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Hydrodynamic Coefficients for a 3-D Uniform Flexible Barge Using Weakly Compressible Smoothed Particle Hydrodynamics: Keynote Contribution for the International Workshop on Wave Loads and Motions of Ships and Offshore Structures, Harbin, China, 5-7 November, 2017 (Article)

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Ramli, M.Z.[a], Temarel, P.[b], Tan, M.[b]

[a]Institute of Oceanography and Maritime Studies (INOCEM), International Islamic University Malaysia (IIUM), Kuantan, Pahang 25200, Malaysia
[b]Fluid Structure Interactions Group, Faculty of Engineering and the Environment, University of Southampton, Southampton, SO16 7QF, United Kingdom

Abstract

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The numerical modelling of the interactions between water waves and floating structures is significant for different areas of the marine sector, especially seakeeping and prediction of wave-induced loads. Seakeeping analysis involving severe flow fluctuations is still quite challenging even for the conventional RANS method. Particle method has been viewed as alternative for such analysis especially those involving deformable boundary, wave breaking and fluid fragmentation around hull shapes. In this paper, the weakly compressible smoothed particle hydrodynamics (WCSPH), a fully Lagrangian particle method, is applied to simulate the symmetric radiation problem for a stationary barge treated as a flexible body. This is carried out by imposing prescribed forced simple harmonic oscillations in heave, pitch and the two- and three-node distortion modes. The resultant, radiation force predictions, namely added mass and fluid damping coefficients , are compared with results from 3-D potential flow boundary element method and 3-D RANS CFD predictions, in order to verify the adopted modelling techniques for WCSPH. WCSPH were found to be in agreement with most results and could predict the fluid actions equally well in most cases.

SciVal Topic Prominence

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