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Guest Editor

Prof. Tatsunori Matsumoto

GEOTECHNICAL ENGINEERING

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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

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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

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T.A.Ooi

A.S.Balasubramaniam

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Cover Photograph: **151 Story Incheon Tower, Songdo, South Korea**

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Paper Contributions

SEAGS encourages the submission of scholarly and practice-oriented articles to is journal. The journal is published quarterly. Before you submit an article, please review the guidelines stated herein for the manuscript preparation and submission procedures.

Geotechnical Engineering Journal accepts submissions via electronic or postal mail (by sending a CD). The manuscript file (text, tables and figures) in pdf format together with the submission letter should be submitted to the Editor, Geotechnical Engineering Journal, c/o School of Engineering and Technology, Asian Institute of Technology, Room no. 211, AIT Library, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand. Email: noppadol@ait.ac.th or seags@ait.ac.th. Papers under review, accepted for publication or published elsewhere are not accepted. The review and publication procedures are available on seags website.

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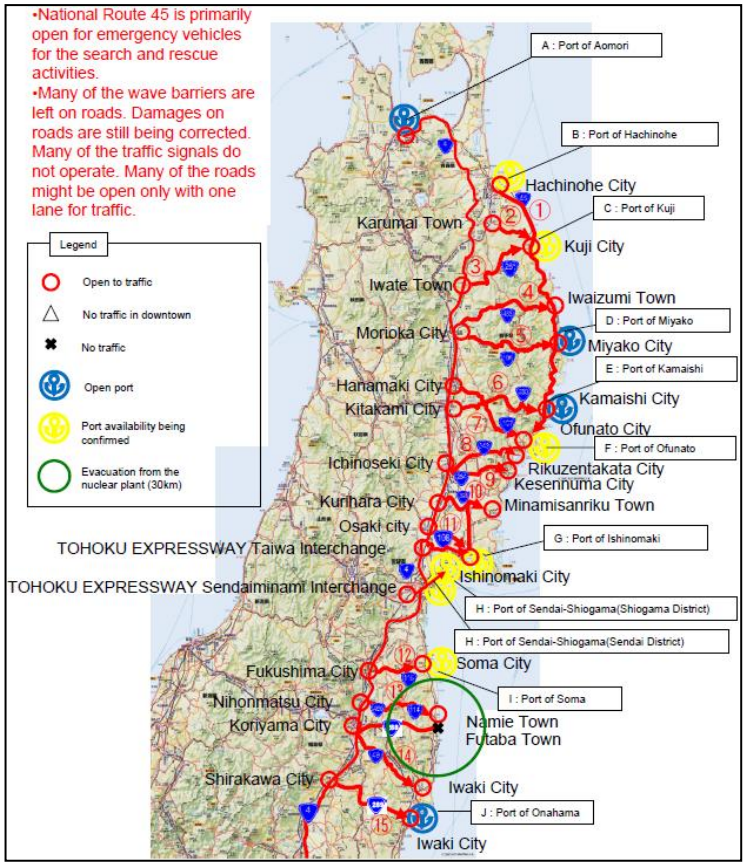
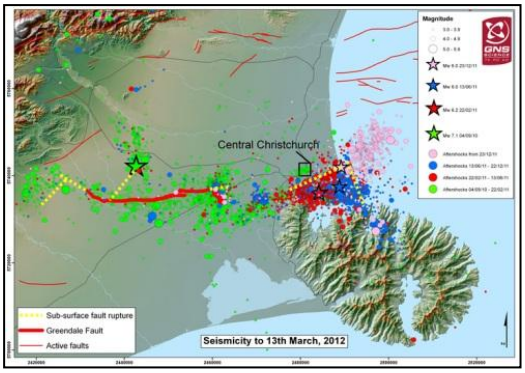
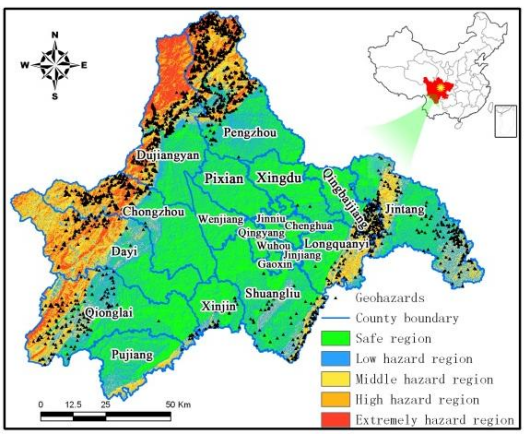
Guest Editors:
Prof. Ikuo Towhata, Prof. Der Wen Chang & Dr. Ivan Gratchev



Tohoku (after Kazama *et al*, 2012)



Christchurch (after Orense *et al*, 2012)



WenChuan (after Yang *et al*, 2012)

GEOTECHNICAL ENGINEERING

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

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.

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

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Cover Photograph: **Wenchuan, Christchurch and Tohoku Earthquakes**

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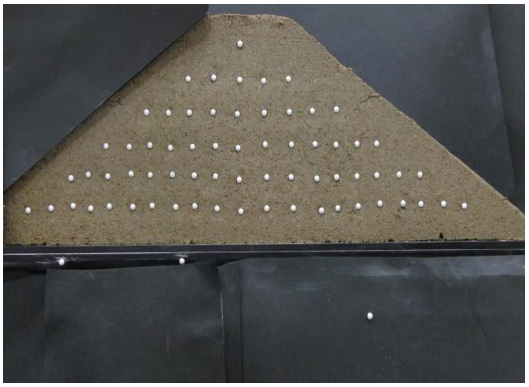
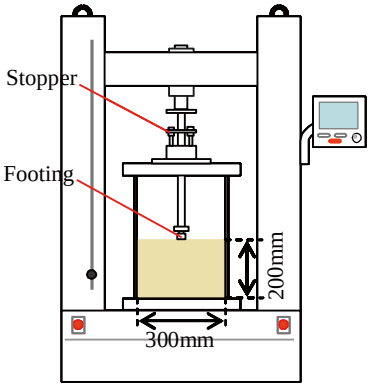
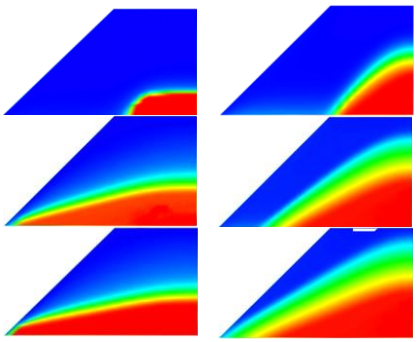


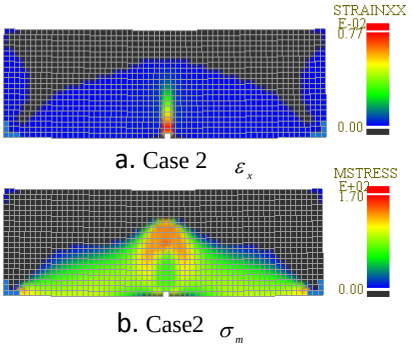
Large Model with guage points for shear and volumetric strain measurement (after Miyanaga, *et al*, 2013)



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

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 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.

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June 2013: Modelling Aspects of Soil Behaviour

Editors: Akira Murakami

Dariusz Wanatowski

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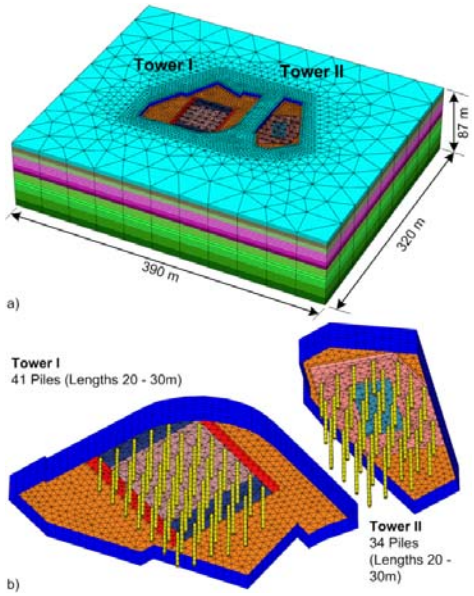
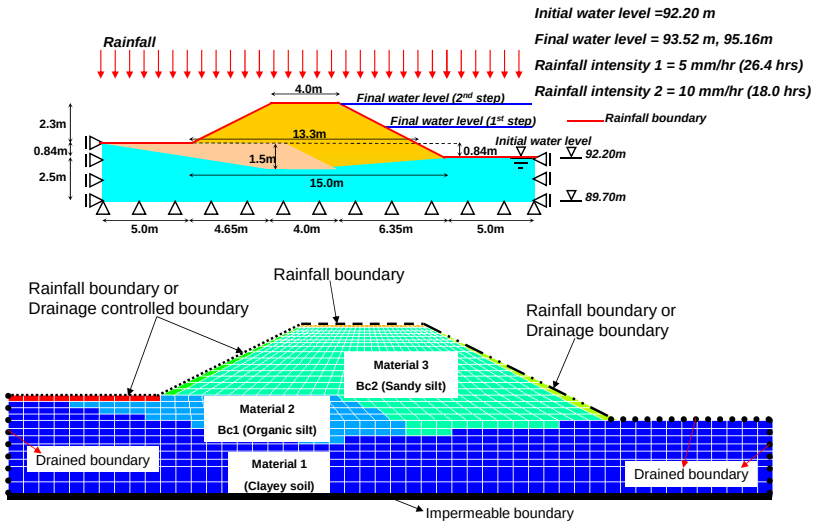
AIT Asian Institute of Technology

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.Kimotoet al 2013)

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;

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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 SPECIAL ISSUE ON NUMERICAL ANALYSES

Editors:
Prof. Fusao Oka, Prof. Helmut F. Schweiger
& Prof. Muhunthan Balasingham

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.

Prof. Muhunthan Balasingham

Prof. Muhunthan Balasingam, Ph.D., P.E., F. ASCE, is Professor of Geotechnical Engineering in the Department of Civil and Environmental Engineering at Washington State University in Pullman, WA, USA. He is also the Founder and Director of the Washington Center for X-ray Computed Tomography established using grant funds from the US National Science Foundation and Murdock Trust Foundation. He has held visiting professorships at Cambridge University, the University of Auckland, and the Georgia Institute of Technology. Dr. Muhunthan received his undergraduate degree in Civil Engineering from the University of Peradeniya, Sri Lanka, and his MS and Ph.D. in Civil Engineering from Purdue University. Dr. Muhunthan's expertise is in the areas of computational and experimental geomechanics, critical state soil mechanics, unsaturated soil mechanics, multi-scale modeling of materials, thermomechanics, bifurcations and instabilities in geomechanics, microstructure characterization and simulation of geomaterials and micromechanics of soils. He has also worked on a wide range of field problems in geotechnical engineering including landslides, dam failures, micropiles, horizontal drains for slopes, and rock fall protection measures. Dr. Muhunthan has received several national and international awards for his scholarly accomplishments. He is a recipient of all of the three top CEE Departmental awards at WSU; Outstanding Teaching, Excellence in Research, and the Leon Luck Most Effective Professor Awards. He also received the Outstanding Teacher Award from the College of Engineering and Architecture at WSU, the Crampton Prize by the Institution of Civil Engineers, UK, an International Fellowship Award from the National Science Foundation, Fellowships from Churchill College Cambridge, Purdue University, and Merit Scholarship from Peradeniya University. Dr. Muhunthan is a member of the Soil Properties and Modeling Committee of ASCE and serves on the editorial advisory board of the International Journal of Geomechanics. He was an editor of the Geotechnical News Magazine, has chaired many national and international conferences, and has presented a number of invited lectures in constitutive modeling of geomaterials.

GEOTECHNICAL ENGINEERING

September 2013: Numerical Analyses

Editors:
Prof. Fusao Oka, Prof. Helmut F. Schweiger & Prof. Muhunthan Balasingham

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- Numerical Simulation of Rainfall Infiltration on Unsaturated Soil Slope With Seepage Flow (after S.Kimotoet al 2013)

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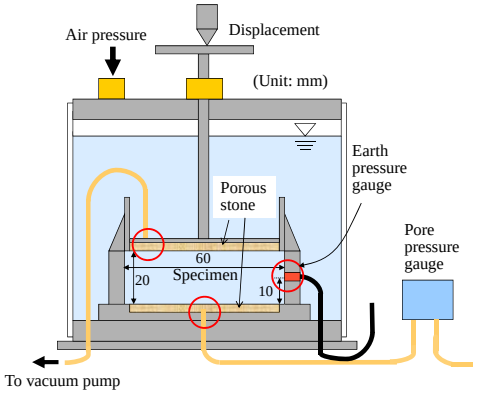

(a) Vertical drainage test set up

(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

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. N. Miura, Prof. S.K. Kim 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
Shuilong Shen Shanghai, China

Prof. H.G. Poulos writes

Ground improvement has become an increasingly important issue in the development of property and infrastructure in areas where ground conditions are poor. South East Asia is one of these areas and so it is entirely appropriate that research into ground improvement methods should be undertaken at one of the region's foremost institutions, the Asian Institute of Technology (AIT). This research has been spearheaded by Professor Dennes T. Bergado, and over the past 3 decades, he and his research team have made many significant contributions to knowledge and practice in the area of ground improvement. Of particular significance is his work on vertical drains and ground reinforcement using inclusions and geosynthetics. He has presented innovative techniques to enhance the performance of vertical drains by heating them, and by the application of electro-osmosis. His two books in this area have been influential and have been of great value to students and practitioners alike.

A feature of Professor Bergado's research is his focus on solving geo-problems in Asia, and his recent research has expanded to include geotechnical aspects of natural disasters, including tsunamis. He and his team have addressed not only the science of the problems they have tackled, but also the technology of application of the science.

AIT has been fortunate to have a person of his calibre to lead the group and to carry on the pioneering work that began decades ago with Dr. Za-Chieh Moh, and continued under Professor A. S. Balasubramaniam. I am sure that I speak for many in our discipline in wishing him an enjoyable retirement, while at the same time hoping that he will be able to continue to contribute his knowledge and experience to the profession and to help guide the younger generation of geo- professionals.

H.G. Poulos
Coffey Geotechnics, and the University of Sydney, Australia.
December 2012.

Prof. Sag-Kyu Kim writes

First of all, I would like to congratulate Professor Dennes T. Bergado on his honourable retirement from AIT. He has long served at the institute as an educator of geotechnical engineering. Through his long teaching career at AIT he has produced a lot of prominent geotechnical engineers, most of whom are now doing leading roles in the Asian region. His research works have mainly been concerned in soft ground improvement and geosynthetics. Lots of papers related to this discipline have been published in international journals and proceedings. Furthermore, he has been involved in important consulting projects including the construction of the new Bangkok international airport. His reputation as an expert in this field has made him to be invited as a theme lecturer or a keynote speaker in many international geotechnical events. It is my honour and privilege to write some words for such an expert in a special volume of Geotechnical Engineering Journal commemorating his academic achievements.

Everywhere in the world there exist soft grounds that need to improve for an effective land use. A large delta neighbouring the city of Busan in Korea was also one of such sites, where the Government planned to develop a large scale harbour along a coastline and residential and industrial compounds behind it. In connection with this challenging project, I opened a short course on 'Soil improvement using prefabricated vertical drains' in 1998 at my University in Seoul. Prof. Dennes T. Bergado gave a practically useful lecture at the event with the theme of 'Design and analysis of vertical drains' and introduced the case of soil improvement of Bangkok clay. Afterwards, I again organized an Asian Regional Committee entitled 'Thick clay deposit,' and I have frequently held seminars and symposia in order to expand and deepen the understanding of ground improvement technologies. He often joined us in those events as an invited speaker and thus through those close contacts he became my long-time colleague and friend. We are deeply indebted to Prof. Dennes T. Bergado for having shared his experiences and introduced new technologies developed at AIT.

Though he is retiring from teaching and research duty at AIT, he is still young and energetic. I am sure he will continue to work with a new role in our geotechnical field. I wish him all the best and enjoying his second career.

Sag-Kyu Kim
Professor Emeritus, Dongguk University, Seoul, Korea.
December 2012.

Prof. N. Miura writes

Bergado – All rounded Player

It was in 1987 when I first contacted with Prof. Dennes T. Bergado who was working at Asian Institute of Technology (AIT) in Bangkok, Thailand immediately as a young faculty member after he came back from U.S.A. Saga University asked me to invite a foreign professor, and I sent invitation letters to several universities. He sent back his positive response to accept our requirements. We were planning to establish a new institute to investigate the lowland problems especially such problems as land-subsidence, soft ground improvement, and water management in lowlands. Prof. Dennes T. Bergado was searching for new research topics after he finished probabilistic research in his PhD dissertation at Utah State University under Professor Loren Anderson. Prof. Dennes T. Bergado was interested in soft ground improvement in Saga Plain, because there exist common properties between soft Ariake Clay in Saga Plain and soft Bangkok clay.

The first topics he selected at Saga University were to investigate the prefabricated vertical drain (PVD). We made a large-scale test instrument for this purpose and he successfully performed experimental model tests. The results were successfully applied in field embankment tests at Saga Airport construction site. Some of the data appeared on his book publication "Soft Ground Improvement in Lowland and Other Environments" published by ASCE press（Bergado, Anderson, Miura and Balasubramaniam, 1996）. Subsequently, this equipment has been utilized for model tests in the soft Bangkok clay which lead to successful applications in the Mega-Projects in Bangkok, Thailand such as the Suvarnabhumi International Airport, Motorway to Pattaya, Outer Ring Road, etc.

During Prof. Dennes T. Bergado's stay at Saga University, close relationship was made with AIT, and Saga University accepted more than ten AIT alumni for doctoral studies. During Bergado's second stay, then AIT President, Prof. North, visited our University. After he went back to AIT, tremendous activities started in the field of geotechnical engineering. Field tests on full-scale embankments at AIT campus became a well-known monuments, and he published numerous papers based on the model embankments, and a large number of doctor students were produced at AIT.

Prof. Bergado's brilliant successes come not only from his creative and innovative researches but also his pleasant personality which attracted excellent students and also practicing engineers. In other words, he has a good sense of management. He is really an all-around player. I hope that he can continue his research activities after retirement and also he can enjoy golf as long as he can. I would like to say many thanks to him for his contribution to our activities at Saga University which led to the establishment of the Institute of Lowland Technology (ILT). Lastly, he also contributed in initiating the now famous International Symposium on Soil Reinforcement (now IS-Kyushu) which started at Saga University in 1988. He was also instrumental in the establishment of the technical journal at ILT called Lowland Technology International (LTI), a name Prof. Dennes T. Bergado suggested.

Norihiko Miura
December 2012

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

Editors: Jinchun Chai & Shuilong 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). Professor Chai is a licensed Professional Engineer in Japan.

PROF. SHUILONG 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 as a guest professor.

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 200 technical papers in Journals and International conferences, in which about 30 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

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

Editors: Prof. Jinchun Chai & Prof. Shuilong Shen

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ENGINEERING

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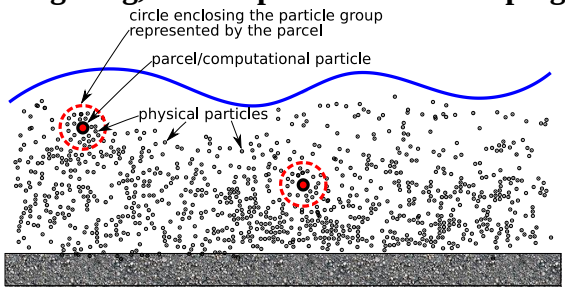
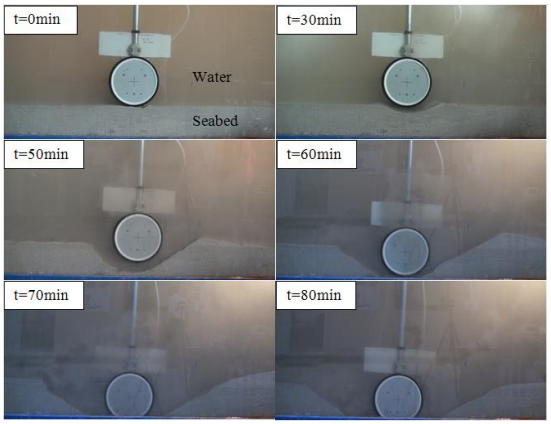
Editors: Shinji Sassa, Poul V. Lade, Li-zhong Wang, Y.K. Chow, Dong Sheng Jeng, Christophe Gaudin & Fuping Gao



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



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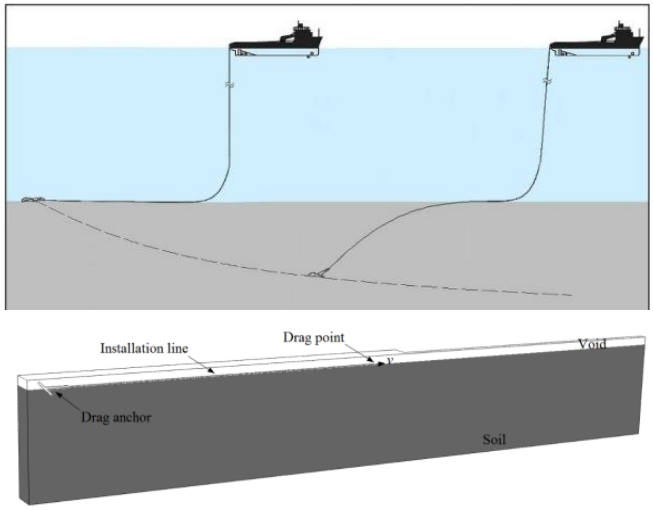
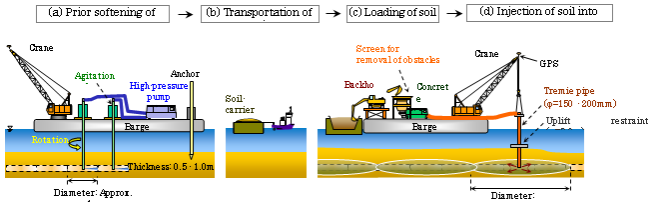


Sketch of the drag anchor installation and its FE model (After Liu and Zhao, 2014)



Construction sequence for restoration of tidal flat (After Kumagai et al., 2014)

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
Chiristophe 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 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

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

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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Honouring Prof Emeritus Osamu Kusakabe
Guest Editor: Masaki Kitazume

Masrur Abdull Hamid Ghani, Kenichi Ito, Minoru Kuriki and Shun Sugawara

L. Ming, Y. Haiqing, H. Sakaeda and O. Ozgur

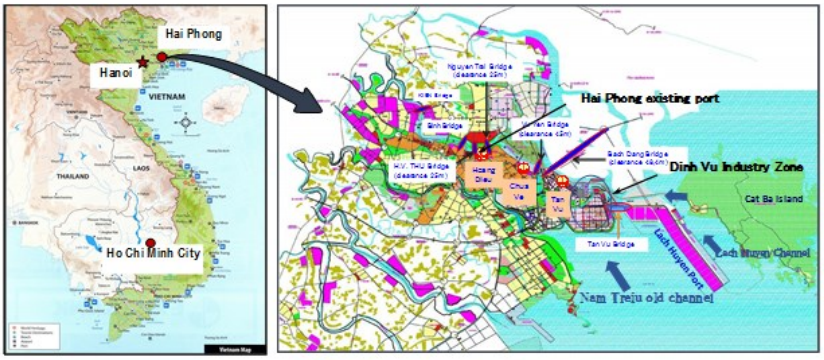

Figure 1 Location of Hai Phong City and Lach Huyen Port Construction Site

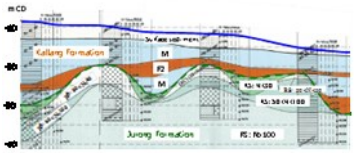

Figure4 Typical soil profile at the site

Photo 1 Soil samples of the Marine Clay and Residual soils

Loh Chee Kit, Eugene Khoo, Seah Kim Huah, JamesLam Pei Wei, Thiam Soon Tan, Fumitaka Tsurumi and Takahiro Kumagai

J. Hamada, Y. Yamashita, T. Honda, M. Sugaya, M. Kamimura

Y. Ishihara, H. Yasuoka and S. Shintaku

Honouring Prof Osamu Kusakabe

KUSAKABE OSAMU currently with Ibaraki National College of Technology, obtained his Ph D & M Eng from the University of Cambridge. Prof Kusakabe had a distinguished academic & administrative career. Formerly, Professor, Director, Tokyo Institute of Technology Graduate School of Science and Engineering, Department of Civil Engineering, Graduate School of Science and Engineering Civil Engineering. He was also a Fellow of Churchill College Cambridge. He is a recipient of prestigious International Awards including Schofield Award (IJPMG); best paper awards of JGS; and award for distinguished service to the Japanese Geotechnical Society.

Prof Kusakabe's research interest include: Physical Modelling of Contaminant Transport in the Subsurface; historical of Development of Cone Penetration Tests with Reappraisal of Interpretation Methods and its Applicability to Clay Soils; Reappraisal of size effect on bearing capacity from plastic solution; Centrifuge Model Tests on Reducing Ground Vibration by Underground Wall; Propagation of Ground Vibration and its Countermeasures Methods- Centrifuge Modelling; Use of Mini-Drum Centrifuge for Studying Migration of Pollutant through a clay deposit; Attempts at centrifugal and numerical simulations of a large-scale in situ loading test on a granular material; Numerical and experimental modelling of wave barriers as a countermeasure against train-induced ground vibrations; An Application of Centrifuge Model in Environmental Geotechnics Assessment of Soft Geological Barrier Subjected to Pile Constructions in Waste Disposal Site. His research work on Centrifugal modelling in Geotechnics is worthy of praise

Guest Editor: Prof Masaki Kitazume

Prof Masaki Kitazume is currently a Professor at Tokyo Institute of Technology, Civil Engineering Department. He is an expert in soil stabilization methods and in centrifugal model testing. Prof Kitazume is the author of a comprehensive book on providing a state of the art on Deep Mixing Methods; covering: recent technologies, machinery, design, construction technology, quality control and assurance; The Deep Mixing Method (DMM), a deep in-situ soil stabilization technique using cement and/or lime as a stabilizing agent. His research work on deep chemical mixing has earned him worldwide reputation present the piled raft foundation with grid-form deep mixing walls supporting the largest scale base-isolated building in Japan

Preface

There are ten peer reviewed papers in this Issue of the journal honouring Prof Osamu Kusakabe.

The first paper is by Marsrur Abull Hamid,et al on Design and construction of Ho Chi Minh City Metro Line 1 Underground Section: Contract Package 1b (CP1b) is a part of Ho Chi Minh City Metro Line 1 (HCMC MRT Line 1) project which consists of underground construction of two stations, bored tunnels, cut-and-cover tunnel, and transition structure. Each structure has its own distinctive features due to its geographical location, underlying geotechnical layer and construction constrain. Opera House Station, whose construction method categorized as deep excavation (up to 30 m depth) is the first underground metro station in Vietnam which is situated in a cramped downtown and surrounded by old-sensitive shallow-founded buildings. It was built by top-down method as the method offers better control of retaining wall deformation to minimize settlement of adjacent buildings. The other station, Ba Son Station, located next to the riverside, was protected by double sheet pile structure during its construction. For cut-and-cover tunnel, the rigid steel pipe sheet pile (SPSP) was used to maintain stability for construction in the river and on the weak alluvium clay soil. The underlying alluvium clay also causes a negative skin friction issue in the design of pile for the transition structure in Ba Son area. As for tunneling beneath the city, the bored tunnel using Earth Pressure Balance (EPB) Tunnel Boring Machine (TBM) was selected. The TBM was launched from Ba Son Station toward Opera House Station twice: one for the east-bound track, and the other is for the west-bound track. In this project, several instruments were deployed to monitor and to ensure the safety of construction works and surrounding buildings. The data from the monitoring works were also useful for back analyzing and reconfiguration of the construction method. Those features brought challenges for both design and construction stages. The design and construction experience of the project are shared in this paper.

The second paper is by L. Ming, Y. Haiqing, H. Sakaeda and O. Ozgur on Big Challenges and Innovative Solutions at HZMB Link Project: Currently one of the world`s most challenging immersed tunnel projects, the Hong Kong – Zhuhai – Macau Bridge Link (HZMB) is being constructed in the Pearl River Estuary, connecting Hong Kong Special Administrative Region (SAR), mainland China (Zhuhai) and Macau SAR. It consists of 6km Immersed Tunnel with two artificial islands. Since the project is being built in the open sea, the design and construction of the tunnel and artificial islands faces a series of grand engineering challenges. For example, the long distance ventilation and safety design, prefabrication of elements weighing nearly 80,000 tons each, foundation, siltation, towing and installation under high water pressure as well as construction of the west and east artificial islands. This paper discusses the major challenges faced during the HZMB Link project design and construction, and gives examples of innovative solutions to overcome those challenges.

In the third paper, Thi Ha describe Lach Huyen Port Infrastructure Project and Soil Improvement Works: To cover cargo demand in northern part of Vietnam and to fit large size vessel in marine transportation sector, an international deep sea port for 100,000 DWT size vessel is being constructed in Lach Huyen area situated at south east part of Hai Phong City. In this project, reclamation work is being conducted at Port Terminal Area and Access Road Area. In the construction area, totally 20m to 30m of fine soil (clay, slit and sandy clay) layers are distributed. To accelerate the consolidation and to reduce the residual consolidation settlement during port operation, soil improvement works are being carried out by cement deep mixing method and prefabricated vertical drain method. In this paper, overall construction project will be introduced in briefly and then soil improvement works will be presented.

The fourth paper by J.N Shirlaw is on a comparison of EPB and slurry TBMs operating in mixed ground conditions resulting from tropical weathering of rock: Deep, but uneven, weathering of rock is common in tropical and sub-tropical areas. Infrastructure development in many Asian cities has required tunnelling through weathered rock profiles. The ground conditions for the tunnelling typically include saprolite, rock, and mixed faces of soil and rock. Where the rock is strong, and mixed ground is anticipated to be encountered over a significant proportion of the drive, slurry TBMs are typically specified in Singapore, based on local experience. Case studies of slurry and EPB tunnelling in mixed ground conditions, from Hong Kong, are presented, and compared, to illustrate the issues involved. For the EPB drive, there were very large increases in the Penetration Index and Specific Energy when working in pressurised EPB mode in ground conditions comprising >50% strong or stronger rock. In these ground conditions the rate of disc cutter replacement was significantly higher than when tunnelling in open mode in a full face of rock, on the same drive. Average progress rates fell to less than 3m per week in the most extreme conditions of 85% to 99% rock, with most of the time being spent on interventions, including a significant proportion of time required to cool the excavation chamber. It is postulated that these observations are related to the clogging of the cut chips of rock in the tool gap, ahead of the cutterhead, when the cut rock becomes the majority of the spoil. A slurry shield in comparable conditions in Hong Kong did not experience the spikes in Penetration Index, Specific Energy, or cutter wear, in mixed ground conditions, that were experienced during the EPB drive.

Loh Chee Kit et al in their 5th Paper deal with Reuse and Recycling of Clayey Soil in Pasir Panjang Terminal Phases 3 and 4 Project in Singapore: In order to increase the handling capacity of ports in Singapore, the Maritime and Port Authority of Singapore (MPA) has embarked on massive port development projects for the past decade. One of the major projects was the Reclamation for Pasir Panjang Terminal Phases 3 and 4, completed in April 2015. The project provided 200 hectares of port land equipped with 5.7 km of berthing facilities to accommodate ultra-large container ships. In this project, MPA embraced sustainable development by reusing dredged and excavated clayey soil as reclamation fill and as fill material to form a containment bund within the footprint of the project. Nearly half of the reclamation fill consisted of clayey soil, which was improved using prefabricated vertical drains with surcharge. The containment bund, which served as a temporary earth-retaining system during reclamation filling, was formed using geotextile tubes filled with clayey soil treated with cement. This paper describes the innovative design and construction in the project.

A. Lim and C. Y. Ou in the sixth paper describe the performance of cross and buttress walls to control wall deflection induced by deep excavation in dense urban area.

The authors, J. Hamada, Y. Yamashita, T. Honda, M. Sugaya, M. Kamimura in the seventh paper on piled raft foundation with grid-form deep mixing walls supporting the largest scale base-isolated building in Japan: This paper offers a case history of 300-m high supertall building in Japan. Since the building has a five-story basement, the top-down method was adopted to carry out the underground construction works safely as well as to save construction time by simultaneous construction of the upper and the basement floors. Furthermore, to ensure high performance against strong earthquakes, piled raft foundation consisting of bottom-enlarged cast-in-place concrete piles and steel H-piles built-in soil-cement wall (TSW) embedded in a very dense sand was employed as a cost-effective foundation. In order to confirm the validity of the foundation design, field monitoring on the settlements and the vertical load sharing between the piles and the raft was performed.

The subsequent paper eight in the series is by K. Yamashita, J. Hamada and K. Hirakawa on Piled raft foundation supporting a supertall building in Osaka constructed by top-down method: This paper offers a case history of 300-m high supertall building in Japan. Since the building has a five-story basement, the top-down method was adopted to carry out the underground construction works safely as well as to save construction time by simultaneous construction of the upper and the basement floors. Furthermore, to ensure high performance against strong earthquakes, piled raft foundation consisting of bottom-enlarged cast-in-place concrete piles and steel H-piles built-in soil-cement wall (TSW) embedded in a very dense sand was employed as a cost-effective foundation. In order to confirm the validity of the foundation design, field monitoring on the settlements and the vertical load sharing between the piles and the raft was performed.

Wang Guixuan, Yin Xunqiang and Zhao Jie in the nineth paper discuss Anti-Seismic Numerical Analysis of Water Intake Structure of Pakistan Karachi K-2/K-3 Nuclear Power Plant: Based on the actual conditions of Pakistan Karachi K2/K3 Nuclear Power Plant (NPP), the special topic of seismic numerical simulation calculation and anti-seismic numerical analysis of water intake structure are introduced. Firstly, the project profile of K2/K3 NPP is briefly presented, including the preliminary design, the soil conditions of site, and the purpose and contents of the proposed special topics. Then, the physical and mechanical qualities of the foundation are introduced. Next, the method for calculating the designed ground motion parameters of engineering site are proposed and parts of results are listed which meet the provisions of standard and can be used as an input data for the anti-seismic analysis. Finally, anti-seismic analysis of water intake gate shaft, water intake tunnel, and diversion dike and bank revetment of water intake channel is described, respectively. Through the numerical analysis, it can be concluded that the design scheme put forward in the design can adopt appropriate reinforcement measures and the marine structure is stable under SL2 earthquake loading.

The last paper tenth in the series is by Y. Ishihara, H. Yasuoka and S. Shintaku on Application of Press-in Method to Coastal Levees in Kochi Coast as Countermeasures against Liquefaction: There had been a concern that coastal levees in Kochi would lose their functions due to the settlement caused by liquefaction of the underlying ground as well as the wide-area ground subsidence of 2 meters in the coming huge Nankai Trough earthquake. Protected inlands were supposed to suffer from the long-term flood due to the succeeding tsunami. To cope with these problems, 13-kilometer-long levees in Kochi Coast have been appointed to be in direct control of Ministry of Land, Infrastructure, Transport and Tourism (MLIT), and have been under construction for seismic reinforcement. Requirements for this construction project were as follows: (1) levees have to be tenacious and their deformations have to be restricted below the allowable values, (2) construction should have minimal impacts on the surrounding environment and human activities, and (3) construction should be carried out at high speed and at low cost, even though cobbles and obstacles are contained in the ground. Under these requirements, reinforcement using sheet piles or tubular piles, along with the Press-in Method as their installation method, was chosen as a solution. This paper explains in detail the background and the decision making process of selecting the construction method for reinforcing the coastal levees in Kochi Coast, as well as the results of piling work in Nino and Nii sections.

Masaki Kitazume

ACKNOWLEDGEMENTS

Ten papers are contained in this issue. The Guest Editor is Prof Masaki KItazume. 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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