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On Correlations of Lagrangian and Eulerian Accelerations in Turbulent Stratified Shear Flows FRANK JACOBITZ, University of San Diego, KAI SCHNEIDER, Aix-Marseille Universit — The correlations of Lagrangian and Eulerian accelerations of homogeneous turbulence with uniform shear and stable stratification are investigated using data from direct numerical simulations. In order to vary the relative importance of shear and stratification, a Richardson number range from $\mathrm{Ri} = 0$, corresponding to unstratified shear flow, to $\mathrm{Ri} = 10$, corresponding to strongly stratified shear flow, is considered. The correlations between Lagrangian and Eulerian accelerations are observed to increase with increasing Richardson number. Using a wavelet-based scale decomposition of the accelerations, their correlations at different scales of motion are also investigated. It was found that the Lagrangian and Eulerian accelerations are strongly correlated at large, energy-containing scales of motion. However, the correlations decrease with decreasing scale of the turbulent motion and the accelerations are mainly decorrelated at small, dissipative scales of motion. In addition, the correlations of Lagrangian and Eulerian time-rates of change of fluctuating density are also considered. Again, stronger correlations are obtained at larger Richardson numbers and at larger scales of the turbulent motion.

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