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Laser doppler velocity measurements of gaseous mixing induced by Richtmyer-Meshkov instability JEAN-FRANCOIS HAAS, Commissariat à l'Energie Atomique, DENIS COUNILH — The turbulent mixing of air and SF6 arising from the Richtmyer-Meskov instability is investigated in a shock tube using Schlieren or laser sheet visualization and laser-doppler velocimetry. The shock tube driver, driven and observation sections are 100, 306 and 25 or 30 cm long respectively. The shock tube cross section is 13 by 13 cm square throughout. Initially, the driven and observation sections are filled with air and SF6 at 1 bar and the driver with air at 3.2 bars in order to generate a Mach 1.2 shock wave. Air and SF6 are initially separated with a thin (1 μm) microcellulose membrane maintained in a plane parallel to the shock by two thin metallic grids, of square mesh spacing 1.8 mm (downstream) and 1.0 mm (upstream). After interaction leading to a Mach 1.3 shock transmitted in SF6, an RMI-induced mixing zone moving at 70 m/s develops to an asymptotic thickness of 1 cm. When the Mach 1.3 reflected shock slows down the flow to -20 m/s, the mixing zone rapidly thickens up to 4 cm when the second reflected (expansion) wave reverses the flow again to 10 m/s. The growth rate is faster for the 30 cm observation section. A two-component laser- doppler velocimeter is used to probe the turbulent velocity field for the 25 cm section. The time evolution of the turbulent kinetic energy at several locations is obtained from many superimposed measurements of the axial and transversal velocities.

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