PHYSICAL MATHEMATICS SEMINAR

Internal and Interfacial Waves in Stratified Fluids

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ABSTRACT:

Internal waves are ubiquitous in the ocean, and are important to understand energy exchange. Several spatial structures can be encountered, from very localized beams closed to topographies to very large scale modes away from generation sites. Their atypical dynamics is the source of very interesting phenomena.

When internal waves create perturbation at a density jump (pycnocline), nonlinearities produced can lead to the generation of internal solitary waves. This mechanism is supposed to explain observations of solitary waves in the ocean, away from topography. We have realized experiments confirming this mechanism of "local generation" of solitary waves, which can be analyzed as a function of one parameter comparing the wavespeed of internal waves with the one of interfacial waves.

Another peculiar phenomenon encountered in stratified fluid is the dead-water phenomenon, when a boat evolving on a two-layer fluid feels an extra drag due to waves being generated at the interface between the two layers whereas the free surface remains still. Discovered by the Artic explorer F. Nansen (1893) and studied by V.W. Ekman (1904), we have revisited this problem for more general stratifications and showed the importance of unsteady dynamics to describe fully its complexity.

TUESDAY, APRIL 5, 2011
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290

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