

Abstract: Nonlinear Interaction Between Free Surface And A Submerged Vehicle: Inviscid Calculation

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Abstract

Study of nonlinear interaction between free surface and a submerged vehicle is of great significance in many ocean engineering and naval architecture applications. In this paper the boundary integral equation methods are derived from generalized Green's Theorem. The fully nonlinear calculations are conducted in time domain starting from rest. An Euler-Lagrange time marching procedure is used in which the kinematic free surface boundary condition and the equation of body motion are used to update the location of surfaces, and the dynamic free surface boundary condition is used to update velocity potential on the surface. Various results are presented in the paper, such as movement of the free-surface, velocity vector field, and force loads exerted on the vehicle. Both explicit and corrector algorithms are adopted and a performance comparison is made.

Keywords: waves, free-surface, nonlinear, boundary integral