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Investigating Mach number dependence on Richtmyer-Meshkov mixing with high resolution velocity and density measurements GREG ORLICZ, SRIDHAR BALASUBRAMANIAN, KATHY PRESTRIDGE, Los Alamos National Laboratory, EXTREME FLUIDS TEAM — Experiments are performed to study the effect of incident shock Mach number (M) on the development of the Richtmyer-Meshkov instability after a shock wave impulsively accelerates a varicose-perturbed, heavy-gas curtain (air-SF_6-air). Incident shock strength is varied within the weak shock regime ($M \leq 1.5$), and the resulting instability and subsequent fluid mixing is measured using simultaneous Planar Laser-Induced Fluorescence (PLIF) and Particle Image Velocimetry (PIV). While large scale features of the evolving layer (e.g. total width) tend to grow similarly in scaled time, differences are observed in how the mixing occurs at smaller length scales. Presented are measures of mixing that can quantify some of these differences, as well as provide calibration and validation data for numerical models of this transitional flow. Through measurements of density PDFs, the instantaneous mixing rate, the density self-correlation parameter, and the area of the mixing layer, it is concluded that for fixed initial conditions, as incident shock Mach number is increased, the uniformity of the mixing layer increases, but the total amount of mixing decreases.

Gregory Orlicz
Los Alamos National Laboratory

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