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Accelerations in Steep Gravity Waves

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ABSTRACT

Surface accelerations can be measured in at least two ways: 1) by a fixed vertical wave guage, 2) by a free-floating buoy. This gives rise to two different vertical accelerations, called respectively “apparent” and “real”, or Langrangian. This paper presents the first accurate calculations of the two types of acceleration, for symmetric waves of finite steepness.

The apparent upwards accelerations is always less than 0.24g, but the apparent downwards acceleration is unlimited. The real vertical acceleration is smoother than the apparent acceleration, and always lies between 0.30g and −0.39g.

The (real) horizontal acceleration is studied, and shown to be greater in amplitude than the real vertical acceleration.

The results are discussed in relation to proposed limits on the acceleration in random seas.

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