

MACHINE LEARNING FOR COMPUTATIONAL MECHANICS: INNOVATIONS AND APPLICATIONS

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ABSTRACT

The rapid advancement of machine learning (ML) and artificial intelligence (AI) has opened new frontiers in computational mechanics, enabling unprecedented capabilities in modeling, simulation, and optimization of complex mechanical systems. This symposium aims to bring together leading experts, researchers, and practitioners at the intersection of machine learning and mechanics to discuss recent breakthroughs, innovative methodologies, and future directions. Topics of interest include, but are not limited to:

- Integration of machine learning with traditional finite element, finite volume, and boundary element methods
- Data-driven modeling and simulation for mechanics, including surrogate modeling and reduced-order models
- Applications of deep learning in predicting mechanical behavior and material properties
- Reinforcement learning and optimization for mechanical system design and control
- Uncertainty quantification, interpretability, and validation of machine learning models in mechanics
- Machine learning for multi-scale and multi-physics simulations
- High-performance computing and scalable machine learning approaches for large-scale mechanical simulations
- Case studies and practical applications of AI/ML in various fields such as aerospace, automotive, biomechanics, and civil engineering.

The symposium encourages contributions from diverse fields to foster interdisciplinary collaboration and provide a comprehensive view of how machine learning is transforming computational mechanics.