

## Study on AUV Motion in the Internal Wave Field (M.Sc. Research)

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**DATE:** Monday, December 9, 2013

**TIME:** 10:30 AM

**PLACE:** C3024

**ABSTRACT:** We studied the motion of neutrally 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  $\omega$  appear in the vertical motion.

**ALL ARE WELCOME!!!**