Abstract Submitted
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**Laboratory Study of Homogeneous and Isotropic Turbulence at High Reynolds Number**[1] ZACHARY PECENAK, ZHONGWANG DOU, FAN YANG, Department of Mechanical & Aerospace Engineering, State University of New York at Buffalo, Buffalo, NY 14260, LUJIE CAO, Department of Mechatronic, Ocean University of China, Qingdao 266003, China, ZACH LIANG, HUI MENG, Department of Mechanical & Aerospace Engineering, State University of New York at Buffalo, Buffalo, NY 14260 — To study particle dynamics modified by isotropic turbulence at high Reynolds numbers and provide experimental data for DNS validation, we have developed a soccer-ball-shaped truncated icosahedron turbulence chamber with 20 adjoining hexagon surfaces, 12 pentagon surfaces and twenty symettrically displaced fans, which form an enclosed chamber of 1m diameter. We use Particle Image Velocimetry (PIV) technique to characterize the base turbulent flow, using different PIV set ups to capture various characteristic scales of turbulence. Results show that the stationary isotropic turbulence field is a spherical domain with diameter of 40 mm with quasi-zero mean velocities. The maximum rms velocity is $\sim$1.5 m/s, corresponding to a Taylor microscale Re of 450. We extract from the PIV velocity field the whole set of turbulent flow parameters including: turbulent kinetic energy, turbulent intensity, kinetic energy dissipation rate, large eddy length and time scales, the Kolmogorov length, time and velocity scales, Taylor microscale and Re, which are critical to the study of inter-particle statistics modified by turbulence.

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