8th ECCOMAS Young Investigators Conference - YIC2025
September 17-19, Pescara, Italy

ADVANCES IN NUMERICAL METHODS FOR MULTI-PHYSICS PROBLEMS WITH APPLICATION TO SUSTAINABLE DEVELOPMENT

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Key words: multi-physics problems, multi-scale problems, sustainability, biomedicine, geophysics.

ABSTRACT

Multi-physics problems, in which interacting physical processes are modeled simultaneously, are a strategic element for understanding and addressing complex real-world challenges in sustainable development. Notable fields of application include biomedicine and geophysics, which are inherently coupled and multiscale, posing unique challenges and opportunities for advancing numerical methodologies.
In recent years, several advancements in computational techniques, including new-generation numerical methods, high-performance computing, data assimilation, and machine learning, have significantly enhanced the accuracy and efficiency of solving these complex problems.

This mini-symposium aims to bring together experts and emerging researchers to share innovations, discuss challenges, and explore the potential of numerical methods in addressing critical questions, focusing on problems stemming from computational biomedicine and geophysics applications. The mini-symposium will highlight recent progress in computational methods for tackling coupled-field problems, particularly those spanning multiple lengths and time scales. The objective is to facilitate interdisciplinary collaboration and to bridge the gap between theoretical advancements and practical applications.

Participants are invited to submit abstracts addressing any of the topics listed but are not limited to:

- Innovative Numerical methods for coupled multi-physics differential systems.
- Adaptive mesh refinement and multiscale modeling techniques.
- High-performance computing for large-scale simulations.
- Data assimilation techniques and their integration with numerical models.
- Novel numerical schemes that offer new paradigms for resolving temporal and/or spatial length scales.
- Reduced order modeling techniques for multi-physics processes.
- Novel verification and validation frameworks for coupled-scale and/or coupled-field analyses integrated with experimental data.