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Measurements in a boundary layer with intense free stream turbulence. NICOLE SHARP, STEPHANIE NEUSCAMMAN, SERGIY GERASHCHENKO, ZELLMAN WARHAFT, Cornell University — A high Reynolds number boundary layer with free stream turbulence up to a Taylor-scale Reynolds number of order 1,000 was produced in a wind tunnel using both active and passive grids. The flow's velocity structure including spectra, co-spectra and probability density functions was mapped using hot-wire anemometry. We found that the transverse velocity variance decreased in the boundary layer, confirming earlier work by Hancock and Bradshaw (J. Fluid Mech., 205, 1989) and Thole and Bogard (J. Fluids Eng., 118, 1996) as well as other recent experimental work. The free stream turbulence Reynolds number, the level of free stream turbulence intensity, and the relative length scales of the boundary layer and free stream turbulence are varied using active and passive grids.

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