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PHASE-FIELD MODELS FOR CRACKING IN COMPLEX MATERIALS

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ABSTRACT

Phase-field modeling has emerged as a promising approach to crack initiation and propagation in brittle and ductile materials. It is very attractive due to several facts: The phase-field approach avoids discontinuous displacements at cracks and the numerical difficulties associated therewith. This allows a straightforward implementation into numerical discretization techniques such as the finite element method. Moreover, the phase-field approach can be extended to cracking in composites, biological tissues and inelastic materials. Extension of the phase-field models to cracking in complex materials exhibiting multi-physics phenomena coupled to mechanics is an active field of research. Chemo-mechanically induced cracks in Li-ion batteries, dissolution-precipitation type cracking in rocks, diffusion-mechanics coupling, cracking in electro-active polymers, and electromechanical breakdown in solid dielectrics are a few examples to mention.

This mini-symposium focuses on, but is not necessarily restricted to the following areas:

- Phase-field approaches to failure in anisotropic continua like composites and biological tissues
- Phase-field approaches to cracking in complex materials exhibiting multiphysical phenomena such as electro-mechanical, magneto-mechanical, thermo-mechanical and chemo-mechanical coupling
- Mesh adaptivity and parallelization for large-scale computations
- Crack initiation criteria in the phase-field modeling for brittle and ductile materials

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