

Abstract Submitted
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Shock interaction with particle curtains of varying thickness
DANIEL FREELONG, PATRICK WAYNE, JANGHAN PARK, GREGORY VIGIL, CAROLINA SHAHEEN, Student Member, PETER VOROBIEFF, Professional Member — The interaction of a curtain of particles with a shock wave is investigated experimentally. Soda lime particles form a gravity-driven curtain. The geometry of the curtain-forming nozzle can be adjusted, producing curtains with a nominal thickness of 2 mm, 4 mm, and 6 mm in the direction of the shock. Particle volume fractions for all three curtains range between 1% and 9%, with variations primarily due to particle acceleration along the vertical extent of the curtain. Prior to shock impact, we measure the instantaneous and average velocities of the particles to show that the particles are nearly in a free-falling state, with their average velocity increasing linearly with vertical distance. Experimental data reveal that the shock wave is both transmitted through and partially reflected by the curtain. Time-resolved images show the underlying flow structure of the interaction. This research is supported by the US Defense Threat Reduction Agency (DTRA) grant HDTRA1-18-1-002.

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