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**Blaise A Bourdin\***, Dept. of Mathematics, 344, Lockett Hall, Louisiana State University, Baton Rouge, LA 70803. *Numerical implementation of variational brittle fracture.*

The variational formulation of brittle fracture mechanics relies (in its current state) in computing the time evolution of global minimizers of an energy functional.

In terms of numerical implementation, this is a challenge, as the energy functional is non-convex. Existing numerical methods typically rely on a time discretization and on constructing evolutions satisfying first order necessary conditions for optimality at each step separately.

I will present a backtracking algorithm based on satisfying an additional necessary condition for optimality of the entire evolution with respect to time. I will give some elements of analysis and will present large scale numerical two and three dimensional numerical experiments. Time-permitting, I will also present experiments based on extensions of the Francfort-Marigo framework, and highlight some of the issues they raise. (Received September 25, 2006)