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Pair dispersions of particles during turbulence transition CHUNG-MIN LEE, California State University, Long Beach, ARMANN GYLFASON, Reykjavik University, FEDERICO TOSCHI, Eindhoven University of Technology —
Small passive and inertial particles are present in a variety of natural or engineering flows, and their transportation and mixing by multi-scale turbulence is both of theoretical interest and practical importance. In many natural and industrial environments, however, the turbulent flow is in a transient state. As a prototype system, we investigate the transition from isotropic to anisotropic turbulence by looking at the influence of a transitioning turbulent flow on the statistical representation of the dynamics of particles, and compare with results from homogeneous and isotropic flows. We conduct Direct Numerical Simulations of initially homogeneous turbulence, on which we suddenly impose a mean shear. The flows are initially seeded with passive and inertial particles, assumed of size that is sufficiently small and at sufficiently low seeding density so that their effect on the turbulent flow field can be neglected, and inter-particle dynamics can be ignored. Our interest is on fundamental Lagrangian statistics of the particle motions. In particular we study pair dispersions of passive and inertial particles, and we will discuss approximations to model these behaviors. Relative velocity and covariance of relative velocity and relative acceleration will also be presented.

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