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Preferential accumulation and enhanced relative velocity of inertial droplet due to interactions with homogeneous isotropic turbulence COLIN BATESON, ALBERTO ALISEDA, Univ of Washington — We present results from wind tunnel experiments on the evolution of small inertial ($d \approx 10 - 200\ \mu m$) water droplets in homogeneous, isotropic, slowly decaying grid turbulence. High-speed imaging and Particle Tracking Velocimetry are used to calculate relative velocity distributions. We analyze the preferential concentration and enhanced relative velocity of droplets resulting from their inertial interactions with the underlying turbulence. The two-dimensional particle velocity, measured from PTV and long-time tracks along a streamwise plane, are conditionally analyzed with respect to the distance to the nearest particle. We focus on the non-normality of the statistics for the particle-particle separation velocity component to dissect the influence of the inertial interaction with the turbulence on the dynamics of the droplets. We observe a negative bias (in the mean and mode) in the separation velocity of particles for short separations, signaling a tendency of particles to collide more frequently than a random agitation by turbulence would predict. The 2-D Radial Distribution Function is also analyzed and compared to previous 1-D results.

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