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Contact-Line Effects on Capillary-Gravitywaves

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Experiments show that the natural frequency and damping rate of capillary-gravity waves in containers greatly depend on the contact-line conditions. In particular, there are important differences between the cases when the contact-line is fixed and when the contact-angle is fixed, and between the cases when the static contact-angle is acute (hydrophillic surface) or obtuse (hydrophobic surface). Two problems are considered: a) the effects of the static contact-angle on the natural frequency in the inviscid case and, b) the effects of a phenomenological condition (which assumes a linear variation of the contact-angle with the speed of the contact-line) on the frequency and damping rate in the case of orthogonal intersection at the contact-line and nearly-inviscid liquid. The results are compared with experimental results showing a significant improvement.

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