Internal Wave Generation in Continuous Three-layer Stratifications: Steady and Oscillating Flow over Bumps and Depressions

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Horizontally propagating internal waves in continuous three-layer like stratifications have a richer range of behaviours than those in two-layer stratifications do. Two significant differences are the existence of breathers and the co-existence of ISWs of both polarities. In this talk results of non-hydrostatic numerical simulations of flow over small bumps and depressions using continuous three-layer stratifications will be presented. Both steady flows at near-critical Froude numbers and oscillating currents are considered showing the formation of a variety of solitary waves, breathers and more complicated mixtures of waves. These waves are often much larger than the amplitude of the topographic perturbation forcing the waves. Both symmetric and asymmetric stratifications are considered. Breathers are easily generated in symmetric stratifications for which the two pycnoclines are sufficiently far apart but for asymmetric stratifications the wave fields generated are more complicated.