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On Lagrangian and Eulerian Acceleration in Rotating and Sheared Homogeneous Turbulence FRANK JACOBITZ, University of San Diego, KAI SCHNEIDER, Aix-Marseille Universite, WOUTER BOS, Ecole Centrale de Lyon, MARIE FARGE, Ecole Normale Supérieure — The Lagrangian and Eulerian acceleration properties of turbulence are of importance for problems ranging from fundamental theoretical considerations to modeling of dispersion processes. The acceleration statistics of rotating and sheared homogeneous turbulence are studied here using direct numerical simulations. The study focusses in particular on the influence of the Coriolis to shear rate ratio and also on the scale dependence of the statistics. The probability density functions (pdfs) of both Lagrangian and Eulerian acceleration show a strong and similar influence on the rotation ratio. The flatness further quantifies this influence and yields values close to three for strong rotation. For moderate and vanishing rotation, the flatness of the Eulerian acceleration is larger than that of the Lagrangian acceleration, contrary to previous results for isotropic turbulence. A wavelet-based scale-dependent analysis shows that the flatness of both Eulerian and Lagrangian acceleration increases as scale decreases. For strong rotation, the Eulerian acceleration is more intermittent than the Lagrangian acceleration, while the opposite result is obtained for moderate rotation.

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