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Particle Turbulence Interaction

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Here we present results from fully-resolved direct numerical simulations of turbulent multiphase flow. In addition to resolving the wide range of length and time scales associated with turbulence we also resolve all the length scales associated with the particle and the small-scale flow features generated by them. We present results for the interaction of a single spherical particle with ambient turbulence and consider the both isotropic freestream turbulence and wall-bounded channel turbulence. The key parameters of the problem are the ratio of particle size to Kolmogorov scale, the ratio of turbulence intensity to mean relative velocity, and the relative distance from the wall. We first study the effect of ambient turbulence on the mean and fluctuating components of drag and lift forces on the particle. We then study the effect of the particle on wall turbulence by focusing attention on the wake region of the particle.

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