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Particle jet formation during explosive dispersal of solid particles DAVID FROST, YANN GREGOIRE, SAM GOROSHIN, McGill University, ROBERT RIPLEY, Martec Ltd., FAN ZHANG, DRDC Suffield — Previous experimental studies have shown that when a layer of solid particles is explosively dispersed, the particles often develop a non-uniform spatial distribution. The instabilities within the particle bed and at the particle layer interface likely form on the timescale of the shock propagation through the particles. The mesoscale perturbations are manifested at later times in experiments by the formation of coherent clusters of particles or jet-like particle structures, which are aerodynamically stable. Experiments have been carried out in spherical and cylindrical geometry to investigate the influence of particle diameter and density and the ratio of particle to high explosive mass on the relative tendency for instabilities to develop in the expanding particle cloud. The number of particle jets that form tends to scale with a particle compaction Reynolds number corresponding to the ratio of inertial to frictional forces of the particle system. Below a critical Reynolds number, the expanding particle cloud remains stable.

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