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**Evolution of the air/SF6 turbulent mixing zone for different lengths of SF6: shock tube visualizations and 3D simulations.** JEAN-FRANCOIS HAAS, JEROME GRIFFOND, DENIS SOUFFLAND, CEA DAM IDF, GHAZI BOUZGARROU, YANNICK BURY, STEPHANE JAMME, ISAE DAEP — A turbulent mixing zone (TMZ) is created in a vertical shock tube (based in ISAE DAEP) when a Mach 1.2 shock wave in air accelerates impulsively to 70 m/s an air/SF6 interface. The gases are initially separated by a thin nitrocellulose membrane maintained flat and parallel to the shock by two wire grids. The upper grid (SF6 side) of square mesh spacing $h_u$ 1.8 or 12.1 mm is expected to seed perturbation for the Richtmyer-Meshkov instability (RMI) while the lower grid with $h_l$ 1 mm is needed to prevent the membrane from bulging prior to the shot. The experiments were carried out for different lengths L of SF6 between the initial interface and the shock tube's end plate : 10, 15, 20, 25 and 30 cm. The time resolved Schlieren image processing based on space and frequency filtering yields similar evolution for the TMZ thickness. Before reshock, the thickness grows initially fast then slows down and reaches different values (10 to 14 mm) according to L. Soon after reshock, the TMZ thickness growths rate is 21 mm/ms independently of L and $h_u$. Numerical Schlieren images generated from 3D numerical simulations (performed at CEA DAM IDF) are analyzed as the experimental ones for L 15 and 25 cm and for $h_u$ 1.8 and 12.1 mm. The very weak experimental dependence on $h_u$ is not obtained by simulation as expected from dimensional reasoning. This discrepancy remains paradoxical.

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