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Numerical Investigation of Wetted Surface Area and Pressure Distribution Acting on a Planing Ship

Tokihiro Katsui

Summary: This paper presents a numerical simulation method to predict the wetted surface area and hydrodynamic forces acting on a planing ship running in a fixed condition. The flow field around a planing ship under the potential flow assumption is determined by solving two integral equations with unknown boundary. The one is well-known lifting surface integral equation and the other one is an integral equation which imposes water surface condition along the wetted surface boundary so called spray root line. The second integral equation is shown by Matsumura et al. and they solved equations under the high aspect ratio approximation. In this study, the integral equations without approximations based on high or low aspect ratio assumptions are solved numerically and it is applied for practical planing ship flow calculation in fixed condition. The obtained wetted surface area and pressure distribution on hull surface are agreed well with experimental results.

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