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Measurements of Anisotropy in Turbulence using SO(3) decomposition GREG VOTH, Wesleyan University, SUSANTHA WIJESINGHE, Wayamba University of Sri Lanka — We use SO(3) decomposition of 3D particle tracking measurements to study the anisotropy of turbulence in a flow between oscillating grids. SO(3) decomposition is a powerful tool for determining the anisotropy as a function of scale, but experimental measurements of 3D anisotropy have proven to be difficult. Barriers that have hindered previous efforts to make these measurements include contamination from anisotropic sampling and the large data sets required for convergence of higher order anisotropic sectors. We use a real-time image compression system to obtain very large data sets of high speed video and to detect and correct for anisotropic sampling. We measure scaling exponents in the anisotropic sectors of the longitudinal structure functions up to j=4. Our results are consistent with previous results from numerical simulations and hot wire anemometry indicating that the scaling exponents at all orders increase with increasing j, so the small scales approach isotropy. We also condition the SO(3) decomposed structure functions on the instantaneous state of the large scales which provides an alternative way to probe the decay of anisotropy. We find that although smaller scales are not becoming independent of the large scales, but they are becoming isotropic.

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