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Abstract View

Instability of a Mixed Layer Model and the Generation of Near-Inertial Motion. Part I: Constant Mixed Layer Depth

John Kroll

Department of Mathematical Sciences, Old Dominion University, Norfolk, Virginia

ABSTRACT

The stability of Niiler's model of a deepening mixed layer was investigated assuming the deepening rate was negligible. Two basically different instability mechanisms appeared. One is a mixture of a Kelvin-Helmholtz type and parallel flow viscous type with a relatively small horizontal wavelength [O(1 km)]. The other depends on the perturbation of the bulk stress and is related to the inflection point type of instability of an inviscid shear model with a relatively long horizontal wavelength]O(10 km)]. The former instability has its most unstable wave directed generally in the direction of the mean flow, while for the latter, it generally is perpendicular to the mean flow and opposite the wind. Each is likely to produce near-inertial motion. Though the former is potentially stronger than the latter, it is also less likely to occur for usual oceanic conditions.

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