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Mach number dependence of the Richtmyer-Meshkov instability with simultaneous density and velocity measurements GREGORY ORLICZ, SRIDHAR BALASUBRAMANIAN, KATHY PRESTRIDGE, Los Alamos National Laboratory — 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). We investigate the mechanisms that drive the instability, at both large and small scales, by examining the time evolution of simultaneous, 2-D density and vorticity fields for each Mach number. Mixing layer width, vorticity, circulation, velocity fluctuations, turbulent kinetic energy, and the density self-correlation parameter are examined as a function of time. These quantities are also examined versus time scaled with the convection velocity of the mixing layer, showing that the rate of change of several of these quantities is independent of Mach number.

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