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On turbulence measurements in pipe flow with positron emission particle tracking CODY WIGGINS, ROQUE SANTOS, NITANT PATEL, ARTHUR RUGGLES, Univ of Tennessee, Knoxville — Positron Emission Particle Tracking (PEPT) is emerging as a measurement technique for flow in granular media and material processing equipment and is of interest to experimental fluid dynamics as it offers the potential for the study of turbulent flows in apparatuses lacking optical access. Here, PEPT is explored as a viable means of Lagrangian particle tracking for turbulence studies. A PEPT study of turbulent water flow (Reynolds number 20,000) in a pipe of circular cross section is performed. Measured trajectories are used to examine Eulerian and Lagrangian turbulence quantities of interest. It is observed that measured Reynolds stresses and acceleration statistics are similar to those previously detailed. Measurement uncertainties are seen to adversely affect measured structure functions, and a correction is attempted. Lagrangian velocity structure functions are seen to show significant deviation from Kolmogorov-like scaling. Results obtained require further study via experiment and simulation to determine if any observations are artifacts of the PEPT technique.

Cody Wiggins
Univ of Tennessee, Knoxville

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