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Particle motions produced by a solitary wave interacting with a plate

Chih-Hua Chang
Ling-Tung University, Taiwan

This study is aimed at the interaction of a solitary wave with a vertical thin plate to simulate the particle behaviors of vortex flow. The stream function-vorticity free-surface (SVFS) model using boundary-fitted grid combined with local overset grid to reveal vortex motions is applied and extended. The SVFS model is a fully-nonlinear viscous wave model. Virtual particles are scattered and traced to perform the vortex motions. Mechanical behaviors such as the streamlines, pathlines, streaklines and transient particle distributions are illustrated. Present numerical model is treated in a dimensionless scale referencing the undisturbed water depth and linear-long-wave celerity. For an infinitesimal plate, the flow characteristics are only dominated by three dimensionless parameters, that is the incident-wave height (*A0*), plate height (*S*), and Reynolds number (*Re*). In this paper, first, we compare qualitatively the streamline patterns with the experimental observations of the particle-tracing photographs. According to the experimental conditions, the *Re* is approximated as 66800. After verification, we analyze numerically the flow characteristics with different *A0* and *S*. Only the brief results are shown here. An incident solitary wave moving toward right starts at $x^{=}$-15 in front of the plate.

Biography

Chih-Hua Chang is an Associate Professor of the Department of Information Management, and Natural Science Division in General Education at Ling-Tung University in Taiwan. He earned a PhD degree in 1997 in Department of Hydraulic and Ocean Engineering of National Cheng Kung University, Taiwan. He has been at Ling-Tung University since 2003. His research interests include Geographic Information System, Coastal and Ocean Engineering, and Computational Fluid Dynamics.

changbox@teamail.ltu.edu.tw

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