Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Mach number effects in shock-driven instabilities with simultaneous velocity and density measurements GREGORY ORLICZ, KATHY PRESTRIDGE, B.J. BALAKUMAR, SRIDHAR BALASUBRAMANIAN, GAVIN FRIEDMAN, Los Alamos National Laboratory — Experiments are performed to study the effects of incident shock Mach number on the development of a varicose-perturbed, heavy-gas curtain (air-SF_6-air). Incident shock strength is varied from Mach 1.2 to Mach 1.8, and the dynamic evolution of the gas curtain is observed using Planar Laser-Induced Fluorescence (PLIF) and Particle Image Velocimetry (PIV). Previous work at the Los Alamos Gas Shock Tube (Orlicz et al. Phys. Fluids 2009, and subsequent experiments), has demonstrated that the evolution of the total mixing width of the curtain scales with velocity. However, the evolution of the instantaneous mixing rate, which measures smaller scale flow features, does not scale with velocity. This suggests that while integral mixing width is a good first order measure of the flow, it is alone insufficient to fully measure the effects of Mach number on the mixing. The implementation of simultaneous PIV/PLIF allows us to gather more complete measurements consisting of the time evolution of paired vorticity and density fields in the flow, and therefore, a more complete picture of the dependency on Mach number.

Gregory Orlicz
Los Alamos National Laboratory

Date submitted: 07 Aug 2010 Electronic form version 1.4