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Summary: We study a model for the rate-independent evolution of cohesive zone delamination in a visco-elastic solid, also exposed to dynamics effects. The main feature of this model, inspired by M. Ortiz and A. Pandolfi [Int. J. Numer. Methods Eng. 44, No. 9, 1267–1282 (1999; Zbl 0932.74067)], is that the surface energy related to the crack opening depends on the history of the crack separation between the two sides of the crack path, and allows for different responses upon loading and unloading.


MSC:
35Q74 PDEs in connection with mechanics of deformable solids
35A15 Variational methods applied to PDEs
74H20 Existence of solutions of dynamical problems in solid mechanics
74C10 Small-strain, rate-dependent theories of plasticity (including theories of viscoplasticity)
49J53 Set-valued and variational analysis
49J45 Methods involving semicontinuity and convergence; relaxation
74C05 Small-strain, rate-independent theories of plasticity (including rigid-plastic and elasto-plastic materials)

Keywords:
cohesive zone delamination; weak formulation; rate-independent processes; semistable energetic solutions; non-smooth constraint; gradient systems; dynamics; irreversibility

Full Text: DOI

References:
[48] R. Scala, A weak formulation for a rate-independent delamination evolution with inertial and viscosity effects subjected to unilateral constraint. WIAS-Preprint 2172., (2172)

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