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Analyzing particle curtains with advection-corrected correlation image velocimetry and particle image velocimetry[1] JANGHAN PARK, DANIEL FREELONG, PATRICK WAYNE, PETER VOROBIEFF, University of New Mexico — We conduct an experimental study of an interaction between a planar shock in air and a nominally planar curtain of particles embedded in air. We investigate shocks at Mach numbers 1.2, 1.4, 1.7, and 2.0. Particle curtains of different nominal thickness (2, 4, and 6 mm) are subjected to shock acceleration. The particles are soda lime microspheres with a density of 1.4 g/cc and diameters ranging from 30 to 50 microns. The curtain formation prior to shock arrival is recorded by a high-speed camera during 2 seconds at 960 frames per second. The curtain mass flow rate is also acquired. Each frame of the particle curtain video is analyzed with advection-corrected correlation image velocimetry (ACCIV) and particle image velocimetry (PIV). We investigate whether ACCIV offers any advantages over PIV for this flow. Measurements of velocity combined with mass flow rate data can then be used to provide an estimate of the particle volume fraction and insights into the air entrainment by the curtain. The subsequent study must relate the local volume fraction in the curtain and its thickness with the post-shock features we observe.

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Peter Vorobieff
University of New Mexico

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