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Shock Interaction with a Finite Thickness Two-Gas Interface
JOHN LABENSKI, NIST, YONG KIM, Lehigh University — A dual-driver shock tube was used to investigate the growth rate of a finite thickness two-gas interface after shock forcing. One driver was used to create an argon-refrigerant interface as the contact surface behind a weak shock wave. The other driver, at the opposite end of the driven section, generates a stronger shock of Mach 1.1 to 1.3 to force the interface back in front of the detector station. Two schlieren systems record the density fluctuations while light scattering detectors record the density of the refrigerant as a function of position over the interface during both it's initial passage and return. A pair of digital cameras take stereo images of the interface, as mapped out by the tracer particles under illumination by a Q-switched ruby laser. The amount of time that the interface is allowed to travel up the driven section determines the interaction time as a control. Comparisons made between the schlieren signals, light scattering detector outputs, and the images quantify the fingered characteristics of the interface and its growth due to shock forcing. The results show that the interface has a distribution of thicknesses and that the interaction with a shock further broadens the interface.

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