Malaysian Geotechnical Society

PRE-AGM Webinar talk on
DATA-CENTRIC DESIGN, CONSTRUCTION AND MANAGEMENT FOR SHIELD TUNNELS
Organised by Youth Wing of MGS (YMGS)

29th June 2022 (Wednesday), 3.00 pm – 5.00 pm
BEM Approved CPD Hours: Applying   Ref. No.: TBC
Qualified for 2 PDUs by PEB

SPEAKER'S PROFILE

REGISTER

Prof. Dongming Zhang is a full professor in Department of Geotechnical Engineering at Tongji University. His interests are focused on the risk and reliability of geo-structural systems, underground infrastructure performance resilience, and machine learning for geo-infrastructure data. Prof. Zhang is the recipient of many awards, notably the National Science Foundation for Excellent Young Scholars (2020), National Key Research and Development Program Chief Scientist (Youth) (2021), and one of 35 Shanghai Young Scientist under 35 Years old (2021). He is presently serving on the committee member and secretary of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee (TC309) Machine Learning and the secretary-general of the International Joint Research Center for Resilient Infrastructure. He is also the associate editor of *Natural Hazards Review- ASCE Journal*, editorial board member of ASCE-ASME J Risk and Uncert. Eng. Syst. Part A: Civil Eng. And Part B: Mech. Eng. He was invited to be the 2020 ISSMGE Bright Spark Lecture speaker.

SYNOPSIS

Shield tunnels are widely used in metro, railway, highway, municipal, hydropower, and other fields. However, the training of experienced practical engineers or shield tunnel drivers is much slower than the development of shield tunnels. Due to the soil uncertainty and information asymmetry, the share experience is challenging and low efficiency. On the other hand, there is a vast amount of data during the site investigation, construction, and maintenance of shield tunnels. How to use the data to help the tunnel design, intelligent shield tunnelling, and rapidly inspect lining defects? Data-centric method provides the possibility to solve the above problems. This study aims to present the data-centric method assisted in the shield tunnel design, construction, and operation. Firstly, a regional multivariate database for soft soils is established, based on which an optimization design methodology for tunnel lining design is proposed. Then, a CNN-based model is constructed for muck soil types identification, which could help achieve automatic control of shield tunnel constructions. Next, a machine learning based posture prediction model is given, which can be adopted to control Shield posture. Finally, a deep learning-based defect recognition algorithm for segmental tunnel linings is developed, showing high efficiency and robustness.

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Ir. Dr. Choo Chung Siung
Chairman
Youth Wing of Malaysian Geotechnical Society

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