Computational Methods for Generalized Continua

Richard Regueiro, University of Colorado at Boulder
Krishna Garikipati, University of Michigan, Ann Arbor
Carlo Sansour, University of Nottingham
Paul Steinmann, Technical University of Kaiserslautern

Generalized continuum theories include micromorphic, micropolar, strain-gradient elasticity, plasticity, and damage theories, to name a few. These developments attempt to account for in a continuum framework deformation/flow of underlying microstructure at small length scales. These developments are suited for applications at the mesoscale as well as in a hierarchical multiscale modeling framework. In view of the inherent complexity of generalized continuum models in comparison to classical continuum models, standard computational implementation tools are usually inadequate.

We invite submissions related, but not limited, to the following topics:

- Continuum and computational frameworks for generalized continua and their physical interpretation.
- Multiscale aspects of generalized continuum materials modeling.
- Fracture and defect mechanics, e.g. based on concepts of configurational mechanics.
- Computational treatment of rotational and/or other additional degrees of freedom.
- Inelastic formulations for generalized continua and their numerical treatment.
- Computational methods for higher gradient formulations and their relation to Cosserat and micromorphic continua.
- Smooth interpolations for higher gradients.
- Duality and complementarity in generalized continua.
- Dislocation dynamics and generalized crystal plasticity modelling.
- Generalized continua for particulate materials.