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Particle Motion Measurements Following the Impingement of a Planar Shock on a Dense Particle Field JUSTIN WAGNER, STEVEN BERESH, SEAN KEARNEY, Sandia National Lab, BRIAN PRUETT, Sanda National Lab, ELTON WRIGHT, Sandia National Lab — The shock-induced dispersal of a dense field of particles is studied using a recently developed multiphase shock tube. The particle field is generated by a gravity-fed method that results in a spanwise curtain of 100-micron spherical particles with a volume fraction of about 20 percent. The facility drives a planar shock into the particle curtain producing interactions at incident shock Mach numbers of 1.66, 1.92, and 2.02. The gas-particle momentum transfer is calculated using a control volume technique that utilizes pressure measurements made upstream and downstream of the interaction along with the method of characteristics. High-speed schlieren imaging reveals the complex wave structure associated with the interaction and also provides a measure of the particle field motion. Particle drag estimates are made using the schlieren imaging and the control volume technique. Furthermore, the trajectories of the upstream and downstream edges of the particle field at different Mach numbers are shown to be similar when normalized by the velocity of the flow induced by the incident shock.

Justin Wagner
Sandia National Lab

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