

Poster 1

Krivets, Stockero & Jacobs

Experimental study of the late-time evolution of single-mode Richtmyer-Meshkov instability

Vitaliy Krivets, John Stockero & Jeffrey Jacobs

Department of Aerospace and Mechanical Engineering,
University of Arizona, USA

vkrivets@email.arizona.edu

A vertical shock tube is used to study the Richtmyer-Meshkov instability of an Air/SF₆ interface. The two gases flow from opposite ends of the shock tube driven section to form the interface which is given a sinusoidal perturbation is by oscillating the tube in the lateral direction. PLIF is used to visualize the flow. New experimental results will be presented in which initial perturbations with shorter wavelength and larger amplitude are used to produce significantly increased dimensionless evolution time kv_0t , where k is the perturbation wave number and v_0 is the initial growth rate. These late-time results show the transition to turbulence of the vortex cores (figure 1) which is triggered by an instability on the vortex spirals. Once turbulent, the vortex cores rapidly grow in size and begin to erode the remainder of the mushroom caps. At the latest times the interface is characterized by flat-topped bubbles separated by thin strips of heavy gas which are remnants of the mushroom stems. When reshocked, this late-stage interfacial pattern results in a decreased growth rate when compared with that observed when earlier stages of evolution are reaccelerated by the reflected shock wave.

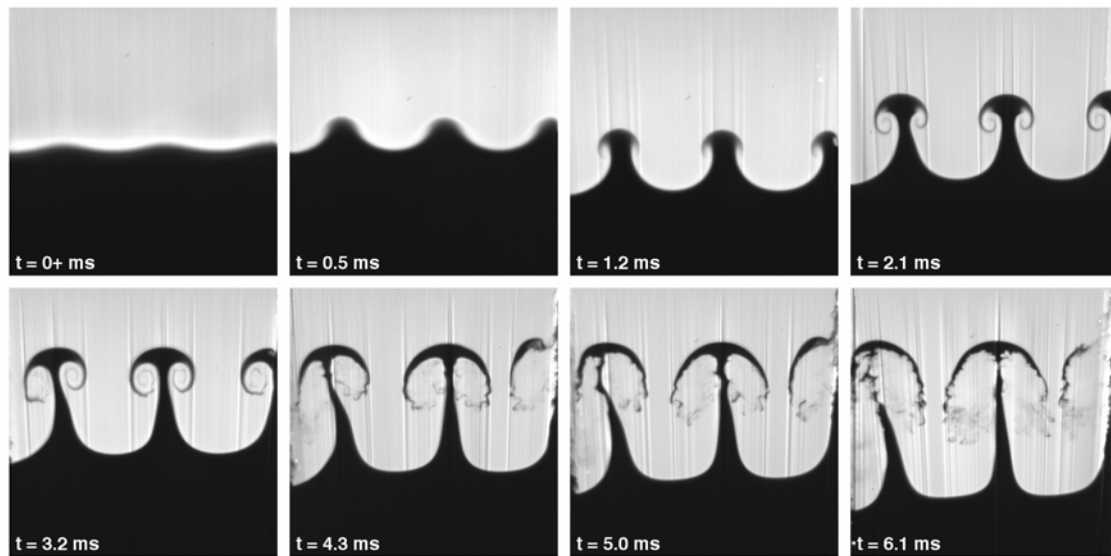


Figure 1: PLIF images assembled to form a time sequence of the instability resulting from shock-acceleration by an $M_s = 1.27$ incident shock wave.