Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Mixing and Entrainment Characteristics of Countercurrent Reacting Shear Layers[1] PHANI RAJAVOLU, DAVID FORLITI, State University of New York at Buffalo — This investigation is concerned with entrainment issues associated with countercurrent shear layers in the presence of heat release. Heat release has a detrimental effect on the shear layer growth which in turn affects the mixing and entrainment into a shear layer. Previous studies have shown that non-reacting countercurrent shear layers have higher normalized turbulence levels, shear layer growth rates and enhanced entrainment characteristics compared to co-flowing shear layers. The objective of the current project is to explore the effect of heat release on the enhanced entrainment characteristics of the countercurrent shear layer. The mixing characteristics of countercurrent shear layers with heat release is experimentally studied. A primary stream consisting of a rich mixture of methane and air interacts with a counterflowing air stream such that a flame stabilizes within the shear layer upon ignition. Particle image velocimetry is employed as the diagnostic to obtain flow field measurements. The enhanced flame stabilization and entrainment obtained using countercurrent shear may facilitate the design of compact combustion systems with increased efficiency and reduced environmental impact.

[1]Supported by ACS Grant PRF # 43689-G9

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Date submitted: 03 Aug 2006 Electronic form version 1.4