Abstract View

Volume 11, Issue 10 (October 1981)

Journal of Physical Oceanography
Article: pp. 1334–1344 | Abstract | PDF (553K)

Long-Wave Trapping by Oceanic Ridges

Richard Paul Shaw and Wayne Neu

Department of Engineering Science, Aerospace Engineering and Nuclear Engineering, F.E.A.S., State University of New York, Buffalo 14214

(Manuscript received March 31, 1981, in final form July 13, 1981)

DOI: 10.1175/1520-0485(1981)011<1334:LWTBOR>2.0.CO;2

ABSTRACT

Long waves are affected by bottom topography and under certain conditions may be trapped along topographical contours which then act as wave guides transmitting wave energy for great distances with little loss. This study examines waves trapped along a submerged ridge described by straight parallel bottom contours which in cross section are composed of constant-slope segments bounded on either side by constant-depth segments. Solutions are found for time harmonic waves periodic in the along-ridge direction and of exponential decay behavior normal to the ridge over the constant-depth segments. Over the linearly varying topography describing the ridge, the solution is in terms of two Kummer (or Whittaker) functions. For a given geometry, a dispersion equation is obtained relating the wave frequency to the along-ridge wavenumber for trapped waves. A constant Coriolis parameter is included. but primary interest is on class I (high-frequency) waves. A comparison of cutoff frequencies predicted for this piecewise continuous ridge and those for a segmented constant-depth ridge is made, and the appropriate scaling factors between the two results are discussed. Comparisons of the phase and group velocities are also made for these cases.