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Centro di Simulazione Numerica Avanzata – CeSNA  
Istituto Universitario di Studi Superiori

# Joys and sorrows of FEM with strong discontinuities for the variational approximations of free discontinuity problems

Joint work with Enrico Babilio & Antonio Fortunato

This talk is concerned with the numerical implementation of a variational model for quasi-static brittle fracture. Essentially the analysis is based on the formulation of variational fracture by Francfort and Marigo, the main difference being the fact that we rely on local rather than on global minimization. Propagation of fracture is obtained by minimizing in a step by step process a form of energy that is the sum of bulk and interface terms. Recent attempts of producing numerical codes for variational fracture (see for example the works of Bourdin or Del Piero et al) are based on the approximation of the energy, in the sense of Gamma-convergence, by means of elliptic functionals (e.g. Ambrosio-Tortorelli approximations). We instead adopt discontinuous finite elements and search for the minima of the energy through descent methods.

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**Friday March 25, Aula MS1**  
**Ore: 11.00 – 13.00**  
**Dipartimento di Meccanica Strutturale**  
**Via Ferrata,1 – Pavia**