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Cylindrical Explosive Dispersal of Metal Particles R.C. RIPLEY, L. DONAHUE, Martec Ltd, Y. HORIE, C.M. JENKINS, AFRL, F. ZHANG, DRDC Suffield — The explosive dispersal of densely-packed metal particles in cylindrical RDX-based charges is studied numerically. Simulations are conducted using a reactive multiphase fluid-dynamic code. Spherical tungsten particles are applied in high metal mass fraction cylindrical charges in two configurations: a particle matrix uniformly embedded in a solid explosive versus an annular shell of particles surrounding a high-explosive core. The effect of particle number density is investigated by varying the nominal particle diameter from 27 to 120 μm while maintaining a constant metal mass fraction. Results are compared with steel particles to evaluate the influence of material density on dispersal. To account for early-time particle loading, momentum acceleration factors for shock interaction with packed metal particles are employed. The near-field dense granular heterogeneous flow effect is included in the governing equations and drag model; in the far-field, drag is the main driving force within the expanding detonation product gases and air. The dispersal dynamics are observed at radial locations in terms of arrival time, velocity and particle concentration. Results from experimental trials, described in the companion paper "Kinetic and Particle Characterization in Explosively-Driven Two-Phase Flow using PIV" by Jenkins *et al.*, will ultimately be used to improve empirical-based drag models for dense supersonic multiphase flow.

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