Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Comparison of Data from Three PIV Configurations for a Supersonic Jet in Transonic Crossflow STEVEN BERESH, JOHN HENFLING, ROCKY ERVEN, RUSSELL SPILLERS, Sandia National Laboratories — Particle image velocimetry (PIV) data have been acquired using three different configurations in the far-field of the interaction of a transverse supersonic jet with a transonic crossflow. The configurations included two-dimensional PIV in the centerline streamwise plane at two overlapping stations, as well as stereoscopic PIV in both the same streamwise plane and the crossplane. The streamwise data show the downstream evolution of the interaction whereas the crossplane data directly reveal its vortex structure. The measurement planes intersect at a common line, allowing a comparison of those mean velocity components and turbulent stresses common to all configurations. All data from the streamwise plane agree to within their estimated uncertainties, but data from the crossplane exhibit reduced velocity and turbulent stress magnitudes by a small but significant degree. Additionally, the vertical positions of the peak velocities are slightly nearer the wall for the crossplane configuration. This comparison suggests that routine methods of uncertainty quantification for data used in the validation of computational models may not fully capture the error sources of an experiment.

Steven Beresh
Sandia National Laboratories

Date submitted: 09 Aug 2005 Electronic form version 1.4