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Shock Interaction of Metal Particles in Condensed Explosive Detonation ROBERT RIPLEY, Martec Ltd., FAN ZHANG, Defence RD Canada - Suffield, FUE-SANG LIEN, University of Waterloo — For detonation propagation in a condensed explosive with metal particles, a macro-scale physical model describing the momentum transfer between the explosive and particles has yet to be completely established. Previous 1D and 2D meso-scale modeling studies indicated that significant momentum transfer from the explosive to the particles occurs as the leading shock front crosses the particles, thus influencing the initiation and detonation structure. In this work, 3D meso-scale modeling is conducted to further study the two-phase momentum transfer during the shock diffraction and subsequent detonation in liquid nitromethane containing packed metal particles. Detonation of the condensed explosive is computed using an Arrhenius reaction model and a hybrid EOS model that combines the Mie-Gruneisen equation for reactants and the JWL equation for products. The compressible particles are modeled using the Tait EOS, where the material strength is negligible. The effect of particle packing configuration and inter-particle spacing is shown by parametric studies. Finally, a physical description of the momentum transfer is discussed.

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