
Analytical solutions describing tidal conversion over ocean ridges

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Abstract

Analytical solutions are constructed of small-amplitude internal waves in an inviscid, uniformly-stratified ocean. Internal waves are generated by barotropic tides over irregular bottom topography. In this process barotropic tidal energy is generally lost to baroclinic internal waves in a process known as tidal conversion. For a discrete family of ocean ridges, having finite support, tidal conversion is absent. It is studied how tidal conversion appears under smooth deformations of this family of ocean ridges. The presented solutions are the first that analytically prescribe internal wave generation over families of ridges, including, for exceptional parameter values, ridges without any tidal conversion.

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