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DNS of helicity-induced stratified turbulent flow ABHILASH J. CHANDY, ABBAS RAHIMI, Department of Mechanical Engineering, University of Akron, Akron, OH - 44325-3903 — Helical flows undergoing density stratification have wide applications in meteorological phenomena such as dust devils, tornadoes, and hurricanes due to the complexity and disasters caused by them. Direct numerical simulations (DNS) of transition to turbulence in a stably stratified Boussinesq fluid are presented for different rotation and stratification intensities. In order to understand the effect of velocity on the energy cascade, comparisons are made between helicity initiated and non-helical flows. Results show that stratification decelerates the helicity decay and causes velocity and vorticity to align with each other. With respect to the helical and non-helical flow comparisons, the total energy in the presence of stratification decays faster with helicity. In addition, the behavior of length scales were examined by comparing temporal variations of the vertical shearing of velocities. Results showed a growing asymmetry with time in the case of helical flow, while non-helical flow stayed close to begin symmetric.

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