

THE UNIVERSITY



OF HONG KONG

DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

ADVANCES IN THE PREDICTION AND CONTROL OF GROUND DEFORMATIONS

Prof. Andrew Whittle

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Date: June 10, 2019 (Monday)

Time: 5:00 p.m. - 6:00 p.m.

Venue: Room 6-12B, Haking Wong Building, The University of Hong Kong

ABSTRACT

This lecture will compare recent experience in the application of advanced constitutive models in the prediction and control of ground movements in four distinct classes of problem: 1) Urban excavation where we have demonstrated control of ground deformations through integration of modeling and measurements for an 18m deep floating excavation support system for the Courthouse Station in Boston. 2) Mechanized tunneling where simplified analytical methods can be used. For Crossrail tunnels (London) in stiff clay, we show that ground deformations at a greenfield site can be well described by a set of three cavity deformation parameters, and are then able to predict structural response for these same parameters. 3) We have investigated the effectiveness of pre-fabricated vertical drains as a non-intrusive method for mitigating the damage to pile-supported wharf structures, for a typical structure at the port of Oakland. These analyses require models that can handle the complex soil response (liquefaction), pile-soil interactions, with coupled flow and deformations. 4) Geotechnical predictions of long-term settlements are needed for large fills on deep clay layers such as those associated with offshore airports such as Kansai in Japan. We have developed a novel constitutive model to improve predictions. This MIT-SR model can represent diverse observations of primary consolidation for clay layers of different thicknesses, providing a unifying framework that can resolve the long-standing paradox of coupled consolidation and creep behavior (Hypotheses A and B).

ABOUT THE SPEAKER

Prof Whittle is the Edmund K. Turner Professor of Civil and Environmental Engineering at MIT. His research deals with the development of constitutive models for soil behavior and their application in predicting the performance of foundations and underground construction projects. He has also carried out extensive research on wireless sensor networks for monitoring underground infrastructure notably in the detection and localization of leaks in water pipe networks. He served as Chief Scientific Advisor for a successful start-up company, Visenti Pte., now a Xylem Brand company. He has served on review panels for hurricane protection systems in New Orleans (NRC), and the 'stem-to-stern' safety of the Big Dig tunnels in Boston, and was a Director for the Massachusetts Department of Transportation (2009-2015).

Prof Whittle is a Co-Editor of the International Journal of Numerical and Analytical Methods in Geomechanics (since 1999). He has published more than 200 papers in refereed journals and conferences, and received several awards for his work from the American Society of Civil Engineers, including the Casagrande Award (1994), the Croes Medal (1994), Middlebrooks Prize (1997, 2002, and 2005) and Huber Research Award (1998). He is a licensed professional engineer in New York State. In 2010 he was elected to the National Academy of Engineering.

- ALL ARE WELCOME -