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Measuring anisotropy of conditional structure functions in turbulence using real-time image compression SUSANTHA WIJESINGHE, DANIEL BLUM, GREG VOTH, Wesleyan University — We use SO(3) decomposition to study the anisotropy of conditional structure functions in a turbulent flow between oscillating grids. The flow between two grids in a 1m x 1m x 1.5m tank achieves R_λ=285 while having a central region that is nearly homogeneous with low anisotropy and a region near the grid with much greater inhomogeneity and anisotropy. A 3D particle tracking system with 4 high speed digital cameras records particle trajectories. We condition Eulerian velocity structure functions on the large scale velocity which reveals the effects of large scales on small scale statistics. Real-time image compression using an FPGA (Field Programmable Gate Array) makes it possible to continuously record the huge data sets necessary to decompose conditional structure functions to extract the anisotropic contributions.

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