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Simulations of Air-Shock Driven Particle Jetting in a Dense Particle Bed.[1] RAHUL BABU KONERU, University of Florida, BERTRAND ROLLIN, Embry-Riddle Aeronautical University, BRADFORD DURANT, FREDERICK OUELLET, S. BALACHANDAR, University of Florida — In this work, simulations of high-speed dispersal of a dense particle bed are carried out to investigate the underlying mechanisms responsible for the formation of the jet-like structures. To this end, four-way coupled Euler-Lagrange (EL) simulations of an air-shock interacting with a dense particle bed are carried out. The simulations are carried out using a discontinuous Galerkin spectral element solver coupled with a high-order Lagrangian solver. A discrete element method is used to resolve the particle collisions along the normal direction. Parametric studies are carried out to test the effect of the incident shock strength and the coefficient of restitution on the development of the jet-like structures. The channeling of the particles is observed to be related to vorticity deposition at the outer edge of the particle bed consistent with the multiphase analog of the Richtmyer-Meshkov instability. Additionally, the role of vorticity generated due to the force coupled back to the gas is investigated by analyzing the relaxation of the relative velocity between both the phases.

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