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The Effect of Stable Stratification on Fluid Particle Dispersion
MARLEEN VAN AARTRIJK, HERMAN CLERCX[1], TU/e — The dispersion of fluid particles in statistically stationary stably stratified turbulence is studied by means of direct numerical simulations. Due to anisotropy of the flow, horizontal and vertical dispersion show different behaviour. Single-particle dispersion in horizontal direction is similar to that in isotropic turbulence. In vertical direction, however, three regimes can be identified: a classical t^2-regime, a plateau which scales as N^{-2} and a diffusion limit $\propto t$, successively. By forcing the flow and performing long-time simulations we were able to observe this last regime, which was predicted but not observed before in purely stratified forced turbulence. A model based on the assumed shape of the velocity autocorrelation function correctly predicts these three regimes. The vertical mean-squared separation of particle pairs shows two plateaus that are not present in isotropic turbulence. They can be linked with characteristics of the flow. Also here the diffusion limit is found.

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