Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Numerical simulations of a chemically reacting Richtmyer-Meshkov turbulent mixing layer HILDA VARSHOCHI, NITESH ATTAL, PRAVEEN RAMAPRABHU, Department of Mechanical Engineering and Engineering Sciences, University of North Carolina at Charlotte — We report on results from detailed numerical simulations that capture the evolution through the Richtmyer-Meshkov instability of a multi-mode interface that initially separates a fuel (H_2) and a corresponding oxidizer (O_2). The three-dimensional simulations were carried out at a resolution of 512 x 512 x 3072 using a modified version of the FLASH code, capable of handling detailed H_2-O_2 combustion chemistry [1], temperature-dependent equation of state, and temperature-dependent molecular transport properties. The perturbation interface was initialized with "alpha-group" [2] type perturbations, and impacted by a Mach 1.2 incident shock travelling from the light (H_2) to heavy (O_2) fluid. We track several quantities through the linear, non-linear and turbulent stages of evolution, and make comparisons with the corresponding non-reacting flowfield from a separate set of simulations. The turbulent mixing layer is also subjected to reshock, which dramatically increases the combustion efficiency at the interface.

[1] Attal, N. et al., submitted to Computers and Fluids for review.
[2] Dimonte, G. et al., Phys. Fluids, 16, p. 1668, 2004.

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Date submitted: 31 Jul 2014 Electronic form version 1.4