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Barotropic Instability of Long Continental Shelf Waves In a Two-Layer Ocean

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ABSTRACT

A two-layer model is used to examine the properties of free continental shelf waves in the presence of a mean longshore horizontally sheared barotropic current. We allow for discontinuities in the current shear. Taking a stepped shelf, the basic equations governing the interfacial displacement and the perturbed streamfunction are uncoupled, yet these variables remain indirectly coupled through the discontinuity relationships. The modification of the shelf wave modes by the stratification and the internal Kelvin wave modes by the longshore current is examined. In particular, internal waves trapped about discontinuities in the current shear are identified.

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