
State of the art of the Lip-field approach

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Abstract

The Lip-field approach is a regularization method for softening material models. It was applied to damage and softening (visco)-plasticity models both in 1D and 2D scenarios. The incremental potential used in the Lip-field approach is the nonregularized one. The regularization comes from the addition of a Lipschitz constraint on the damage field (or adequate (visco)-plastic quantities). In other words, the free energy does not depend on the damage gradient. The search of the displacement and damage fields from one time-step to the next is based on an iterative staggered scheme. The displacement field is sought for a given damage field. Then, a Lipschitz continuous damage field is sought for a given displacement field. Both problems are convex. The solution to the latter benefits from bounds proven in (1). The implementation of the Lipschitz regularity constraint on a finite element mesh and details of the overall solution scheme will be presented. Numerical examples will demonstrate the capability of the approach (2).

(1) Nicolas Moes, Nicolas Chevaugeron. Lipschitz regularization for softening material models: the Lip-field approach. *Comptes Rendus. Mécanique*, 2021, 349 (2), pp.415-434. [⟨10.5802/crmeca.91⟩](#). [⟨hal-03806305⟩](#)

(2) Nicolas Chevaugeron, Nicolas Moes. Lipschitz regularization for fracture: The Lip-field approach. *Computer Methods in Applied Mechanics and Engineering*, 2022, 402, pp.115644. [⟨10.1016/j.cma.2022.115644⟩](#). [⟨hal-03927211⟩](#)

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