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ADVANCED HOMOGENIZATION APPROACHES FOR MODELING DAMAGE AND FAILURE IN SOLIDS

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ABSTRACT

This minisymposium concentrates on the development of advanced homogenization approaches for the modeling of failure in solids and exploits conventional as well as non-conventional numerical techniques for the description and prediction of microstructural damage and fracture mechanisms at various length scales.

The following topics serve exemplarily as guideline for potential contributions:

- Advanced homogenization approaches linking microstructural failure mechanisms to macroscopic material properties.
- Novel discretization techniques to model damage and failure in solids, including advances in cohesive, embedded, and extended finite element formulations as well as damage or phase field models.
- Meshfree and particle methods, atomistic simulations, or density functional theory methods applied to model microstructure instabilities at failure.
- New methods addressing crack propagation and shear band evolution in e.g. discrete failure simulations.
- Applications in brittle and ductile failure as well as dynamic fracture, fatigue, durability, or reliability of solids.
- Modeling failure and self-healing mechanisms in biological and engineering materials with electric, magnetic, or chemical coupling.