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Single-particle Lagrangian statistics from direct numerical simulations of rotating-stratified turbulence ALAIN PUMIR, Ecole Normale Superieure de Lyon, DHAWAL BUARIA, New York University, USA, FABIO FERACO, RAFFAELE MARINO, Ecole Centrale de Lyon, France, ANNICK POUQUET, University of Colorado, Boulder, USA., DUANE ROSENBERG, None, LEONARDO PRIMAVERA, Universita della Calabria, Italy — To study the influence of rotation and stratification (RaS) on turbulent transport, we perform a DNS study of Lagrangian statistics in the case where the ratio between the frequencies associated with RaS, f and N, is $N/f = 5$. We vary the Froude number Fr in the range $0.03 < Fr < 0.2$. We separate the motion in the horizontal and vertical directions. As the intensity of RaS increases, a sharp transition is observed from a regime dominated by eddies to a regime dominated by waves, when the product $N\tau_\eta$ becomes larger than 1, τ_η, being the Kolmogorov time based on the mean kinetic energy dissipation. In the regime $N\tau_\eta < 1$, acceleration statistics exhibit characteristics of isotropic turbulence in both directions. This includes probability density functions with wide tails and acceleration variance approximately scaling as per Kolmogorov theory, contrary to what happens when waves prevail ($N\tau_\eta > 1$). In the regime $N\tau_\eta < 1$, rotation enhances the mean-square displacements in horizontal planes at short times but suppresses them at longer times, in the diffusive regime. In all cases, the displacements in the vertical direction are always reduced, and in the $N\tau_\eta > 1$ regime, the motion is essentially trapped in horizontal plane.

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