Isogeometric phase-field modeling of ductile fracture at finite strains

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ABSTRACT

Phase-field modeling of fracture in elastic and elasto-plastic solids is a modern promising framework that enables a unified description of complicated failure processes (including crack initiation, propagation, branching, merging), as well as its efficient numerical treatment, see [1] and references therein for elastic and [2-4] for elasto-plastic solids.
In this work, we implement a recently developed phase-field model for ductile fracture in elasto-plastic solids at finite strains within the isogeometric framework, using both Galerkin and collocation [5] approaches. Comparisons are presented between isogeometric and conventional Lagrange discretizations, as well as between Galerkin and collocation formulations. The approach is capable to predict the interaction between plasticity, fracture and large deformations, which is relevant for modeling of forming processes.

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