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Two-particle dispersion in stably stratified and rotating turbulence LUKAS LIECHTENSTEIN, Ecole Centrale de Lyon, France, FABIEN S. GODEFERD, CLAUDE CAMBON — Geophysical flows are always subjected to stratification due to density gradients, and to the earth's rotation. Although the role of turbulence in mixing is still not clearly understood, it is of prime importance in geophysical flows. A good understanding of the physical mechanisms underlying the evolution of two particle dispersion is important for modelling turbulent diffusion. We study a simplified case which nevertheless captures the most important physical mechanisms in geophysical flows in the Boussinesq system of equations with the Brunt-Vaisala frequency N a parameter for the stratification and f, the Coriolis parameter. We generate and compare two particle dispersion from direct numerical simulation (DNS) and kinematic simulation (KS) for different ratios of rotation to stratification. KS only involves linear dynamics in the evolution of the velocity field and exhibits no coherent vortices, while DNS is a fully nonlinear simulation exhbiting typical coherent structures for rotating and stratified turbulence. The absence of nonlinearities and coherent structures only weakly influences single particle dispersion. However, two particle dispersion is widely affected by nonlinearities in the velocity field evolution. We characterize two particle dispersion for rotating and stratified turbulence compared to isotropic turbulence. Furthermore, we isolate features, which appear or disappear depending on the nonlinearity in the flow.

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