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ADVANCES IN DAMAGE & FRACTURE MODELING OF MULTIPHYSICS MATERIALS

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MINISYMPOSIUM

Many industrial applications have led to the need for the analysis of material failure in challenging multiphysics scenarios such as hydrodynamic, thermal, chemical, or electric material stimulation. Such scenarios are observed in many natural solids and engineered products. This mini-symposium aims to provide a platform to discuss the recent advancements in computational fracture modeling within multiphysics loading conditions. The topics of interest include, but are not limited to the following:

· Novel discretization techniques, e.g. phase-field and regularized damage models, extended/generalized finite element methods, cohesive zone methods, meshless and particle methods, peridynamics.
· Constitutive and phenomenological modeling of fracture initiation and propagation, with multiphysics considerations
· Mixed finite element formulations and stabilization techniques
· Spatial and temporal multiscale techniques to represent various physical processes across scales
· Computational homogenization and reduced order modeling
· Numerical solution algorithms aimed to reduce the computational cost of non-linear multiphysics problems, including: staggered solution methods, and iterative methods
· Data-driven approaches to constitutive and multiphysics modeling
· Machine-learning powered models for efficient and accurate multiphysics and nonlinear mechanics modeling
· Case studies focused on applications areas: fluid-structure interaction, hydraulic fracture, thermo-plasticity, electro- and chemo- mechanical couplings, corrosion and other environmental factors, rupture of soft materials.