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COMPUTATIONS OF ROLL MOTION IN WAVES USING A FULLY NONLINEAR TIME DOMAIN POTENTIAL FLOW METHOD

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Optimization of modern hulls when moving in a seaway puts new demands on the computational methods used. Nonlinear effects become important for wave loads and added resistance in waves in presence of large motions.

The purpose of this paper is to present a method which aims to fill the gap between RANSE methods and partly nonlinear panel methods. The method solves the fully nonlinear free surface time-domain potential flow problem including a hull undergoing rigid body motions. Nonlinearities under the hypothesis of potential flow are taken into account, i.e. higher and lower frequency components, hull shape above calm water line and interaction between incoming, radiated, diffracted, reflected and ship generated waves.

The potential flow method alone cannot handle roll motion since roll is dominated by viscous effects. Two methods to include roll damping within the potential flow code are used: the first one obtains roll damping coefficients through inertial and geometric characteristics of the ship. The second one uses model test results. Numerical results using both methods are compared.

The code has already been tested in head seas. In this paper, numerical simulations of roll decay and roll motion in beam sea are compared to model test results.

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