Keynote Speaker Bio

Xinzheng Lu

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Prof. Xinzheng Lu is a Professor and the Head of the Institute of Disaster Prevention and Mitigation at Tsinghua University. His major research interests cover disaster prevention and mitigation and the intelligent design of civil engineering. He has published over 200 papers and 8 books, and his publications have received over 20000 citations. He has been listed as one of the "most cited Chinese researchers" by Elsevier (2014-2023). 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 numerous landmark projects. He delivered keynote presentations at significant international conferences, including the 18th World Conference on Earthquake Engineering. He has received several important awards, including the National Natural Science Award (Second Prize), the First-Class Science and Technology Progress Award of Beijing, the "Gold+" Award at the Geneva International Exhibition of Inventions, and the JM Ko Award.

Keynote Title:

Generative AI-Driven Structural and Safety Design across Multiple-Domain Engineering

Generative AI-driven structural and safety design is a crucial element of smart construction. Traditional human-centric methods are often inefficient and overly dependent on individual expertise, frequently falling short of engineering requirements. Targeting the intelligent design demand of multiple-domain engineering (e.g., buildings, MEPs, and infrastructures), this study presents a high-quality, efficient design method driven by generative AI. Based on generative AI models such as diffusion models, generative adversarial networks, and graph neural networks, an intelligent design algorithm is proposed based on "data-knowledge-mechanics" fusion learning. This method effectively addresses the challenges of limited training data and quality inconsistency while ensuring compliance, safety, and cost-efficiency. Case studies involving building structural design, fire sprinkler design, and rock-filled dam design demonstrate that AI-generated design outcomes achieve expert-level quality, meeting design code requirements with significantly improved efficiency (approximately 10 times faster than traditional workflows). This research advances intelligent construction by creating a self-evolving framework integrating domain knowledge with data-driven learning.

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