Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

An Extended Pressure Equilibrium Model for Multiphase Flows - Application to Shock-Induced Particle Dispersion THOMAS MCGRATH, JEFFREY ST. CLAIR, NSWC Indian Head, SIVARAMAKRISHNAN BALACHANDAR, University of Florida — Multiphase flows containing a dispersed particle phase interacting with a background continuous phase are important in applications ranging from volcanic eruptions to advanced energetics. Modern multiphase models offer well-posed governing equations that treat each phase as compressible and allow each to retain separate velocities, temperatures, and pressures. Such models have been widely used in the investigation shock propagation over energetic material or porous media. In cases where one phase is much stiffer than the others, such as metal particles immersed in a background fluid, it is common to assume that the stiffer phase is completely incompressible. In this work, we seek a set of model equations that naturally transitions between the limits of fully-compressibility of all phases and near-incompressibility of one phase. An extended pressure equilibrium model that progresses toward this goal is presented. Using a simple assumption of the pressure relaxation path, a modified set of governing equations with the desired transitional properties is attained. The governing equations and mathematical characteristics of the model are discussed and analyzed, and preliminary numerical results are presented.

Thomas McGrath
NSWC Indian Head

Date submitted: 02 Feb 2015 Electronic form version 1.4