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Particle segregation during explosive dispersal of binary particle mixtures DAVID FROST, JASON LOISEAU, BRADLEY MARR, SAM GOROSHIN, McGill University — The explosive dispersal of a layer of solid particles surrounding a spherical high explosive charge generates a turbulent, multiphase flow. The shock-compacted particle layer typically fractures into discrete fragments which shed particles in their wakes forming jet-like structures. The tendency to form jets depends on the particle to explosive mass ratio and type of particles, with brittle particles (e.g., glass) as well as ductile metallic particles particularly susceptible to jet formation. In contrast, tough, dense (e.g., steel) particles are much less prone to forming jets. Experiments have been carried out to determine the degree of particle segregation that occurs during the explosive dispersal of a uniform binary mixture containing both "jetting" (silicon carbide) and "non-jetting" (steel) particles with various mass fractions of each particle type. During the dispersal of mixtures that contain predominantly non-jetting (steel) particles, the steel particles form a stable layer whereas the jetting (silicon carbide) particles rapidly segregate and form jets which lag behind the steel particles. As the fraction of silicon carbide particles increases, the jet structures dominate the particle motion and the steel particles are entrained into the jets.

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