1106-74-491 **S M Mallikarjunaiah*** (mmallikarjuna@math.tamu.edu), Mail Stop 3368 Department of Mathematics, Texas A&M University, College Station, TX 77843, and **Jay R. Walton** (jwalton@math.tamu.edu), Mail Stop 3368 Department of Mathematics, Texas A&M University, College Station, TX 77843. *Numerical Modeling of Plane-Strain Fracture in the Context of a Strain-Limiting Theory of Elasticity.* Preliminary report.

The classical theory of Linearized Elastic Fracture Mechanics (LEFM) suffers two logical inconsistencies in that it predicts an elliptical crack-opening profile and an unbounded crack-tip strain while the theory was predicated upon the assumption of infinitesimal strain. Implicit strain-limiting theories of elasticity offers a novel approach for modeling fracture by limiting strains to a physically realistic level. A subclass of implicit models allows the linearized elastic strain to be a non-linear function of the Cauchy stress. In this work we study the problem of plane-strain fracture in the context of a strain-limiting theory of elasticity. The inverted constitutive relation along with the equilibrium equations give rise to a second order quasi-linear partial differential equation with displacement as the unknown. The mathematical model incorporates the classical fracture boundary conditions. By using a damped Newton's, method we construct a linearized version of the strong form from which the numerical solution was obtained using Adaptive Finite Element Method (AFEM). The results of this numerical study indicate that even very near the (mathematical) crack tip, both stress and strain remain much smaller in magnitude than the corresponding predictions from LEFM. (Received September 08, 2014)