



## Abstract View

[Volume 6, Issue 3 \(May 1976\)](#)

### Journal of Physical Oceanography

Article: pp. 355–371 | [Abstract](#) | [PDF \(1.06M\)](#)

# Baroclinic Instability in the Denmark Strait Overflow

**Peter C. Smith**

*Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada*

(Manuscript received September 1, 1975, in final form January 12, 1976)

DOI: 10.1175/1520-0485(1976)006<0355:BIITDS>2.0.CO;2

### ABSTRACT

Current meter records and hydrographic data taken in the Denmark Strait overflow during a one-month experiment in August–September 1973 are analyzed. Mean conditions indicate that a strong, cold overflow current existed throughout the experiment. The most outstanding feature of the velocity and temperature spectra is a strong peak at a period of 1.8 days. These oscillations appear to amplify in the downstream direction and are highly correlated over the entire flow at the southern end of the Strait. Phase estimates indicate that velocity components are in quadrature, while the cross-stream perturbation heat flux acts to reduce the mean potential energy associated with the sloping isotherms.

To explain the low-frequency variability, a quasi-geostrophic two-layer model for channel flow with a sloping bottom is developed. Using measured values of shear and other physical parameters, the model is found to be unstable over a limited range of wavelengths and frequencies. The most unstable wave is 80 km long and has a period of 2.1 days in close agreement with peaks in the current meter spectra. Furthermore, phase differences measured across the stream are found to be consistent with the propagation in the direction of the mean flow.

The study concludes with a discussion of finite-amplitude aspects of the instabilities.

#### Options:

- [Create Reference](#)
- [Email this Article](#)
- [Add to MyArchive](#)
- [Search AMS Glossary](#)

#### Search CrossRef for:

- [Articles Citing This Article](#)

#### Search Google Scholar for:

- [Peter C. Smith](#)



© 2008 American Meteorological Society [Privacy Policy and Disclaimer](#)

Headquarters: 45 Beacon Street Boston, MA 02108-3693

DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826

[amsinfo@ametsoc.org](mailto:amsinfo@ametsoc.org) Phone: 617-227-2425 Fax: 617-742-8718

[Allen Press, Inc.](#) assists in the online publication of *AMS* journals.