THE IMPACT OF THE HORIZONTAL CORIOLIS COMPONENT ON

WAVES IN THE OCEAN

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ABSTRACT

The traditional approximation neglects the horizontal component of the Coriolis, which has its justification in a scaling argument. However, this leaves the effect of the neglected terms unquantified. This paper takes a step toward identifying some of the errors associated with the approximation. On the mid-latitude f-plane we find that the maximum error in the dispersion relation is approximately $\frac{\tilde{f}}{N}$. Another effect introduced by the inclusion of the horizontal term is the modification of the reflection laws for internal gravity waves. The critical frequency now depends on slope orientation. An analysis for the equatorial β-plane shows that the resulting set of equations is inseparable and the hydrostatic approximation cannot be made. The standard equatorial dispersion relation is recovered with no dependence on the horizontal rotation term, and the meridional structure of the solutions is modified.