Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 47 No.1 March 2016 ISSN 0046-5828

ENGINEERING

Journal of the

SOUTHEAST ASIAN GEOTECHNICAL SOCIETY

&

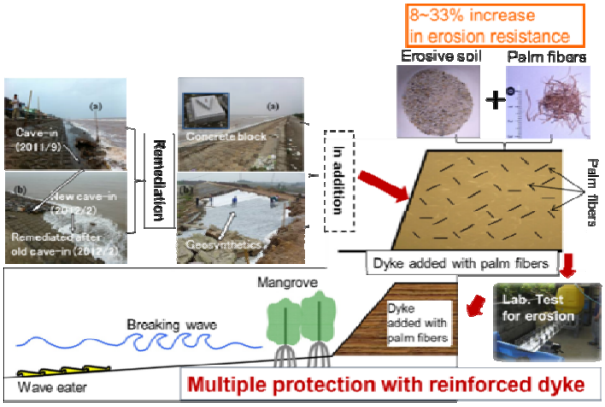
ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

AGSSEA

Sponsored by

ASIAN INSTITUTE OF TECHNOLOGY (AIT)

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

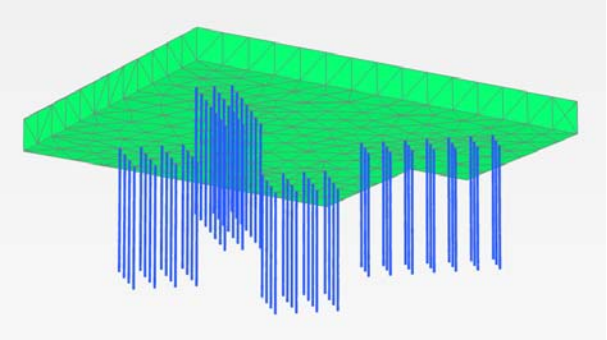


Multiple protective measures used in coastal areas

(After Yasuhara *et al.*, 2016)

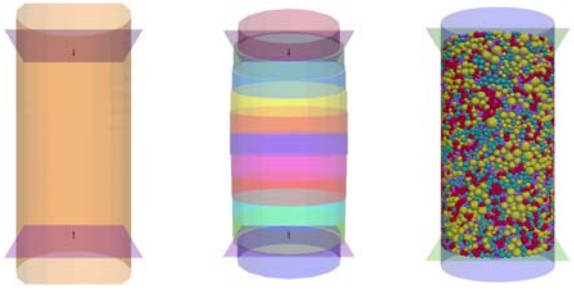
Example of erosional scene of river bank in the Mekong Delta

(After Yasuhara *et al.*, 2016)



Plaxis 3D piled raft foundation model

(After Phung Duc Long, 2016)



Geometry of DEM models

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

GEOTECHNICAL ENGINEERING

Published by the:
SOUTHEAST ASIAN GEOTECHNICAL SOCIETY &
ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

EDITOR-IN-CHIEF

A.S. Balasubramaniam (Team)
San Shyan Lin (Taiwan)
Eng Choon Leong (Singapore)
Suched Likitlersuang (Thailand)
Jian Hua Yin (Hong Kong)
S R Kim (Korea)
Akira Murakami (Japan)

EDITORS

Teik Aun Ooi
Erwin Yan Nam Oh
Noppadol Phienwej

CO-EDITORS

Der Wen Chang
D.T.Bergado
Jian Chu
Darius Wanatowski

EDITORIAL ADVISERS

A.S. BALASUBRAMANIAM, *Australia*
E.W. BRAND, *U.K.*
WEN HUI TING, *Malaysia*
KWET YEW YONG, Singapore
CHUNG TIEN CHIN, *Taiwan*
DENNES T. BERGADO, Philippines
ZA-CHIEH MOH, *Taiwan*
CHIN-DER OU, *Taiwan*
JOHN CHIEN-CHUNG LI, *Taiwan*
H.G. POULOS, *Australia*
PEDRO SECO E PINTO, Portugal

SEAGS EXECUTIVE COMMITTEE MEMBERS (2013 – 2016)

DR. TEIK AUN OOI	President
DR. NOPPADOL PHIENWEJ	Hon. Secretary General
DR. ZA-CHIEH MOH	Founding President
DR. CHUNG TIEN CHIN	Immediate Past President
PROF. KWET YEW YONG	Past President
DR. JOHN CHIEN-CHUNG LI	Past President
DR WEN HUI TING	Past President

SEAGS GENERAL COMMITTEE 2013 - 2016

DR. TEIK AUN OOI *(President)*
DR. NOPPADOL PHIENWEJ *(Hon. Secretary General)*
DR. ZA-CHIEH MOH *(Founding President)*
DR. CHUNG TIEN CHIN *(Immediate Past President)*
PROF. KWET YEW YONG *(Past President)*
DR. JOHN CHIEN-CHUNG LI *(Past President)*
DR. WEN HUI TING *(Past President)*
PROF. A.S. BALASUBRAMANIAM*(Past President)*
DR. CHIN DER OU *(Past President)*
PROF. JIAN CHU
IR. YEW WENG YEE
IR. KENNY K.S. YEE
IR. THIEN SENG YEE
PROF. DER-WEN CHANG
PROF. HUNG-JIUN LIAO
DR. SOKTAY LIM
PROF. MEEI-LING LIN
PROF. DENNES T. BERGADO
PROF. T. LIANG

Geotechnical Engineering is the official journal of the Southeast Asian Geotechnical Society and the Association of Geotechnical Societies in Southeast Asia. It is published four times a year in March, June, September and December and is free to members of the Society. The annual subscription rate for non-members is US$50 to individuals and US$100 to libraries and companies. Back issues are available. Cheques or money orders should be made payable to the Asian Institute of Technology. Membership application forms and other details can be obtained from:

The Secretariat, SEAGS
Room 211, AIT Library
Asian Institute of Technology
P.O. Box 4, Klong Luang
Pathumthani 12120, Thailand
Website: hiip://www.seags.ait.ac.th

Ir. Kenny Yee
Hon. Secretary General
Association of Geotechnical Societies in Southeast Asia
E-mail: kenny.yeeks@gmail.com
Website: http://www.agssea.org

GEOTECHNICAL ENGINEERING

AGSSEA COUNCIL SESSION 2013 - 2016

Chairman		Prof. Kwet-Yew YONG
Hon. Secretary-General		Ir. Kenny YEE
Hon. Treasurer		Prof. Charles Wang-Wai NG
Immediate Past Chairman		Dr. Teik-Aun OOI
Hon. Founder Chairman		Dr. Za-Chieh MOH
Council Members	Southeast Asian Geotechnical Society (SEAGS)	Dr. Noppadol PHIENWEJ - Vacant -
	Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE)	Dr. PHUNG Duc Long Mr. MAI Trieu Quang
	Hong Kong Geotechnical Engineering Society (HKGES)	Ir Rupert LEUNG Dr Johnny CHEUK
	Geotechnical Society of Singapore (GeoSS)	Dr. Tiong Guan NG Prof. Chun-Fai LEUNG
	Thai Geotechnical Society (TGS)	Prof. Suttisak SORALUMP Dr. Apiniti JOTISANKASA
	Chinese Taipei Geotechnical Society (CTGS)	Prof. Chang-Yu OU Prof. Yung-Show FANG
	Indonesian Society for Geotechnical Engineering (HATTI)	Prof. Masyhur IRSYAM Dr. Pinto Tua SIMATUPANG
	Malaysian Geotechnical Society (MGS)	Dr. Sin-Fatt CHAN Ir. Shaw Shong Liew
Nominated Co-opted Members		Dr. Wen-Hui TING Prof. Jian CHU Prof. Hung-Jiun LIAO Prof. TRINH Minh Thu
Advisors		Prof. A S BALASUBRAMANIAM Dr. John Chien-Chung LI Prof. Dennes T. BERGADO Ir. Raymond CHAN Dr. Jack PAPPIN Dr. Chung-Tien CHIN

Ir. Kenny Yee

Hon. Secretary General

Association of Geotechnical Societies in Southeast Asia

E-mail: ***kenny.yeeks@gmail.com***

IEM Training Centre Sdn. Bhd.

No. 33-1A, Jalan SS 52/18

P.O. Box 224 (Jalan Sultan)

46200 Petaling Jaya, SelangorDarul Ehsan, MALAYSIA

Tel: (60) 03 7958 6851

Fax: (60) 03 79582851

E-mail: ***iemtrainingcentre@gmail.com***

GEOTECHNICAL ENGINEERING

EDITORIAL PANEL

Prof. D.T. Bergado
Asian Institute of Technology
Bangkok Thailand

Dr. R.P. Brenner
Weinfelden
Switzerland

Prof. D.W. Chang
Tamkang University
Tamsui Taiwan

Prof. Jian Chu
Iowa State University
Iowa U.S.A

Prof. Fuping Gao
Institute of Mechanics
Chinese Academy of Sciences
Beijing China

Dr. Ivan Gratchev
Griffith University Gold Coast Campus
Gold Coast Queensland Australia

Dr. Wei-Dong Guo
University of Wollongong
Wollongong
Australia

Dr. Abuel-Naga Hossam
The University of Manchester
Manchester U.K.

Prof. Dong-Sheng Jeng
Griffith University Gold Coast Campus
Gold Coast
Queensland Australia

Prof. A (Malek) Bouazza
Monash University
Melbourne Australia

Prof. Jin-Chun Chai
Saga University
Saga, Japan

Prof. Y.K. Chow
National University of Singapore, NUS
Singapore

Prof. Roger Frank
Université Paris-Est
École des Ponts ParisTech
Laboratoire Navier-geotechnical team
(CERMES)
Marne-la-Vallée cedex 2 France

Prof. Christophe Gaudin
University of Western Australia
Perth Australia

Prof. Jürgen Grabe
Karlsruhe University
Germany

Prof. Jie Han
The University of Kansas
Lawrence, Kansas
USA

Prof. B. Indraratna
University of Wollongong
Wollongong Australia

Dr. Apiniti Jotisankasa
Department of Civil Engineering
Kasetsart University
Bangkok Thailand

Prof. C. H. Juang
Clemson University
U.S.A.

Dr. Eng Choon Leong
Nanyang Technological University
Singapore

Prof. Robert Liang
Akron University
U.S.A.

Prof. San-Shyan Lin
Taiwan Ocean University
Keelung Taiwan

Prof. Tatsunori Matsumoto
Kanazawa University
Kakuma-machi, Kanazawa Japan

Prof. Fusao Oka
Kyoto University, Kyoto Japan

Prof. Charles W. W. Ng
The Hong Kong University of Science and Technology
Kowloon Hong Kong

Dr. T.A. Ooi
The Institution of Engineers, Malaysia
Kuala Lumpur Malaysia

Prof. C.Y. Ou
National Taiwan University of Science and Technology
Taipei, Taiwan

Prof. Anand J. Puppala
The University of Texas at Arlington
Texas U.S.A

Professor Paulus P. Rahardjo
Parahyangan Catholic University
Indonesia

Prof. Poul V. Lade
The Catholic University of America
Washington, D.C., U.S.A.

Prof. Chun-Fai Leung
National University of Singapore
Singapore

Prof. Meei-Ling Lin
Department of Civil Engineering
National Taiwan University
Taipei, Taiwan

Mr. Tom Lunne
Norwegian Geotechnical Institute
Oslo, Norway

Prof. Akira Murakami
Kyoto University
Kyoto Japan

Dr. Farrokh Nadim
Technical Director
Norwegian Geotechnical Institute (NGI)
Oslo, Norway

Dr. Erwin Oh
Griffith University Gold Coast Campus
Gold Coast
Queensland Australia

Prof. Zhen-Yu Yin
Tongji University
China

Dr. N. Phienwej
Asian Institute of Technology
Bangkok Thailand

Prof. Harianto Rahardjo
Nanyang Technology University
Singapore

Dr. Shinji Sassa
Port and AirportResearch Institute
Nagase Yokosuka Japan

Prof. Helmut F. Schweiger
Graz University of Technology
Graz
Austria

Prof. D. N. Singh
Indian Institute of Technology Bombay
Powai, Mumbai, India

Prof. Ikuo Towhata
Univesity of Tokyo
Tokyo Japan

Dr. Dariusz Wanatowski
The University of Nottingham
Ningbo
China

Dr. Albert T. Yeung
University of Hong Kong (HKU)
Hong Kong

Prof. Shui-Long Shen
Shanghai Jiao Tong University
Shanghai China

Prof. Mitsutaka Sugimoto
Nagaoka University of Technology
Nagaoka Japan

Prof. B.V.S. Viswanadham
Indian Institute of Technology Bombay
Powai, Maharashtra, India

Prof. Li-zhong Wang
Zhejiang University
China

Prof. Jian-Hua Yin
The Hong Kong Polytechnic
University
Hong Kong

GEOTECHNICAL ENGINEERING

GUEST EDITORS

Prof. Jie Han (March 2011)

Prof. Tatsunori Matsumoto (June 2011)

Prof. Der-Wen Chang

Prof. Chang Yu Ou (September 2011)

Dr. Dariusz Wanatowski (December 2011)

Prof. Charles W W Ng (March 2012)

Dr. Apiniti Jotisankasa

Prof. Ikuo Towhata (June 2012)

Prof. Der-Wen Chang

Dr. Ivan Gratchev

Prof. Abdelmalek Bouazza (September 2012)

Tom Lunne (December 2012)

Prof. Don de Groot

Prof. Der-Wen Chang (March 2013)

Dariusz Wanatowski

Prof Akira Murakami (June 2013)

Dariusz Wanatowski

Prof. Fusao Oka (September, 2013)

Prof. Helmut F. Schweiger

Prof. Muhunthan Balasingham

Prof Jinchun Chai (December, 2013)

Prof Shuilong Shen

Prof Buddhima Indraratna (March, 2014)

A/Prof Cholachat Rujikiatkamjorn

Prof Tatsunori Matsumoto (June, 2014)

Prof Jurgen Grabe

Prof Der Wen Chang

B.V.S. Viswanadham (September, 2014)

Hanh Quang Le

Ooi Teik Aun

Shinji Sassa (December, 2014)

Poul V. Lade,

Li-zhong Wang,

Y.K. Chow,

Dong Sheng Jeng,

Christophe Gaudin,

Fuping Gao

Suched Likitlersuang (March 2015)

Suksun Horpibulsuk

Suttisak Soralump

Tirawat Boonyatee

Suchatvee Suwansawat

Thanakorn Chompoorat

San-Shyan Lin (June 2015)

Charng Hsein Juang

Robert Liang

Zhen-Yu Yin (September 2015)

Jian-Hua Yin

Prof. Jay Meegoda (December 2015)

Prof. Limin Hu

Dr. Phung Duc Long (March 2016)

Prof. San-Shyan Lin

PAST EDITORS

Dr. E.W. Brand (1970 – 1973)

Dr. E.W. Brand, Prof. A.S. Balasubramaniam (1974 – 1976)

Dr. E.W. Brand, Dr. V.K. Campbell (1977 – 1978)

Dr. V.K. Campbell (1978 – 1980)

Mr. J.S. Younger (1980 – 1985)

Mr. D.R. Greenway (1986 – 1987)

Mr. P.G.D. Whiteside (1988 – 1989)

Mr. C.A.M. Franks (1990 – 1995)

Prof. D.T. Bergado (1996 – 2001)

Dr. N. Phienwej (2002 -2010)

GEOTECHNICAL ENGINEERING

PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Phung Duc Long

ACKNOWLEDGEMENT

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

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

K. Y. Yong

N . Phienwej

T. A. Ooi

A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

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

Dr. Phung Duc Long

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

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

Prof. San-Shyan Lin

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

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

Geotechnical Engineering Journal of the SEAGS & AGSSEA Vol. 47 No.1 March 2016 ISSN 0046-5828

GEOTECHNICAL ENGINEERING

March 2016: VIETNAM SPECIAL ISSUE

Editors: Dr. Phung Duc Long & San Shyan Lin

TABLE OF CONTENTS

List of Papers **Page**

1: Prediction of Piled Raft Foundation Settlement – A Case Study 01-06
By Phung Duc Long
***Please click here to download paper*

2: Geotechnical Adaptation to the Vietnamese Coastal and Riverine Erosion in the Context of Climate Change 07-14
By K. Yasuhara, M. Tamura, Trinh Cong Van and Do Minh Duc
***Please click here to download paper*

3: Bidirectional Tests on Two Shaft-Grouted Barrette Piles in Mekong Delta, Vietnam 15-25
By H. M. Nguyen, B. H. Fellenius, A. J. Puppala, P. Aravind, and Q. T. Tran
***Please click here to download paper*

4: Soil Characterization and Land Subsidence Prediction for the First MRT Line in HCM City 26-31
By Pham Huy Giao and Ta Thi Thoang
***Please click here to download paper*

5: Soft Ground Improvement by Deep Cement-Mixing Technique in Southern Vietnam 32-38
By Dinesh Raj Shiwakoti and Ryuji Manai
***Please click here to download paper*

6: Over Consolidation Feature of Clayey Soils in Southern Vietnam According to Piezocone 39-44
By Bui Truong Son, Le Hong Quang, Lam Ngoc Qui
***Please click here to download paper*

7: Ground Improvement Using Soil-Cement Method: A Case Study with Laboratory Testing and 45-49
In-Situ Verification for a Highway Project in Southern Vietnam
By Phan To Anh Vu
***Please click here to download paper*

8: Wide Storage Tanks on Piled Foundations 50-61
By Bengt H. Fellenius and Mauricio Ochoa
***Please click here to download paper*

9: Discrete Modelling of Excavation in Fractured Rock by NSCD Method 62-68
By Tran Thi Thu Hang and Frederic Dubois
***Please click here to download paper*

10: A Method for Estimating Pile Group Settlement Considering Distribution of Pile Shaft Friction (SDF) – Application for Pile Groups in Vietnam 69-78
By Duong Diep Thuy, Pham Quang Hung, and Le Thiet Trung
***Please click here to download paper

11: Mechanical behaviour of Hai Duong Medium Sand in Triaxial Test and its DEM Simulations 79-86
By Nguyen Quang Tuan and Heinz Konietzky
***Please click here to download paper

12: Influence of Geometrical Parameters of Soil-Cement Columns on the Average Settlement of Embankment on Reinforced Soft Soil – Numerical Analysis 87-91
By Tran The Truyen, Nguyen Van Hung, and Tran N. Hoa
***Please click here to download paper

13: Evaluation of Performance of Diaphragm Walls by Wall Deflection Paths for Deep Excavations in Central Ha Noi 92-99
By Benson Hsiung, Dao Sy Dan, and William Cheang
***Please click here to download paper

14: Effect of Vacuum Pressure Distribution on Settlement Analysis Results for an Improved Thick Soft Clay Deposit at Sai Gon-Hiep Phuoc Terminal Port, South of Vietnam 100-105
By Hoang Hiep and Pham Huy Giao
***Please click here to download paper

15: Characteristic of Unsaturated Soil of Earth Fill Dams in Vietnam 106-117
By Nguyen Thi Ngoc Huong and Trinh Minh Thu
***Please click here to download paper

16: Settlement management for urban tunnels: an example from France 118-125
By Alain Guilloux and Hervé Le Bissonnais
***Please click here to download paper

Cover Photographs:

1. Multiple protective measures used in coastal areas (After Yasuhara et al. June 2016)
2. Example of erosional scene of river bank in the Mekong Delta (After Yasuhara et al. June 2016)
3. Plaxis 3D piled raft foundation model (After Phung Duc Long June 2016)
4. Geometry of DEM models (After N.Q. Tuan and H. Konietzky June 2016)

GEOTECHNICAL ENGINEERING

Paper Contribution, Technical notes and Discussions

SEAGS & AGSSEA encourage the submission of scholarly and practice-oriented articles to its journal. The journal is published quarterly. Both sponsors of the journal, the Southeast Asian Geotechnical Society and the Association of Geotechnical Societies in Southeast Asia, promote the ideals and goals of the International Society of Soil Mechanics and Geotechhnical Engineering in fostering communications, developing insights and enabling the advancement of the geotechnical engineering discipline. Thus the publishing ethics followed is similar to other leading geotechnical journals.Standard ethical behaviour of the authors, the editor and his editorial panel, the reviewers and the publishers is followed.

Before you submit an article, please review the guidelines stated herein for the manuscript preparation and submission procedures. Paper template is available upon request.

Geotechnical Engineering Journal accepts submissions via electronic. The manuscript file (text, tables and figures) in both words and pdf format together with the submission letter should be submitted to the Secretariat and copied to the Editor-in-Chief, 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: seags@ait.ac.th. Papers under review, accepted for publication or published elsewhere are not accepted. The guidelines for author are as follows:-

1. The manuscript including abstract of not more than 150 words and references must be typed in Times New Roman 9 on one side of A4 paper with a margin of 25 mm on each side. The abstract should be written clearly stating the purpose, scope of work and procedure adopted together with the major findings including a summary of the conclusions.
2. The paper title must not exceed 70 characters including spaces.
3. The maximum length of papers in the print format of the Journal is 12 two-column pages in single-spaced in Times New Roman 9 including figures and tables. A Journal page contains approximately 1,040 words. Authors can approximate manuscript length by counting the number of words on a typical manuscript page and multiplying that by the number of total pages (except for tables and figures). Add word-equivalents for figures and tables by estimating the portion of the journal page each will occupy when reduced to fit on a 160 mm x 240 mm journal page. A figure reduced to one-quarter of a page would be 260 word-equivalents. When reduced, the figure must be legible and its type size no smaller than 6 point font (after reduction).
4. Figures: Line art should be submitted in black ink or laser printed; halftones and color should be original glossy art. Figures should be submitted at final width i.e. 90 mm for one column and 185 mm for two columns. The font of the legends should be in Times New Roman and should use capital letters for the first letter of the first word only and use lower case for the rest of the words. Background screening and grids are not acceptable.
5. Each table must be typed on one side of a single sheet of paper.
6. All mathematics must be typewritten and special symbols identified. Letter symbols should be defined when they first appear.
7. The paper must have an introduction and end with a set of conclusions.
8. Practical applications should be included, if appropriate.
9. If experimental data and/or relations fitted to measurements are presented, the uncertainty of the results must be stated. The uncertainty must include both systematic (bias) errors and imprecisions.
10. Authors need not be Society members. Each author’s full name, Society membership grade (if applicable), present title and affiliation and complete mailing address must appear as a footnote at the bottom of the first page of the paper.

11. Journal papers submitted are subject to peer review before acceptance for publication.
12. Each author must use SI (International System) units and units acceptable in SI. Other units may be given in parentheses or in an appendix.
13. Maximum of five keywords should be given.

14. REFERENCES

American Petroleum Institute (API) (1993). Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Working Stress Design, API Recommended Practice 2AWSD (RP 2A-WSD), 20th edition, 1993, p191

Earth, J.B., and Geo, W.P. (2011). "Asian Geotechnical amongst Authors of Conference Publications", Proceedings of Int. Conference on Asian Geotechnical, publisher, city, pp 133-137.

Finn WDL and Fujita N. (2002). "Piles in liquefiable soils: seismic analysis and design issues," Soil Dynamics and Earthquake Engineering, 22, Issues 9-12, pp731-742

15. Discussions on a published paper shall be made in the same format and submitted within six months of its appearance and closing discussion will be published within twelve months.

For additional information, please write to:

The Secretariat, SEAGS
Room 211, AIT Library
Asian Institute of Technology
P.O. Box 4, Klong Luang
Pathumthani 12120, THAILAND
Email: seags@ait.ac.th
Website: http://www.seags.ait.ac.th

Ir. Kenny Yee
Hon. Secretary General
Association of Geotechnical Societies in Southeast Asia
E-mail: kenny.yeeks@gmail.com
Website: http://www.agssea.org

IEM Training Centre Sdn. Bhd.
No. 33-1A, Jalan SS 52/18
P.O. Box 224 (Jalan Sultan)
46200 Petaling Jaya, SelangorDarul Ehsan, MALAYSIA
Tel: (60) 03 7958 6851
Fax: (60) 03 79582851
E-mail: iemtrainingcentre@gmail.com
Website: http://www.iemtc.com