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Particle pair dispersion in turbulent boundary layer CRISTIAN MARCHIOLI, ENRICO PITTON, ALFREDO SOLDATI, Dept. Energy Technologies, University of Udine, FEDERICO TOSCHI, Dept. Applied Physics, Technische Universiteit Eindhoven — The rate at which two particles separate in turbulent flow is of central importance to predict the spatial distribution of inhomogeneities and to characterize mixing. Pair separation is analyzed for the specific case of small inertial particles in dispersed turbulent channel flow to determine the role of mean shear and small-scale structures. To this aim an Eulerian-Lagrangian approach based on pseudo-spectral direct numerical simulation of fully-developed gas-solid flow at friction Reynolds number $Re_\tau = 150$ is used. Pair separation statistics were computed for particles with different inertia released from different regions of the channel. Results demonstrate (i) that shear-induced effects predominate in the near-wall region, where velocity gradients reach a maximum, whereas small-scale fluctuations predominate away from the wall, where turbulence becomes more homogeneous and isotropic; and (ii) that the modalities by which particles become affected depend strongly on inertia. Starting from these results, open modelling issues will be addressed.

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