



DEPARTMENT OF CIVIL ENGINEERING
GRAND CHALLENGES SEMINAR

Jointly organized by Department of Civil Engineering, HKU & ASCE Greater China Section

**Recent Advances in Generative AI for Engineering Design:
Advancing Algorithms, Expanding Applications, and Integrating Workflows**

Professor Xinzheng LU
Tsinghua University

Date: August 27, 2026 (Thursday)
Time: 11:00 a.m. – 12:00 noon (Hong Kong time)
Zoom: <https://hku.zoom.us/jc/94638290131>
Meeting number: 946 3829 0131
Password: 785154

Co-host
organization:



美國土木工程師學會
大中華分會



Abstract

Generative AI is rapidly reshaping engineering design by moving from isolated data-driven generation toward integrated systems that combine learning, optimization, mechanics, reasoning, and autonomous execution. This presentation reviews recent advances along three directions: advancing algorithms, expanding applications, and integrating multidisciplinary and agentic workflows. Methodologically, the work evolves from generative adversarial networks, graph neural networks, and diffusion models for design generation to intelligent optimization, knowledge-mechanics integration with surrogate models and differentiable finite-element analysis, and spatial-reasoning multimodal large language models with tokenized representations and reinforcement learning. These methods integrate engineering drawings, design conditions, expert knowledge, code constraints, and structural performance into generation and verification. Applications cover new and existing building structures, dams, photovoltaic supports, bridges, and fire-sprinkler systems. The presentation further extends generative design to integrated architectural-structural design and agentic workflows. Case studies show that AI-generated solutions can approach expert designs while reducing design time, improving code compliance and structural performance, and supporting real-world engineering applications.

About the Speaker

Prof. Xinzheng Lu got his BS and Ph.D. degrees from Tsinghua University of China. Now he is a full professor and the Head of the Institute of Disaster Prevention and Mitigation of the Department of Civil Engineering at Tsinghua University. He also serves as Editor of Earthquake Engineering & Structural Dynamics, among other academic appointments. Prof. Lu's major research interests cover intelligent design of civil engineering, and disaster prevention and mitigation. He has published more than 200 international journal papers and eight books, and his publications have received over 20,000 citations. He has been listed as one of the "most cited Chinese researchers from 2014-2025" by Elsevier. His research outcomes have been adopted by Chinese and international design codes, major disaster simulation systems, and structural calculation software, and have been applied to many landmark projects. He delivered multiple keynote presentations at significant international conferences, including the 18th World Conference on Earthquake Engineering. He has received several important awards, including the Second Class National Natural Science Award, the First-Class Science and Technology Progress Award of Beijing (first contributor), the First-Class Natural Science Award of Ministry of Education of China (first contributor), the Distinguished Professor of the Chang Jiang Scholars Program, the XPLOER PRIZE of the Tencent Foundation, Gold Award with congratulations of the jury of International Exhibition of Inventions of Geneva (first contributor), and the J. M. Ko Award.

- ALL ARE WELCOME -