Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Internal gravity waves in stratified turbulent flow past a towed sphere at $Re = 3700$ ANIKESH PAL, SUTANU SARKAR, University of California San Diego — Direct numerical simulation (DNS) has been performed to investigate internal gravity waves in flow past a sphere at $Re = 3700$ in a stratified fluid with a focus on quantifying the distinction between body and turbulence generation of waves.The simulations show an excellent match between simulation and prior theory regarding amplitude and frequency of the waves generated by the body. With a decrease in Fr, the body generation mechanism become stronger and waves exhibit upstream propagation. In the downstream direction, there is a very clear distinction in the temporal and spatial structure between waves generated by the body and those by the turbulent flow. Turbulence leads to waves with high frequency modes that propagate into the background and interact with the low frequency lee waves. Quantitative analysis of the potential energy (PE) distribution as a function of Fr and downstream distance has also been carried out. For $Fr = 1$, a significant amount of the energy produced by the displacement of the fluid by the body is converted into PE of the lee waves. In contrast, most of the input energy goes into the turbulent wake for $Fr = 3$. The $Fr = 1$ case manifests a substantial decrease in the recirculation length and an increase in the wave drag as compared to $Fr = 3$.

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Date submitted: 25 Jul 2015 Electronic form version 1.4