Application of the PFEM/X-IVAS method to sea-keeping problems

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ABSTRACT

We present the simulation of sea-keeping problems using the particle finite element method (PFEM) on a fixed background mesh. The time-integration of the particle kinematics is done using the X-IVAS scheme [1]. The Navier-Stokes equations are formulated to solve for the diffracted/radiated response of an incident wave on a floating body.

We discuss the effects on the solution accuracy and efficiency by choosing the following implementation of the PFEM + X-IVAS method: a) analytical solutions to the particle kinematics governed by the X-IVAS scheme obtained using numerically stable formulas [2] and b) The data transfer/projection from the particles to the nodes of the fixed-mesh performed using the Shepard [3] and thin-plate spline [4] interpolations.

Likewise, comparisons are made against the solutions obtained using time-domain sea-keeping solvers [5] based on the potential flow theory.

REFERENCES


