Title:

Nonlinearities and irreversible processes in solids: computational multi-scale and multi-field approaches

Organizers:

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Abstract:

Crystal plasticity is an inherent multiscale process that ranges in length scale from the In order to predict and design the material behavior of microstructured and multi-scale solid materials, modeling and simulation approaches of mechanisms on various scales have to be taken into account. The interaction of nano-, micro- and mesostructures with non-linear constitutive properties and complex deformation mechanisms is a permanent challenge for theoretical and numerical scale-bridging schemes. This minisymposium is dedicated to discuss recent advances in multi-scale and multi-field homogenization techniques of nonlinear and inelastic deformation processes of solids. These challenges can be approached by theoretical, numerical and hybrid approaches. This can be complemented by adaptive switching between the concurrent techniques. The topics addressed in this section will include, but are not limited to: multi-scale modeling of heterogeneous materials, methods for coupled multi-field modeling, modeling of defects and failure processes, homogenization and model order reduction techniques, data-driven techniques, image-based homogenization, multi-parametric problems including topology and morphology optimization.