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Simulation of Wave-Induced Motions of a Turning Ship

Hironori Yasukawa

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Summary: A practical method for simulating both ship maneuvering and wave-induced motions is presented. Separating the basic motion equations into 2 groups where one is for high frequency wave-induced motion problem and the other is for low frequency maneuvering problem, we derive the total 10 motion equations which are composed of 6DOF equations for high frequency problem and 4DOF (surge, sway, roll and yaw) equations for low frequency problem. New Strip Method was used for estimating the hydrodynamic force components such as added mass, wave damping and wave exciting forces for high frequency problem. The present method coincides with the time domain strip method when dealing with a ship straight moving problem. And when the wave height is set to be zero, the method coincides with the maneuvering simulation method in still water, so-called MMG model. Wave-induced motions for SR108 container ship model in turning condition were predicted using the present method. The predicted results are compared with the free-running model test results. The results roughly agree with the test results. The present method can capture the overall tendency of the wave-induced motions of the turning ship in time domain.

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