

Abstract

Two-dimensional periodic gravity-capillary waves at the interface between two unbounded fluids with different density are analyzed. The lighter fluid is above the interface. The perturbation method is used to obtain solutions to the fifth order for interface profile, velocity potential and oscillation frequency. The solutions have been carefully controlled by other solutions (third-order surface gravity-capillary solutions, third-order interface gravity waves and fifth-order surface gravity waves). These solutions can be used to describe the qualitative nature of small-amplitude traveling waves and provide initial guesses for numerical solutions to the full Euler system. The results highlight the significant influence on wave profile and wave frequency. In addition, this study extends the Wilton singularity to interfacial waves. (C) 2016 Academie des sciences. Published by Elsevier Masson SAS. All rights reserved.