

UNIVERSITY OF MACAU
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT of
CIVIL AND ENVIRONMENTAL ENGINEERING

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**" Behaviours and related three-
dimensional modelling of deep excavation,
tunneling and embedded track slab base in
soft ground "**

by

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Venue: E11 – 3033

Abstract

In the first part of the presentation, behaviours of deep excavations in loose to medium dense sand and Jakarta clay which have not been explored before were examined and discussed and three- dimensional modelling of excavations were conducted associated with observational data to define certain key soil properties, such as soil stiffness at various stress and strain level. Also by three- dimensional modelling, plane strain ratio (PSR) chart which could assist to transfer displacements induced under plane strain condition to the one under three- dimensional condition was developed. Factors affecting PSR, such as distance from the corner, geometry of the excavation and ground conditions were reviewed. Further, data about deformations caused by tunneling in loose to medium dense sand was collected and studied and it was found that the ground displacement is mainly caused by gap at shield tail and no consolidation settlement is seen. Through three- dimensional modelling, vertical displacements in both transverse and longitudinal directions were simulated successfully. Influences from operation parameters, such as face and backfill grouting pressure were evaluated and stress status and strain level during various construction stages were discussed too. The importance of nonlinearity and small strain characteristic of soils could be confirmed by these analyses also. Finally, in terms of sustainable development, a recycle material, air- cooled furnace slags (ACFS) is used to replace granular materials as base of a special embedded track slab in soft ground. A series of lab/field tests and numerical analyses were thus delivered to validate properties and performance of ACFS base.

Biography



Dr. Bin- Chen Benson Hsiung is from Taiwan and completed his 1st degree in Taiwan, Master degree in University of Illinois, Urbana- Champaign, United

States in 1996. After Dr. Hsiung graduated from US, he came back to Taiwan and then joined an engineering consulting firm there as a geotechnical engineer for approximately 1 year before he went to University of Bristol to study for his PhD. Dr. Hsiung got his PhD at the end of 2001 and then moved to work for an international consulting firm, Maunsell (now AECOM) for several large- scale infrastructure projects in both UK and Taiwan, such as HS1, Heathrow T5 and Taiwan High Speed Rail. Dr. Hsiung came back to Taiwan and joined Department of Civil Engineering, National Kaohsiung of Applied Sciences (re-named as “National Kaohsiung University of Science and Technology” after 1st of February, 2018) as a full- time academic staff in August 2003. Dr Hsiung is a well- qualified British chartered civil engineer and also country representative in Taiwan of Institution of Civil Engineering. He was promoted to be associate professor in the university since 2010. From 2011 to 2015, Dr. Hsiung was on leave for his replacement work in industry for 4 years, mainly involved in promotion and operation of overseas projects, such as Jakarta MRT in Indonesia also tenders for MRTs in other South and Southeast Asia countries. Dr. Hsiung’s main research interests are deep excavation, TBM tunneling, soil- structure interaction analysis and geotechnical monitoring etc.. Outside the university, Dr. Hsiung currently takes several posts, such as the secretary of Asian Technical Committee 6 “Urban GeoEngineering” under ISSMGE, secretary of Chinese Taipei (Taiwan) Geotechnical Society and deputy secretary of conference committee of 16th Asian Regional Conference of ISSMGE which will be held in Taipei, Taiwan on October 2019. Up to now he has published approximately 50 international journal and conference papers and supervised more than 30 PhD & MSc students in total.

ALL ARE WELCOME!