

# How do particles modify turbulent flows ?

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Particle-laden turbulent flows are ubiquitous in nature (e.g. aerosols in clouds, and dust storms on Earth and Mars) and in industrial applications (e.g. liquid fuel and pulverized coal sprays in combustion chambers). Experimental and numerical studies of these flows are quite challenging due to the wide spectra of length- and time-scales of the dispersed particles in addition to the spectra of scales intrinsic to the carrier fluid turbulence. The two-way nonlinear interactions between the dispersed particles and the turbulence result in complex multi-scale physical phenomena.

The lecture focuses on the physical mechanisms of the two-way interactions between dispersed spherical particles and isotropic turbulence using Direct Numerical Simulation (DNS). Particles whose diameter is smaller than the Kolmogorov length scale of turbulence are simulated as point particles. Particles with diameter larger than the Kolmogorov length scale are fully resolved using the Immersed Boundary method.