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On a Gas-Particle Analogue to the Richtmyer-Meshkov Instability. Part 1: Evolution of a Corrugated Particle Curtain FREDERICK OUELLET, Los Alamos National Laboratory, BERTRAND ROLLIN, Embry-Riddle Aeronautical University, BRADFORD DURANT, RAHUL BABU KONERU, S. BALACHANDAR, University of Florida — An emerging area of research in the multiphase flow community is the study of Shock-Driven Multiphase Instability (SDMI) which is a gas-particle analog of the traditional two-fluid Richtmyer-Meshkov instability (RMI). We study the interaction of a planar air shock with a corrugated glass particle curtain through the use of numerical simulations with an Eulerian-Lagrangian approach. The simulations track the computational particle trajectories as well as the evolution of the curtain of gas which is initially trapped inside of the particle curtain. This work focuses on the evolution of the particle curtain after interacting with the shock. Two shock Mach numbers, 1.21 and 1.5, are studied along with perturbation wavelengths of 3.6 and 7.2 mm to analyze the roles of these parameters as the evolving curtain undergoes SDMI both before and after reshock. The effect of particle loading in the curtain evolution is also investigated. A dilute curtain (roughly 0.1% volume fraction) replicates the Atwood number of an air-SF_6 RMI experiment and a denser curtain at 26% volume fraction is used to introduce additional multiphase coupling effects. This study also looks at the validity of comparing the fluid-only and multiphase Atwood numbers in the two-way coupled flow regime.

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