

Matthew Durey

Resonant free-surface water waves in closed basins

Nonlinear resonance is a mechanism by which energy is continuously exchanged between a small number of linear wave modes, a phenomenon common to a large number of dispersive fluid systems. In the context of free-surface gravity waves, nonlinear resonance has been studied extensively over the past century, with a particular focus on domains that are large compared to the characteristic wavelength (such as oceans). However, nonlinear resonance in confined three-dimensional geometries has received relatively little attention, despite the need to mitigate large-amplitude sloshing in industrial and geophysical basins. Here I will present the results of a combined theoretical and computational investigation into the onset and dynamics of resonant triads in cylindrical basins, with extensions to two-layer flows and non-uniform bottom topography