

Abstract Submitted  
for the DFD07 Meeting of  
The American Physical Society

**Focusing-schlieren “PIV” for the measurement of 3-D turbulent flows** MICHAEL LAWSON, GARY SETTLES, Penn State, LEONARD WEINSTEIN, retired — Combining the particle imaging velocimetry (PIV) technique with schlieren optics allows flowfield measurements to be made in some cases without the need for particle seeding. Instead, turbulent eddies themselves play the role of seed particles in a transparent refractive flow. In our earlier work (Optics Lasers Engr. 44(3-4), 2006) a disadvantage of this method was found in that the measured eddy velocity is averaged across the flowfield due to the integrating propriety of conventional schlieren optics. Here, a focusing-schlieren system is implemented in order to remove that constraint and thus obtain “planar” velocity data in 3-D turbulent flows. This is demonstrated using an axisymmetric helium jet in air and a Mach 3 turbulent boundary layer in a supersonic wind tunnel. The results are promising, even though the simultaneous requirements of narrow depth-of-field and high schlieren sensitivity place severe constraints on the optics and are ultimately incompatible.

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Date submitted: 04 Aug 2007

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