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Energy transfer in internal wave triads for non-uniform stratifications. Part II: Bounded domain with varying topography SARANRAJ GURURAJ, ANIRBAN GUHA, University of Dundee — Weakly nonlinear triadic wave-wave interactions is a mechanism by which energy from large scale oceanic internal waves cascades to small scales, finally leading to ocean mixing. Due to variations in submarine topography, ocean depth (h) is also variable, which in turn can impact the formation of resonant triads. Using multiple scale analysis, amplitude evolution equations of the waves forming a triad are derived in the presence of weakly varying h, assuming the waves slowly vary with amplitude but rapidly vary in phase both in space and time. For triads interacting in a medium of varying h and uniform stratification, the horizontal wavenumber condition for waves (1,2,3), given by $k_{(1,a)} + k_{(2,b)} + k_{(3,c)} = 0$ is unaffected, where (a, b, c) are integers denoting the modenumber. For nonuniform stratification, triads (and self-interactions) that do not satisfy the condition $a = b = c$ can violate the horizontal wavenumber condition as h varies. In nonuniform stratification, the nonlinear coupling coefficients (NLC) do not decrease (increase) monotonically with increasing (decreasing) h. Also NLC may change by one order of magnitude with a slow change in h. Moreover, the most unstable triad was found to change with relatively small changes in h.

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