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Particle Jet Mitigation During Explosive Dispersal of Particles in Concentric Layers BRADLEY MARR, DAVID FROST, JASON LOISEAU, SAMUEL GOROSHIN, QUENTIN PONTALIER, McGill University, FAN ZHANG, Defence R&D Canada-Suffield — The explosive dispersal of a layer of solid particles surrounding a high-explosive charge generates a turbulent, multiphase flow. The shock-compacted particle layer can fracture into discrete fragments which move radially outwards on ballistic trajectories. The fragments shed particles in their wakes, forming jet-like structures. The tendency to form jets depends on the mass-ratio of the particles to explosive and the material properties of the particles. Brittle ceramic particles and soft, ductile metal particles are more susceptible to forming jets, whereas particles that are comprised of materials with moderate hardness, high compressive strength and high toughness are much less prone to jet formation. In the present study, we examine the effect that concentrically layering two powder species, silicon carbide and steel, at varying volumetric ratios has on the resulting dispersion. It is seen that through the inclusion of an inner layer of non-jetting particles (steel), the strength of the initial shock wave can be attenuated and the jetting response of a typically jetting (silicon carbide) material can be suppressed. Increasing the initial thickness of the non-jetting inner layer further suppresses jet formation until the jetting response is almost completely mitigated.

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