are grateful to the authors and reviewers for their contributions. We are very pleased with the significant contributions made by authors in making this Issue feasible to our SE Asian Geotechnical Community and others.

Jay N. Meegoda
Liming Hu

ACKNOWLEDGEMENT

The December 2015 Issue of the Journal on problematic soils on problematic and contaminated soils is edited by Prof. Jay Meegoda and Prof. Liming Hu. They did an excellent job within a sort time and also forwarded all the completed documents well in time for the Journal Production team under the Leadership of DR. Ooi at IEM , Malaysia.
There are 15 papers in this Issue and a Feature story by Dr. John Endicott on Challenges in going underground in transportation and other utilities.
The guest editors have adequately covered the important aspects of the papers: First six papers are on contaminated soils or groundwater and their remediation. Next two papers are on electro-osmosis drainage. Next three are on ground improvement. Last four are on interesting or emerging topics such as education, impact of rise in sea level, numerical analysis and theoretical analysis. It is rewarding to note the authors of the papers cover all continents. It is a clear indication of the International nature of the Journal.
There were numerous Guest editors from 2011 to 2015; each and every one of them brought innovation and scholarly contribution both in research and practice. The journal continues to have page lengths suitable for the authors to comprehensively present their contributions. As a cost cutting measure the hard copy of the journal is only produced after all the soft copies are produced and this is a bound volume made available to all in the middle of the subsequent year. The soft copies are released spot on time in March, June, September and December each year. All articles are reviewed by more than two reviewers; Prof. Jay Meegoda and Prof. Liming Hu used an excellent set of reviewers.

The Issues in 2016 are devoted to AGSSEA country contributions and will be released by Taiwan Geotechnical society editors in March 2016, followed by the editors in Singapore, Hong Kong and Malaysia for the June, September and December Issues respectively. This will be followed by the Anniversary Issues in 2017. It is anticipated that the journal will also have a higher level of standard from the 51st year of the formation of SEAGS in 1967.
It is a genuine pleasure to have the excellent contributions in this December 2015 Issue and to record our vote of thanks to the Guest Editors Prof. Jay Meegoda and Prof. Liming Hu, the authors of the articles, the reviewers and all those who have contributed to the success in this Issues as well as the previous such Issues from 2011. It is important to thank Prof. San Shyan Lin for his varied contribution to SEAGS-AGSSEA in addition to his duties in the editorial team as a most valued member

No doubt the contribution of the articles in Issue and the Feature story will further add prestige to the success story of the journal.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

DECEMBER 2015: SPECIAL ISSUE ON PROBLEMATIC SOILS INCLUDING CONTAMINATED SOILS

Editors: Prof. Jay N. Meegoda and Prof. Liming Hu

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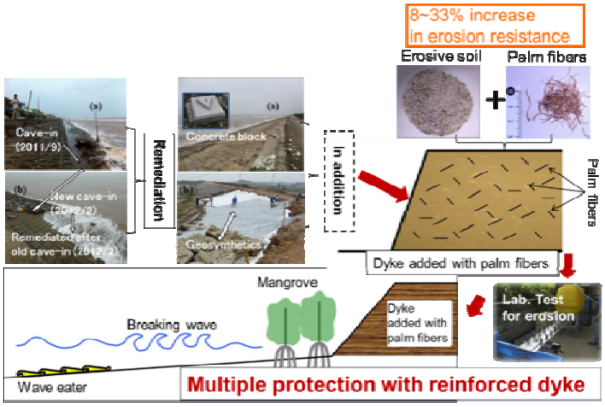
Editors: Dr. Phung Duc Long & Prof. San-Shyan Lin

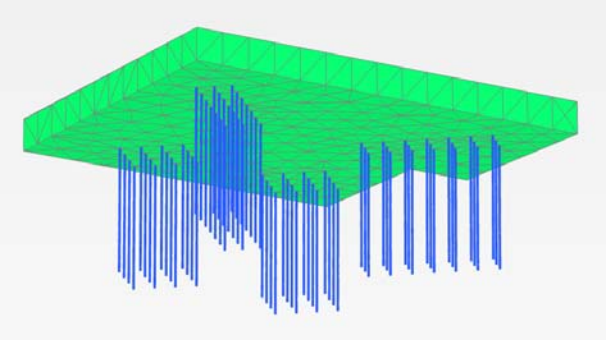


Multiple protective measures used in coastal areas

(After Yasuhara *et al.*, 2016)

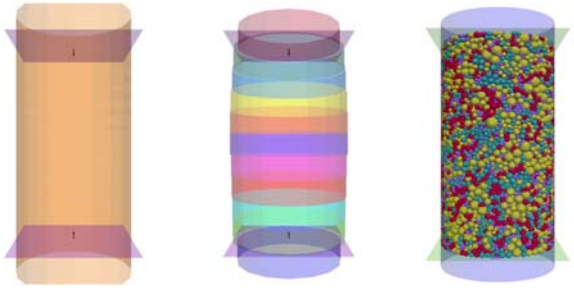
Example of erosional scene of river bank in the Mekong Delta

(After Yasuhara *et al.*, 2016)



Plaxis 3D piled raft foundation model

(After Phung Duc Long, 2016)



Geometry of DEM models

(After Nguyen Quang Tuan and H. Konietzky, 2016)

GEOTECHNICAL ENGINEERING

March-2016 Issue: Vietnam Special Issue
Edited by Dr. Phung Duc Long & Prof. San Shyan Lin

Dr. Phung Duc Long

Dr. Phung is President of the Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE). He received his Ph.D. degree at the Geotechnical Department, Chalmers University of Technology in Gothenburg, Sweden in 1993. He has worked at the Institute for Building Science & Technology (IBST) in Hanoi, Vietnam from 1975 to 1988; at the Swedish Geotechnical Institute (SGI) in Linköping, Sweden from 1988 to 1994; at Chalmers University of Technology from 1989 to 1993, at Skanska Sweden as Technical Manager from 1994 to 2002; at WSP Asia in Hong Kong as Associate Director from 2002-2003; at WSP Vietnam in Hanoi as General Director from 2003-2011; and at Long GeoDesign as Director since 2011.

Dr. Phung has 40 years of international experience. His expertise areas are: deep foundations and piled raft foundations for high-rise buildings, temporary and permanent support for deep excavations, tunneling, soil improvement, underpinning, pile dynamics, and numerical analysis of soil-structure interaction problems. He has worked with projects in many countries, as Sweden, Norway, Denmark, USA, England, Russia, Germany, India, Hong Kong, China and Vietnam, etc. Some of his highlight projects are: Uni-Storebrand Headquarter in Oslo with steel-core piles into rock; SL-10 South Link in Stockholm with sheet pile wall for deep cut & cover tunnel in soft clay; Fredriksberg Metro Station in Copenhagen, the world largest drilled-pile wall for deep excavation; soil stabilization with lime-cement columns for Highway I15, Salt Lake City, Utah, USA; Öresund Link between Sweden and Denmark; Årsta Bridge in Stockholm with pile foundations and sheet pile walls in deep water and soft clay; the peer-review of piled foundation for the ICC Tower, 118 floors, 490m high in Hong Kong, the No. 4 tallest high-rise in the world, and the Sailing Tower in Ho Chi Minh City, Vietnam. He is the author and co-author of more than 100 technical papers and books in English, Swedish and Vietnamese for different national, regional and international seminars, conferences, and technical journals. He is the chief editor of a number of publications, as the proceeding of the international conferences Geotec Hanoi 2011, and Geotec Hanoi 2013.

Prof. San-Shyan Lin

Dr. Lin is a Professor at Department of Harbor and River Engineering of National Taiwan Ocean University in Taiwan. He received his Ph.D. degree in Civil Engineering from Washington University in St. Louis, Missouri USA in 1992. Dr. Lin was an engineer at Taiwan Area National Expressway Engineering Bureau from 1992 to 1994. Prof. Lin also served as TRB A2K03 Committee member on Foundations of Bridges and Other Structures between 1995 and 2004. He is also serving as committee member of TC-212 and ATC-1 of ISSMGE and as editorial board member of four major international journals in geotechnical engineering.

Prof. Lin's research and practical experiences have been dealt with static and dynamic behaviour of deep foundations, ground improvement and effects of scouring on bridge foundations. In the past decades, he was involved in many research projects such as interpretation of pile load testing results due to axial, lateral, or combined loading; effect of soil liquefaction on performance of pile foundation in sand; seismic effect of pile foundations; performance of suction pile in sand or in clay; and effect of scouring on performance of pile and caisson foundations etc. Prof. Lin has published more than 110 peer-reviewed journal papers and conference papers. One of his published Journal papers dealing with cyclic lateral loading effect on permanent strain of deep foundation due to cyclic lateral loading has been cited more than 60 times in Google academic website by many international researchers working on wind turbine foundations.

GEOTECHNICAL ENGINEERING

PREFACE

This journal issue was edited and contributed from works in Vietnam by Vietnamese authors and other popular persons.Sixteen papers are contained in this issue. Dr. Phung Duc Long is the lead editor. His Vietnamese team included: Dr. Pham Van Long, Dr. Pham Huy Giao, Mr. Mai Trieu Quang, Dr. Nguyen Anh Minh, Dr. Vu Quang Hung, and Dr. Vu The Manh.

The construction field in Vietnam has been under a very fast development. More than ten years ago the first 30-storey tower appeared in Vietnam. Today, the height has reached to 70-80 floors. During the last decade many tall towers, long bridges, deep tunnels, large hydro-power dams, large airport and habours, etc have appeared in Vietnam. Thousands of kilometers of highway have been constructed. New metro projects have been started both in Hanoi anh Ho Chi Minh City. It is understandable why geotechnical engineering has recently developed very fast in Vietnam.

The issue's major topics relate to piled raft foundations; piled foundations for storage tanks; pile group settlements; coastal and riverine erosion in the context of climate change; soil characterization for land subsidence evaluation for MRT projects; discrete modelling of excavation in fractured rock; settlement management for urban tunnels; evaluation of performance of diaphragm walls; study on clayey soils using piezocone; DEM simulations of medium dense sand in triaxial apparatus; characteristic of unsaturated soil of earth fill dams; ground improvement using soil-cement columns/deep mixing method; and ground improvement with preloading, and PVD and vacuum pressure.

Phung Duc Long (paper No.1) has made a detailed study on pile raft foundation in which the piles are used for reducing settlement, not for taking the total load from superstructure as in the conventional pile foundations. The results from his field model test, which strongly supports the concept of settlement-reducers, are reviewed. Basing on the experiment, a simplified design method is proposed. In the paper, the method is used for the conceptual design of a large high-rise building complex. In combination with FEM, the simplified method gives a reliable tool for conceptual design of piled-raft foundations. PLAXIS 3D is used for modelling both the piled and un-piled foundations in the study.

Yasuhara *et al*, (paper No.2) describe climate change related disasters such as erosion along riverine and coastal areas of the Mekong Delta in the South Vietnam. Also, the red river delta in the north is expected to be exacerbated by land subsidence, sea-level rise (SLR), and magnified typhoons. Adaptation to severe erosion is expected to respond to regional circumstances and the demands of local residents. Based on the expectations outlined above, for soft adaptation, attempts were made to conduct perception surveys of local residents, in addition to field surveys of erosion at riverside and coastal areas using an un-crewed aerial vehicle (UAV). Furthermore, for hard adaptation, a proposal is made to conduct pilot field tests at the coast for reinforcing coastal dykes using the combined technique of locally available materials with cost-saving eco-geosynthetics in addition to application of ICT. This paper explains the possibility of

smart adaptation combining soft and hard adaptation to reduce severe coastal and riverine erosion in the Vietnamese deltas.

Nguyen, H. M., Fellenius, B.H., Puppala, A.J. Aravind, P., and Tran, Q.T. (paper No.3) introduce bidirectional static loading tests on two shaft-grouted barrette piles of the 40-storey Exim Bank Building in Ho Chi Minh City, Vietnam. Simulation of the measured load-movement response indicated that the shaft resistance response was hyperbolic. The test schedule was interrupted by unloading/reloading cycles, which disturbed the gage data and included uneven load-holding durations which exacerbated the analysis difficulty.

Pham Huy Giao and Ta Thi Thoang (paper No.4) have an excellent paper on soil characterization and land subsidence prediction for the first MRT line in HCM city to meet the transportation needs of a fast growing population and rapid urbanization. Being located in the Sai Gon-Dong Nai delta HCM city area has low elevations and is underlain by a sequence of clayey, silty and sandy soil layers. Land subsidence due to groundwater extraction had been suspected and observed in HCM city. In this study, geotechnical characterization of the subsoil along the first MRT line was carried out. Prediction of land subsidence along this MRT line was conducted using a FEM consolidation code.

Shiwakoti and Manai (paper No.5) examine the application of deep cement-mixing technique in improving engineering properties of soft grounds at nine different sites in southern Vietnam's typical soft soil deposits. The exercise consisted of running a series of laboratory tests on undisturbed soil samples and their mixes with cement and field trials, followed by field application of 500,000 m cement treated columns with 600mm diameter, using Dry Jet Mixing technique. After the field trials and applications, cores were extracted from the treated grounds to evaluate improvement in their engineering characteristics. Both the laboratory and the field results revealed a drastic enhancement in strength, stiffness, and permeability of the treated soft soils.

Over-consolidation ratio (OCR) is an important geotechnical parameter for predicting undrained shear strength, lateral pressure ratio and settlement of clayey ground. Piezocone studies were made by **Bui Truong Son, Le Hong Quang and Lam Ngoc Qui** (paper No.6). In Southern Vietnam, a thick layer of saturated soft clays distributes throughout all the area. It includes Mekong (in Ca Mau province) and Dong Nai (in HCMC and Vung Tau) alluvial deposits. Below the soft clayey layer, there is a layer of either stiff to very stiff clay or fine sand. Based on the reliable data of consolidation test results of samples taken by piston tube and piezocone, relationship between over-consolidation ratio and normalized penetration resistant is established and analysed.

Phan To Anh Vu (paper No.7) studied the ground improvement using soil-cement method: A case study with laboratory testing and in-situ verification for a Highway project in Southern Vietnam. This article presents the experimental unconfined compressive strength results of soil-cement columns to improve the soft soil gained by Tan Son Nhat-Binh Loi Outer Ring Road Project, located in Ho Chi Minh City, Vietnam. The laboratory test results revealed that the Stable Soil cement has a greater unconfined compressive strength than tower (60%) slag cement. In addition, cement-soil samples obtained from in-situ indicated that the target cement content of 240 kg/m3 was satisfied not only a required compressive

strength (>24 kgf/cm2) but also a low-cost. The obtained results are expected to provide an experience for further design and construction in Ho Chi Minh City and its vicinity.

Bengt Fellenius and Mauricio Ochoa (paper No.8) write on the use of piled foundations for wide storage tanks. The authors have analyzed five case records involving wide piled foundations and show that the foundation settlement can be modeled as a flexible raft placed at the pile toe level with the foundation load distributed according to Boussinesq stress distribution and that the capacity of an individual pile is not relevant to the foundation performance. Differential settlement between the perimeter and interior piles and the effect of drag force and downdrag are discussed. The limitation of drag force as affected by the pile spacing and the weight of the soil in between the interior piles is addressed.

Tran Thi Thu Hang and Frederic Dubois (paper No.9) deal with discrete modelling of excavation in fractured rock by NSCD method. The presence of the network of discontinuities on intact rock is a special feature of nature rock masses. Non Smooth Contact Dynamics method (NSCD) is a discrete numerical method that owns many strong advantages of the study on granular materials and has been used recently in rock engineering. LMGC90, open-sourced software built on NSCD, has demonstrated a robust capacity in the modelling and mechanical analysis of diverse environments, masonry and rock included. In this study, a numerical modelling of a multi-phase-excavation in fractured rock was realized. The simulation of the tunnelling with the consideration of the state of the excavation and its neighbouring rock blocks, during and after the excavation schedule, and at each excavation phase was conducted. The obtained mechanical behaviours of the model were analysed, and three failure mechanisms of the excavation vicinity during the tunnelling was aimed. The observed phenomena showed typical effects of two components of the rock mass (rock structure and rock material) to the stability of the excavation and the host rock mass.

Duong Diep Thuy, Pham Quang Hung, and Le Thiet Trung (paper No.10) studied the pile groups in Vietnam using a method for estimating the pile group settlement considering the distribution of pile shaft friction, called SDF. For illustrating the proposed method is used for a full scaled experimental model by Koizumi et al (1967), for a field model test by Phung (1993) and for two case histories in Vietnam, Ca Mau Fertilizer Plant, and Ecopark Tower 2. Comparison of the calculated settlements with the measurement results shows that the SDF method provided a good prediction for all the studied cases.

Nguyen Quang Tuan and H. Konietzky (paper No.11) deals with the mechanical behaviour of Hai Duong Medium dense sand in triaxial test and its simulation using DEM. Numerical simulations of the drained triaxial behaviour of medium sand, a typical constructional soil material and widely used in Northern Provinces of Vietnam, were performed using discrete element method (DEM). The sand was simulated based on spherical particles using PFC3D with a non-linear contact model including rolling resistance. The calibrated simulations show that the DEM model is able to capture the mechanical behaviour of sand. The effects of different microscopic parameters on the macroscopic behaviour of the sand were investigated.

Tran The Truyen, Nguyen Van Hung, and Tran N. Hoa (paper No.12) studied the influence of geometrical parameters of soil cement columns on the settlement of embankments on reinforced soft soil. Deep Mixing Method (DMM) is a widely used soft soil improvement method in the construction of road, port, and tunnel foundations, etc. Deep mixing of cement with soil and water, forming Soil Cement Columns (SCC) in situ, has been applied in many projects in Vietnam in recent years; it has proved many advantages compared with other applied methods in the site. At present, Vietnamese engineers are concerned with finding out recommendations for an optimal choice of SCC scheme. This paper analyzes the influence of main geometrical parameters of SCC including the length, the diameter, and the spacing on the behavior of reinforced soft soils in some construction projects in Vietnam. The results will be an important basis for recommendations on the choice of rational schemes of SCC for soft soil improvement in Vietnam.

Benson Hsiung, Dao Sy Dan and William Cheang (paper No.13) evaluated the performance of diaphragm walls by wall deflection paths for deep excavations in Central Hanoi. The objective of this paper is to evaluate the performance of diaphragm walls by wall deflection paths for deep excavations in Central Hanoi. PLAXIS 2D was used for 2D finite element analyses in this paper. A benchmark analysis was first conducted on the excavation to verify the validity of material models and their input parameters for predicting wall deflections. The reference envelopes of wall deflection paths were then delivered for various conditions of deep excavations in Central Hanoi. Considering the current prediction, up to 72 mm of the maximum lateral wall displacement was predicted for an excavation with a 21.9 m depth. Reference envelopes of excavations have been developed and discussed in various conditions of the excavation. It is found that the maximum lateral wall displacement at the first stage of excavation is roughly inversely proportional to the Young's moduli of soils. Changing the wall thickness leads to the limited difference in reference envelope at shallow excavation stages, but this may not be correct when the excavation goes deeper.

Hoang Hiep and Pham Huy Giao (paper No.14) studied the effect of vacuum pressure distribution on settlement analysis results for an improved thick soft clay deposit at Sai Gon-Hiep Phuoc terminal port, South of Vietnam. In this study an approach of settlement analysis using a FORTRAN code was proposed to successfully simulate the large consolidation settlement of a thick soft clay deposit, improved by combination of preloading, PVD and vacuum pressure for Sai Gon-Hiep Phuoc (SGHP) project. Geotechnical characterization of the subsoil profile underlying the project site was carefully done to provide input data for settlement analysis, in which a particular focus was given on studying the vacuum pressure distribution along the 35-m deep PVD. It was found that the coefficient of vacuum pressure distribution (kP) from 0.85 to 1.0 gave the best estimation of the time-dependent total primary settlement as embankment construction goes in addition to a smear effect RS= 3.0. The increasing trend of kP with time might be explained by the fact that for the later stages of loading the vacuum pressure could spread more to the depth.

Nguyen Thi Ngoc Huong and Trinh Minh Thu (paper No.15) studied the Characteristic of Unsaturated Soil of Earth Fill Dams in Vietnam. Earth dams in Vietnam, especially earth dams at the central part of Vietnam, are generally made using in-situ soils having low clay content. The knowledge, experience, calculation theory, apparatus etc, for unsaturated soils in Vietnam are still very limited, especially the

studies of the influences of the shear strength of unsaturated soils to the stability of earthen structures. Therefore, study on the soil-water characteristic curve, shear strength and coefficient of permeability versus different matric suction for Vietnamese soil is an urgent task. This study shows that when the matric suction in the soil changes, the effective cohesion c' would also change; however the internal friction angle is almost unchanged for some types of soil in Vietnam. The experimental results can be applied to study the effect of unsaturated soil to the factor of safety of the slope.

Finally paper by **Alain Guilloux and Hervé Le Bissonnais** (paper No.16) is on the management of settlements for urban tunnels. The TOULON highway tunnel is located in a very dense urban environment, and a much complex geology. The excavated section is about 120 m^2 and the depth is in the range 15-35 m. The aim of the paper is to show how a great attention was paid to the settlements control: at the design stage through soils investigations, survey of existing constructions in regards to their sensibility to tunnel induced settlement, definition of settlements thresholds, and choice of ground pre-reinforcement techniques; during the construction, by heavy monitoring of deformations and continuous adaptation of the supports to the actual settlements and buildings behaviour.

This issue contains sixteen papers which are related to the Vietnam soil conditions and contribute to the advancement of geotechnics, and are all written by the Vietnamese authors, about projects in Vietnam, or the topics that Vietnam are facing. It is hoped that the issue will demonstrate how the authors have made their studies geared in a manner useful to geotechnical engineers in Vietnam and elsewhere.

Phung Duc Long

ACKNOWLEDGEMENT

It is a genuine pleasure to note that this Issue contains sixteen excellent contributions as made by authors mostly from Vietnam in using modern developments in Geotechnics relevant and applicable to Vietnamese soil and rock conditions. They are mostly practical in nature and is an excellent example of how research be conducted useful to our geotechnical profession in practice. Dr. PHUNG Duc Long is the lead editor. His Vietnamese team included: Dr. Pham Van Long, Dr. Pham Huy Giao, Mr. Mai Trieu Quang, Dr. Nguyen Anh Minh, Dr. Vu Quang Hung, and Dr. Vu The Manh.

The Preface by Dr. Phung adequately covers the details of the contributions by the authors. Vietnam is an important arm of our AGSSEA and has developed enormously in the recent years with tall buildings, coastal structures, highways and expressways, airport developments etc. It is a paradise for geotechnical engineers. We are all most grateful to Dr. Phung and his team. This issue demonstrates the future of Geotechnics extend to all member countries of AGSSEA and beyond. The successful conferences and symposia organised by the Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE) is also worthy of praise.

K. Y. Yong

N . Phienwej

T. A. Ooi

A. S. Balasubramaniam

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GEOTECHNICAL ENGINEERING

March 2016: VIETNAM SPECIAL ISSUE

Editors: Dr. Phung Duc Long & San Shyan Lin

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GEOTECHNICAL

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Editor: Prof. Meei-Ling Lin

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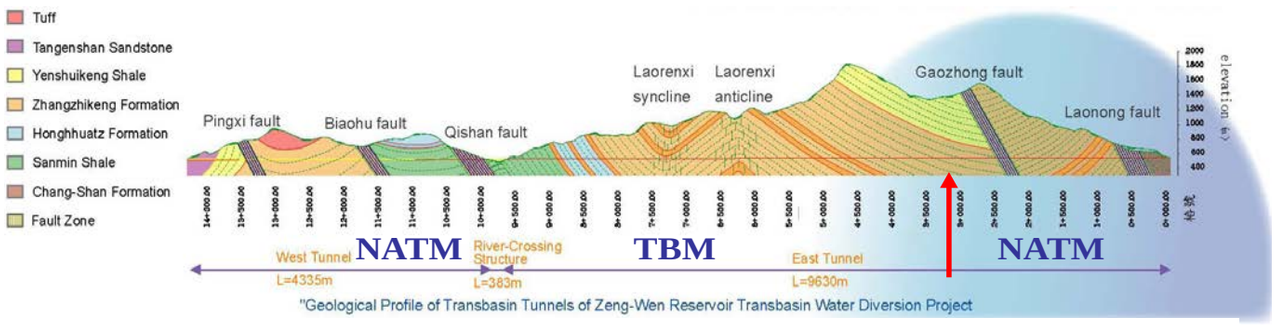
Satellite Image of the Taipei Basin
(After Yang, Wong and Hwang, 2016)

Sedimentation of Typhoon Morakot on Wanda Reservoir in central Taiwan. (After Lee, Wang, Chang Lien and Huang, 2016)



Geological profile along tunnels in TDT project

(After Lee, Wang, Chang, Lien and Huang, 2016)

GEOTECHNICAL ENGINEERING

JUNE 2016 ISSUE: CTGS ISSUE

Edited by Meei-Ling Lin

Professor Meei-Ling Lin

Dr. Lin is a Professor at Department of Civil Engineering, National Taiwan University. She received her Ph.D. degree in Civil Engineering from University of Texas, Austin, USA, in 1987. Dr. Lin has been a member of the General Committee of the Southeast Asia Geotechnical Society since 2007. She serves as a committee member of the Jointed Technical Committee 1 (JTC1 on Landslide) of the International Society for Soil Mechanics and Geotechnical Engineering, the International Association for Engineering Geology and the Environment, the International Society for Rock Mechanics, and the International Geo-textile Society. She also serves as a committee member of Technical Committee 303 (TC-303 on Flood) and Asian Technical Committee-1 (ATC-1 on Climate Change) of ISSMGE.

Prof. Lin's research interests and experiences include: potential analysis and simulation and behaviors of debris flow and slope stability, seismic slope behavior and stability, dynamic soil behaviors associated with soil liquefaction and ground responses analysis, mapping and micro-zonation of related debris flow, seismic slope stability potential, and seismic ground response. She lead a group to initiate a drafted Code for the Engineered Slope for the Ministry of Transportation and Communication, Executive Yuan, Taiwan. She has been invited as a Keynote speaker of international conferences, a special lecture speaker of International Landslide Symposiums and a panel reporter by ISSMG Conferences, and recently delivered an Opening Keynote for the Fourth Italian Workshop on Landslides.

SPECIAL FEATURE STORY ON

"Recent Diaphragm Wall Technologies and Future Challenges"
By Hosoi Takeshi and Matsushita Shinya.

Dr. Hosoi Takeshi

Dr. Hosoi Takeshi is a Technical Advisor at WSP Parsons Brinckerhoff, Singapore. He received his PhD with research focused on "Bearing Capacity of Diaphragm Wall Foundation and various Issues during its Construction" from Kyoto University, Kyoto, Japan in the year 1993.

Dr. Hosoi has more than 50 years of experience in design and construction of underground structures, tunnelling, bridge foundations and marine works. He is an international expert in diaphragm wall, barrette and bored pile foundation, shield tunnelling, NATM tunnelling, and other complex geotechnical works.

He is a Professional Engineer (PE) in Japan Since 1983, Fellowship of Japanese Society of Civil Engineer and International Member of Japanese Geotechnical Society. He coordinated the Asian Ocean Seminar sponsored by Japanese Ministry of Port and Harbour for 10 years. He was also a national member in "E-Defence Project" in Japan.

He served as a General Manager of Technical Research & Earthquake Technology Research Institute for 8 years and General Manager of Design Department of Nishimatsu Construction Co. Ltd. for 7 years.

Mr. Matsushita Shinya

Mr. Matsushita Shinya has been a Chief Engineer of Matsushita M&C Lab Co. Ltd. Since 2013. He was graduated from Nagoya University (Department of Science) in 1972 and joined Matsushita M&C Lab Co. Ltd.in 1972. He served as CEO of Matsushita M&C Lab. Co. Ltd. from 2003-2013. He is a Member of Japanese Geotechnical Society. He has been involved in a lot of big diaphragm wall projects in Japan for more than 40yers. In 1982 he was engaged in the experimental diaphragm wall construction for practical use of high DS polymer slurry and in 1984 he was joined the diaphragm wall construction project for Nagoya Subway 6 Line to lead successful adoption of polymer slurry. He was involved in Diaphragm Wall Foundation of Aomori Bay Bridge in 1988 and also in 1991 Diaphragm Wall Shaft at Kawasaki Artificial Island for Trans Tokyo Bay Highway Road. From 1992 to 1994 he was invited by the Grand Hi-Lai Hotel project and the Tuntex project（the Tuntex & Chien Tai Tower）at Kaohsiung, Taiwan as a consultant of Polymer slurry. From 2001 to 2006 he took part in the Water

Cut-off Wall Project at Kansai International Airport for stabilizing land settlement as a chief engineer for quality control of slurry. In 2008 he engaged in the Wall Foundation , “Knuckle Wall ” Project of Tokyo Sky Tree as a chief engineer for quality control of polymer slurry.

HISTORICAL NOTE ON

"Expriences of Geotechnical Development in Japan and Future Directions"

By Masami Fukuoka

Professor Masami Fukuoka

Prof. Fukuoka was born on 12 March 1917 in Okayama Prefecture, Japan. He studied Civil Engineering at the University of Tokyo, and in 1940 he entered the profession fully, taking up a post as a civil engineer for Japan's Public Works Research Institute (PWRI) of the Ministry of Internal Affair. During the Second World War, he served in the Japanese military.

He returned to PWRI after the war ended, and his engineering acumen was immediately needed. Japan experienced a series of severe earthquakes and floods, which further complicated the damage the country had suffered to its infrastructure during the war. It was one of the most difficult times in the history of Japan, he said to me when I was young. As a civil engineer, in particularly, as a geotechnical engineer, he worked to restore Japan's infrastructures from the effects of war and natural disasters. His strength of leadership was an especially important contribution to the design and construction of a great number of important infrastructures; and his work improved projects across a broad range of sectors, including those dealing landslides, road building and pavements, slope stability, flood control, river and coastal dyke engineering, ground investigation and soil test, earth pressure and retaining walls, rock-fill and earth-fill dams, ground subsidence, foundations of long-span bridges, earthquake geotechnical engineering and, eventually, geosynthetic engineering. The breadth of his work was extraordinary, considering how difficult it is to become a specialist in even one of these areas today. After rising to serve as PWRI's director, he retired in 1970 and entered academia and became a full professor of Civil Engineering of the University of Tokyo, where I was studying as doctoral candidate. In 1977, Prof. Fukuoka transitioned to a professorship

at Tokyo University of Science where he remained until his retirement in 1986. As his career progressed; he contributed greatly to multiple professional organizations. He helped establish the Japanese Geotechnical Society (JGS) in 1949 and served as President from 1976 – 1997. He was integral to Tokyo playing host to the 9thInternational Conference on Soil Mechanics and Foundation Engineering, then served as President of the International Society for Soil Mechanics and Foundation Engineering (now ISSMGE) from 1977-1981.During this period, while at Tokyo University of Science, he started the research on geosynthetic-reinforced soil retaining walls and geomembrane lining at the bottom of reservoirs.

GEOTECHNICAL ENGINEERING

PREFACE

This Issue contains thirteen excellent papers as the country issue from Chinese Taipei Geotechnical Society (CTGS). It is an example of contributions from leading private sectors in Taiwan and also academics.

The first paper by Lee et al deals with the topic of rock tunnelling applied to steady water resources supply in Taiwan, challenges and examples. The authors deal with increasing soil erosion and slope collapse in some catchment area in Taiwan in the past decade. Also, increased sedimentation rates of the reservoirs reducing the effective capacity, and severely affecting the steady water supply. Multiple measures have been proposed for stabilizing the water supply. Tunnelling in the catchment area, even close to a dam, represents serious environmental and engineering risks. The authors present two cases of rock tunnelling as applied to steady water resources supply. Challenges and some distinctive issues, such as the presence of a high-temperature ground, a combustible gas emission ground, and potential instability of rock wedges caused by large underground excavation, are discussed. The authors then present countermeasures with a clever design of an elephant-trunk intake pipe to release turbid water. State-of-the-art tunnelling through rock and some innovative tunnelling technologies are utilized in these two cases.

The second paper by Chiu et al deals with the interesting topic of the state-of-the-art of tunnel maintenance in Taiwan and challenges to sustainable development. Tunnel construction in Taiwan started as early as the late nineteenth century; within the last 125 years, tunnel maintenance in Taiwan went through several stages. In early years engineers dealt with tunnel excavation. Now tunnel inspections, repairs and reinforcement were performed only when serious damages were observed. As the number of damaged tunnels increased, investigations revealed that the degradation of tunnels in Taiwan is inevitable and usually occurred in an exceptionally shot period. Frequent earthquakes, a high ground water level and poorly cemented rock masses provide an environment for such degradation. To adapt more effectively to the environment, tunnel maintenance looked at the entire life cycle of a tunnel. Thus the diagnostic methods have demonstrated to be useful in enhancing the sustainable operation of tunnels.

An interesting contribution by Wang et al dealt with rock tunnel –shaft intersection in projects in Taiwan. The construction of an intersection between a shaft and a rock tunnel is a three-dimensional problem, and requires more complex excavation and support methods than those used in conventional two-dimensional tunnel construction. The paper considered examples of rock tunnelling in Taiwan, and the construction of intersections between shafts and tunnels. Data are collected from case histories first, and the excavation sequences are classified. Then challenges as encountered to secure construction of the intersections of shafts and tunnels are examined, including the significant scale effects of rock masses on excavations; difficulties

in controlling rock deformation near the intersections, and groundwater ingress are also discussed. Strategies and countermeasures as applied to overcome these difficulties in recent projects, and their effectiveness is investigated. Finally, the state-of-the-art design and construction of intersections between shafts and tunnels in Taiwan are presented.

The fourth paper by Hsiao et al dealt with the influence of peak strength degradation in assessing the stability of tunnels in hard rocks. Tunnelling depths are increasing rapidly in Taiwan. The effect of brittle failure on hard rock tunnelling is, however, rarely studied. In this paper, a study is carried out on the importance of the post-peak behaviour using Hoek-Brown failure criterion is investigated; through strength loss experimental studies , a relationship between strength loss parameter and confining stress is established. Subsequently, a numerical analysis model (so-called strength degradation model), is proposed and applied to predict the impact of the post-peak strength degradation on an actual tunnel. The analysis showed that the effect of the post-peak strength degradation on deformation during excavation is becoming more and more pronounced with increasing depth of tunnels. Severe deformation due to the excavation may endanger the tunnel stability during construction in deep overburden. Thus the strength degradation beyond brittle failure shall play an exceptionally important role in the stability of deep tunnelling.

The fifth paper by Hwang et al is on the deep excavations in Taipei Basin and the performance of diaphragm walls. Since movements of diaphragm walls are reduced by the presence of existing underground structures in the vicinity of excavation, comparison of the observed wall deflections with the results obtained by using two-dimensional analyses may lead to erroneous conclusions. Similarly, additions to diaphragm walls, such as buttresses, station entrances, ventilation shafts, etc., will also tend to reduce wall deflections. Thus the authors recommend to compare the results of two-dimensional analyses with the upper envelopes, designated as “reference envelope”, of a family of wall deflection paths of the same geometry of excavation and the same characteristics of the retaining system. Inclinometer readings obtained at Shandao Temple Station of the Bannan Line of Taipei Metro were studied to establish the relationship between wall deflections and depth of excavations. The results are verified by numerical analyses using PLAXIS computer software. Reference envelopes were then developed for estimating maximum wall deflections; and charts were established for correcting inclinometer readings to account for the movement at diaphragm wall toes. The authors found that the width of excavation has significant influence on wall deflections and toe movements. Additionally, the consolidation of the Songshan Formation due to the drawdown of groundwater in the Jingmei Formation reduced the movements of diaphragm wall toes.

In an interesting paper Yang et al studied the hydraulic characteristics of the Jingmei Formation and the Dewatering of Deep Excavations in Taipei Basin. Geotechnical Engineers in Taipei are well aware that the Jingmei Formation is a unique geological feature of the Taipei Basin. It is highly permeable and a water-rich stratum responsible for many failures in underground constructions. The piezometric heads in the

Jingmei Formation had to be lowered by pumping for the deep excavations to be carried out safely. The authors thus discuss the hydraulic characteristics of the Jingmei Formation and the experience gained in large scale dewatering schemes. Attempts have been made to establish the relationship between the progression of tides in the river and the fluctuation of the piezometric levels in this Formation. The authors found that, the transmissivity and storage coefficient deduced from the observed groundwater drawdown are affected not only by the pumping rate, but also the duration of pumping; thus the rates required tend to be overestimated as based on the results of pumping tests.

Forensic studies have now become an important field in geotechnical engineering. The seventh paper by Lee et al is on the forensic investigation of a subway tunnel failure during construction. In this paper, the forensic evidences and investigation of a subway tunnel construction failure occurred in Kaohsiung, Taiwan is presented. The studied construction failure occurred during a cross-passage excavation of a shield tunnel construction work of the Kaohsiung Mass Rapid Transit System, and resulted in severe tunnel collapse and extensive ground failure that even reached to ground surface 30m above the tunnel depth. Valuable photo images obtained during and post event, as well as results of special geophysical testing methods were presented and compared to verify aspects of the proposed failure scenario. Information presented in this paper would be helpful to improve engineers' knowledge for preventing similar construction risks.

Typhoon Morakot brought tremendous rainfall of a hundred-year recurrence period in Taiwan. The paper by Chou et al concentrates on the effects as encountered by roads and houses in the middle and southern part of Taiwan; from landslides, debris flows, and floods. Erosion of road foundations, sliding of slopes, and collapse of bridges has paralysed the road system. Using Alishan Route 18 as an example, this paper discusses different causes, types, and renovation methods of slope disasters for future reference.

The paper by Lee et al also deals with the forecast of shallow landslides pertinent to Taiwan in a study which combines rainfall parameters and landslide susceptibility. Catastrophic landslides and debris slides triggered by typhoons such as Typhoon Morakot (2009) have occurred more frequently in the recent years, and caused many casualties and much economic loss in Taiwan. For the purpose of reducing the damage and preventing loss of life resulting from geological hazards, this study collects multiple period landslide inventories which contain the information of occurrence time, location, magnitude, rainfall intensity, and accumulated rainfall to establish the rainfall threshold for shallow landslides on a regional scale. The concept of a hazard matrix which combines the magnitude (landslide ratio of slope units) and the possibility of occurrence (historical disaster records) are investigated to set up the early warning thresholds. Accordingly, the critical rainfall thresholds were built up based on the R_{24} (24 hours cumulated rainfall) and I_3 (3-hour mean rainfall intensity) of historical records. The model developed can predict the possible sediment hazard on the hillslope 2~9 hours before occurrence of landslides. The web based GIS helped to have early-warning systems to display the real-time rainfall data and the warning signal immediately for disaster prevention through increasing the response time.

Chang et al made dynamic analyses for performance based seismic design of geotechnical structures with examples in deep foundation. Performance-Based Seismic design (PBSD) of geotechnical engineering structures can be evaluated by a number of methods taking into account the uncertainties of the designed influence factors. Despite the fact that the seismic force is known to be a significant factor, the static and/or pseudo static analyses seem to be commonly adopted in design practice. The paper by Chang et al briefly discusses alternate approaches with the emphasis on dynamic analysis. Examples are given with the assessments of two deep foundations located in Taiwan. Dynamic analysis is rather important to the seismic design problems since it can monitor the details of time-dependent structural responses incorporating both peak ground acceleration and duration of the earthquake. Other than the 3D finite element analysis, the simplified solution from 1D wave equation analysis can be very effective and convenient for PBSD analysis on deep foundation.

The eleventh paper in this CTGS Issue is on the time dependent dynamic characteristics during soil liquefaction in saturated sand. Chen et al, conducted model pile tests to quantify the relation between soil stiffness and excess pore water pressure during liquefaction, the test data of a series of shaking table tests on model pile in saturated sand using a large biaxial laminar shear box conducted at the National Center for Research on Earthquake Engineering were analysed. The pile tip was fixed at the bottom of the shear box to simulate the condition of a pile foundation embedded in a firm stratum. The pile head was mounted with steel disks to simulate the superstructure. In addition, strain gauges and mini-accelerometers were placed on the pile surface to obtain the response of the pile under shaking. Therefore, the model pile can be considered as a sensor to evaluate the changes of dynamic characteristics of soil-pile system during the shaking by using the time-frequency analysis and system identification technique. The results showed that the stiffness of the soil would increase with the dissipation of pore water pressure and the recovery of soil stiffness is directly related to the effective stress ratio of soil specimen.

The interesting paper by Shi et al present geological investigation and sliding mitigation in Jiufen Area in Taiwan. Jiufen's orographic and geological characteristics together with frequent typhoons and heavy rain make it potentially vulnerable to landslides. The landslide problems can be disastrous not only to the 2,300 local residents, but also to the constant flow of tourists visiting the town. After the site investigations, it is concluded that both of the colluvium and groundwater are the most important geological factors to the slope stability problems. According to the long-term groundwater level monitoring result, it varied from 8m to 12m during the period of typhoon and heavy rainfall. And the displacement induced by the groundwater level rising was found. Four underground flow lines were located based on the resistivity image profiling and self-potential investigation. Then five water collection wells were planned to construct according to the locations of underground flow lines. The level lowered down about 15m after the wells completed and the slope became stable. It is suggested that the depth of colluvium in Jiufen area needs to be investigated in more detail.

Finally the last paper thirteenth in this Issue is by Shu et al on the interpretation and analysis of potential fluidised landslide slope. Fluidized landslide, also called hillslope-type debris flow, often occurs on the village side hillslope in the mountain area during extreme weather condition. Fluidized landslide induces more severe damages than the shallow landslide; however its recognition model is still lacked. In this research a recognition model of the potential fluidized landslide slope was developed using 80 cases occurred in the Kaoping River basin, southern Taiwan. 30 fluidized landslides and 30 shallow landslides are employed for the model development and another 10 events of each landslide are applied for verification. Results show that the recognition model composed of 8 discriminant factors including geomorphology factors, hydrology factors and potential landslide factor predicated by SHALSTAB model provides accuracy rate of 85% of the verification events. Thus the model can be of practical use for fluidized landslide interpretation. The model can be used to identify the potential dangerous slope areas and effectively assist the disaster prevention and early warning of villages in mountain area.

The editor of this CTGS Issue is very pleased to be able to present the geotechnical activities in Taiwan through these thirteen contributions and hope that the material would be beneficial to Geotechnical Engineers in SE Asia and elsewhere.

Meei Ling Lin

ACKNOWLEDGEMENT

Thirteen excellent contributions are contained in this Country Issue of the Chinese Taipei Geotechnical Society (CTGS) as edited by Prof. Meei Ling Lin. All contributions are by authors from Taiwan and Prof. Meei Ling Lin must be congratulated for her excellent task. In the Preface Prof Lin have described in great detail the contributions from the authors. It is a pleasure to note that successful country issues are now completed by the Thai Geotechnical Society, The Vietnamese Society and now the Chinese Taipei Society. The contributions from Singapore, Hong Kong and Malaysia will also be released soon. Also, last but not least from Indonesia.

This issue also contains a special feature story on “Recent Diaphragm Wall Technologies and Future Challenges” by Hosoi Takeshi and Matsushita Shinya; a historical note on “Experiences of Geotechnical Development in Japan and Future Directions” by Masami Fukuoka and an “Obituary of Masami Fukuoka” by Fumio Tatsuoka. The passing away of Prof Masami Fukuoka on 27 January 2016 is a great loss to the engineering communities.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

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Editor: Professor Meei-Ling Lin

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Thien Seng Yee, Swee Huat Chan and Teik Aun Ooi

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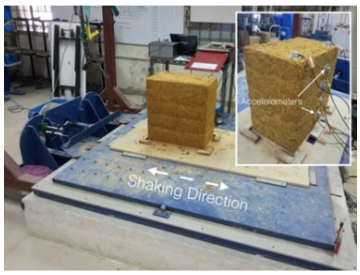

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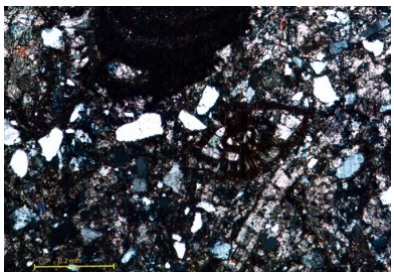

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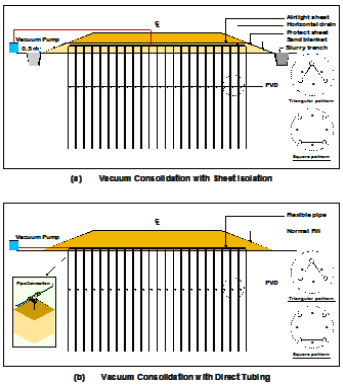

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PREFACE

The first paper is by Za Chieh Moh on Professionalism and ethics of geotechnical engineering. According to Moh, Ethics is the branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct. Ethics is qualitative. It may change with time, circumstance and environment. Practice of ethics requires proper understanding of the time frame. Many professional engineering organizations have a set of Code of Ethics or Code of Practice to regulate or guide their members. Basically they all center around public welfare, sustainable development, professional competence, truthful and faithful, honourable, responsibly and lawfully. Success of engineering projects not only depends upon the engineering professional, but it also closely related to other non-engineering professionals. In the paper, discussions are presented about engineering ethics for non-engineering professionals. Ishihara in the Chin Fung Kee named lecture dealt with recent advances in pile testing and diaphragm wall constructions in Japan.

The second paper by Ishihara consists of brief introduction of the in-situ pile loading tests that have been conducted in Japan over the last two decades in connection with the design and construction of high-rise buildings in areas of soft soil deposits. In addition to the conventional types of tests in which the load is applied at the top and at the toe of the pile (O-cell test), what may be called “pile toe bearing test” and “skin friction test” is introduced. The results of these tests are described and compared with those from the conventional type of the pile loading tests. In-situ prototype tests are also introduced in which bearing power of Barrette type pile is compared with that of the circular type pile. A special case of in-situ pile loading tests conducted in Singapore is also introduced in which the friction between the circular ring-shaped concrete segment and the surrounding soil deposit was measured directly during excavation of the shaft by applying loads up and down by jacks installed between two adjacent segments in vertical direction. The latter part of this paper is a brief description on constructions of large-diameter circular diaphragm walls that was carried out about 10 years ago for the LNG storage tank in the coastal site in Tokyo Bay. The construction of the large-scale Kawasaki Island in the middle of Tokyo Bay in Japan will also be introduced. The whole scheme and process of construction is for these two undertakings is introduced with some comments on observed behaviour of the walls and on special precaution taken during construction.

The third paper by Jian Chu dealt with innovations in soil improvement methods. These include the dynamic replacement and mixing method for the improvement of peaty soil, the layered clay-sand method for land reclamation using clayey fill, and the biodegradable fiberdrains. Other new soil improvement methods in the related areas are also presented to illustrate the role of innovation in the advance of soil improvement technologies. These include the drainage enhanced dynamic compaction method for the improvement of clay layers, the underwater dynamic replacement method for the treatment of seabed clayey soil, the use of the vacuum preloading with horizontal drains method, methods to form working platform on top of soft fill for land reclamation using soft fill materials, the NEUSpace method for land reclamation in deep water, and the new types of prefabricated vertical drains (PVDs). Methods for mitigation of liquefaction hazard, making water pond in sand, and prevention of dike failure from overtopping using biotechnologies are also introduced.

The fourth paper by Poulos dealt with lessions learned from designing high-rise building foundations. The design of tall building foundations involves a systematic process which incorporates ground investigation, ground characterization, preliminary design of the foundation system for the anticipated structural loads, detailed foundation design, load testing of the proposed foundations, modification of the foundation design, if appropriate, and monitoring of the foundation performance as construction proceeds.

This paper also described the process and some of the tools available for implementing it. It then set out a series of lessons learned during the design of such foundations, and illustrate these lessons with examples from projects in Asia and the Middle East.

The fifth Paper by Buddhima Indraratna and his co-authors is on the subject of the Advancements in Rail Track Geotechnology at Increased Speeds and Axle Loads . Ballasted railroads are designed to provide high speed commuter and heavy haul transportation. Ballast is one of most important load bearing components of the track substructure. However, it often experiences excessive settlement, lateral deformation and particle breakage when subjected to large dynamic (cyclic and impact) stresses. In addition, tracks constructed along coastal areas often undergo large settlements over soft compressible estuarine deposits, leading to frequent and costly track maintenance. The use of artificial inclusions such as geogrids, geocomposites, shock-mats (rubber) and prefabricated vertical drains (PVDs) are attractive options to maintain the vertical and horizontal alignment of tracks and to curtail excessive maintenance costs. This paper provides a deeper insight to the recent advancements in rail track geotechnology at increased in speeds and axle loads.

The sixth Paper by P.V. Long and his co-authors is on the subject of "Performance and Analyses of Thick Soft Clay Deposit Improved by PVD with Surcharge Preloading and Vacuum Consolidation – A Case Study at CMIT". The authors discussed ground improvement using PVD for increasing foundation stability and controlling residual settlements of the container yard constructed on 35 m thick soft clay deposit at CMIT, Vietnam. The treated area is about 40 ha including vacuum consolidation combined with 6.3 m embankment surcharge for a strip of 57 m along the river bank (VCA) and conventional surcharge preloading using 9.1 m sand fill embankment for the remaining area. The monitored data indicated that PVD thickness of 3 mm arranged in spacing of 0.9 m to 1.2 m can be used successfully for improvement of thick soft clay deposit in both methods of embankment preloading with and without vacuum pumping. Performance of reduced embankment combined with vacuum pumping is very much better than that of conventional embankment preloading in terms of shortening construction time, reducing lateral displacement, increasing stability, and minimizing residual settlement. Back calculated ch value is dependent on the assumptions of smear effects including smear zone ratio, ds/dm and permeability ratio, Rs = kh/ks. For ds/dm = 2 as commonly used, the back-calculated ch value is directly proportional to Rs and the value of Rs in vacuum consolidation seems smaller than that in embankment preloading. Using the back-calculated results of compressibility and flow parameters, the time-settlements re-calculated by 1-D method are in very good comparison with measured data for both conventional preloading and vacuum consolidation considering the vacuum pressure as an induced vertical stress

distributed uniformly in the PVD zone. Analyses of factor of safety from observed pore pressures during embankment construction illustrated that the commonly used stability chart as given by Wakita & Matsuo (1994) is too conservative for PVD improved soft ground. Secondary compression behavior of thick soft ground improved by PVD including back calculation for coefficient of secondary compression and estimation of long term residual settlement are also provided.

The seventh paper is on the Characteristics of Hardpan calcrete of the Nyalau formation and impact on design of shallow foundations is by Sim et al. Nyalau Formation, found in Bintulu Division in Sarawak, Malaysia was formed by a thick array of shallow water marine and paralic sedimentary rocks. The formation is of predominantly sandstone origin and also the lesser known 'limestone' which is described as hardpan calcrete in this paper. Changes of sea levels during the mid-Pleistocene epoch resulting in the formation of raised terrace where marine deposits sedimented and subsequently followed by depositions of the coastal alluviums and inland peat swamps. Laboratory studies and design aspects of shallow foundations are described as well.

The eighth paper is by Seah et al is on ground improvement with vacuum consolidation method in Vietnam. In recent years, vacuum consolidation method has been extensively used in Vietnam on various types of infrastructural projects. The main reason for adopting this method is that the construction cost is relatively close to the conventional prefabricated vertical drain method with less surcharge fill and shorter construction time. Hauling or transporting large amount of fill has been a major problem in most infrastructure projects. With the stringent settlement requirements specified by the Vietnamese Government, ground improvement via vacuum consolidation has become very popular hence attracting various International vacuum consolidation specialists to participate in Vietnamese projects.

The ninth paper is by Tanaka & Lee deals with the dynamic properties of residual soils in Malaysia. The paper examines the dynamic deformation properties of a selected residual soil sample in Malaysia through a series of laboratory tests; including cyclic triaxial tests on the compacted residual soil with a measurement of deformation responses at small strains, and shaking table tests on a small soil block whereby the acceleration responses at different levels were analysed. The results showed that the dynamic deformation properties of the soil, namely the variation of shear modulus over a shear stain were ranging between 10-5 and 10-2.; the G values obtained were comparable to those published data.

The tenth paper is by Michael Dobie dealing with the pre-consolidation pressure of the Holocene marine clay of Malaysia. Prediction of the consolidation settlement of very soft alluvial clays in general requires knowledge of the compressibility characteristics of the deposit, but in particular it requires an accurate determination of the preconsolidation pressure. In the OC stress range settlements are likely to be relatively small, but once into the NC range, they can become very large. Therefore the accurate determination of the preconsolidation pressure is essential if reliable consolidation settlement predictions are to be made. This is examined in detail by back-analysing settlement data from two trial embankments which were built over 13m of Holocene marine clay at Juru (south of Butterworth), as part of the geotechnical investigations carried out for the North-South Expressway project over the period 1990 to

1991, then making comparisons to settlement calculated from measured compressibility properties. The definitive determination of preconsolidation pressure is derived from the behaviour of the trial embankment itself, which is then compared with assessments based on undrained shear strength, oedometer test results and piezocone tests.

Eleventh paper by Boon & Ooi deals with FEM analyses and t-z load transfer analyses on critical structures in Kuala Lumpur during tunnelling works. Three case histories are presented: The first one is on a 15 storey tower building seated on a raft foundation. Two modelling approaches were adopted to model the tunnel using the 2-D finite element software PLAXIS, namely the contraction method and the internal pressure method. The second one is on a flyover bridge, of which the pile toes are at an elevation higher than the tunnel crown; and the third one is on the piles of a Light Rail Transit (LRT) bridge in the vicinity of a tunnel. For the latter two case histories, the load transfer t-z and Q-z method (Seed & Reese, 1967), which can be implemented easily into a spreadsheet, to estimate the pile settlements induced by tunnelling is found to be applicable. Finally, insights obtained from the t-z and Q-z analyses are used to explain and refine the influence zones previously proposed by Jacobsz et al. (2004) derived from centrifuge tests. The line joining the points of inflection of multiple subsurface Gaussian settlement profiles (Mair et al., 1993) at different depths was found to correspond to the maximum settlement along the vertical profile, above which the settlement is always increasing.

In the twelfth paper, Tan & Ooi presented top down and bottom up methods of deep excavation in Kenny Hill Formation. The deep excavations are for the Klang Valley MRT underground stations; namely the Bukit Bintang and Merdeka stations which have similar retained depth of 33.5m and 31m respectively and both having 1.2m thick Diaphragm walls. Both the stations are designed with the same design criteria and factor of safety. The selection of type of retention systems, strutting system, construction sequences and timing and instrumentations are discussed.
The predicted and measured diaphragm walls displacements and Strut forces at different stages are then compared and discussed.

In the thirteenth paper Liew & Ho described the problems of Jack-in piling system in Malaysia causing large soil displacement inducing lateral and vertical movements of earlier installed piles, premature refusal to penetration of pile due to intermittent obstruction and also inadequate pile embedment due to shallow end bearing stratum. Pre-boring technique with or without infill are used to overcome the obstruction problem and to ensure adequate pile embedment. The proof loading pile termination criteria appears to produce favourable pile performance and quality assurance.
There are inherent long-term performance deterioration associated with shallow end bearing piles and incomparable short-term and long-term toe resistances, particularly in meta-sedimentary formation, which is prone to stress relief due to softening effect.

The fourteenth paper is by Lee et al on rainfall induced landslides in Malaysia. Landslide constitutes one of the major geohazards in Malaysia. The frequent landslide occurrences are mainly attributed to rainfall

(extrinsic factor) and tropical residual soil (intrinsic factor). This paper provides insights into the mechanisms of rainfall-induced landslides in the country and reviews efforts that have been taken to mitigate the hazard. Despite of the fact that local authorities, government agencies and practitioners have played their enormous roles in producing a better hillside development planning and control in the country, there are still areas for future improvement. The basic understanding of the unsaturated soil mechanics among practitioners and the laboratory facilities to support the theories still need to be enhanced. Besides, the country can move towards a better landslide risk control and management by advancing the studies in run-out behaviours of landslide, establishing database for soil profiles particularly in landslide prone areas, and switching to risk-informed approach of slope stability assessment.

The fifteenth paper by Tan et al is on the "Considerations of Deep Excavation in Kenny Hill and Kuala Lumpur Limestone Formations at the KVMRT". The paper described the constraints in excavation works in urban environment in the construction of underground space development in the KVMRT stations in the Kuala Lumpur city centre.

The sixteenth paper by W. Mao, I. Towhata, S. Aoyama and S. Goto is on the subject of Grain crushing under pile tip explored by acoustic emission. They thought that the recent practice in design of pile foundations under vertical load relies significantly on either a classic plasticity framework or empiricism. Despite efforts to explore the real pile behavior mainly in 1960s and 1970s, research interest has decreased in the recent times. Accordingly, much is not known about the group pile behavior that is more complicated than that of a single pile. One of the possible reasons for this poor situation is the lack of novel research methodology. In this regard, the authors chose the behavior of both a single pile and group piles subjected to vertical load, and carried out model tests using several new research tools. One important finding was the significant vertical compression of sand under the pile tips which was accompanied by crushing of sand grains. To further investigate the process of grain crushing, the acoustic emission (AE) method was introduced so that "when" and "where" of grain crushing might be identified through the interpretation of micro noise that was generated by crushing. Being different from early studies on AE in geotechnical materials, the present study paid attention to the frequency components of the noise and found that noise by grain sliding is of lower frequency while that by crushing exhibits higher frequency. This finding enabled the authors to interpret more accurately the recorded noise, and the timing and location of grain crush during pile penetration were identified. These findings were verified against the independent graphic interpretation of grain movement (PIV). Consequently, a close correlation between AE intensity and yielding of sand were identified. It is important that grain crushing occurs slightly below the elevation of the pile tip and sand immediately below the tip is significantly compressed but less prone to crushing.

The seventeenth paper is on test embankment supported by vibro stone column related to the high-speed rail project in Malaysia by Yee et al. The Ipoh-Padang Besar Electrified Double Track project is a multibillion-dollar high-speed rail project that involves installation of double tracks, electrification work, construction of stations, bridges and tunnels. Stringent performance specifications governed all aspects of

the project. Various ground improvement techniques were employed, among them Vibro stone columns. From 2008 to 2010, a low, instrumented test embankment supported by Vibro stone columns was built and monitored. The purpose was firstly to demonstrate that Vibro stone columns would not result in "hard points" at the surface even of a low embankment. The second purpose was to investigate the rest periods required for consolidation settlements to occur. Instrumentation and visual inspection show that no "hard points" were observed on the embankment surface, that Priebe's (1995) method adequately predicts the magnitude of settlements, and that Han & Ye's (2001) method adequately predicts the rate of settlements. The track has been operational since 2013, and settlement performance has been within the stringent specifications.

Editors:
Thien Seng Yee,
Swee Huat Chan
and Teik Aun Ooi

ACKNOWLEDGEMENT

Seventeen papers consisting of four Keynote and three Special Lectures from the recently completed 19th SEAGC and 2rd AGSSEAC which are upgraded together with ten contributed papers are contained in this Malaysia Special Issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Prof. San Shyan Lin
Prof. Kwet Yew Yong
Prof. A. S. Balasubramaniam
Dr. Noppadol Phienwej

December 2016: MALAYSIA SPECIAL ISSUE

Edited by

Thien Seng Yee, Swee Huat Chan and **Teik Aun Ooi**

Ir. Thien Seng Yee

Ir. Yee graduated in civil engineering from the University of Malaya in 1978 and has over the years worked on projects largely involving heavy plant and building foundations as well as large infrastructures. He had also carried out numerous works on distress evaluations and rehabilitation engineering. In 1994, Ir. Yee set up his own practice, Geo.Consult, to support the construction industry with both expert and specialist advice; in particular on geotechnical engineering aspects. His participation in recent projects of significance are the Kuching Deep Water Port, Shah Alam Expressway, North-South Expressway, Kuantan Port Inner Harbour Development, Kuantan-Kertih Railway and the Rawang-Ipoh Double Tracking Railway. He has authored/co-authored more than a dozen technical papers in local and international conferences. Ir. Yee is an expert witness and accredited checker registered with the Board of Engineers Malaysia for the design of geotechnical engineering works. Ir. Yee is the Chairman of the Geotechnical Engineering Technical Division of the Institution of Engineers Malaysia for Session 2015/2016.

Ir. Dr. Swee Huat Chan

Ir. Dr. Swee Huat Chan is a registered Professional Engineer with the Board of Engineers, Malaysia since 2005. He graduated with a 1st Class Honors Degree in Civil & Structural Engineering from the Universiti Kebangsaan Malaysia in 1997. He obtained his Ph.D degree from the National University of Singapore in 2003. He worked as a Geotechnical Engineer in SSP Geotechnics Sdn. Bhd. for about 5 years before he joined Dr C.T. Toh Consultant as a Resident Engineer for about 2 years. He is one of the founders and directors of Geo-Excel Consultants Sdn. Bhd., a geotechnical engineering consulting firm. For the past 15 years, he has involved himself in analysis, design and construction of various geotechnical works and aspects including shallow & deep foundations, deep excavations & earth retaining structures, slope stability analyses & stabilization, landfill liner systems, seepage analyses, assessments of tunnelling methods, soil improvement techniques (highway, railway, airport, etc.), geotechnical failure investigations, 3-D finite element analyses, etc. He also served as an independent expert witness in several lawsuit cases in the High Court of Malaya at Kuala Lumpur. He is currently the Honorary Treasurer for Malaysian Geotechnical Society, Committee Member for the Geotechnical Engineering Technical Division in The Institution of Engineers, Malaysia and Member of Working Group on Drafting of Malaysia National Annex to Eurocode 7: Geotechnical Design - Part 2: Ground Investigation and Testing.

Ir. Dr. Teik Aun Ooi

Ir. Dr. Teik Aun Ooi obtained his Bachelor of Civil Engineering and Master of Engineering from Auckland Universiity in 1966 and 1968 respectively. He obtained his PhD from University of Sheffield in 1980. He was the Co - Organizing Chairman of the recently concluded SEAGC2016. He is the immediate Past President of the Southeast Asian Geotechnical Society (SEAGS), Founder Chairman of the Association of Geotechnical Societies in Southeast Asia (AGSSEA). He is a Past President of the Malaysian Institute of Arbitrators (MIArb). He is the Immediate Past ICE Country Representative for Malaysia (2000 - 2015), Founder Chairman of IEM Tunnelling and Underground Space Technical Division (TUSTD), Founder Chairman of IEM Consulting Engineering Special Interest Group (CESIG), He is an Honorary Fellow of The Institution of Engineers, Malaysia (Hon. FIEM), Fellow of the Institution of Civil Engineers (CEng FICE), Fellow of the MIArb (FMIArb), Fellow of Malaysian Society of Adjudicators (FMSA) and Fellow of Asean Academy of Engineering and Technology (FAAET). Dr. Ooi has fifty years of experience in the Construction Industry. He spent his initial fourteen years with the Public Works Department Malaysia before leaving to work in the private sector where he spent seventeen years working in the construction sector. He play major role in the Johore Baru Causeway widening and the design and construction of Senai Airport in 1970s. He was the Project manager for the Wisma Saberkas Building Project in Kuching in 1980s. He was Project Director for the Design and Construction supervision of the New Kuching Deep Water Port at Kampung Senari in 1990s. He started his consultancy practice in 2000 specialising in Civil and Geotechnical Engineering works. Dr. Ooi is a practicing Consulting Engineer, An Expert Witness in Court and in Arbitration, An Accredited Checker, An Arbitrator and An Adjudicator. He is a member of the Accredited Checker Committee of the Board of Engineers, Malaysia. Dr. Ooi devoted much of his time in honorable public service in continuing education of engineers and development of Malaysia Annexes for Eurocode 7 and 8. He is an independent executive director of IEM Training Centre Sdn Bhd since 1992. In 2013 he was appointed executive director of the IEM Academy Sdn Bhd. He has been Organizing Secretary and Chairman of numerous IEM Workshops, Seminars, and Conferences since 1970s. He was responsible for forming five active ICE Student Chapters in Universities in Kuala Lumpur. Dr Ooi conducted touring lectures in geotechnical engineering to Malaysia, Vietnam, Thailand, Cambodia, Laos, Myanmar and Philippines. In Malaysia he was invited to deliver the prestigous 19th Professor Chin Fung Kee Memorable Lecture in 2009. He frequently delivered lectures to the final year University engineering students.

GEOTECHNICAL ENGINEERING

December 2016: MALAYSIA SPECIAL ISSUE

Edited by

Thien Seng Yee, Swee Huat Chan and **Teik Aun Ooi**

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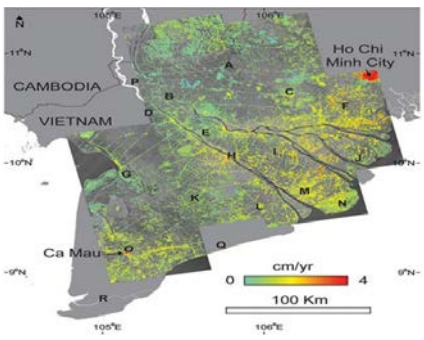

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GEOTECHNICAL ENGINEERING

March 2017: Climate Change, Environmental Geotechnics and Geo-hazards

Edited by
Kazuya Yasuhara, Farrokh Nadim and **Dennes Bergado**

Kazuya Yasuhara

Kazuya Yasuhara is Professor Emeritus of Ibaraki University in Japan; His academic career started in Kyushu University where he was from 1968 to 1978, earning a Doctoral Degree as well. He was then a Professor at Ibaraki University from 1990 to 2007. Prof Yasuhara was the International Project Coordinator at the Institute of Global Change Adaptation Science from 2010 to 2015. He was also a Review Editor for IPCC AR 5 from 2010 to 2014. Since 2015, Prof. Yasuhara is a Specially appointed researcher at Ibaraki University.

Prof. Yasuhara was at University of Illinois Urbana- Champaign in Illinois, USA from 1979-1981 and was a Post Doctorate Research Fellow at the Norwegian Geotechnical Institute from 1986 to 1987. Prof. Yasuhara was the recipient of several prestigious awards: ASCE Best Paper Award in 1999; JGS Award for Meritorious Service in 1999; Groundwater Science and Technology Award (IAHR) in 2000; JGS Award for the Best Research Achievement in 2004; Best Paper Award from Japan Chapter of International Geosynthetics Society in 2006; and JGS Meritorious Research Award for Ground Environment in 2008. His current research interest is in Climate change-induced compound geo-disasters in Asia-Pacific regions and their adaptation countermeasures against earthquake-induced settlements of infrastructures. Prof. Yasuhara is the author of a very large number of publications in this field and others in Geotechnics.

Farrokh Nadim

Dr. Dr Farrokh Nadim is the director of the Centre of Excellence, the "International Centre for Geohazards" (ICG), at the Norwegian Geotechnical Institute (NGI). He has a BSc in structural engineering from Sharif University of Technology in Iran, and MSc and ScD degrees in civil engineering from Massachusetts Institute of Technology (MIT). Dr Nadim came to NGI in 1982 on a post-doctoral fellowship and joined NGI as a fulltime employee in 1984. His major fields of work are related to landslides and geohazards, risk and reliability analysis, geotechnical earthquake engineering, behaviour of geotechnical structures under cyclic and dynamic loading, and offshore foundation engineering. He is author or co-author of over 80 scientific publications, and Chair of Technical Committee 32 of ISSMGE: "Engineering practice of risk assessment and management". Since 2003 Dr Nadim has been an adjunct professor at both the Norwegian University of Science and Technology (NTNU) and University of Oslo (UiO).

Dennes Bergado

Prof. Bergado (Dennes) was in the Geotechnical Engineering batch that graduated from AIT in 1976. After working for a while in Philippines, Prof. Bergado studied at Utah State University in USA on a Full Bright Scholarship and worked with Prof. Loren Anderson. Prof. Bergado joined AIT as an Assistant Professor in 1982. At AIT in the early years Prof. Bergado was involved with many major Sponsored Research Projects including the USAID Funded Welded Wire Mechanical Stabilized Earth and Geosynthetics in Embankments on Soft Clays. Prof. Bergado was also deeply involved with the PVD Soft Ground Improvement Project at the Second Bangkok (Suvarnabhumi) Airport Site with the Airport Authority of Thailand. The Doctoral Students of Prof. Bergado were: Prof. Shivashankar, Prof. Chai, Dr. Long, Dr Panich, Dr Lorenzo, Dr Sompote, Dr Lai, Dr Abuel-Naga, Dr Chairat, Dr. Pittaya, Dr Jaturonk, and Dr Tawatchai to name a few. He successfully supervised a total of 17 doctor and 160 master graduates. Prof. Bergado wrote 2 books in soil/ground improvement, edited 22 conference proceedings with more than 140 journal and 280 conference papers. Prof. Bergado also edited the Volume on Geotechnical Engineering in SE Asia for the Golden Jubilee Conference at San Francisco in 1985. Prof. Bergado was associated with the Southeast Asian Geotechnical Society from the time he joined AIT, earlier as Editor of the Journal (1996-2000) and later became the Secretary General of SEAGS (2001-2012). He also initiated the Asian Center for Soil Improvement and Geosynthetics (ACSIG) and founded the International Geosynthetics Society (IGS)-Thailand Chapter. Currently, he is serving his second term as elected member of the IGS International Council. Prof. Bergado spent his Sabbatical at Saga University.

GEOTECHNICAL ENGINEERING

PREFACE

There are fourteen papers in this Issue edited by Yasuhara, Nadim & Bergado. The first paper is by Yasuhara et al on Geo-disasters in Japan in the Context of Climate Change. The authors say: Japan is an area affected strongly by land surface upheaval and by climate change instability. Background evidence of increasing and magnifying geo-disasters includes the following: (i) frequent and extremely severe torrential rainfall; (ii) high and increasing frequency of strong earthquakes (5+ and 6- as the Japan Meteorological Agency seismic intensity scale); and (iii) typhoons with magnified damage effects. Based on a review of that information stated above, an attempt has been made to overview the present situation and future trends of geo-disasters in the context of climate change and to present possible adaptive measures against disasters. Particularly, emphasis is assigned to the importance of the combined effects of plural events, which increases the probability of extreme events, sometimes triggering devastating consequences. Adaptive measures against climate change-associated geo-disasters are presented by classification into software and hardware. Special emphasis is devoted to the availability of information and communication technology (ICT) and information, communication and robot technology (ICRT) involving devices such as IC-sensors and un-crewed vehicles (UAV, drones), which are useful in early warning systems and in simple monitoring systems.

The second paper is by Do Minh Duc et al on climate change impacts in a large-scale erosion coast of Hai Hau district, Vietnam and the adaptation. It seems among the effects of global warming, sea level rise (SLR) and severe typhoons pose the greatest threat to the stability of human settlements along coastlines. Therefore, countermeasures must be developed to mitigate the influences of strong typhoons and persistent SLR for coastal protection. This study assesses climate change impacts on coastal erosion, especially in two projected SLR scenarios of RCP2.6 and RCP8.5. The results show that SLR and severe typhoons lead to the increase of coastal erosion, beach lowering and scour. Moreover, as in projected SLR scenarios, average waves in high tide can cause severe soil erosion at inner slopes and lead to dyke failure by 2060. The paper highlights the need for additional geotechnical engineering measures to protect the coast of Hai Hau district against SLR and severe typhoons. Among the alternatives available for countering these threats, applying soil stabilization and soil improvement combined with geosynthetics are promising strategies for coastal structures. Hybrid structures can be used with earth reinforcement and soil improvement. Additionally, the paper emphasizes the importance of multiple protective adaptations, including geosynthetics and ecological engineering measures against climate change-induced severe erosion on the coast of Hai Hau district.

Karsrud et al in the third paper described subsidence and shoreline retreat in the Ca Mau Province – Vietnam: Causes, consequences and mitigation options: The authors say in the past decades, the Ca Mau province located at the southern end of Vietnam, has experienced significant land-loss. Satellite data suggest that a loss of land, or a retreat of the shoreline, ranging from about 100 m to 1.4 km have occurred over the past 20 years or so. In addition to the retreating coastline, the Ca Mau coastline has experienced loss of mangrove forests and salt-water intrusion into canals and rivers in the region. A study undertaken in collaboration between Vietnamese and Norwegian institutions has tentatively concluded that the main cause of the land-loss is subsidence of the ground surface as a result of ongoing groundwater pumping. The experienced land-loss may be further enhanced by a climate change related sea-level rise. Large parts of the land area in Ca Mau lie less than 1.5 m above sea-level. The subsidence settlements may already have reached 40 to 80 cm in some places, and the present subsidence rates may correspond to 2-4 cm/year. Recent satellite based data using In SAR technology (Interferometry Synthetic Aperture Radar) confirm that significant subsidence is on-going in all provinces in Vietnam from Ho Chi Minh City and southwards. If no actions are taken soon, the implication will be that these provinces are lost to the sea within a time frame of a few decades.

The only realistic way to prevent such subsidence settlements is to greatly reduce groundwater pumping in the area, and replace it with water from other sources. Also in light predicted climate-change related sea-level rise, some physical barriers may also be required to protect the region against flooding. It is

recommended to immediately initiate an observational program and supplementary analyses to verify the present and future subsidence of the ground surface in Ca Mau. This is to ensure that remedial actions are planned for and implemented before it is too late.

In their paper (fourth one) Yahaya et al present rainfall erosivity variability for Penang Island in Malaysia. Rainfall erosivity considers the rainfall amount and its intensity. This is an important parameter for soil erosion risk assessment under future land use and climate change. Comparisons of all climatic parameters show that rainfall is directly involved in the loss of soil quality during torrential rain. The effect of rainfall erosivity in Northern part of Malaysia was considered for two stations, Bukit Berapit and Air Itam. Monthly as well as annual rainfall was obtained from the Department of Drainage and Irrigation, Malaysia for thirty years (1983-2012). Trends analysis of the rainfall data were obtained for 30 years that shows trends for mean annual rainfall. This was conducted using Mann-Kendall trend analysis and Sen's slope tests. Trend analysis shows that there is negative significant difference in mean annual rainfall for the studied period for Air Itam. The Fournier indexes were used to determine the effect of extreme rainfall events towards soil erosivity. Bukit Berapit recorded 3.33% cases of severe impact using Fournier index and 13.33% cases of high impact using modified Fournier index. The result shows that there is a relationship between rainfall trends and soil erosivity.

The fifth paper is on the influence of increased precipitation on the transient seepage through levees during flood events. This paper is by Scheurmann et al. The transient seepage through levees during a flood event depends on several factors, such as the initial water content condition within the levee as a result of former flood and precipitation events which is frequently neglected. Results of experimental and numerical investigations are presented which show the importance of the initial water content distribution on the resulting transient seepage. Analytical methods for calculating the transient seepage through levees are introduced. The modified method after Brauns (1999) allows for the determination of the seepage through levees under consideration of partly saturated conditions. The initial conditions for the transient seepage can be chosen based on simple considerations related to the field capacity or the effective infiltration of water due to precipitation.

Hazarika in his paper sixth in the series discuss the use of low carbon and low cost (LC2) Materials in climate change adaptation measures. Material recycling of waste tires, which reduces the release of greenhouse gases, for protecting coastal structures from potential natural hazards is proposed here. A new technique using waste tires behind sea walls to protect them from the damage due to impact force of tsunami is described. Cultivation of suitable plants inside the tires was proposed and field tests on planting trees that can grow in saline soil conditions were performed to see whether tire structures can preserve the greenery of the area. A physical model for tsunami impact force simulation was also developed to evaluate the reduction effect of tsunami impact force by the tire structures. Results of this research, if implemented, is not only expected to contribute towards economic countermeasures against natural hazards, but also will go a long way towards providing a sustainable solution for infrastructure development in the future.

Lee et al are the authors of the seventh paper on performance monitoring of bridge foundations under multi-hazards
In an effort to proactively monitoring the safety of bridge foundations so as to probe the possible performance of bridge foundation during natural hazards such as floods, debris flows, rainstorms, and typhoons, an intelligent monitoring system was developed by the authors and had applied to several bridges. In this paper, theoretical background and development will be firstly described. Two case histories will then be presented to describe performance of bridge foundation during natural hazards. Such information will be also further discussed by integrating environment factors such as rainfall amount and flow velocity. Research progress presented in this paper is hoped to be helpful in understanding performance of bridge foundation during hazards so as to provide insights of pre-warning of bridge safety.

The eighth paper by Chanmee et al is titled analysis and simulations of flood control dikes and erosion protection schemes using PLAXIS FEM 2D and SLIDE computer softwares. In 2011, Thailand has suffered from devastating flooding due to climate change. During this time, 2 typhoons from the Pacific area went

straight across Vietnam to Northern Laos and Northern Thailand instead of the usual path to Taiwan and Japan. Subsequently, huge flooding damaged many infrastructures and overtopped flood protection dikes of many industrial estates and educational institutions in the Central Plain of Thailand such as at Hi-Tech Industrial Estate, Bang Pa-In Industrial Estate, Navanakorn Industrial Estate and Asian Institute of Technology. The same phenomenon also occurred in Laos PDR which caused unusually heavy rains and widespread river flooding in 2011.

Consequently, slope failures occurred along National Road 1B (NR 1B) in Pongsaly Province in Northern Laos due to undercutting erosions at the lower slopes by the adjacent flooded river. To evaluate the stability of these protection structures, finite element and limit equilibrium methods were utilized. PLAXIS 2D software was used to analyze the slope stability of improved flood protection dikes and erosion control schemes at low and high water levels incorporating the various supporting and reinforcing materials such as geosynthetics, concrete sheet pile and concrete slab. Moreover, the PLAXIS 2D software was also utilized to predict the vertical deformations (settlements) of improved flood protection dikes in cases of additional embankment height and at different cases of flood water levels. In addition, the SLIDE software was used to predict the value of the factor of safety by using limit equilibrium method for the improved flood protection dikes and erosion control schemes.

In the subsequent paper nine in the series Araki et al deal with arresting rainfall-induced red soil runoff in a farmland by inhibitory adaptation measures. Climate change-induced red soil erosion in Okinawa of Japan has become widely recognized due to the increased frequencies of heavy rainfall. Approximately 85% of runoff from farmland is accounted as a source of the red soil erosion. In this study, field experimental plots were conducted in Ginoza village in Okinawa to investigate the effectiveness of potential adaptation measures in arresting the red soil erosion. A physical model for estimating a sediment volume of soil erosion was derived based on grain size distribution. The maximum particle sizes were derived as a function of rainfall intensity, initial soil conditions and strength parameters of the surface soil. The measured maximum particle sizes of the discharged red soil were agreed well with the model results and could offer the basis for determining an appropriate method of adaptation based on geotechnical aspect.

Umino et al in the tenth paper deal with iron and steel slag properties and mechanisms for carbon dioxide fixation in a low-carbon society. The paper presents carbon dioxide (CO2) fixation properties of an iron and steel slag containing calcium, in order to contribute to a geotechnical application for the formation of a sound material-cycle society and a low-carbon society. To investigate the properties of CO2 fixation, CO2 fixation tests with constant flow were conducted. Results show that when the CO2 concentration 4500 μL-$_{CO2}$/L was flowed in a specimen by 0.05 L/min, for a non-aged steelmaking slag, the amount of CO2 fixed was the maximum: 0.04 g- CO2/g-slag. The amount of CO2 fixed in the steelmaking slag resulted from about 20% of soluble calcium in the chemical reaction. Therefore, it is possible that the quantity of CO2 fixation can be evaluated from the viewpoint of the mechanism of CO2 fixation using the quantity of water soluble calcium.

Kusakabe et al in the eleventh paper deal with the development of gross national safety index for natural disasters. After the Great East Japan Earthquake on March 11, 2011, it appeared that Japan was extremely vulnerable to natural disasters and lack of adequate social systems for mitigating natural disasters. The authors advocated a need for the development of safety index systems for natural disasters for policy makers and decision makers to prioritize mitigation measures to be implemented. The World Conference on Disaster Reduction in Kobe in 2005 adopted the Hyogo Framework for Action, which clearly states the urgent need for developing vulnerability index. An extensive literature survey was firstly conducted to find out the State of the Art regarding to the development of systems of indicators of disaster risk and vulnerability at national and sub-national scale. The survey indicates that the system of indicators such as World Risk Index (WRI) is widely accepted. By modifying the WRI index, a new index named GNS (Gross National Safety for natural disasters) was developed in this study. Risk in GNS is defined by Hazard x Exposure x Vulnerability. Five natural events are considered in 2015 version of GNS, including earthquake, tsunami, storm surge, sediment related disaster event, and volcanic activity. An initial calculation was carried out by using various big data available open to public. The results of disaster risk and vulnerability

are presented in the prefectural scale in Japan. Our intension is not to provide the ranking of GNS but to offer the policy and decision makers a piece of scientific information for selecting highest priority measures for mitigation in a rational manner. A few commentary remarks are added to include the impact of climate change on natural disasters in the safety index system.

The twelfth paper by Yuan et al. describes the flooding hazards and potential risks due to heavy rain and sea level change in Shanghai, China. Current sea level change is mainly induced by global warming which is believed to increase the sea level if sustained for a sufficiently long period of time. Many coastal cities around the world have suffered adverse effects as a consequence of sea level change. Shanghai is a coastal city which is located on the estuary of the Yangtze River with an elevation ranging from 3 to 4 m. Its geological and climatic conditions make the city sensitive to flooding risk caused by heavy rain and sea level change. This paper analyses the recent sea level change and heavy rainfall in Shanghai. Regional rates of sea level change can be divided into i) the rate of eustatic sea level change; ii) tectonic movement of the continent; and iii) land subsidence in Shanghai. A correlation analysis shows that the number of local torrential rains and short duration torrential rains correlates with sea level change. Incidents including pluvial flooding, sea water intrusion and potential damage to coastal structures will be more serious if the rate of sea level change continues to rise. To protect the environment and to control economic losses, more countermeasures should be established to prevent the potential hazards.

The thirteenth paper by Soralump and Chaithong is on the modeling impact of future climate on stability of slope based on general circulation model. Slope failures are one of geo-hazard which are one of the most dangerous and occur very often. Climate is an important role in stability of slope. In many cases rainfalls induce slope instability and lead to slope failure or landslide whereas evaporation might stabilize slope. Climate change due to greenhouse effect and global warming might affect precipitation and evaporation patterns in the future and influence future slope failure. Therefore, the paper proposes a method for assessment impact of climate change on slope failure occurrences based on general circulation model (GCM). Methodology combines between climate scenarios as a result of general circulation model and modified critical antecedent precipitation index model. GCM results are downscaled with dynamical-statistical technique to derive local climate. Analysis found that trends of susceptibility of soil instability vary and depend on climate in each year period.

The fourteenth paper by Ghosh and Pal describes the geotechnical measures for Uttarakhand Flash Flood in 2013 in India. In many “Run of the River” hydro-electric projects in the four main states of northern India have been frequented by “Cloud Burst” induced flash flood since 2003, which is primarily attributed to climate variability and land use pattern changes. Given the ageing population of vulnerable constructions along the hilly terrains, safety issues require more attention in the form of technical auditing cum inspections, routine monitoring, emergency drills, surveillance systems, and regularly updated emergency action plans. In addition to these accelerated events of “cloud burst” induced flash flood in the hilly region has opened up Dam safety issues, which are debated in the court of law for which geo-professional intervention have to be looked into. The climatic and other geo-morphological changes that might have caused Uttarakhand Flash Flood in 2013 are explained. Damages to the geotechnical structures in the form of excessive erosion, landslides, siltation of catchment area of several Dams in Uttarakhand state of India are described with some illustrations of landslide mitigation by indigenous bio-engineering solution as one the means of rehabilitation measures.

Editors:
Kazuya Yasuhara,
Farrokh Nadim
and Dennes Bergado

ACKNOWLEDGEMENT

Fourteen papers on Climate Change & Geotechnics are contained in this Issue. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Prof. San Shyan Lin
Prof. Kwet Yew Yong
Dr. Noppadol Phienwej
Prof. A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

March 2017: Climate Change, Environmental Geotechnics and Geo-hazards

Edited by
Kazuya Yasuhara, Farrokh Nadim and **Dennes Bergado**

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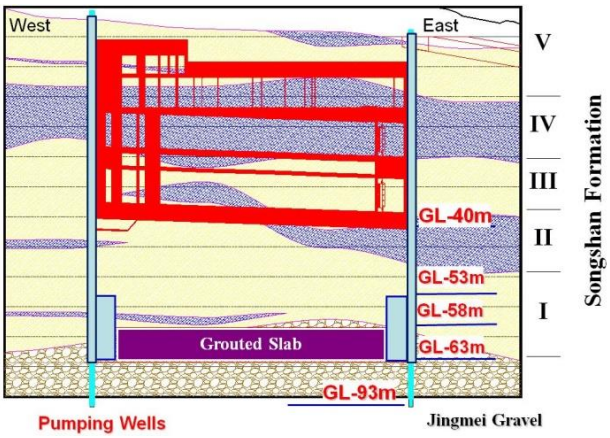

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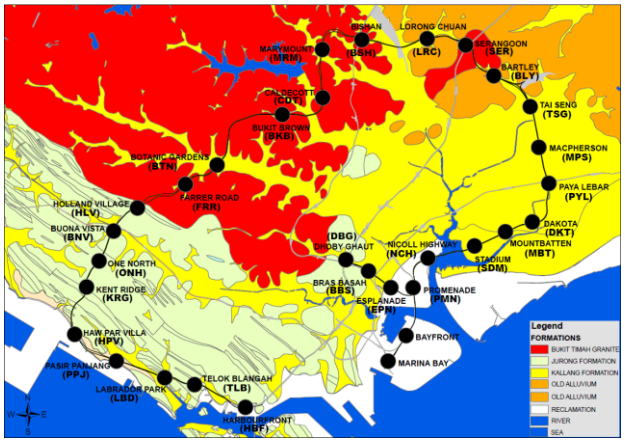

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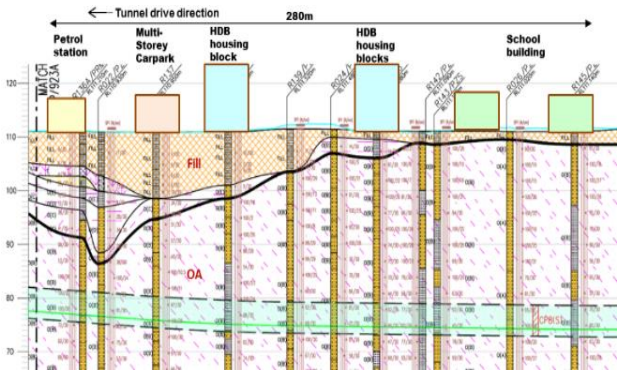

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GEOTECHNICAL ENGINEERING

June 2017: Papers on Mass Transit Projects & also contributed papers

Edited by
Kok Hun Goh, Jeyatharan Kumarasamy, Richard Hwang & San Shyan Lin

Kok Hun Goh

Dr Goh obtained his Bachelor of Engineering and Masters of Engineering from the National University of Singapore, and received his doctorate from the University of Cambridge. He has more than 15 years of geotechnical engineering experience, and has been involved in the design aspects of several road and rail infrastructure projects in Singapore. He is currently a deputy director who looks after the Geotechnical & Tunnels Division in the Land Transport Authority of Singapore. He is registered as a professional engineer in Singapore with specialisation in geotechnical engineering as well as a chartered professional engineer.

Jeyatharan Kumarasamy

Dr Jeyatharan Kumarasamy graduated from Cambridge University, UK (Ph.D. in Soil Mechanics) in 1992 and University of Peradeniva, Sri Lanka with B.Sc. (Eng.) First Class Honours in 1985.

He worked as senior geotechnical engineer for nearly five years with Parsons Brinckerhoff in Singapore Office. Since 2002, Jeyatharan is working with Land Transport Authority (LTA) on several major rail and road underground projects. He currently holds the Assistant Chief Specialist (Geotechnical) position in LTA.

Richard Hwang

Dr. Hwang received his bachelor degree from the National Taiwan University, master degree from North Dakota State University and doctor degree from the University of California at Berkeley. His doctoral research was on soil-structure interaction in earthquakes and he is one of the original authors of the finite element computer programmes FLUSH and QUAD4 for seismic studies. He was manager of Singapore Branch of Kiso-Jiban Consultants, and served as leader of a team of geotechnical engineers serving Singapore Mass Rapid Transit Corporation, which was later merged to Land Transport Authority, for the Phase 1 construction of the Singapore metro systems. At Moh and Associates, Inc. he led a team serving Department of Rapid Transit Systems providing geotechnical engineering consulting services on the construction of Taipei Metro.

Dr. Hwang is specialized in numerical analyses, foundation engineering, and underground constructions and has authored and co-authored 160 technical papers. He delivered the 7th Geotechnical Engineering Heritage Lecture at Taiwan Professional Engineers Association and received Geotechnical Engineering Heritage Award from Sino-Geotechnics Research and Development Foundation.

San Shyan Lin

Prof. San-Shyan Lin graduated from Chung Yuan University with a BSCE degree in 1981. He then obtained his master degree from Utah State University, Logan, Utah in 1985 and his PhD from Washington University in St. Louis, Missouri in 1992. Before his teaching career at university, Dr. Lin served as an engineer at Taiwan Area National Expressway Engineering Bureau between1992 to1994. Dr. Lin has been serving at Department of Harbor and River Engineering (DHRE) of National Taiwan Ocean University (NTOU) since 1994. He was promoted as a full professor in 2000. Thereafter, he took some university duties by serving as the secretary-general at office of the secretariat between 2001 and 2003; the chairman of DHRE between 2005 and 2006; the acting dean of college of engineering in 2007 and the vice president of NTOU between 2006 and 2012.

Prof. Lin served as a committee member of committee A2K03-Foundations of Bridges and Other Structures of TRB, USA between 1995 and 2004. Currently, he is still serving as a committee member of TC-212 and ATC-1 of ISSMGE and as an editorial board member of four international journals. In addition, Dr. Lin also served as the president of Taiwan Geotechnical Society (2011-2013); Chairman of International Geosynthetics Society- West Pacific Regional Chapter (2002-2004); CEO of Sino-Geotechnics Foundation (2011-2014) etc. Dr. Lin received the distinguished alumnus award from Chung Yuan University in 2009 and the distinguish Engineering Professor Award from Taiwan Pavement Engineering Society in 2011. Prof. Lin’s research and practical experiences have been dealt with deep foundations and geosynthetics.

GEOTECHNICAL ENGINEERING

PREFACE

There are seventeen papers in this Issue; the first twelve are papers edited by the Guest Editors: Kok Hun Goh, Jeyatharan Kumarasamy and Richard Hwang on Mass Transit Projects; additionally there are five contributed papers processed by our in-house editors.

The first paper is by R. N. Hwang and Z. C. Moh on Deep Excavations in Taipei Metro Construction: Discussed herein are the geological features of the Taipei Basin relevant to the construction of Taipei Metro and the deep excavations carried out with emphasis on back analyses of wall deflections. The excavation at the crossover next to G17 Station of the Green Line is adopted as an example to illustrate the applications of wall deflection paths and reference envelopes. The importance of calibrating inclinometer readings to account for the movements at the tips is confirmed by numerical analyses; and the assumption that movements at the joints between the struts at the first level and the diaphragm walls would be negligible in subsequent stages of excavation once these struts are preloaded is verified. Furthermore, it is proved that the concept of wall deflection path is very useful to quantify the influence of various factors, e.g., the depth and width of excavation, wall length, preloads of struts, and the thickness of soft deposits, on the performance of diaphragm walls.

The second paper is by Dazhi Wen on the Development of Reinforced Concrete Segmental Lining Design for MRT Bored Tunnels in Singapore: Reinforced concrete segments are commonly used as tunnel linings for bored tunnels constructed by tunnel boring machines (TBM). This paper describes the development and evolution of the segmental lining design from the Phases I/II of the Singapore Mass Rapid Transit (MRT) construction in the 1980s to the current design for the MRT lines under construction. The topics include the general arrangement of the segmental linings, structural design requirements, durability requirements, fire resistance and selection of waterproofing materials of the linings. The design and construction of bored tunnels in close proximity is presented with the experience gained in the past projects. Fire tests conducted by the Land Transport Authority are also presented. The rational, experience and challenges of adopting steel fibre reinforced concrete segments in recent MRT projects are discussed in the paper. The paper also presents in detail the experience gained in Singapore MRT projects in selecting the gaskets for waterproofing of the joints between segments to achieve the durability requirements for the bored tunnels.

In the third paper, Jeyatharan Kumarasamy described the influence of Geology and its Impact on the Construction of Singapore MRT Circle Line: The Circle Line (CCL) is a fully underground railway line in Singapore connecting the inner suburban areas of the city. It is 39.5 km long with 34 stations and built in six separate packages. Site investigations comprising boreholes, CPTs and geophysical surveys for the project were carried out in various phases to reveal ground conditions along the route in order to determine the most appropriate construction methods. Extensive field and laboratory testing were also carried out to establish geotechnical design parameters. This paper summarises geological conditions encountered along the CCL route and highlights the effect of geology on selected construction methods.

In their paper (fourth one) K.H. Goh and Y. Zhang discussed the issues related to Constructing the cut-and-cover tunnels and bored tunnels of the Singapore Downtown Line: The Downtown Line (DTL) is a major MRT line under construction after the completion of the Circle Line in Singapore. This paper discusses the ground conditions for the DTL and how it influenced the selection of the support systems adopted for the excavation for the stations which are constructed using cut-and-cover method, and also the selection of tunnel boring machines for the bored tunnels. The key features of the temporary support systems were presented together with their performance in terms of ground movements and ground water table drawdown. Issues encountered during the excavation, in particular for DTL Stage 2 in the soils and rocks of the Bukit Timah Granite Formation was also presented in the paper and the effectiveness of various measures implemented will be discussed based on the experience and observations during the construction. The key features and

parameters of all the earth pressure balanced and slurry TBMs used in different DTL contracts were also presented and compared.

The fifth paper is on Bored tunnelling directly below buildings in Singapore Downtown Line by K.H Goh et al: One of the specific challenges faced in undertaking underground infrastructure developments is the construction of bored tunnels directly below buildings. This paper reports the experiences of bored tunnelling directly below several buildings in the recently implemented Downtown Line project, including case studies with details such as the structural system and foundation details of the buildings, ground condition, geometry and clearance between the building foundation and the tunnelling works, as well as instrumentation monitoring results of ground and building settlement during tunnelling. It is hoped that these cases could be used as references in the design of future bored tunnelling works; to give greater confidence that tunnelling directly below buildings can be carried out without affecting the buildings so long as appropriate tunnelling controls are taken to mitigate ground deformation issues.

In the sixth paper, Charles Im et al presented the Application of Gravity Survey in Urbanized City Environment: Subsurface information and geotechnical data are required during the planning, development and design stages of all construction projects particularly where major components are supported on or in the earth and underlying rock. An understanding of the basic site geology is also necessary for the proper planning of the ground investigation works. Consequently, the geological features that will affect the design and construction of the project must be investigated and evaluated as much as possible within the allowable project timeframe to ensure successful implementation of the project. This paper presents an overview of the authors' experiences in using Gravity Survey, as a reconnaissance ground investigation method to identify areas of enhanced ground risks, in the complex variable and unpredictable Kuala Lumpur Karstic Limestone formation during the underground reference design stage of the Klang Valley Mass Rapid Transit Line 2 (SSP Line) in Kuala Lumpur, Malaysia. This paper also presents some lessons learnt of the past in the region, and what were the specific measures that had been strictly implemented on this occasion to ensure quality results can be derived from the Gravity Survey within the urbanized city environment and meet the objectives of the survey.

M. Kawasaki et al are the authors of the seventh paper on Water Sealing by Wire Brush with Grease for Pneumatic Caisson Method at Great Depth Underground: Pneumatic caisson method can be widely applied to various ground but suffers from a limitation on the applicable depth due to the work under high atmospheric pressure. To overcome the problem, the pneumatic caisson method employing an unmanned excavation method with helium mixed gas has been developed. However, the new technology of the pneumatic caisson method will be required to construct a vertical shaft for urban tunnels at great depth underground space. Therefore, applying water-sealing technique at shield tail to friction cut space around pneumatic caisson wall, a method to reduce atmospheric pressure in a working chamber at the ground with low permeability has been proposed. This research carried out the element tests to examine the water-sealing performance of the proposed method, and discussed the influence of some properties on water-sealing performance and its mechanism. As a result, it was confirmed that the proposed method can keep the grease pressure of 1 MPa for one hour.

The eighth paper by N. Som and is entitled Geotechnical Challenges of Kolkata Metro Construction: The paper gives an account of the Kolkata Metro construction which included the first underground railway for mass rapid transit system of an Indian city. Construction was started in 1975 and the first line of the metro covering a length of 17 km was opened in 1984. Thereafter construction had been taken up in phases. Currently Kolkata metro construction includes an ambitious package of 140 km of underground, at grade and viaduct stretches. Construction has to be done in very difficult condition through congested urban areas which includes a tunnel below the Ganga river. Resource crunch and construction through heavily built-up urban land extended the period of construction but modern design techniques and field instrumentation have helped to ensure high quality work in densely populated urban centre.

In the ninth paper, Gerardo Agustin Pittaro deals with the use of pressure relief wells to optimize ground improvement layer thickness in deep excavations: Deep excavations in soft ground often need stabilization with ground improvement (GI). One of the methods to improve the ground is to use Jet Grouting Piles (JGP)

or Deep Soil Mixing (DSM). JGP and DSM are achieved by mixing the soil with cement and water, generating a structure that performs well under compression forces but not under tension forces. These ground improvement blocks provide larger passive resistance thereby reducing wall displacements. Due to the above mentioned one of the necessary requirements for successful design is that no tension forces are allowed in any zone of the ground improvement block. This paper discussed how pressure relief wells inside the excavation are used in order to decrease the tension strains in the ground improvement block. In order to demonstrate this, 2D numerical analyses were performed.

C. Veeresh and K.H. Goh in the tenth paper discussed about Bukit Timah Granite Formation - Engineering Properties and Construction Challenges: The Bukit Timah Granite Formation is one of the oldest geological formations in Singapore and is found mostly in the central and northern parts of Singapore. A major section of Singapore's underground metro construction passes through the Bukit Timah formation soils, and extensive field and laboratory testing has been carried out on the rock samples. Uniaxial Compressive Strength (UCS) tests have been carried out on hundreds of samples, test results have shown wide variation in the strength and the maximum strength is found to be much higher compared to the previously published data. This paper presents a review of UCS strength of the Bukit Timah Formation, Point Load index tests and correlations which were developed for site specific locations. This paper also reviews the abrasivity of Bukit Timah Granite and factors affecting it. Influence of UCS and other factors on the drilling, coring and excavation rates in Bukit Timah Granite are also presented.

In the eleventh paper and the last one assembled by the guest editors, L.J. Endicott presents the experiences of 41 years of Mass Transit Underground Railways: In 1975 many cities in Southeast Asia were becoming congested and few had underground railways. Now several cities have underground railway systems comprising several lines and many stations, some extend above ground. Currently underground railways are being built or are being extended in many cities in Southeast Asia. Construction projects are often large including several sections of tunnels and stations in one contract. This paper reflects on the early days of pioneering and on some of the changes that have taken place in the planning, design, and construction of underground Mass Transit Systems during the last 41 years.

The twelfth paper as described by by T. N. Huynh, H.V. Pham, M. Sugimoto, Y. Tanaka, H. Ohta and K. Yasui on the Simulation of H&V shield behaviour at sharp curve by kinematic shield model. The paper discusses the restriction of underground space use and the horizontal and vertical variation shield method (H&V shield) was innovated, of which the cross section is changed from horizontal multi-circular shape to vertical one or vice versa. However, this method has never been applied in practice. Therefore, this study aims to examine the H&V shield control method, using the developed the kinematic shield model for H&V shield. As a result, the following were found: 1) the calculated shield behaviour has an overall good agreement with the planned one; 2) the ground displacement is a predominant factor affecting shield behaviour; and 3) the proposed model can simulate the H&V shield behaviour reasonably.

The thirteenth paper (also contributed direct to the in-house editors) by Badee Alshameri, Aziman Madun and Ismail Bakar is the first of the contributed papers edited by San Shyan Lin on Comparison of the Effect of Fine Content and Density towards the Shear Strength Parameters : The improvement of soil strength is very important in the engineering design for the civil and geotechnical projects. However, this improvement can be achieved by improving the shear strength parameters of soil (i.e. shear strength, friction angle and cohesion) by using different techniques (e.g. densify the soil and change the soil composition). This paper will compare between the effects of density and fine content towards the shear strength parameters. Numerous soil samples (i.e. 99 samples) from six soil mixtures of sand-kaolin mixtures were compacted and subjected to direct shear box test to evaluate the effect of density and fine content. The results showed some discordant effects between the density and fine content. While the cohesion increased by the increment of the fine content, it decreased by the increment of the density. However, both of shear strength and friction angle increased to the highest value with the increment of the fine content and density then by further increment in the fine content and density, the shear strength and friction decreased where this behaviour can be explained through the inter-granular void ratio issue. On the other side, even the results showed interface between the effect of density

and fine content, but the fine content has more significant effect in the shear strength parameters and also in the soil density value itself.

The fourteenth Paper (also contributed direct to the in-house editors) by Xiao-long Zhou et al is on Shaft Resistances of Jacked Open-ended PHC Pipe Piles: The shaft resistance of open-ended pipe piles during installation and static loading test plays an important role in the design of pile foundation. One open-ended Pre-stressed High-strength Concrete (PHC) pile instrumented with sensors was jacked to investigate the performance of shaft resistance during installation and loading test. Test results indicated that the shaft resistances gradually transferred along depth during installation, and the magnitude is closely related to soil properties. The shaft resistance at the same depth decrease with jacked cycles. After five jacked cycles, the shaft resistances in sand silt at 6 m depth decreased about 58.8%. The decrement of silty clay at 10 m depth was about 12.1% after three jacked cycles. In the loading test, the shaft resistance of test pile were gradually mobilized from up to down.

P.R. Stott and E. Theron in the fifteenth paper (also contributed direct to the in-house editors) is on the Estimation of Shrink/Swell Potential and Variability of Clays by Small-Scale Suction Tests: The relationship between suction and water content gives crucial information about a soil. Small projects like economic housing do not warrant the time and cost of determining the full soil water suction curve. A considerable range of soil suctions can easily be achieved within a reasonably short time by using small samples, simple suction control and a high precision balance. It appears that in this way it may be possible to estimate heave potential and variability of soil properties at reasonable cost in an acceptable time. Variability assessment appears to offer significant potential for improving the reliability of foundation design on shrink/swell soils.

The sixteenth paper (also contributed direct to the in-house editors) by M. R. Selamat et al is on Pullout Tests on Strips with Anchorage Elements under Low Stresses: The lack of pullout capacity of reinforcement strips often compromised the finishing quality of the mechanically stabilized earth (MSE) structure. In this research, three strips were each attached with 6 anchorage elements of 1cm, 2cm, and 3cm deep respectively in order to enhance the pullout capacities, while another strip was plain. Each strip was subjected to pullout tests under low normal stresses ranging from 1.61kPa to 13.20kPa to simulate shallow embedment in the field. Under the low normal stress of 1.61kPa, the pullout capacities of strips with anchorage elements were enhanced up to 366% of the plain strip capacity; under the higher normal stress of 13.2kPa however, the pullout capacity enhancements were only up to 163% of the plain strip capacity. The results indicate the merit of attaching anchorage elements to strips under shallow overburden in a MSE structure and the significant increase in pullout capacity achievable by such strips.

The last paper of this Issue is seventeenth (also contributed direct to the in-house editors) by Li Changhong, Zhou Xiaolong, Zhang Long,Wei Xiaoming and Li Wanling on Numerical Simulation Analysis and In-situ Monitoring of Long and Narrow Deep Foundation Pit. The authors studied the characteristics of long and narrow deep foundation pit. The displacement distribution of X-axis with different length-width ratios of 1:1, 2:1 and 3:1 were analyzed and then the displacement distribution of Y-axis at the slope bottom and the displacement distribution of Z-axis at the foundation bottom were studied. The different displacement distribution law of pile-anchor support and soil nailing wall support were analyzed in different excavation processes considering in-situ supporting schemes, and the different supporting effects of the two supporting structures were presented on the stability of foundation pit slope. By comparing the monitoring values at the 32 in-situ positions, the numerical simulation result was basically identical with the monitored data, on average 3mm higher than the measured value. By using MIDAS software, the excavation and supporting process of the foundation pit could be simulated, and it can provide guidance for the construction of long and narrow deep foundation pit and adjust the monitoring period appropriately.

Editors:
Kok Hun Goh
Jeyatharan Kumarasamy
Richard Hwang
San Shyan Lin

ACKNOWLEDGEMENT

Seventeen papers are contained in this issue. Twelve of them are assembled by the Guest Editors and another five contributed papers directly to the in-house editors. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Prof. San Shyan Lin
Prof. Kwet Yew Yong
Dr. Noppadol Phienwej
Prof. A. S. Balasubramaniam

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GEOTECHNICAL ENGINEERING

June 2017: Mass Transit Projects & Contributed papers

Edited by
Kok Hun Goh, Jeyatharan Kumarasamy, Richard Hwang & San Shyan Lin

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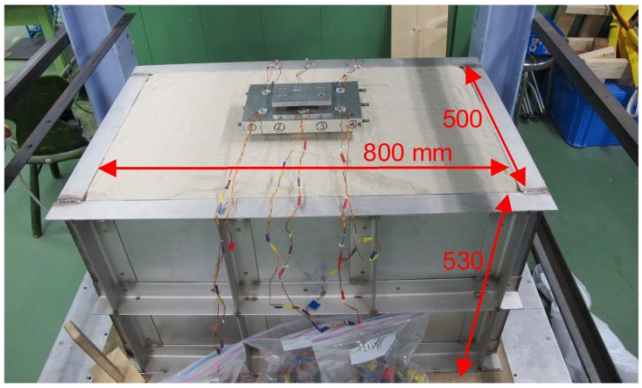

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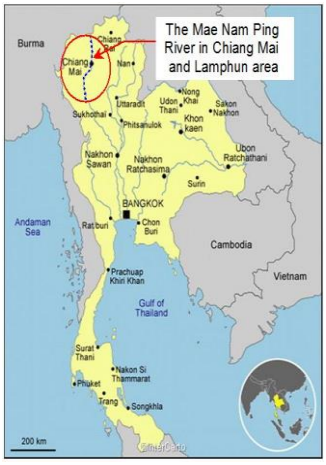

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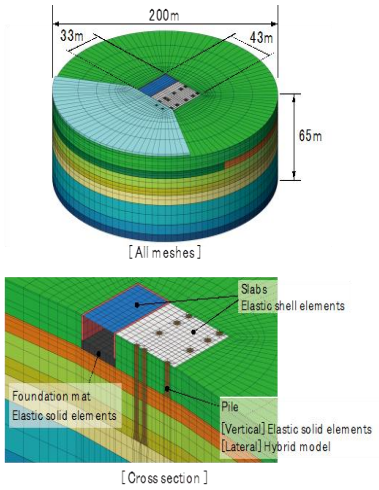

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GEOTECHNICAL ENGINEERING

September 2017: Deep Foundations

Edited by: Tatsunori Matsumoto, Der Wen Chang & San Shyan Lin

Tatsunori Matsumoto

Prof. Matsumoto is now with Kanazawa University in Japan for nearly 37 years. He was educated at the Kanazawa University and received his Doctoral Degree from Kyoto University for his work on steel pipe piles in 1989. He has extensive research and practical experience on piled foundations and piled raft foundations. Prof. Matsumoto has a Shake Table Facility for the study of dynamic and earthquake type of behaviour of piled foundations. He has also worked on the centrifuge with pile groups and piled raft foundations in collaboration with Taisei Corporation. Prof. Matsumoto also has wide experience in the seismic design of raft and piled raft foundations. Prof. Matsumoto is one of the authors of the computer software PRAB—Piled Raft Analysis with Batter Piles. With this software piled raft foundation can be analyzed with vertical and horizontal loads as well as moment.

Der Wen Chang

Prof. Der-Wen Chang has been the Geotechnical faculty member at The Department of Civil Engineering of Tamkang University (TKU), Taipei, Taiwan for over 25 years. He received Ph.D. in Civil Engineering at The University of Texas at Austin in 1991 and MS in Civil Engineering at Michigan State University in 1987. Prof. Chang has supervised the research work of over 70 Master Thesis and 3 Ph.D. Thesis at TKU, and published more than 200 articles as the Journal, Conf. papers and reports. Nearly all his research studies are related to numerical modeling and dynamic analyses for the geotechnical structures. His research experiences include NDT methods on pavements, seismic behaviors of the pile foundation, constitutive modeling of the soils, and recent study on the performance based design for the earth structures. Prof. Chang is also the visiting Professor at University of Washington at Seattle, US in 2008 and LN Gumilyov Eurasian National University at Astana, Kazakhstan for research studies in 2010 and 2011. Other than the research works, Prof. Chang devotes himself a great deal to serve the communities. He involves heavily and indeed shows his good performance in the public works related to education and constructions. Prof. Chang is currently the Executive Board member of Chinese Taipei Geotechnical Society, GC member at SEAGS and Editorial Panel for SEAGS/AGSSEA J. of Geotechnical Engineering, and TC212/TC305/ATC18 member at ISSMGE. He is also the Chairman of Conference Committee at 16ARC which is to be held in Taipei, Taiwan in October, 2019.

San Shyan Lin

Prof. San-Shyan Lin graduated from Chung Yuan University with a BSCE degree in 1981. He then obtained his master degree from Utah State University, Logan, Utah in 1985 and his PhD from Washington University in St. Louis, Missouri in 1992. Before his teaching career at university, Dr. Lin served as an engineer at Taiwan Area National Expressway Engineering Bureau between1992 to1994. Dr. Lin has been serving at Department of Harbor and River Engineering (DHRE) of National Taiwan Ocean University (NTOU) since 1994. He was promoted as a full professor in 2000. Thereafter, he took some university duties by serving as the secretary-general at office of the secretariat between 2001 and 2003; the chairman of DHRE between 2005 and 2006; the acting dean of college of engineering in 2007 and the vice president of NTOU between 2006 and 2012.

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GEOTECHNICAL ENGINEERING

PREFACE

There are 17 papers in this Issue; the first twelve are papers edited by the Guest Editors: Tatsunori Matsumoto, Der-Wen Chang and San-Shyan Lin; additionally there are five contributed papers are processed by our in-house editors.

The first paper is by K. Ng and T. Sullivan on challenges and recommendations for steel H-piles driven in soft rock: The capacity of a pile driven in soft rock depends on soil confinement along the pile and rock at its toe; these are rarely known during design. This design challenge often leads to a large discrepancy between estimated and measured resistances. Results of six bridge projects completed in Wyoming, USA, are presented to highlight the challenges pertaining to present design and construction practices of driven piles in rock. The results show that static analysis methods, dynamic analysis methods, and structural analyses yield inconsistent pile resistance estimations. A recommendation considering the structure-geomaterial interaction is proposed to improve the design and construction of steel H-piles driven in soft rock.

The second paper is by Anh-Tuan Vu, Tatsunori Matsumoto, Shun-ichi Kobayashi and Shinya Shimono on Experimental study on pile foundations having batter piles
subjected to combination of vertical and horizontal loading at 1-g field: in the paper, the behaviours and resistance mechanisms of pile foundations having batter piles were investigated through a series of vertical load tests and combination load tests on model foundations in dry sand ground at 1-g field. Pile foundation models consisting of 3 piles and 6 piles, with or without batter piles, were used in the experiments. The model pile was close-ended pipe with a length of 255 mm and an outer diameter of 20 mm. Dry silica sand having a relative density, Dr, of about 82% was used for the model ground. The results indicate that the piled raft having batter piles is the most effective to increase the resistances (in both vertical and horizontal directions) and reduce the inclination.

In the third paper, T. Tikanta, T. Matsumoto, A. T. Vu, S. Kobayashi, S. Shimono and C. Bamrungwong conduct experiments on a reinforcement method using sheet pile wall for bridge pile foundations subjected to pile embedment reduction and numerical validation. Due to the riverbed soil excavation for the utilization in construction works for many years, the level of riverbed of the Mae Nam Ping River has been considerably decreased, resulting in reduction of embedment lengths of piles for many bridge foundations. Erosion was not a cause of the lowering of the riverbed. Reductions of bearing capacity due to the lowering of riverbed soil is the main cause of bridge pile foundation settlements or collapses at present. In order to prevent the damages of existing bridge pile foundations caused by the riverbed soil excavation, a reinforcement method using sheet piles called “Sheet Pile Wall (SPW) reinforcement” is proposed. The experimental results show that the proposed SPW reinforcement method is very efficient and promising. Numerical simulation of an experiment using FEM was also carried out to get more insight into the mechanism of the SPW method and validate the proposed SPW method.

In their paper (fourth one) San-Shyan Lin, Yun-Chih Chiang, Xin-Hua Lin, Hsing-Yu Wang, and Sung-Shan Hsiao carry our numerical studies on performance of offshore wind turbine composite suction pile in sand subjected to combined loading. Numerical analysis on the performance of the proposed suction pile with enlarged lid size subjected to combined lateral and axial loading is presented in the paper. The numerical model is firstly validated by comparison with other numerical study results. The parametric analysis results prove a suction pile with enlarged lid size has better performance than a normal suction pile on both the overall bearing capacity and the stability of the foundation.

The fifth paper is on Consideration of Effects of Pile Group Interaction in Piled Raft System Based on Field Monitoring and Single Pile Load Tests by K. Yamashita, S. Wakai1, J. Hamada and T. Tanikawa. In the paper, the effects of pile group interaction were investigated based on the results of two monitoring cases of piled raft foundations and single pile load tests in soft ground. Based on the investigation, it was found that the modified load-settlement data of the monitored piles were generally consistent with the static load-settlement curve of a single pile. Therefore, no significant effects of pile group interaction on settlement were found. In such cases as pile groups with large spacing, single pile load test data can be more useful in the settlement prediction of piled rafts and pile groups. In addition, it was found that the pile head stiffness of the equivalent static load-settlement curve derived from the rapid load testing in clay soils using the UPM was considerably large compared to the stiffness of the static load test curve, as pointed out by previous studies.

In the sixth paper, In-situ Full Scale Load Tests and Reliability Evaluation of Bearing Capacity for Nodular Cast-in-place Concrete Pile is studied by K. Watanabe, A. Mitsumori, H. Nishioka and M. Koda. This paper firstly summarizes the in-situ full scale load tests, and then describes the results of standard bearing capacity based on the data from the in situ full-scale load tests, finally mentions the estimation of ground resistance coefficient for nodular cast-in-place concrete piles.

The seventh paper by K. Watanabe, T. Yamamoto and T. Sudo is titled Development of Steel Pipe Pile Combined with Ground Improvement in Narrow Spaces. Since pile construction in narrow spaces is constrained by the site and process, in this paper, a construction method combining steel pipe piles with ground improvement using a mechanical agitator (e-column construction method®) was developed. This paper briefly summarizes the construction method, presents the static load tests and rapid load tests, and discusses the results of load tests. The results of the loading tests suggest that the bearing capacity can be evaluated by using the undrained shear strength and SPT N-value. Also, a simplified rapid loading test can be applied to validating the bearing capacity at a construction site. For the joint of the steel pipe piles, the maximum tensile resistance obtained from the experiment was larger than that obtained from the calculation formula.

In the subsequent paper eight in the series K. Watanabe, N. Suzuki and M. Sahara deal with Design and Analysis of Composite Foundation for High-rise Buildings. This paper shows two design cases of composite foundations for high-rise buildings. These two foundations were designed by considering the effect of deformation on the results of a static FEM analysis. The slab settlement was measured upon completion of construction. It was con-firmed that composite foundations deform within a presupposed range.

Hung-Jiun Liao, Chin-Lung Chiu, Chung-Kuang Chien, Yi-En Tang and Heng-Chih Cheng in the ninth paper deal with Pervious Material Made from Landslide Debris for Road Base Construction. This paper introduces an on-site mixing method to prepare pervious-CLSM (controlled low strength material) from the landslide debris by mixing it with proper amount of cement and water. Through the mixing process, the fine soils in the debris will flocculate to a sizable particles and/or stick to the surface of aggregates. As a result, the fines content of the debris can be eliminated and a pervious-CLSM is made. Through the binding effect of cement, the pervious-CLSM can also have moderate strength to maintain the stability of filled embankment and to sustain the traffic load as well. Together with geo-grid, a wrap-faced reinforced embankment as the road base can be constructed quickly using the site prepared CLSM as well as a backhoe machine and hand tools.

The tenth paper is by E. Heins, K.-F. Seitz, A. Chmelnizkij, M. Milatz and J. Grabe on Advances in numerical modelling of different ground improvement techniques. A lot of successful scientific research is conducted on piles and piling using various numerical methods. Therefore, it is assumed that numerical models can be used to improve ground improvement methods. In this contribution, different ground improvement techniques and numerical models to simulate the influence of these techniques on the surrounding soil are presented. Furthermore, optimization methods and potentials of ground improvement techniques are shown.

Ashutosh Kumar and Deepankar Choudhury are the authors of the eleventh paper on Load sharing mechanism of Combined Pile-Raft Foundation (CPRF) under seismic loads. In the present work, the load sharing mechanism under seismic loads for fully hinged (H) and fully rigid (R) connected Combined Pile-Raft Foundation (CPRF) have been studied by using three-dimensional finite element based geotechnical software. Results of the present analyses show that connection rigidity had little influence on vertical settlement of CPRF but had pronounced response on the load sharing by foundation components. In the purview of seismic loading, lateral stiffness played a pivotal role in deciding the load-settlement, lateral displacement, bending moment in piles and inclination response of CPRF. The load sharing by foundation components is governed by mobilization of lateral displacement.

The 12th paper and the last one as assembled by the guest editors is Deflection Behaviour of GFRP Bar Reinforced Concrete Passive Bored Pile in Deep Excavation Construction by J. L. Zhou, E. Oh, X. Zhang, M. Bolton, H. Y. Qin and L. Zhang. This paper describes the investigation of a glass fibre reinforced polymer bar (GFRP bar) as a replacement for a traditional steel bar reinforcement in bored concrete piles with specific application to deep excavation construction. The deflection behaviours of GFRP piles during the installation of one concrete and two steel supports were provided. It is concluded that, based on the difference between the total accumulated deflection of each pile, the GFRP bar reinforced concrete piles can resist the lateral loading and can provide an alternative to traditionally reinforced concrete piles used in shield construction.

The 13th paper by describe by Byron Mawer, Denis Kalumba and Charles Warren-Codrington is the first of the contributed papers edited by San Shyan Lin on Loading and Dynamic Response Considerations for the Design of Wind Turbine Foundations on South African Soils. The discussion of this paper was centered on the sources of loading that wind turbines experience and the consequences of this on the geotechnical design of gravity footings. Rotational stiffness of the foundation was shown to have an important effect on the dynamic response of the wind turbine tower, and thus, on the assumptions surrounding the calculation of the natural frequency of the global system. Soil stiffness effects on natural frequency assumptions were found to be more critical than the minimum stiffness requirements applied by design guidelines and had a notable effect on dynamic amplification for an undamped system.

The 14th paper (also contributed direct to the in-house editors) by Mounir BOUASSIDA, Mnaouar KLAI, Seifeddine TABCHOUCHE and Mekki MELLAS on Comparison of Numerical Analyses of Behaviour of Column-Reinforced Foundations. This paper studies the prediction of behaviour of foundations resting on a soil reinforced by sand and stone columns. A Tunisian case history of oil tank is investigated. By adopting the Mohr-Coulomb failure criterion for columns material and the hardening soil model for soft clay, the evolution of long term settlement predicted by Plaxis code showed the acceleration of the consolidation of the compressible soft clay due to the enhanced drainage property of column material.

P. Pizette and N-E. Abriak in the 15th paper (also contributed direct to the in-house editors) is on Particle image velocimetry analysis on the sinking of shallow foundation in 2D. This paper focuses on the development of punching device dedicated to study the failure of 2D analogue soil. In order to follow the kinematic behaviors of soil, Particle Image Velocimetry (PIV) analysis has been developed and tested in the case of the shallow foundations. The results show that the field of the soil displacement under the foundation can be followed via the PIV method. In particular, the image analysis results are qualitatively in good agreement with the Prandlt scheme.

The 16th paper of this Issue (also contributed direct to the in-house editors) is by B. T. T. Nguyen1, T. Takeyama2 and M. Kitazume on Attempt of Simple Calculation on studying Failure mechanism of DM Columns. A simple calculation, based on limit equilibrium method, was performed to evaluate the failure pattern of deep mixing (DM) columns, used to reinforce an embankment slope. In this study, a trial of limit equilibrium method to access the failure mode of the columns is focused with an overall mechanism. As a result, while the calculation can simply predict the failure pattern of the DM columns, a parametric study was also performed to evaluate the effect of several improvement factors.

The last paper of this Issue, the 17th (also contributed direct to the in-house editors) is Microzonation of liquefaction hazard using liquefaction index in Babol City by A. Janalizadechoobbasti, M. Naghizadeh rokni, and R. Charaty. In this paper, the zoning map of Babol liquefaction risk is provided. In this regard, a study was conducted on the soils in Babol and after examining different areas of the city, laboratory results and field studies of more than 50 boreholes in different areas with a depth of 20 m were analyzed for finding liquefaction and non-liquefaction segments. In this study, different approaches were used including Seed, Iwasaki, Haeri and Yasrebi, Chin & Zhang and Sewmez & Gocojlou procedures and finally, a computer program was written for examining and providing microzoning map of Babol liquefaction risk.

Editors:
Tatsunori Matsumoto
Der Wen Chang
San Shyan Lin

ACKNOWLEDGEMENT

Seventeen papers are contained in this issue. Twelve of them are assembled by the Guest Editors and another four contributed papers by the in-house editors. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

Dr. Teik Aun Ooi
Prof. San Shyan Lin
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Dr. Noppadol Phienwej
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GEOTECHNICAL ENGINEERING

September 2017: Deep Foundations

Edited by
Tatsunori Matsumoto, Der Wen Chang & San Shyan Lin

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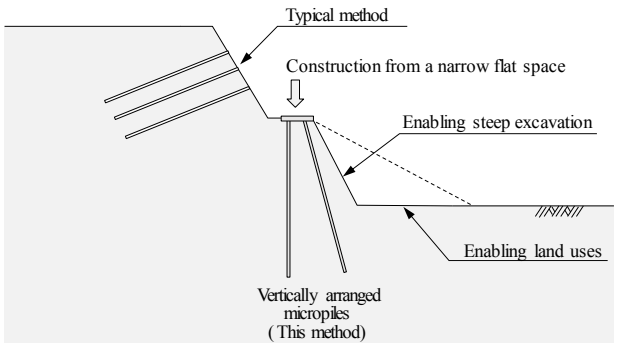

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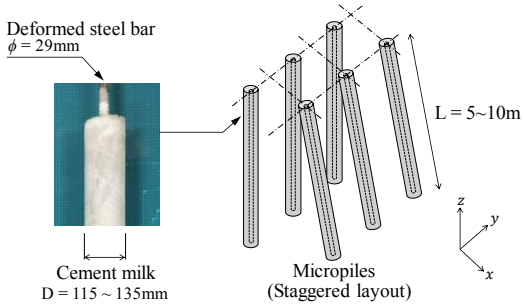
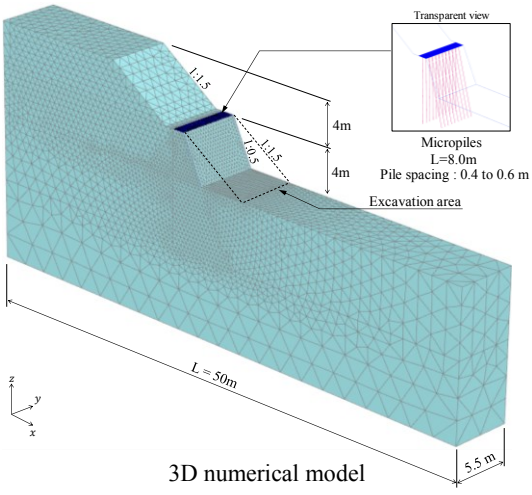


Overview of micropiles



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PREFACE

December 2017 Issue

This Issue is in two parts; Part 1 papers edited by Prof Akira Murakami as Guest Editor and Part 2 contributed papers directly edited by In-house Editors and Prof Mounir Bouassida

The first seven papers in the Issue are edited by Prof Akira Murakami as the Guest Editor and the subsequent papers are direct contributed ones; quite a few papers were acquired by Prof Mounir of papers from African continent.

The first paper is on Modelling the Effects of Static Shear on the Undrained Cyclic Torsional Simple Shear Behaviour of Liquefiable Sand by Gabriele Chiaro, L.I. Nalin De Silva and Junichi Koseki: Spanning from purely theoretical standpoint to practical applications, there is a particular interest to enhance understanding of the effects of static shear on the cyclic behavior of soil elements underneath sloped ground. To address this issue, two subsequent steps were undertaken in this study. First, a systematic laboratory investigation was carried out on Toyoura sand specimens subjected to various levels of combined static and cyclic shear stresses. Then, a new state-dependent cyclic model was developed. Since experimental findings have been exhaustively reported elsewhere, in this paper they are only briefly recalled for the benefit of comprehensiveness. Instead, the new model is presented in details and its performance is verified by simulating undrained cyclic torsional simple shear tests carried out on Toyoura sand specimens. Essentially, the model is built on an extended general stress-strain hyperbolic equation approach, in which the void ratio and stress level dependency upon non-linear stress-strain response of sand is incorporated. Besides, a novel empirical stress-dilatancy relationship is used to account for the effect of density on the stress ratio as well as to model the excess pore water pressure generation in undrained shear conditions as the mirror effect of volumetric change in drained shear conditions.

The second paper by A. Kamura, J. Kim, T. Kawai, M. Kazama, N. Hikita and S. Konishi is on Numerical Study on the Design of Reinforced Soil by Vertical Micropiles. The mechanical behaviour of the reinforced soil by vertical micropiles was considered using the three-dimensional finite element analysis. To make effective use of space around the slope, soil needs to be reinforced using micropiles placed in a small area. The main objective of this investigation was to evaluate the mechanical influence of various micropile arrangements and to determine the effects of pile spacing for design purposes. Numerical simulations of three cases using different pile angles indicated the amount of slope displacement and the values of the sectional force of the micropiles differed significantly. Among the three cases, the maximum slope displacement was 1.7 times the minimum value. Finally, numerical simulations of three cases using different pile spacing was carried out to clarify the effects of pile spacing on the amount of slope displacement and the sectional force of the micropiles.

In the third paper Soil-water Coupled Analysis of Pore Water Pressure Dissipation in Performance Design—Examinations of Effectiveness in Reclaimed Ground is studied by Toshihiro Nonaka, Shotaro Yamada, and Toshihiro Noda: Japan has a large number of reclaimed regions unimproved against liquefaction and countermeasures in such regions are necessary to prepare for a great earthquake. A new macro-element method has been proposed that involves applying the soil-water-coupled finite deformation analysis code ***GEOASIA*** with an inertial term, and a numerical-analysis technique has been designed that quantitatively evaluates the improvement effect of the pore water pressure dissipation method (PWPDM). In this study, PWPDM effectiveness was examined for a reclaimed ground using the proposed method. Detailed examinations were conducted with the intention of developing a more advanced performance design, without being limited to the concept of the current design code. The main findings are as follows: 1) the proposed analysis code enables quantitative evaluation of the improved effectiveness of PWPDM in a reclaimed ground; 2) more advanced PWPDM designs are possible by not only suppressing the maximum

excess pore water pressure to the permissible range of the current design code, but also evaluating the ground deformation adequately; and 3) the new macro-element method, capable of reproducing the phenomenon of well resistance, can evaluate the reduction in the improvement effect because of the degradation of drainage capability, thus making it useful for maintenance purposes such as drain clogging.

In their paper (fourth one), Y. Fukumoto and S. Ohtsuka made Comparison of Sheared Granular soils: Same Void Ratio but Considerably Different Fabric: This paper reports a comparison of two types of sheared granular soil specimens, with almost the same void ratios but considerably different fabric, using the discrete element method in two dimensions. The specimens are prepared by applying two different methods of particle generation; one specimen is generated by placing the particles geometrically, while the other specimen is generated by placing the particles randomly. Then, computational direct shear tests are conducted in order to compare the yielding behaviours of the two specimens. The obtained bulk shear responses show different trends, even though the values for the void ratio at the initial state are almost the same. Toward the critical state, however, the initial differences in the stress state and the granular fabric gradually disappear and eventually reach almost the same state. The results reveal that not only macroscopic quantities, but also the contact force distribution and the angular variation in contact forces, have a unique critical state. In particular, the angular distribution of contact angles inside the shear band is also found to have a unique critical state.

The fifth paper is on Coupled Analysis of Navier-Stokes and Darcy Flows by the Brinkman Equations by S. Arimoto, K**.** Fujisawa and A. Murakami: Simultaneous analysis of seepage flows in porous media and regular flows in fluid domains has a variety of applications to practical problems. The objective of this paper is to present a numerical method to simulate these two different flows simultaneously and continuously, and to investigate the influence of the Darcy flows in porous media on the Navier-Stokes flows in the fluid domain. To this end, the authors have employed the Darcy-Brinkman equations, which include the Navier-Stokes equations and can approximately describe Darcy flows by changing the values of porosity and hydraulic conductivity. The solutions of the Darcy-Brinkman equations are affected by two dimensionless quantity, i.e., the Reynolds number, Re and the Darcy number, Da. After the procedures to provide stable solutions of the governing equations are explained, this paper considers the two types of problems involving Navier-Stokes/Darcy coupled flows and the influence of the two dimensionless parameters on the solutions are investigated. One is the backward-facing step flow with a porous step, and the other is the preferential flows in porous media. The numerical results have shown that the permeability of the porous step slightly affects the reattachment of the flow in the former problem, and that the shape of the void or cavity in porous media changes the structure of the flow in it and the Darcy number changes the flux into the fluid domain in the latter problem.

In the sixth paper, Y. Kurimoto, Y. L. Xiong, S. Kageyama and F. Zhang presented Numerical Investigation on Mechanical Behaviour of Natural Barrier in Geological Repository of High-Level Radioactive Waste. It is commonly known that geological repository is regarded as the most practical way of permanent disposal of high-level radioactive waste (HLW). Yet, there are some engineering problems needed to be solved before its practical application. In geological repository, one of the most important factors is the thermo-hydraulic-mechanical (THM) behaviour of natural barrier. The aim of this paper is to investigate the influence of temperature on the deformation and the strength of host rocks, such as the soft sedimentary rock, with some element tests and the numerical simulations with a program of FEM named as ***SOFT*** based on a thermo-elasto-viscoplastic constitutive model.

Trihanyndio Rendy Satrya, Ria Asih Aryani Soemitro, Toshifumi Mukunoki and Indarto are the authors of the seventh paper and the last one assembled by the guest editor on Change of Soil Properties in the Bengawan Solo River Embankment due to Drying–Wetting Cycles. This paper studies the behaviour of Bengawan Solo River embankment soil properties for both in-situ and laboratory conditions. In the laboratory, series of cyclic drying and wetting tests were carried out to clarify the changes of in-situ soil properties over time since the soil had been initially compacted. Maximum dry density from Standard Proctor test was applied as initial compacted condition. Three cycles of drying and wetting were used to represent three cycles of dry and rainy seasons. The in-situ soil investigation was carried out during seasons. The results show that the investigated in-situ soil properties were in good agreement with the laboratory test

results at the 2nd and 3rd cycles. It denotes that these numbers of cycles are required to achieve the similar condition as in-situ soil. In addition, by observing the rate of change in soil properties, it was possible to trace back the construction time of the river embankment.

The eighth paper and the rest are from direct contribution. The eighth paper is on Soft Ground Improvement at the Rampal Coal Based Power Plant Connecting Road Project in Bangladesh by Sudipta Chakraborty, Ripon Hore, Fahim Ahmed and M. A. Ansary. Preloading with vertical sand drain (VSD) is presented as a soil improvement method in this paper. The work is based on a real life road (4 lane and 2 slow moving lanes) construction project carried out in Rampal sub-district of Bagerhat, Khulna, Bangladesh. The construction sequences and the basic design example of VSD for embankment works on very soft clay soil are discussed in this paper. This paper presents soft ground improvement using VSD including VSD installation, preloading techniques, settlement and stability, design calculation, observational method and analysis of monitoring data. No extra load has been used; preloading has been carried out with the self-weight of road in combination with fill embankment. Soil treated with VSD, has resulted in improvement of soil settlement.

The ninth paper by Badee Alshameri , Aziman Madun and Ismail Bakar is entitled Assessment on the Effect of Fine Content and Moisture Content Towards Shear Strength**.** The shear strength τ, shear modulus G, friction angle $\emptyset$, and cohesion c are remarkable design parameters in the geotechnical and civil projects. These design parameters were affected by several factors. In this paper, the fine content and moisture content factors will be evaluated. Numerous compacted sand-kaolin samples were test through the direct shear box test (by using shear rate equals to 1 mm/min, the samples dimension equals to 100 × 100 mm) to assess the effect of these factors. The results show interface between both effects of fine content and moisture content towards the shear strength parameters. According to the results; (1) there is no significant effect on shear strength parameters at low portions of fine content FC and moisture content w, (2) at higher portion of FC and w, bot FC and w show different relationships with shear strength parameters, (3) both relative high shear rate and low applied stress lead to present high value of friction angle (4) compact the soil mixtures with same compaction effort and different fine and moisture content lead to change the soil structure and void ratio thus produce regressive relationship between the friction angle toward density.

Dipendra Gautam, Hemchandra Chaulagain, Hugo Rodrigues and Hem Raj Shahi in the tenth paper worked on Ground Response Based Preliminary Microzonation of Kathmandu Valley. This paper analyzes spatially selected 286 deep borehole logs reaching up to the bedrock are and the results are presented in terms of amplification factor, ground acceleration and predominant period. The peak ground acceleration (PGA) is estimated to be 0.10 and 0.50 g indicating strong influence of nonlinearity in particular areas of Kathmandu valley wherein de-amplification is observed. The peak spectral acceleration is found to be varying between 0.30 to 1.75 g for the study area and soil predominant period is estimated in the range of 0.7 to 5 sec. Preliminary microzonation maps for PGA and soil predominant period are prepared and presented in this paper. Comparisons and interpretations on the basis of 1934 and 2015 earthquakes are presented in terms of damage scenario.

In the eleventh paper, V. Oderah and D. Kalumba investigated on the Use of Sugarcane Bagasse for Soil Reinforcement in Geotechnical Applications. The global initiative of minimizing the generation of waste materials, and the reduction of the environmental footprint of industrial processes has impelled the innovation into their use in geotechnical applications. Use of these materials in this manner, especially as soil reinforcements, could help solve the drudgery and secondary snags of disposing of the materials. This study therefore aimed at investigating the effects of sugarcane bagasse reinforcement on selected South African soils as well as the drawbacks of environmental conditions on the composite formed. Different types of sugarcane bagasse were utilised in evaluating their effect on the shear strength characteristics of the composite. The results indicated a higher improvement in the angle of internal friction in finely grained soil compared to coarsely grained soil. Saturation of the composite in water insignificantly reduced the strength characteristics beyond 2 days. In addition, an increase in shear characteristics depended on fineness of the soil, bagasse type and content, and on the vertical load.

The twelfth paper as described by S. Daoud, I. Said, S. Ennour and M. Bouassida on Quasi-Static Numerical Modelling of an Ore Carrier Hold: The problems associated with ore carriers' incidents, have preoccupied international organizations and many research laboratories which have been mobilised to identify the causes and seek for the solutions. The cargo liquefaction is considered to be the major cause of ore carriers' capsizing. The final aim of this research is to establish a new test procedure for evaluating the shear strength of loaded ore in view of its liquefaction prevention. First, a brief review is presented about the possible origins of cargo instability and examines the stress distribution by means of a quasi-static numerical modelling. Second, an assessment of the shear ratio variation, in terms of the hold inclination is established. According to this analysis, at a 15° hold inclination, the maximum shear ratio is less than 0.2 in all pile areas except under the residual slopes and at the surface that are assumed to be the most vulnerable parts.

The thirteenth paper is on Shear Strength of an Expansive Overconsolidated Clay Treated with Hydraulic Binders by A. Mahamedi and M. Khemissa: This paper presents and analyzes the results of a series of identification, compaction and direct shear tests performed in accordance with the Algerian standards on an expansive overconsolidated clay treated with locally manufactured hydraulic binders (composed Portland cement and extinct lime). This clay comes from the urban site of Sidi-Hadjrès city (wilaya of M'sila, Algeria), where significant damages frequently appear in the road infrastructures, roadway systems and various networks and in civil and industrial light structures. Tests results show that the geotechnical parameters values deduced from these tests are concordant and confirm the shear strength improvement of this natural clay treated with cement or lime and compacted under the optimum Proctor conditions. However, contrary to its mineralogical characteristics which do not seem to be affected by the treatment, this expansive natural clay is characterized by as well drained as undrained shear strength sensitive to stabilizer content; the best performances are obtained for a treatment corresponding to 8% cement or lime content.

The fourteenth paper is on Numerical Modelling of Retaining Wall Resting on Expansive Soil by Bushra Suhale Al-Busoda , Safa Hussain Abid Awn, & Hassan Obaid Abbase : To model the behavior of expansive soil, it seems necessary to move towards elastoplastic models that have been used for different types of clays. Hardening soil model is chosen in this study. Retaining walls rested on expansive soils are subjected to uplift and lateral forces due to soil swelling. More importantly, the swelling in expansive soil tends to cause additional lateral pressure on wall that caused deformations and bending. Various pattern types of helical piles are used to reduce the vertical and lateral movement of retaining wall constructed on expansive soil. The backfill soil beyond retaining wall is affected by swelling of expansive soil that caused additional lateral earth pressure on the wall of retaining wall. This study showed that the use of inclined helical piles beside vertical helical piles under the base of retaining wall decreased vertical movement 94% and lateral movement 70% for ratio of length of helical pile to depth of expansive soil (L/H) equal to 3.2. In general, the presence of helical piles below retaining wall resisted and controlled the vertical movement but do not control lateral movement except the case of using inclined helical piles.

N. M. Alsanabani, T. O. AL-Refeai, and A. O. Alshenawy in the fifteenth paper is on Simplified Method for Designing Piled Raft Foundation in Sandy Soils: The main purpose of this study is to develop a simplified method for computing the load carried by piles, and settlement of piled raft based on the characteristics of an unpiled raft, pile group, and soil. These are important criteria for preliminary piled raft design. Based on the results obtained from finite element analysis, simplified formulas and curves are generated for different conditions of sand and different pile spacing. These formulas and curves contain the stiffness ratio and efficiency factor of the unpiled raft and pile groups. The results of the proposed method were validated using the Poulos–Davis–Randolph method.

The sixteenth paper by Ramkrishnan R., Karthik V., Mukund S. Unnithan, Kiran Balaji R., Athul Vinu M., Anju Venugopalan is on Stabilization of Seepage Induced Soil Mass Movements using Sand Drains: Rising groundwater levels increases the pore water pressure in the soil slopes, acting as a triggering factor for landslides. By installing sand drains (horizontal or vertical) along the slope, the groundwater level can be lowered below the critical level, reducing the pore water pressure and also the probability of slope failure significantly. In this study, laboratory-scale soil slopes of varying geometry were modelled in a tank and

constant inflow was provided to simulate groundwater flow. With and without loading, the critical phreatic levels for the various slopes were determined. Vertical sand drains were then installed along the slope and the tests were repeated for a fixed duration. It was found that the slopes did not fail and remained stable for a longer time period, even with increase of groundwater flow. Hence it was concluded that sand drains are a feasible slope stabilization technique even on slopes subjected to static loading.

The seventeenth paper is on Experimental Study on the Durability of Soil-Cement Columns in Coastal Areas by Pham Van Ngoc, Brett Turner, Jinsong Huang and Richard Kelly: Deep soil mixing is one of the most commonly used ground improvement techniques. With high sulphate content in soil and seawater, stabilized soil in coastal areas can deteriorate in strength due to sulphate attack. In this research, the degradation in strength of cement treated soil exposed to synthetic seawater is measured by uniaxial compression and needle penetration testing. Three exposure conditions, namely 100% seawater, 200% seawater and in sealed condition (control samples), were used to measure the deterioration level due to the effect of sulphate. In addition, the extent of the portlandite consumption was also measured by Thermo-gravimetric Analysis which reflects the calcium distribution in the soil-cement columns. The test results show that the strength deterioration occurs deeper and faster in higher seawater environments. Furthermore, when in contact with increasing sulphate concentration, the strength deterioration shows a close relation with calcium distribution.

The eighteenth paper is by Wei Xiaoming ,Li Changhong ,Zhou Xiaolong ,Hu Baowen & Li Wanling on The Change Laws of Strength and Selection of Cement-sand Ratio of Cemented Backfill: Lilou Iron Mine is the largest domestic underground backfill mining and uses advanced whole tailings cemented filling process system. For the backfill, both the change law of strength development and the cement-sand ratio are important considerations for design. A differentiation analysis was performed of the strength of laboratory test blocks at the age of 28d and in situ cemented backfill samples. When the filling slurry concentration was 72% and cement-sand ratio was 1:4, the in situ coring strength was 2.98 MPa higher than that of laboratory-cured specimens; when the slurry concentration was 68% and cement-sand ratios were 1:4, 1:6 and 1:8, the in situ coring strength was 1.68MPa, 2.33 MPa and 1.44 MPa higher than that of laboratory-cured specimens. With an increase of filling height, the change laws has been explored of downward parabola in conditions that the strength difference is consistent with the bulk density difference of the cemented backfill. The stress of cemented backfill with different ratios were calculated and analyzed on the basis of ANSYS numerical simulation and similar filling mines. According to the position of stress concentration and change law of strength difference, this paper proposes an design scheme for high-stage cemented backfill with ratio parameters at different heights.

The last paper of this issue is nineteenth by T.C. Ekneligoda, L.-T. Yang, D. Wanatowski, A.M. Marshall1, and L.R. Stace on Numerical modelling of Ground Subsidence at an Underground Coal Gasification Site. A detailed numerical modelling study was carried out by the authors to represent geotechnical aspects of the Wieczorek underground coal gasification (UCG) site in Poland. A coupled thermos-mechanical numerical model was created to represent a single coal burning panel. The coal burning process was simulated by modifying the energy balance equation with an additional term related to the calorific value of coal as a source. Temperature dependent material properties were assigned to the coupled thermal-mechanical model according to published data. In the model, the burning zone spread about 7.5m laterally after 20 days of burning. Results from the coupled model were used to gauge a worst-case scenario in terms of the potential size of a formed cavity. This data was used within a less computationally expensive mechanical-only numerical model in order to evaluate the ground subsidence caused by the worst-case scenario for single and multiple UCG burning panels. The single panel burning resulted in 23mm of ground subsidence at the top of the model after long term coal burning. The ground subsidence measured at the top of the model, at the centre point of the gasification arrangement, was approximately 72mm when five panels were burnt with an edge to edge panel distance of 5m; this was increased to 85mm for seven panels.

ACKNOWLEDGEMENT

Nineteen papers are contained in this issue. Twelve of them are assembled by the Guest Editors and another seven contributed papers directly to the in-house editors. No doubt the material contained herein would be most valuable to our profession. The editors have adequately described the contributions in the preface. They are to be congratulated for these contributions.

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GEOTECHNICAL ENGINEERING

December 2017: Papers by Guest Editor Akira Murakami & Contributed Papers

Edited by:
Akira Murakami, San Shyan Lin & Mounir Bouassida

Akira Murakami

Prof. Akira Murakami received his BS (1978) at the Agricultural Engineering Department; MS (1980) at the Civil Engineering Department and Dr. Agr. (1991) from Kyoto University (KU), respectively. In 1982, he became an assistant professor at the Agricultural Engineering Department of KU, and was promoted to an associate professor of KU in 1994. He moved to the Graduate School of Environmental Science of Okayama University with a promotion to full professor in 1999. After joining Okayama University for just 10 years, he moved back to a full professor of KU in 2009. He has served as the Vice President of the Japanese Geotechnical Society (JGS), the Board Member of the Japanese Society of Irrigation, Drainage and Rural Engineering (JSIDRE), and the International Association for Computer Methods and Advances in Geomechanics (IACMAG), and also serves as a core member of TC103 of ISSMGE and a member of the Multidisciplinary International Society on Inverse Problems in Science and Engineering. He had acted as the Secretary of TC34 of ISSMGE for two terms and delivered a general report of 'Numerical Methods' at 16ICSMGE held in Osaka. He is the recipient of the Japanese Society of Civil Engineering (JSCE) Paper Award (1996), the JSIDRE Sawada Prize (2007), the JGS Best Accomplishment Award (2008), the JSIDRE Best Paper Award (2010), the JGS Paper Award (2011, 2013) and is a Fellow of JSCE. His research interests include the data assimilation, inverse problem, finite element methods, mesh free methods, and DEM in geomechanics.

San-Shyan Lin

Prof. San-Shyan Lin graduated from Chung Yuan University with a BSCE degree in 1981. He then obtained his master degree from Utah State University, Logan, Utah in 1985 and his PhD from Washington University in St. Louis, Missouri in 1992. Before his teaching career at university, Dr. Lin served as an engineer at Taiwan Area National Expressway Engineering Bureau between1992 to1994. Dr. Lin has been serving at Department of Harbor and River Engineering (DHRE) of National Taiwan Ocean University (NTOU) since 1994. He was promoted as a full professor in 2000. Thereafter, he took some university duties by serving as the secretary-general at office of the secretariat between 2001 and 2003; the chairman of DHRE between 2005 and 2006; the acting dean of college of engineering in 2007 and the vice president of NTOU between 2006 and 2012.

Prof. Lin served as a committee member of committee A2K03-Foundations of Bridges and Other Structures of TRB, USA between 1995 and 2004. Currently, he is still serving as a committee member of TC-212 and ATC-1 of ISSMGE and as an editorial board member of four international journals. In addition, Dr. Lin also served as the president of Taiwan Geotechnical Society (2011-2013); Chairman of International Geosynthetics Society- West Pacific Regional Chapter (2002-2004); CEO of Sino-Geotechnics Foundation (2011-2014) etc. Dr. Lin received the distinguished alumnus award from Chung Yuan University in 2009 and the distinguish Engineering Professor Award from Taiwan Pavement Engineering Society in 2011. Prof. Lin's research and practical experiences have been dealt with deep foundations and geosynthetics.

Mounir Bouassida

Mounir Bouassida is a professor of civil engineering at the National Engineering School of Tunis (ENIT) of the University of Tunis El Manar where he earned his B.S., M.S., Ph.D., and doctorate of sciences diplomas, all in civil engineering. He is the director of the Research Laboratory in Geotechnical Engineering and has supervised 16 Ph.D. and 29 Master of science graduates. His research focuses on soil improvement techniques and behavior of soft clays. Dr. Bouassida is the (co)author of 87 papers in refereed international journals; 130 papers, including 20 keynote lectures; and three books. He is a member of the editorial committees of journals Ground Improvement (ICE), Geotechnical Geological Engineering, Infrastructure Innovative Solutions, and International Journal of Geomechanics (ASCE). He is also an active reviewer in several international journals. As a 2006 Fulbright scholar, Bouassida elaborated a novel methodology for the design of foundations on reinforced soil by columns. He was awarded the 2006 S. Prakash Prize for Excellence in the practice of geotechnical engineering. In 2008, Bouassida launched a Tunisian consulting office in geotechnical engineering, SIMPRO. He is a co-developer of the software Columns 1.01 used for designing column-reinforced foundations. Prof. Bouassida held the office of the vice president of ISSMGE for Africa (2005–2009). He benefited from several grants as a visiting professor in the USA, France, Belgium, Australia, Vietnam, Hong Kong, and Norway.

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