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Shock-Driven Variable-Density Turbulence: New Insights[1] DAVID REILLY, Georgia Institute of Technology, JACOB MCFARLAND, University of Missouri, DEVESH RANJAN, Georgia Institute of Technology — Results are presented from a newly-constructed inclined shock tube facility which was used to study the coupled Richtmyer-Meshkov instability and Kelvin-Helmholtz instability before and after reshock. This study focuses on the effect of multiple initial conditions, which include two Atwood numbers (0.23 and 0.67), two Mach numbers (1.55 and 2.01), and two inclination angles (60° and 80°). Mie scattering images of the interface development were acquired to track mixing width. Particle image velocimetry measurements were ensemble averaged over ten instantaneous realizations, which were used to determine circulation deposition as well as turbulent stresses and the cross correlation ($\overline{u'v'}$) across the mixing width. Furthermore, energy spectra were obtained for three stages of development before and after reshock. The most developed case exhibited the beginning of an inertial subrange after reshock, which may indicate a turbulent state has been reached. High-resolution planar laser-induced fluorescence was employed to obtain full-field density statistics. The density field was quantified with the density p.d.f. across the mixing width.

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