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ADVANCES AND APPLICATIONS OF PARTICLE AND MESHFREE METHODS IN CONTINUUM MECHANICS

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ABSTRACT

Particle and meshfree methods have established themselves as robust computational frameworks for capturing large deformations and complex topological changes in continuum mechanics. However, ensuring high-order consistency and numerical stability remains a fundamental challenge. This minisymposium provides a multidisciplinary forum for discussing novel formulations, high-fidelity numerical schemes, and their practical implementations. We focus on the development of advanced spatial discretization, high-order time integration, and efficient algorithms for incompressible and multi-phase systems. Key topics of interest include consistent boundary treatments, particle shifting techniques, multi-resolution and adaptive resolution schemes, and multi-physics coupling such as fluid-structure interaction. While emphasizing fundamental methodological advancements, we strongly encourage contributions addressing industrial applications and rigorous validation, highlighting the potential of next-generation particle methods in solving demanding engineering challenges.