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Numerical Study of Explosive Dispersal of Particles[1] BERTRAND ROLLIN, SUBRAMANIAN ANNAMALAI, CHRISTOPHER NEAL, THOMAS JACKSON, S. BALACHANDAR, Center for Compressible Multiphase Turbulence, University of Florida — Recent experiments have shown that when a layer of solid particles is explosively dispersed, a multiphase instability front occurs, which leads to the formation of aerodynamically stable jet-like particle structures. We aim at replicating these experimental observations using highly resolved large-scale simulations, to improve our understanding of particulate front instabilities and jetting phenomenon. We consider a cylindrical core of high pressure and density gas generated from energetic material. Throughout the length of the cylinder, an annular region of micron-sized inert spherical particles surrounds the charge. The particles are treated as point particles, the gas is treated as a continuum, and a rigorous two-way coupled compressible multiphase formulation is used. The jets are believed to have their origin during the early phase of rapid acceleration of the bed of particles. Therefore, this work focuses on capturing the early-time behavior and growth of the instabilities caused by the presence of particles. The accuracy of our predictive simulations will be studied by comparing the shock radius, particle front location, and other relevant metrics against the data extracted from experimental results.

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