

Abstract Submitted
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Turbulence measurements in high-speed flows using the Focusing Laser Differential Interferometer MATTHEW FULGHUM, GARY SETTLES, Penn State University — The Focusing Laser Differential Interferometer (FLDI) was invented by Smeets at ISL in the 1970s, and was used recently by Parziale in the CalTech T5 shock tunnel. It is a relatively-simple, non-imaging common-path interferometer for measuring refractive signals from transition and turbulence, and it has a unique ability to look through facility windows, ignore sidewall boundary-layers and vibration, and concentrate only on the signal near a pair of sharp beam foci in the core flow. Benchtop experiments using a turbulent helium jet in air demonstrate focusing ability, frequency response, unwanted signal rejection, and ease of use. The FLDI is then used to measure freestream turbulence intensity and spectra in the PSU supersonic wind tunnel at Mach 3, with results compared to hot-wire-anemometer data. A special feature of the FLDI instrument used here is the replacement of traditional fixed Wollaston prisms with variable Sanderson prisms for laser-beam separation and recombination. Research sponsored by AEDC Hypervelocity Tunnel 9.

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