Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Numerical Study of Multiple Shock-Bubble Interactions[1] XIAOLIN LI, SUNY at Stony Brook, VADIM GAMEZO, ELAINE ORAN, ANNE STAPLES, Naval Research Laboratory, LINGLING WU, SUNY at Stony Brook — We have performed numerical simulations of interactions of a low-density bubble with multiple shocks, including a planar incident shock and subsequent shocks reflected from channel walls. The compressible fluid dynamics is described by Euler and Navier-Stokes equations solved by a high-order method combined with a front-tracking algorithm to maintain the sharp interface between the bubble and the background gas. Simulation results were interpreted using Fourier analysis of vorticity and kinetic energy. The analysis shows that the Richtmyer- Meshkov instability resulting from repeated shock-interface interactions generates vorticity on multiple scales. Vorticity and energy spectra for the high-speed flow dominated by shock- interface interaction are very different from those expected for an equilibrium Kolmogorov-type turbulence. These results can also be extended to high-speed turbulent combustion dominated by shock-flame interactions.

[1]Work supported in part by the Office of Naval Research Summer Faculty Program

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Date submitted: 07 Sep 2006 Electronic form version 1.4