

HONORING PROF. ROGER OHAYON FOR HIS LIFELONG CONTRIBUTIONS TO COUPLED PROBLEMS

PARTITIONED METHODS FOR COUPLED PROBLEMS: INTERFACE DYNAMICS, STABILITY, AND EMERGING TECHNIQUES

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ABSTRACT

This mini-symposium focuses on recent advances in partitioned approaches for the analysis of coupled dynamical systems, with particular emphasis on interface dynamics and stability in strongly coupled problems. Partitioned methods have become a key enabler for the simulation of multiphysics systems, allowing the reuse of specialized solvers and promoting modular, flexible computational frameworks. However, ensuring robustness, accuracy, and efficiency across interfaces remains a central challenge, especially in transient and nonlinear regimes.

Recent developments in coupling algorithms, interface treatments, and hybrid numerical strategies have significantly improved the stability and convergence properties of partitioned schemes. At the same time, emerging approaches such as data-driven modeling, reduced-order techniques, and uncertainty quantification, are opening new possibilities for scalable and predictive simulations.

This mini-symposium aims to bring together contributions addressing both foundational and applied aspects of partitioned methods, with a particular focus on - advanced interface coupling strategies and domain decomposition methods - stability, accuracy, and energy conservation in transient coupled problems - non-matching discretizations and evolving interface techniques - and contact, impact, and nonlinear interface phenomena.

The session also welcomes contributions integrating modern methodologies, including reduced-order modeling, machine learning, and multidisciplinary design optimization, within partitioned frameworks.

Applications of interest include fluid-structure interaction, thermo-mechanical and electro-mechanical systems, and multiphysics problems in solid mechanics, such as smart materials and adaptive structures. Industrial applications and production-level implementations are particularly encouraged.