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Gilles A. Francfort* (francfor@galilee.univ-paris13.fr), LPMTM, Université Paris-Nord, Avenue J.-B. Clément, 93430 Villetaneuse, France. *A variational approach to quasi-static evolution for a class of dissipative materials.*

Rate independence is a shared feature of many constitutive behaviors for solids, from brittle fracture, to associated elasto-plasticity, damage or phase transformation.

I will discuss why any quasi-static evolution for rate-independent materials can be viewed as a time-indexed sequence of constrained minimization problems and illustrate this in various settings chosen among fracture, phase transformations or damage.

The most natural mathematical approach consists in discretizing time and minimizing the corresponding energy. It then remains to pass to the limit in the time step.

This program is met with success in many cases like fracture or phase transformation. I will briefly indicate the main steps in the simpler case of phase transformation and, time permitting, will evoke the issues related to possible relaxation in the more challenging setting of damage. (Received August 19, 2005)