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Anisotropy in Pair Dispersion of Inertial Particles in Turbulent Channel Flow ENRICO PITTON, CRISTIAN MARCHIOLI, ALFREDO SOLDATI, University of Udine, VALENTINA LAVEZZO, FEDERICO TOSCHI, Technische Universiteit Eindhoven — The rate at which two particles separate in turbulent bounded flows is crucial to predict the inhomogeneities of particle spatial distribution and to characterize mixing. In this paper we examine the role of mean shear and small-scale turbulent velocity fluctuations on pair separation. To this aim an Eulerian-Lagrangian approach based on pseudo-spectral DNS of turbulent channel flow is used. Pair separation statistics were computed for particles with different inertia (and for tracers) released from different regions of the channel. Results confirm that shear-induced effects predominate when the pair separation distance becomes comparable to the largest scale of the flow, and also reveal the fundamental role played by particles-turbulence interaction at the small scales in triggering separation during the initial stages of pair dispersion. As a result, pair dispersion in non-homogeneus anisotropic turbulence has a superdiffusive nature and may generate non-Gaussian number density distributions of both particles and tracers. These features persist even when statistics are shown free of unidirectional convection, and exhibit strong dependency on particle inertia.

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