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The turbulent, stratified near wake of a sphere at Re = 3700 and Fr = 3 ANIKESH PAL, University of California San Diego, ANTONIO POSA, ELIAS BALARAS, The George Washington University, SUTANU SARKAR, University of California San Diego — Direct numerical simulation of flow past a sphere in a stratified fluid has been carried out at a sub-critical Reynolds number of 3700 and Froude number of 3. The choice of Re = 3700 allows validation against previous unstratified wake simulation including the recent DNS of Rodriguez et al. (2011). The conservation equations are solved in a cylindrical coordinate system and an immersed boundary method is employed to represent the sphere. The primary focus of this study is to understand buoyancy effects on near wake characteristics. The separated shear layer from the surface of the sphere becomes unstable resulting in transition to turbulence. The recirculation region is found to be affected by buoyancy. The turbulent stratified wake experiences a substantial suppression in the vertical direction in comparison to the corresponding unstratified case. Nevertheless, in the horizontal direction, the turbulent wake expands significantly more than in the unstratified case. Changes in the intensity, spectral content and structure of near-wake fluctuations in the wake are assessed. The momentum and energy transported by the internal gravity waves generated by the turbulent wake are also quantified.

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