



ARTISTE2025

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Special Session Title:

Innovative AI approaches in Structural Optimization, Design and Control

Organizers

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Abstract

During the last decades, advancements in Artificial Intelligence (AI), supported by high-performance computing, have revolutionized problem-solving paradigms in structural engineering. Moving beyond conventional optimization frameworks, AI-driven methodologies now enable algorithmic form-finding, generative design exploration, and autonomous control systems, redefining how engineers synthesize structural performance with architectural innovation.

The Special Session "Innovative AI Approaches in Structural Optimization, Design, and Control" seeks to highlight the potential of AI in structural engineering. By integrating cutting-edge computational techniques, AI-driven methodologies enhance multi-objective decision-making, refine form-finding processes and pioneer adaptive designs that balance resilience, costs and sustainability. Contributions will address how AI contribute to explore non-intuitive design solutions, reduce computational costs and bridges gaps between structural mechanics and architectural creativity.

The session invites interdisciplinary contributions from researchers and practitioners to explore emerging computational frontiers. Through interdisciplinary collaboration, the goal is to explore how AI can shape the future of the built environment, paving the way for more intelligent, efficient, and sustainable structural solutions.

Contents of interest include, but are not limited to, the following topics:

- Multi-objective optimization in structural engineering
- AI-driven form-finding techniques
- Structural identification and monitoring
- Risk analysis, vulnerability, and resilience assessment
- Shape-resistant structures and optimized design
- Topology optimization and innovative materials
- Surrogate models for structural optimization
- Automation in construction and adaptive design
- Real-time control and AI-enhanced decision-making frameworks



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