On the importance of restoring term approximations for large pitching floating devices

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On the importance of restoring term approximations for large pitching floating devices.

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Abstract

The present paper analyzes the convenience of using non-linear methods for hydrostatic force approximations. An alternative methodology is here proposed and validated by laboratory experiments. The coefficients involved in the calculation of the hydrostatic force, submerged volume, and centre of buoyancy are calculated using a panelization of the hull geometry. The presented methodology is included in a time domain model that solves Cummins' equation, so the instantaneous value of the hydrostatic force is employed at each time step, extending the validity of the approximation.

The improvements of this methodology are compared with the classical approach of using a constant hydrostatic matrix based on precomputed values at equilibrium. A wave energy converter (WEC) designed to extract energy through large rotations is employed to analyze the effect of non-linearizing the hydrostatic term. The results of the methodology for static conditions are validated using commercial software. A sensitivity analysis of the paneliza-

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