Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 46 No.4 December 2015 ISSN 0046-5828

GEOTECHNICAL

ENGINEERING

Journal of the

SOUTHEAST ASIAN GEOTECHNICAL SOCIETY

&

ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

AGSSEA

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ASIAN INSTITUTE OF TECHNOLOGY (AIT)

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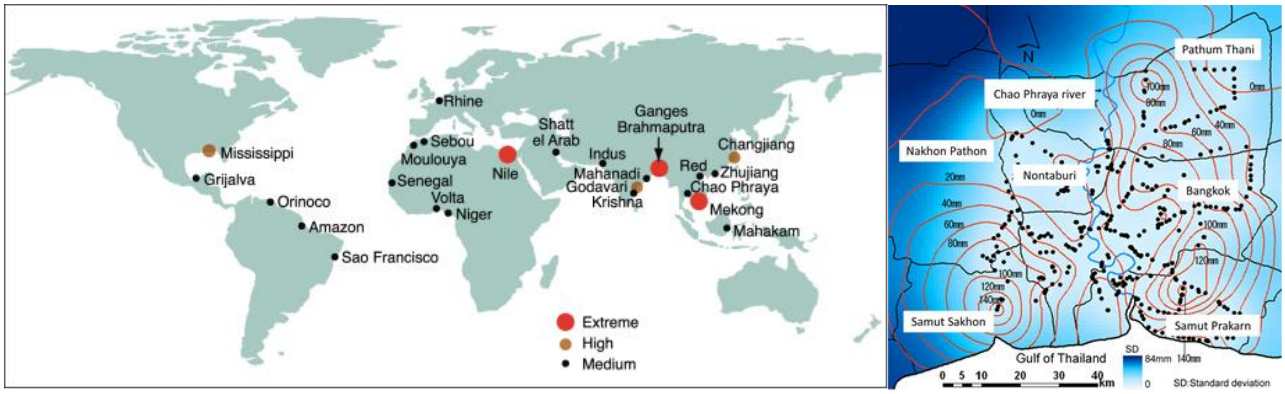
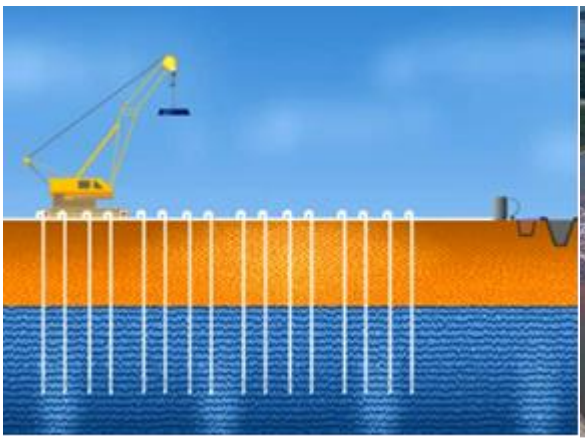
Editors: Prof. Jay Meegoda & Prof. Liming Hu



Inundation Caused by Sea-Level Rise Combined with Land Subsidence
(After Yasuhara, Murakami and Mimura 2015)



Vacuum De-Watering and Dynamic Compaction
(After Liang, Xu and Edil 2015)

Reclamation at Rio de Janeiro State, Brazil
(After Barbosa, Barboza de Oliveira and Marques 2015)

GEOTECHNICAL ENGINEERING

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

Prof. Jay N. Meegoda

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

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

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

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

Prof. Liming Hu

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

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

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

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

GEOTECHNICAL ENGINEERING

L. John Endicott

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

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

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

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

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

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

Burland

Professor Michele Jamiolkowski

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

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

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

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

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

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

Professor Carlo Viggiani

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

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

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

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

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

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

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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Jay N. Meegoda
Liming Hu

ACKNOWLEDGEMENT

The December 2015 Issue of the Journal on problematic soils on problematic and contaminated soils is edited by Prof. Jay Meegoda and Prof. Liming Hu. They did an excellent job within a sort time and also forwarded all the completed documents well in time for the Journal Production team under the Leadership of DR. Ooi at IEM , Malaysia.

There are 15 papers in this Issue and a Feature story by Dr. John Endicott on Challenges in going underground in transportation and other utilities.

The guest editors have adequately covered the important aspects of the papers: First six papers are on contaminated soils or groundwater and their remediation. Next two papers are on electro-osmosis drainage. Next three are on ground improvement. Last four are on interesting or emerging topics such as education, impact of rise in sea level, numerical analysis and theoretical analysis. It is rewarding to note the authors of the papers cover all continents. It is a clear indication of the International nature of the Journal.

There were numerous Guest editors from 2011 to 2015; each and every one of them brought innovation and scholarly contribution both in research and practice. The journal continues to have page lengths suitable for the authors to comprehensively present their contributions. As a cost cutting measure the hard copy of the journal is only produced after all the soft copies are produced and this is a bound volume made available to all in the middle of the subsequent year. The soft copies are released spot on time in March, June, September and December each year. All articles are reviewed by more than two reviewers; Prof. Jay Meegoda and Prof. Liming Hu used an excellent set of reviewers.

The Issues in 2016 are devoted to AGSSEA country contributions and will be released by Taiwan Geotechnical society editors in March 2016, followed by the editors in Singapore, Hong Kong and Malaysia for the June, September and December Issues respectively. This will be followed by the Anniversary Issues in 2017. It is anticipated that the journal will also have a higher level of standard from the 51st year of the formation of SEAGS in 1967.

It is a genuine pleasure to have the excellent contributions in this December 2015 Issue and to record our vote of thanks to the Guest Editors Prof. Jay Meegoda and Prof. Liming Hu, the authors of the articles, the reviewers and all those who have contributed to the success in this Issues as well as the previous such Issues from 2011. It is important to thank Prof. San Shyan Lin for his varied contribution to SEAGS-AGSSEA in addition to his duties in the editorial team as a most valued member

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

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

GEOTECHNICAL ENGINEERING

DECEMBER 2015: SPECIAL ISSUE ON PROBLEMATIC SOILS INCLUDING CONTAMINATED SOILS

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

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