Abstract Submitted
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Computational Meso-Scale Study of Representative Unit Cubes for Inert Spheres Subject to Intense Shocks[1] CAMERON STEWART, Department of Mechanical and Aerospace Engineering, UCSD, FADY NAJJAR, LLNL, D. SCOTT STEWART, JOHN BDZIL, UIUC — Modern-engineered high explosive (HE) materials can consist of a matrix of solid, inert particles embedded into an HE charge. When this charge is detonated, intense shock waves are generated. As these intense shocks interact with the inert particles, large deformations occur in the particles while the incident shock diffracts around the particle interface. We will present results from a series of 3-D DNS of an intense shock interacting with unit-cube configurations of inert particles embedded into nitromethane. The LLNL multi-physics massively parallel hydrodynamics code ALE3D is used to carry out high-resolution (4 million nodes) simulations. Three representative unit-cube configurations are considered: primitive cubic, face-centered and body-centered cubic for two particle material types of varying impedance ratios. Previous work has only looked at in-line particles configurations. We investigate the time evolution of the unit cell configurations, vorticity being generated by the shock interaction, as well as the velocity and acceleration of the particles until they reach the quasi-steady regime.

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