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Turbulent Channel Flow Measurements with a Nano-scale Thermal Anemometry Probe[1] SEAN BAILEY, BRANDON WITTE, University of Kentucky — Using a Nano-scale Thermal Anemometry Probe (NSTAP), streamwise velocity was measured in a turbulent channel flow wind tunnel at Reynolds numbers ranging from $Re_\tau = 500$ to $Re_\tau = 4000$. Use of these probes results in the a sensing-length-to-viscous-length-scale ratio of just 5 at the highest Reynolds number measured. Thus measured results can be considered free of spatial filtering effects. Point statistics are compared to recently published DNS and LDV data at similar Reynolds numbers and the results are found to be in good agreement. However, comparison of the measured spectra provide further evidence of aliasing at long wavelengths due to application of Taylor's frozen flow hypothesis, with increased aliasing evident with increasing Reynolds numbers. In addition to conventional point statistics, the dissipative scales of turbulence are investigated with focus on the wall-dependent scaling. Results support the existence of a universal pdf distribution of these scales once scaled to account for large-scale anisotropy.

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Sean Bailey
University of Kentucky

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