Abstract Submitted
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Characterization of Rapid Solid-Particle Dispersal by a Blast Wave[1] BERTRAND ROLLIN, Embry-Riddle Aeronautical University, RAHUL KONERU, BRADFORD DURANT, FREDERICK OUELLET, University of Florida — The impulsive dispersal of a bed of solid particles is often accompanied by the late time formation of coherent aerodynamic structures identified as particle jets. Despite numerous experimental and numerical studies to date, the intricate mechanisms leading to the formation and selection of these jets have not been conclusively characterized. In light of recently published experimental work, numerical simulations of the problem are performed using the quasi-two-dimensional geometric setting of a Hele-Shaw cell. Explicitly, a dense and uniform volumetric distribution of solid particles shaped in the form of a right circular hollow cylinder is sandwiched between two solid plates separated by a small distance. The initial impulse to the particles is then given by a relatively weak air blast wave. The highly resolved point-particle simulations focus on the interplay between particle inertia and the gas-solid particle limit of classic hydrodynamic instabilities such as the Rayleigh-Taylor and the Richtmyer-Meshkov instabilities, in explaining the formation of internal and external particle jets. The initial overpressure and particle properties are used as control parameters in the quantification of the characteristics of the late-time particle jets.

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