MAREK STASTNA, University of Waterloo
Numerical modeling of internal wave-boundary layer interaction

Internal waves in stratified fluids are a ubiquitous feature of both the oceans and the atmosphere. Many classical theories naturally assume that the fluid in which the wave propagate is inviscid. Over the past few years there has been a gradual accumulation of experimental and numerical work that has exposed the rich interplay between internal waves and the viscous boundary layer. I will discuss examples of internal solitary-like waves propagating over an undulating bottom, generating vortices as they go. Using Lagrangian particle tracking, I will demonstrate that the vortices transport near bottom fluid up into the water column in a coherent manner. Using suites of simulations I will demonstrate that there is an optimal wavelength of topography undulations that leads to a maximum in kinetic energy production due to vortex production. When the thermo or pycnocline lies near the bottom, the vortices deform the pycnocline in a significant way and can potentially serve to partially destroy the pycnocline, thereby altering the waveguide for waves propagating behind the leading wave. Time permitting I will compare the results for vertically-trapped waves with those found for viscous critical reflection of vertically propagating internal waves.