1135-74-3103 **Mallikarjunaiah S Muddamallappa***, 100 Institute Road, Worcester, MA 01545, and **Christopher J Larsen** and **Marcus Sarkis**. *A phase-field description of dynamic brittle fracture model: a single anti-plane shear crack.*

In this talk, we describe an efficient finite element treatment of a variational, time-discrete model for dynamic brittle fracture. We start by providing an overview of an existing dynamic fracture model that stems from Griffith's theory and based on the Ambrosio-Tortorelli crack regularization. We propose an efficient numerical scheme based on the bilinear finite elements. For the temporal discretization of the equations of motion, we use generalized $\alpha-$time integration algorithm, which is implicit and unconditionally stable. To accommodate the crack irreversibility, we use a primal-dual active set strategy, which can be identified as a semi-smooth Newton's method. It is well known that to resolve the crack-path accurately, the mesh near the crack needs to be very fine, so it is common to use adaptive meshes. We propose a simple, robust, local mesh-refinement criterion to reduce the computational cost. We show that the phase-field based variational approach and adaptive finite-elements provides an efficient procedure for simulating the complex crack propagation such as crack-branching. (Received September 26, 2017)