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A Numerical Study of Topographic Wave Reflection in Semi-Infinite Channels

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ABSTRACT

The Potential vorticity equation describing topographic waves is approximately solved using the channel method of Stocker and Hutter. The domain of integration is a semi-infinite channel and models an estuary, the bathymetry of which is varied through a transverse and a longitudinal topography parameter. It is shown that in this domain the spectrum of topographic waves consists of a discrete and a continuous part. The former exhibits wave modes trapped at the closed end of the channel; these waves correspond to the bay modes in a rectangular basin. Resonances with a similar bay-trapped structure also occur in the continuous spectrum. Their dependence on the bay geometry is studied. A consistent explanation of the three topographic wave types found earlier in an enclosed basin is given in terms of topographic wave reflections.

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