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Effect of multi-mode initial conditions in shock-driven flows[1]
SRIDHAR BALASUBRAMANIAN, KATHERINE PRESTRIDGE, B.J. BALAKUMAR, GREGORY ORLICZ, GAVIN FRIEDMAN, LANL — Carefully imposed initial conditions have been shown to control late time turbulence and mixing in buoyancy-driven flows [*Dimonte et al., 2004; Banerjee & Andrews, 2009*]. This is important in understanding and prediction of Inertial Confinement Fusion. We report the experimental results on the initial condition parameters, namely amplitude (δ) and wavelength (λ) of perturbations, that impact the material mixing and transition to turbulence in shock-driven, Richtmyer-Meshkov instability. A detailed study on the impact of δ and λ on turbulence in a heavy gas varicose curtain (air-SF_6-air) is undertaken. Experiments were conducted with stable, membrane-free initial conditions at shock Mach number, $Ma = 1.2$ and Atwood number, $At = 0.67$. The effect of multi-mode initial conditions on mixing and transition was quantitatively measured using simultaneous Particle Image Velocimetry (PIV) and Planar-Laser Induced Fluorescence (PLIF). The turbulence statistics were measured for different combinations of δ, λ. The results obtained are being compared with data from ongoing 3-D numerical simulations.

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