Special Session Title:

ML-Enabled Conceptual Structural Design

Organisers

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Abstract

This special session focuses on advancing the integration of artificial intelligence (AI) and machine learning (ML) into conceptual structural design, with the goal of fostering innovation at the intersection of computational intelligence and structural creativity. It brings together researchers, designers, and engineers who are exploring novel AI/ML methods to support early-stage design processes. Topics include accelerating forward and inverse form-finding and topology exploration workflows, as well as techniques for incorporating structural knowledge and physical constraints.

The session will spotlight developments such as equilibrium-aware design with ML, physics-informed learning, deep geometric reasoning, and generative approaches that enhance design exploration and performance. Emphasis will be placed on emerging methods that enable collaboration between humans and machines, promote explainability, and support the creation of intelligent and intuitive design tools.

Topics of interest include, but are not limited to:

- ML for Form-Finding and Topology Optimisation
- Geometric Deep Learning in Structural Design
- Generative AI for Innovative Structural Systems
- Reinforcement Learning and Decision-Making in Structural Exploration
- AI-Enhanced Structural Visualisation and Design Feedback
- Large Language Models and Hybrid Intelligence in Conceptual Design