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Dynamics of flow over a sphere at moderate Re in a highly stratified fluid ANIKESH PAL, SUTANU SARKAR, University Of California San Diego — Direct numerical simulations (DNS) are performed to investigate the flow past a sphere at $Re = 3700$ and $Fr \in [0.025, 1]$. Unlike previous experimental and numerical studies of flow over a sphere at low Re and low Fr, it is found that the fluctuations tend to regenerate at Fr lower than a critical value for moderate $Re = 3700$. High stratification suppress vertical motion and, for a three-dimensional body, the fluid flows horizontally around the sides leading to a new regime of unsteady vortex shedding. Vertically thin layers of shear interspersed between quasi-two dimensional motions undergo secondary Kelvin-Helmholtz (KH) instabilities if the buoyancy Reynolds number, $Re_b \geq O(1)$. The combined effect of unsteady vortex shedding, enhanced horizontal shear, and secondary KH instabilities results in the regeneration of turbulence at low Fr. There is an *increase* in the coefficient of drag C_d at high stratification (low Fr), for $Re = 3700$. This result is contrary to previous experiments on flow over sphere at low Re where C_d was found to *decrease* with increase in stratification in the low-Fr regime.

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