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Christoph Ortner* (christoph.ortner@merton.ox.ac.uk). *Simulation of Brittle Fracture using Phase Field Approximations and AFEM.*

I will describe an adaptive finite element algorithm for the approximation of the Ambrosio–Tortorelli approximation to the Griffith functional. The main idea is that, rather than minimizing the discretized AT-functional, the AT-functional will be minimized in function space and each minimization step is discretized by an adaptive finite element method. The convergence of the algorithm to critical points of the AT-functional can be established rigorously. I will moreover present a generalization of the AT-approximation which can be "tuned" so that the phase field v and the displacement u have more efficient "shapes". For example, it is possible to formulate an AT-approximation where v has compact support which has both numerical and mechanical advantages. (Joint with Siobhan Burke and Endre Süli). (Received March 03, 2009)