

COMPUTATIONAL MECHANICS, SIMULATION, AND OPTIMAL DESIGN

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ABSTRACT

Computational mechanics, numerical simulation, and optimal design have become indispensable technologies in modern engineering, providing the scientific and computational foundation for digital engineering and next-generation digital twins. Advances in computational methodologies have significantly expanded the capability to analyze, predict, and optimize the behavior of complex engineering systems, enabling more efficient, reliable, and sustainable design and manufacturing processes. This mini-symposium aims to provide a broad forum for researchers and engineers working on advanced computational methods and their applications across various engineering disciplines.

The scope of this mini-symposium includes, but is not limited to, computational mechanics, numerical simulation, topology optimization, shape and multidisciplinary optimization, multiphysics analysis, additive manufacturing, computational modeling, reduced-order modeling, inverse analysis, uncertainty quantification, data-driven and AI-assisted computational engineering, machine learning for engineering design, high-performance computing, and digital engineering technologies. Contributions addressing theoretical developments, novel numerical methods, computational algorithms, software frameworks, and practical engineering or industrial applications are all welcome.

Particular emphasis is placed on computational technologies that support engineering analysis, design optimization, manufacturing, and decision-making, as well as methodologies that enable or contribute to the development of digital twins. By bringing

together researchers from computational mechanics, computational engineering, optimization, manufacturing, and related fields, this mini-symposium seeks to promote interdisciplinary discussions, encourage collaboration between academia and industry, and stimulate the development of innovative computational technologies for future engineering systems.