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Mixing Layer Growth of Richtmyer-Meshkov Instability at High Mach Number JOHN CHARONKO, TIFFANY DESJARDINS, MATTHEW FREEMAN, ADAM MARTINEZ, ANTONIO MARTINEZ, KATHY PRESTRIDGE, Los Alamos Natlional Laboratory — There has been considerable investigation of the growth of the mixing layer that forms due to the Richtmyer-Meshkov instability when a shock passes a density interface with initial perturbations. However, there have been fewer studies in systems at high Mach numbers. In these systems, compressibility effects in the post shock regime may be significant as the turbulent fluctuations also become a significant fraction of the speed of sound. We have been investigating such systems using a gun-driven 40-mm aluminum slug to send an M = 8.9 shock into a shock tube filled with xenon and argon (postshock density ratio $r = 3.5$, Atwood number At = 0.55). The gases are separated by a 3-D printed plastic membrane with sinusoidal initial conditions of $kh_0 = 0.24$ and 0.72. We use proton radiography to acquire a sequence of 21 line-of-sight integrated fields of quantitative density per shot, and compute growth rates and mix widths to investigate the effect of initial conditions. The possibility of using such data to make quantitative estimates of density statistics (such as the parameter b in the BHR RANS closure model) is also investigated.

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