Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

A simple model for deformation in solids with universal predictions for stress-strain curves and slip avalanches KARIN DAHMEN, Dept. of Physics, University of Illinois at Urbana Champaign, YEHUDA BEN-ZION, Earth Sciences, University of Southern California, JONATHAN UHL, KARIN DAHMEN COLLABORATION, YEHUDA BEN-ZION COLLABORATION — A basic model for deformation of solids with only one tuning parameter (weakening epsilon) is introduced. The model can reproduce observed stress-strain curves, acoustic emissions and related power spectra, event statistics, and geometrical properties of slip, with a continuous phase transition from brittle to ductile behavior. Exact universal predictions are extracted using mean field theory and renormalization group tools. The results agree with recent experimental observations and simulations of related models for dislocation dynamics, material damage, and earthquake statistics.

Karin Dahmen
dahmen@uiuc.edu

Date submitted: 30 Nov 2008 Electronic form version 1.4