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Numerical simulation for a free surface of a long gravity wave. (English) Zbl 1302.76032
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Summary: This paper deals with the study of a long gravity wave profile in a bidimensional rectangular basin, and the aim of this work consists in determining a free surface equation of gravity wave. The equations of motion of such a problem with its boundaries conditions are reduced to a system of nonlinear equations. The applying shallow water theory helps to solve the system and the solution is expanded asymptotically in terms of Poincaré's parameter ε . The approximating with respect to the parameter ε at the first, second and three orders, the problem is transformed into a wave equation. A numerical example is given to support the theory.

MSC:

76B15 Water waves, gravity waves; dispersion and scattering, nonlinear interaction
74J15 Surface waves in solid mechanics
35A15 Variational methods applied to PDEs

Keywords:

free surface; long gravity wave; shallow water theory

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