



Abstract View

[Volume 16, Issue 10 \(October 1986\)](#)

Journal of Physical Oceanography

Article: pp. 1605–1624 | [Abstract](#) | [PDF \(818K\)](#)

On the Accelerations in the Free Surface of Nonlinear Gravity-Capillary Waves

S.J. Hogan

Mathematical Institute, University of Oxford, Oxford OX1 3LB, U.K.

(Manuscript received October 9, 1985, in final form March 3, 1986)

DOI: 10.1175/1520-0485(1986)016<1605:OTAITF>2.0.CO;2

ABSTRACT

The real and apparent accelerations in the free surface of nonlinear gravity-capillary waves are calculated over a wide range of wavelengths. It is shown that surface tension has hardly any effect on the results previously obtained for pure gravity waves, for wavelengths down to 20 cm in length, over the range of steepness considered. At the other extreme, we present for pure capillary waves, exact analytic results valid for all steepnesses up to and including the highest wave. This yields some intriguing conclusions including the fact that the horizontal component of the real acceleration has the opposite sign over most of the surface of the highest wave to that which it does over the surface of linear waves. We also consider the effect of gravity on this solution as well as the case when both restoring forces are of equal importance.

For short waves considered here, the behavior of all the accelerations in the nonlinear wave is nonsinusoidal with maximum values considerably in excess of those predicted by linear theory.

Options:

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

Search CrossRef for:

- [Articles Citing This Article](#)

Search Google Scholar for:

- [S.J. Hogan](#)



DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
[Allen Press, Inc.](#) assists in the online publication of *AMS* journals.