# Abstract View

Volume 12, Issue 7 (July 1982)

**Journal of Physical Oceanography**
Article: pp. 635–643 | Abstract | PDF (698K)

# The Generation of Diurnal Period Shelf Waves by Tidal Currents

**Richard E. Thomson and William R. Crawford**

*Department of Fisheries and Oceans, Institute of Ocean Sciences, Sidney, British Columbia V8L 4B2 Canada*

(Manuscript received December 18, 1981, in final form March 17, 1982)

DOI: 10.1175/1520-0485(1982)012<0635:TGODPS>2.0.CO;2

ABSTRACT

Continental shelf waves of diurnal period are shown to be generated by tidally induced Reynolds stresses within a bottom Stokes-scale boundary layer. The theory is applicable to a uniformly rotating, homogeneous ocean of two-dimensional depth variability in which alongshore variations occur over scales large compared to the shelf width. Explicit solutions are derived for the shelf wave velocity components and for the cross-shelf sea surface slope in the case of a traveling Kelvin wave forcing. Numerical values are presented for an exponential depth profile $H = H_0 \exp(-2\alpha x)$, where $x$ is the coordinate normal to the coast. Results indicate that the amplitude of the shelf wave current can exceed that of the astronomical tidal current and that the alongshore component of the shelf wave current will consistently lead the alongshore component of the tidal current by 180° to 0° over one, wavelength in the direction of phase propagation.