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Experimental Investigation of the Richtmyer-Meshkov Instability Through Simultaneous Measurements of Concentration and Velocity DANIEL REESE, ALEX AMES, CHRIS NOBLE, JASON OAKLEY, DAVE ROTHAMER, RICCARDO BONAZZA, University of Wisconsin — The present work investigates the evolution of the Richtmyer-Meshkov instability through simultaneous measurements of concentration and velocity. In the Wisconsin Shock Tube Laboratory at the University of Wisconsin, a broadband, shear-layer initial condition is created at the interface between helium and argon (Atwood number A =0.7). The helium is seeded with acetone vapor for use in planar laser-induced fluorescence (PLIF), while each gas in the shear layer cross flow is seeded with particulate TiO_2, which is used to track the flow and allow for the Mie scattering of light. Once impulsively accelerated by a M =1.57 shock wave, the interface is imaged twice in close succession using a planar laser sheet containing both the second and fourth harmonic output (532 nm and 266 nm, respectively) of a dual-cavity Nd:YAG laser. Particle image pairs are captured on a dual-frame CCD camera, for use in particle image velocimetry (PIV), while PLIF images are corrected to show concentration. Velocity fields are obtained from particle images using the Insight 4G software package by TSI, and velocity field structure is investigated and compared against concentration images. Probability density functions (PDFs) and planar energy spectra (of both velocity fluctuations and concentration) are then calculated and results are discussed.

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