

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

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**" Macro- and Micro-mechanical Modeling of Cyclic
Liquefaction in Sands "**

by

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Venue: E11 - 1043

Abstract

Understanding the fundamental mechanism of soil liquefaction is one of the major challenges in geotechnical earthquake engineering and soil dynamics. In this talk, I present numerical modeling of soil liquefaction from both macroscopic and micromechanical perspectives. First, a bounding-surface hypoplasticity model is developed to capture the macroscopic behaviors of sands during various phases of undrained cyclic loading. The model utilized a new modulus formulation to improve the simulation of cyclic mobility and post liquefaction behaviors of both loose and dense sands. Second, micromechanical perspectives of the liquefaction process are investigated using the Discrete Element simulation. It is observed that during various stages of undrained cyclic loading, the soil exhibits definitive change in the load-bearing structure and particle-void distribution in the granular packing. The micromechanical structures are found to have strong correlation with cyclic mobility and post-liquefaction deformation of granular soils. Therefore, understanding the evolution of microstructure in granular soils can provide significant insights into constitutive modeling of soil liquefaction.

Biography

Dr. Wang is Associate Professor in the Department of Civil and Environmental Engineering at the Hong Kong University of Science and Technology (HKUST). He received B. Eng. and M. Eng. from Tsinghua University in 1997 and 2000, Ph.D. from the University of California, Berkeley in 2005. Dr. Wang's research areas focus on geotechnical earthquake engineering, soil dynamics and computational modeling. His research interests include ground motion characterization, selection and simulation for earthquake engineering analyses, nonlinear numerical analysis of dynamic soil-structure interaction, development of advanced numerical models for soil liquefaction. He authored or edited two books, published more than 30 papers in international journals. Dr. Wang is presently President of American Society of Civil Engineers – Hong Kong Section, Secretary of TC210 of International Society for Soil Mechanics and Geotechnical Engineering, and Secretary of Hong Kong Society of Theoretical and Applied Mechanics. He was awarded Li Foundation Heritage Prize in 2010 for his outstanding research contributions in earthquake engineering and geo-hazard mitigation.

ALL ARE WELCOME!