Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

A model for internal wave drift FAN LIN, JAMES MUNROE, Memorial Univ of Newfoundland — We studied the motion of neuturally buoyant spheres induced by internal waves in a linearly stratified fluid with moderate Reynolds number (200-300). The characteristic scale of the sphere is much smaller than the wavescale ($D/\lambda < 0.05$) so we apply the Morison equation to model the motion of the spheres. In our 5-metre long wave tank, a mode-1 internal wave was generated by a wave generator to study the motion of the spheres. Experimental results show that similar to surface waves, there exists a wave induced drift of the sphere resulting from the phase lag between the motion of the sphere and the fluid. The magnitude and direction of the drift velocity u_d can be affected by many parameters, including the initial phase of the wave generator, depth of the sphere, and the frequency of the internal waves. An empirical formula for u_d will be introduced and will be compared to the theoretical results from a numerical simulation. For the vertical motion of the sphere, both the experiment and numerical simulation show that at low frequency of the internal waves ($\omega/N < 0.2$), a series of harmonics of ω appear in the vertical motion.

Fan Lin
Memorial Univ of Newfoundland

Date submitted: 26 Jul 2013 Electronic form version 1.4