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The Scattering of a Continental Shelf Wave by a Long Thin Barrier Lying Parallel to the Coast

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ABSTRACT

The scattering of an incident shelf wave by a long thin offshore barrier located parallel to the coast is solved for a general monotonically increasing depth profile, using the unforced, inviscid barotropic shallow water equations under rigid lid and alongshore geostrophy approximation. In particular, simple analytic formulas for the scattering coefficients are derived for the exponential shelf profile. In the channel between the barrier and the coast, much of the incident shelf wave energy is transferred to the zero (or Kelvin) mode. Seaward of the barrier, substantial energy transfer from an incident second-mode shelf wave to the first mode is possible. Downstream from the barrier, the incident mode may vanish, leaving a different mode to dominate.

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