Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

**Comparison of Mesomechanical and Continuum Granular Flow Models for Ceramics** DONALD CURRAN, SRI International — Constitutive models for the shear strength of ceramics undergoing fracture are needed for modeling long rod and shaped-charge jet penetration events in ceramic armor. The ceramic material ahead of the penetrator has been observed to be finely comminuted material that flows around the nose of the eroding penetrator [Shockey at al, 1990]. The most-used continuum models are of the Drucker-Prager type with an upper cutoff [Walker, 2002], or of the Mohr-Coulomb type with strain rate dependence and strain- softening [Johnson and Holmquist, 1992, 1993, 2002]. A disadvantage of such models is that they have an unclear connection to the actual microscopic processes of granular flow and comminution. An alternate approach is to use mesomechanical models that describe the dynamics of the granular flow, as well as containing a description of the granular comminution and resultant material softening. However, a disadvantage of the mesomechanical models is that they are computationally more burdensome to apply. In the present paper, we compare the behaviors of a mesomechanical model, FRAGBED2 [Curran and Cooper, 2003], with the Walker and Johnson-Holmquist continuum models, where the granular material is subjected to simple strain histories under various confining pressures and strain rates. We conclude that the mesomechanical model can provide valuable input to the continuum models, both in interpretation of the continuum models' parameters, and in suggesting the range of applicability.

Donald Curran
SRI International

Date submitted: 21 Jan 2005 Electronic form version 1.4