Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Analysis Deformation Dynamics in Solids SETARE SADEQI, SANICHIRO YOSHIDA, Southeastern Louisiana University — This paper describes a Finite Element Analysis (FEA) that we conduct to model a recent field theory of deformation and fracture of solids. This field theory postulates that solids under external load always have local regions where deformation dynamics obeys linear elasticity. Requesting local symmetry in the linear elasticity by introducing a gauge field, the theory derives a set of field equations that describe deformation dynamics for all regimes, i.e., elastic, plastic and fracture regimes. The FEA model solves these field equations under various scenarios. In this presentation, we report our recent FEA in which we simulate deformation of a plate specimen under a tensile load. The right end of the specimen is subject to gradual pull. Simulation results are discussed for several parameters including displacement in the tensile direction, the quantity corresponding to the charge of symmetry, and material's resistive force defined by the field theory. For some of these parameters, simulation results are compared with experiment. Our preliminary results are promising indicating some quantitative agreement with experiment.

Sanichiro Yoshida
Southeastern Louisiana University

Date submitted: 10 Nov 2016 Electronic form version 1.4