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[Volume 18, Issue 7 \(July 1988\)](#)

Journal of Physical Oceanography

Article: pp. 977–986 | [Abstract](#) | [PDF \(574K\)](#)

Instability of a Mixed Layer Model and the Generation of Near-Inertial Motion. Part II: Mixed Layer Deepening

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(Manuscript received November 18, 1986, in final form December 11, 1987)

DOI: 10.1175/1520-0485(1988)018<0977:IOAMLM>2.0.CO;2

ABSTRACT

In Part I we examined the stability of a model of the mixed layer, neglecting the deepening rate. Here we examine the effects of the deepening but neglect the oscillations in the steady state. We find that the two types of instability found previously are modified. The long wavelength [O(10) km] instability becomes more stable while the converse is true for the short wavelength [O(1) km] instability with the purely kinematic effect of the slowly deepening mixed layer on the equally slow vertically propagating near-inertial waves being of most importance. The short wavelength instability might be expected to be observed if the lateral friction is sufficiently large. There is also a different short wavelength instability which is basically independent of the ocean interior which might be expected to appear if friction is sufficiently small.

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