Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Fracture In Disordered Media: Nucleated, Critical or Percolative?[1] ASHIVNI SHEKHAWAT, Cornell University, STEFANO ZAPPERI, CNR - Consiglio Nazionale delle Ricerche, JAMES SETHNA, Cornell University — Fracture is often considered to be an abrupt transition and is modeled by nucleation theory. However, the precursor events leading to macroscopic failure display scaling behavior and are understood in terms of critical phenomena. Further, the universal roughness properties of fracture surfaces have been explained by modeling fracture as a percolative process. We attempt to unify these disparate descriptions of fracture in one comprehensive theory. We study the random fuse network as a typical model of disordered brittle media. We show that in this model fracture can be nucleated, critical or percolative depending on the behavior of the tail of the distribution of fuse strengths. We explore the phase diagram by using numerical simulations as well as theoretical arguments.

[1]This research was supported by DOE-BES DE-FG02-07ER-46393

Ashivni Shekhawat
Cornell University

Date submitted: 11 Nov 2011 Electronic form version 1.4