香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

土木及環境工程學系
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

SEMINAR

ENGINEERING HAZARD-RESILIENT INFRASTRUCTURE THROUGH PHYSICS-BASED SIMULATION AND MACHINE LEARNING



Speaker

Prof. XIE Yazhou

Associate Professor, McGill University, Canada

Abstract

This seminar presents recent research advances from the Hazard Mitigation & Infrastructure Resilience (HMIR) Lab at McGill. The topics covered include aftershock hazard evolution, regional seismic risk assessment, and machine learning applications in natural hazards engineering. First, using the Cascadia Subduction Zone megathrust earthquake as a case study, aftershock hazards are simulated to explicitly account for the temporal dependence and stochastic nature of mainshock–aftershock sequences. A Markov chain model is further employed to characterize the evolution of structural damage under successive aftershocks. Second, leveraging second-generation component-level seismic fragility models for California bridges, a refined framework is established to estimate component-level repair costs and functional recovery. The framework is utilized for high-resolution seismic loss assessment of the Los Angeles bridge network. The presentation further showcases recent developments in statistical and deep learning surrogate models for innovative applications in earthquake and multi-hazards engineering. Collectively, these advances enhance modelling fidelity, resolution, computational efficiency, and uncertainty quantification towards next-generation assessment and design of multi-hazard resilient infrastructure.atastrophic flow-like landslides such as debris flows, debris avalanches, and impact-loading-triggered landslides still pose severe challenges for mitigation. Based on insightful field evidence, recent numerical approaches now allow for estimating the overall cascading process, responsible for both the mobilised volume and velocity to increase tremendously. A system based on flexible net barriers can be a solution, but also artificially rooted soils can work within the scope. What is still missing for reliable design, durability assessment, and standard procedures to apply in practice? The seminar will provide recent enhancements, still posing open questions.

Biography

Dr. Yazhou (Tim) Xie is an Associate Professor and William Dawson Scholar in the Department of Civil Engineering at McGill University. He directs the HMIR Lab at McGill. Xie received his B.Eng. and M.Sc. degrees from Tongji University, followed by a Ph.D. from the University of California, Los Angeles (UCLA). He then worked as a Postdoctoral Research Associate at Rice University. Dr. Xie's research focuses on seismic resilience, multi-hazard risk, and the innovative application of AI. He has published more than 70 papers in leading journals and has led over 20 competitively funded research projects. Dr. Xie has received several honors and awards, including the 2017 UCLA Dissertation Year Fellowship Award and the 2023 Engineering Class of 1944 Teaching Award. Xie currently serves as an Associate Editor for ASCE OPEN: Multidisciplinary Journal of Civil Engineering and Earthquake Spectra. Xie is also a member of the technical committee for CSA S6:30, Canadian Highway Bridge Design Code.



19 November 2026

Thursday

3pm- 4pm

Room 3584A (Lift 27/28), Civil Engineering Academic Building, HKUST

Enquiry:

Ms. Sandy Wong

cesandy@ust.hk