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[Volume 13, Issue 4 \(April 1983\)](#)

Journal of Physical Oceanography

Article: pp. 663–677 | [Abstract](#) | [PDF \(869K\)](#)

Stability of Free Surface Ekman Layers

George F. Spooner

Ocean Dynamics Branch, Naval Research Laboratory, Washington, DC 20375

(Manuscript received September 8, 1982, in final form December 13, 1982)

DOI: 10.1175/1520-0485(1983)013<0663:SOFSEL>2.0.CO;2

ABSTRACT

The stability of free surface, laminar Ekman layers is examined for both the homogeneous and the two-layer case. The eigenvalues of the homogeneous case depend upon the wavenumbers α and β ; and the Reynolds number Re . Those of the two-layer case depend upon α , β , Re , the depth of the top layer, and the parameter $Fr^* = g\delta(\rho^* - \rho)/(U_s^2\rho)$, where g is the acceleration of gravity, δ is the Ekman scaling depth, ρ and ρ^* are the densities of the top and bottom layers, respectively, and U_s is the mean speed at the surface. The behavior of the inflection point mode and the parallel mode of instability is examined as a function of the independent parameters in both cases.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693

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

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