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Ambrosio-Tortorelli approximation of quasi-static evolution of brittle fractures. (English)

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Calc. Var. Partial Differ. Equ. 22, No. 2, 129-172 (2005).

The author defines a notion of quasi-static evolution for the elliptic approximation of the Mumford-Shah functional proposed by *L. Ambrosio* and *V. M. Tortorelli* [Commun. Pure Appl. Math. 43, No. 8, 999–1036 (1990; Zbl 0722.49020), Boll. Unione Mat. Ital., VII. Ser., B 6, No. 1, 105–123 (1992; Zbl 0776.49029)]. The quasi-static evolution for the Ambrosio-Tortorelli functional is obtained through a discretization in time procedure: each step is performed using a variational argument which gives the minimal properties. The author proves that this regular evolution converges to a quasi-static growth of brittle fractures in linearly elastic bodies in the sense of Francfort-Larsen.

Reviewer: Vasily A. Chernecky (Odessa)

MSC:

- 35B27 Homogenization in context of PDEs; PDEs in media with periodic structure Cited in 49 Documents
- 35R35 Free boundary problems for PDEs
- 74R10 Brittle fracture
- 49J45 Methods involving semicontinuity and convergence; relaxation
- 74G65 Energy minimization in equilibrium problems in solid mechanics

Keywords:

elliptic approximation; Mumford-Shah functional; quasi-static growth of brittle fractures in linearly elastic bodies; Ambrosio-Tortorelli functional

Full Text: DOI arXiv

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