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Preferential accumulation and enhanced relative velocity of inertial droplets due to interactions with homogeneous isotropic turbulence COLIN BATESON, ALBERTO ALISEDA, University 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 a Particle Tracking algorithm are used to calculate relative velocity distributions. We analyze the preferential concentration, via the 2D Radial Distribution Function, and enhanced relative velocity of droplets resulting from their inertial interactions with the underlying turbulence. The two-dimensional particle velocities, measured from multi-image tracks along a streamwise plane, are conditionally analyzed with respect to the distance from the nearest particle. We focus on the non-normality of the statistics for the particle-particle separation velocity component to examine 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 tails of the distribution are interpreted in terms of the collision/coalescence process and the probability of collisions that do not lead to coalescence.

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