Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Planar Imaging of Mach 3 Hypermixer Flowfields with Varying Geometry[1] ROSS BURNS, NOEL CLEMENS, The University of Texas at Austin — At the high Mach number associated with hypersonic flight, potentially excessive pressure loads and changes in air chemistry necessitate supersonic flow within a scramjet combustor. A form of mixing enhancement is therefore required to enable proper mixing of the fuel and air streams and maintain efficient combustion. Hypermixers have shown promise as an effective mixing enhancement strategy, utilizing streamwise vorticity to enhance large scale transport and micromixing rather than relying solely on turbulence. An experimental investigation of several strut-based Mach 3 hypermixing flowfields is being conducted, concentrating on the effect of geometric variations (ramp angle and spacing) on the flowfield mixing characteristics. Global flow features are examined through the use of planar laser scattering (PLS) and two-component particle image velocimetry (PIV). The evolution of streamwise vortical structures is observed at different streamwise locations using stereoscopic PIV. Finally, the interaction of these vorticies with an injected scalar is studied by combining the use of two- and three-component PIV with planar laser-induced fluorescence (PLIF).

[1]This work was supported by NASA Fundamental Aeronautics Program.

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Date submitted: 03 Aug 2012 Electronic form version 1.4