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Effect of flow straining on particle accelerations and distribution[1]
ARMANN GYLFASON, Reykjavik University, CHUNG-MIN LEE, California State University Long Beach, LAHCEN BOUHLALI, Reykjavik University, FEDERICO TOSCHI, Eindhoven University of Technology — We explore effects of large scale straining on Lagrangian properties of particles in turbulence. We perform direct numerical simulations of strained turbulence laden with passive and inertial particles of varied inertia, as well as perform particle tracking velocimetry measurement in the same geometry. From both of these studies we analyze particle acceleration statistics to investigate the effect of large scale flow distortion due to straining, resulting in anisotropy that ranges from the large scale down to the inertial range and the dissipative range. A secondary objective is to understand the effects of weak straining on the distribution of particles in the fluid, by examining the evolution of spatial distribution statistics and investigating particle dispersion from simple sources. Particular attention is given to the dependence of these statistics on Reynolds number and rate of strain, in combination with particle inertia.

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