Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Mesoscale Analysis of Deformation Wave Structure and Dissipation in Metalized Solid Explosive[1] SUNADA CHAKRAVARTHY, KEITH GONTHIER, Louisiana State University — Impact induced heating of metalized explosive is characterized by high frequency temperature fluctuations occurring in the vicinity of inter-particle contact surfaces due to plastic and friction work. Importantly, these fluctuations, which are difficult to experimentally resolve, are influenced by the material's meso-structure, composition, and porosity. In this study, a Lagrangian finite and discrete element technique is used to computationally examine quasi-steady, piston supported uniaxial deformation waves in granular metal (Al)-explosive (HMX) mixtures based on a plane strain, finite deformation, thermoelastic-viscoplastic, and friction constitutive theory. Emphasis is placed on characterizing how metal mass fraction, particle size distribution, and wave strength affect both the filtered spatial wave structure and the fluctuations in dissipation occurring near Al-Al, HMX-HMX, and Al-HMX particle contact surfaces. The potential relevance to impact sensitivity is discussed.

[1]This work is supported by the AFRL-RWME, Eglin AFB, Florida, and the U.S. Defense Threat Reduction Agency.

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Date submitted: 16 Feb 2011 Electronic form version 1.4