Bouchitté, Guy; **Mielke, Alexander**; **Roubíček, Tomáš**
A complete-damage problem at small strains. (English) Zbl 1238.74005
Z. Angew. Math. Phys. 60, No. 2, 205-236 (2009).

Summary: Damage of a linearly-responding material that can completely disintegrate is addressed at small strains. Using time-varying Dirichlet boundary conditions, we set up a rate-independent evolution problem in multidimensional situations. The stored energy involves the gradient of the damage variable. This variable as well as stress and energies are shown to be well-defined even under complete damage, in contrast to displacement and strain. Existence of an energetic solution is proved, in particular, by a detailed investigation of the Γ-limit of the stored energy and its dependence on boundary conditions. Eventually, the theory is illustrated on a one-dimensional example.

MSC:

74A45	Theories of fracture and damage
74R20	Anelastic fracture and damage
74C05	Small-strain, rate-independent theories of plasticity (including rigid-plastic and elasto-plastic materials)
74G65	Energy minimization in equilibrium problems in solid mechanics
35Q74	PDEs in connection with mechanics of deformable solids

Keywords:

variational inequality; existence; gamma-convergence; stored energy

Full Text: DOI