

Abstract Submitted
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DNS of stably stratified Taylor-Green vortex ABBAS RAHIMI, ABHILASH J. CHANDY, Department of Mechanical Engineering, University of Akron, Akron, OH - 44325-3903 — Stratified flows, flows where density varies in one direction, have wide applications in some of the phenomena occurring in the atmospheric and ocean. Direct numerical simulations (DNS) of transition to turbulence in a stably stratified Boussinesq fluid are presented for the three-dimensional Taylor-Green vortex problem at different stratification and turbulence intensities measured in terms of different Froude (Fr) (∞ and $10^{-2} - 10^{-1}$) and Reynolds numbers (Re) (800 and 1600), respectively. Features investigated include temporal variations of the energy spectrum cascade, local Froude numbers, vertical shearing of the velocities, and dissipation of kinetic and potential energy. The results from these simulations demonstrated forward cascade of energy for high Re and revealed the strong anisotropic structure of turbulence and suppression of vertical motion under stratification.

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