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CURRENT TRENDS AND ADVANCES IN ENRICHED FINITE ELEMENT METHODS AND COUPLED SIMULATIONS

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MINISYMPOSIUM

Iterative coupling algorithms and Enriched Finite Element Methods (*e*-FEMs) such as Generalized/eXtended FEM are two distinct but related methods that are often used to solve multiscale, fracture, moving interfaces, and other challenging problems in mechanics. *e*-FEMs have received increased attention and undergone substantial development during the last two decades. Recent focus has been placed on improving the method's conditioning, and in the development of Interface- and Discontinuity-Enriched FEMs as alternative procedures for analyzing weak and strong discontinuities. The question of conditioning, robustness, and performance are common issues of *e*-FEMs and iterative coupling algorithms.

As these methods get more and more mature, a common challenge concerns their implementation in available software which is often difficult and time-consuming and, therefore, expensive. One strategy to address this issue is to non-intrusively couple commercial and research software and thus provide the end-user with simulation and modeling capabilities not available in any single software.

This mini-symposium aims to bring together engineers, mathematicians, computer scientists, and national laboratory and industrial researchers to discuss and exchange ideas on new developments, applications, and progresses in coupling algorithms and Enriched FEMs. While contributions to all aspects of these methods and their implementation are invited, topics of particular interest include:

- verification and validation; accuracy, computational efficiency, convergence, and stability of *e*-FEMs and coupling algorithms.
- new developments for immerse boundary or fictitious domain problems, flow and fluid-structure interaction, among others.
- applications to industrial problems exhibiting multiscale phenomena, localized non-linearities such as fracture or damage, and non-linear material behavior.
- acceleration techniques for coupling algorithms.
- coupling algorithms for multi-physics and time-dependent problems.