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Tomo-PIV Measurement of High Reynolds Number Dissipation Scale Structures NICHOLAS WORTH, TIMOTHY NICKELS, Cambridge University — Understanding the sources of dissipative intermittency in high Reynolds number turbulence is of significant interest, especially given the increasing affordability of LES. Coherent dissipation scale structures have been identified in numerous numerical and experiment investigations, although the latter are typically restricted by the need for accurate resolution of extremely small fast motions. These investigations are therefore often limited to one-dimensional measurements, making the study of these 3D structures and their relationship to the dissipation field difficult. The current investigation employs a very large water mixing tank (2m in diameter), which uses counter-rotating impellors to generate high Reynolds number turbulence ($R_\lambda \approx 1000$) that is close to isotropic and homogeneous. The large scale of the tank brings the smallest scales within the resolution of Tomo-PIV, allowing full 3D realization of these structures. This unique experimental setup presents a number of challenges, which include: seeding density limitations imposed by optical attenuation through the tank; demanding light sheet intensity requirements; and the extremely high computational cost of Tomographic reconstruction for the thousands of velocity fields required for statistical analysis. Initial results will be presented along with future plans for measurement refinement.

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