

Phase-field dynamic fracture model and discretization

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In this talk we describe a finite element treatment of a variational, time-discrete model for dynamic brittle fracture. We start by providing an overview of existing dynamic fracture model that stems from Griffith's theory and based on the Ambrosio-Tortorelli interface regularization. For the temporal discretization of the wave equation of motion, we consider generalized alpha-time integration algorithm, which is implicit and unconditionally stable. To accommodate the crack irreversibility, we use a primal-dual active set strategy. To resolve the crack-path accurately, we propose a simple, robust, local mesh-refinement criterion. We show that the phase-field based variational approach and adaptive finite elements provides an efficient procedure for simulating the complex crack propagation including crack-branching.