9th International Conference on Coupled Problems in Science and Engineering (COUPLED 2021)
13-16 June 2021, Chia Laguna, Sardinia, Italy

SOLUTION OF COUPLED PROBLEMS WITH EMBEDDED DISCRETIZATION TECHNIQUES

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Key Words: Embedded FEM, Coupled Problems.

Embedded finite element methods such as CutFEM [1], AgFEM [2] and the Finite Cell Method [3] are specially attractive techniques for the numerical solution of coupled problems on complex geometries. This includes multi-phase and multi-physics applications with moving interfaces (e.g., fracture mechanics, fluid-structure interaction, or free surface flows), applications with varying domain topologies (e.g., shape or topology optimization, or 3D printing simulations), or in large-scale parallel computations, where generating and partitioning large unstructured meshes is particularly difficult. The successful application of these techniques to challenging problems requires to address a number of well known issues, including numerical integration on cut elements, imposition of boundary conditions, and stability of the resulting discrete operators, which motivates current research efforts in the embedded FEM community. In this invited session, we would like to gather some of the latest outcomes of this research including new theoretical results, discretization methods, algorithmic strategies, software implementations, and challenging scientific and engineering applications.

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