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Experiments on the Ricthmyer-Meshkov instability with an imposed, random initial perturbation JEFFREY JACOBS, VITALIY KRIVETS, ROBERT MORGAN, COLE VALANCIUS, University of Arizona — A vertical shock tube is used to perform experiments on the Richtmyer-Meshkov instability with a three-dimensional random initial perturbation. A membrane-less flat interface is formed by opposed gas flows in which the light and heavy gases enter the shock tube from the top and from the bottom of the driven section. An air/SF_6 gas combination is used and an $M_s = 1.2$ incident shock wave impulsively accelerates the interface. Initial perturbations on the interface were created using an electromagnetic actuator located near the bottom of the shock tube. The actuator produces a vertical oscillation of the gas column within the shock tube and this motion generates small random three-dimensional perturbations on a flat mixing zone. Mie scattering is used to visualize the mixing zone. Light from a laser sheet is scattered by smoke particles seeded in the air. The laser sheet slices the shock tube trough the diagonal of the square test section in the vertical direction at a frequency of 6 kHz. Image sequences are captured by three high-speed CMOS video cameras, which cover the full visualization zone. Measurements of the integral penetration depth are obtained and are compared to existing models.

Jeffrey Jacobs
University of Arizona

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