



香港岩土及岩土環境工程專業協會
ASSOCIATION OF GEOTECHNICAL &
GEOENVIRONMENTAL SPECIALISTS (HONG KONG)

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ANNOUNCEMENT

AGS (HK) Technical Seminar

Data-driven Sequential Development of Geological Cross-sections Along Tunnel Trajectory

by

Ir. Dr Yu WANG

(Professor, The Hong Kong University of Science and Technology)

&

Ir. Dr Chao SHI

(Assistant Professor, Nanyang Technological University, Singapore)

Date: Thursday, 24 April 2025

Time: 18:30 – 19:30 (Hong Kong Time)

Venue: The webinar will be conducted through Zoom.

Successful applicants will be informed by emails with a Zoom's link to the webinar. Participants should arrange for their own device with a stable network environment to join the webinar.

Enquiry: agshk.org@gmail.com

Fee: Free of charge

Registration: <https://www.ags-hk.org/event-details/data-driven-sequential-development-of-geological-cross-sections-along-tunnel-trajectory>

Please register by 18:30 on 24 April 2025. Successful applicants will receive webinar details after registration. CPD certificate will be sent to the attendees, who attended more than 80% of the webinar time, within 2 weeks after the webinar.

Book Prize: Professionals under 35 years of age are encouraged to submit a Book Prize Report (max. 500 words) on webinars and site visits arranged by AGS (HK).

Contributors to successful Book Prize Reports will be awarded a Book Prize that comprises of a book "Geology of Site Investigation Boreholes in Hong Kong" written by Chris Fletcher, and a coupon of HK\$500 for Eslite Spectrum (誠品生活) or equivalent. The successful Book Prize Report will also be published on the AGS (HK) website to showcase your accomplishment.

Prior to report submission, please refer to the "The AGS Book Prize Reports – Assessment Framework"* on the AGS (HK) website. You may submit your Book Prize Report to our assessors by uploading the report file through the AGS (HK) website at <https://www.ags-hk.org/book-prize>. Should you have any questions, please contact us at agshk@meinhardt.com.hk.

*Link to the AGS Book Prize Reports – Assessment Framework:
https://www.ags-hk.org/files/ugd/521a4c_b94496034732484687441cf4ed4d0b9.pdf



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Synopsis:

Forecasting geological cross-section ahead of tunnel face is an essential ingredient for tunnel design and construction. Geological analysis and drilling have been the most traditional approach for predicting tunnel ahead geological conditions. However, this practice is often subjective, and geological information retrieved from previous tunnel excavation in the same project has not been used quantitatively. Therefore, a data-driven framework is developed to sequentially develop geological cross-section along planned tunnel trajectory conditioning on site-specific data and prior geological knowledge. The proposed framework dynamically and continuously incorporates geological information revealed from tunnel excavation as additional site-specific data, which provide first-hand direct geological information from the immediate past tunnel sections and can actually serve as the most relevant prior geological knowledge for forward prediction. All the prior geological knowledge is compiled as a site-specific training image database. When the actual geological cross-sections are revealed from tunnel excavation, the training image database is also updated for the next loop of tunnel ahead geological prediction. The proposed method is illustrated using data obtained from a real tunnelling project in Australia. Results indicate that the proposed method continuously provides accurate prediction of geological cross-section along planned tunnel trajectory with quantified stratigraphic uncertainty.

About the Speaker:

Dr Yu Wang is a professor of geotechnical engineering at the Hong Kong University of Science and Technology (HKUST). He was a professor at City University of Hong Kong before he moved to HKUST in late 2024. He is a Registered Professional Engineer (Civil) in Hong Kong and an elected Fellow of American Society of Civil Engineers (ASCE). His recent research efforts have focused on machine learning in geotechnical and geological engineering, geotechnical site characterization, geotechnical uncertainty, reliability and risk, geo-hazards (e.g., landslides and earthquakes), and geothermal energy. His research has earned several prestigious international/national awards, including the 2023 *Thomas A. Middlebrooks Award* from ASCE (with Dr Chao SHI), the 2022 *R.M. Quigley Award* (Honourable Mention) from Canadian Geotechnical Society (with Dr Chao SHI), the 2020 Best Paper Award from the *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, the 2020 Higher Education Outstanding Scientific Research Output Awards (the First-class Natural Science Award) from the Ministry of Education, China, the First-class Natural Science Award from the Hubei Provincial Government in 2017, the Highly Cited Research Award from the international journal of *Engineering Geology* in 2017, and the GEOSNet Young Researcher Award from the Geotechnical Safety Network (GEOSNet) in 2015. He has authored/co-authored over 180 journal papers and two books in English. He served as president of ASCE Hong Kong Section in 2012-2013 and serves in editorial boards of several top journals in geotechnical engineering or risk and uncertainty analysis (e.g., Associate Editor for the *ASCE Journal of Geotechnical and Geoenvironmental Engineering*).



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Dr. Chao SHI is an Assistant Professor in geotechnical engineering at Nanyang Technological University, Singapore. He obtained his PhD from City University of Hong Kong in 2022. He is a chartered geotechnical engineer in both the UK and mainland China, with five years' industry experience in internationally leading consultancy and contractor company in Hong Kong. His research focuses on developing efficient machine learning algorithms to bridge the gap between sparse data and probabilistic underground digital twins. He has received significant recognition from both the industry and academia in the USA, Canada, and the UK, including Thomas A. Middlebrooks Award (2023) from ASCE, R.M. Quigley Award (2022) from Canadian Geotechnical Society, and Early Career Award (2023) from Institution of Civil Engineers, UK.

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