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Impingement of a Planar Shock Wave on a Dense Field of Particles JUSTIN WAGNER, STEVEN BERESH, SEAN KEARNEY, WAYNE TROTT, JAIME CASTANEDA, BRIAN PRUETT, MELVIN BAER, Sandia National Lab — A novel multiphase shock tube has recently been developed to study particle dynamics in gas-solid flows having particle volume fractions that reside between the dilute and granular regimes. The method for introducing particles into the tube involves the use of a gravity-fed contoured particle seeder, which is capable of producing dense fields of spatially isotropic particles. The facility is capable of producing planar shocks having a maximum shock Mach number of about 2.1 that propagate into air at initially ambient conditions. The primary purpose of this new facility is to provide high fidelity data of shock-particle interactions in flows having particle volume fractions of about 1 to 50%. To achieve this goal, the facility drives a planar shock into a spatially isotropic field, or curtain, of particles. Experiments are conducted for two configurations where the particle curtain is either parallel to the spanwise, or the streamwise direction. Arrays of high-frequency-response pressure transducers are placed near the particle curtain to measure the attenuation and shape change of the shock owing to its interaction with the dense gas particle field. In addition, simultaneous high-speed imaging is used to visualize the impact of the shock on the particle curtain and to measure the particle motion induced downstream of the shock.

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