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Point measurements of density and velocity in RMI induced turbulent mixing zones. JEAN-FRANCOIS HAAS, DENIS COUNILH, CEA/DIF, CHRISTIAN MARIANI, LAZHAR HOUAS, GEORGES JOURDAN, CNRS/IUSTI, LAURENT SCHWAEDERLE, formerly at IUSTI and CEA/DIF — We measure a RMI air/SF6 mix induced by a Mach 1.2 shock wave using Schlieren, a constant temperature hot wire anemometer (CTHWA) in IUSTI and a 2 components laser Doppler velocimeter (LDV) at CEA/DIF. The discontinuous interface is materialized by a nitrocellulose microfilm set against a square wire mesh with a wire spacing of 1.8 mm. The CTHWA output voltage is a function of several local gas characteristics. Using some simplifying assumptions and an inverse method we obtain velocity and concentration evolutions before the reshock. The LDV provides a velocity data point whenever a seeding particle crosses the measuring volume and the diffused light reaches the receiving optics. The membrane fragments reduce the data rate in the mixing zone. Many identical runs are needed to measure the velocity mean and variance in the mix. Before reshock, the variance is just above the one measured in SF6. After reshock, the much larger variance indicates anisotropic amplification. The post reshock variance is higher for 25 cm SF6 length than for 20 cm at abscissa 13.5 and 10.5 cm respectively, as confirmed by the thicker mix from the Schlieren images. We compare the data to the results from 3D Euler simulation and Reynolds stress tensor modelling at CEA/DIF.

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