

RECENT ADVANCES IN FINITE ELEMENT METHODS FOR COUPLED PROBLEMS IN CFD

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ABSTRACT

The coupling of partial differential equations arises in many multi-physics applications related to incompressible fluid dynamics, including fluid-structure interaction, multiphase flows, magnetohydrodynamics, thermally driven flows, and geophysical flows. These problems often involve nonlinear interactions among physical processes and disparate spatial and temporal scales, creating significant challenges for the design of accurate, stable, conservative, and efficient numerical methods. This invited session will bring together researchers developing and analysing modern finite element methods for such systems, including continuous, discontinuous, hybridized, stabilized, adaptive, and high-order approaches. The talks will address theoretical, numerical, and computational aspects of these methods, with an emphasis on robustness, accuracy, scalability, and their application to physically relevant coupled flow problems.