Hydrodynamic Software Suites

Making Design Concept Evaluation More Efficient

BY ARNO BONS

To support designers and engineers in evaluating design concepts more efficiently, MARIN has developed the hydrodynamic suites QSHIP and QPROP.

Hydrodynamic considerations have a great impact on the operational performance of a ship during its lifetime. For this reason, it is important to integrate hydrodynamic analyses as early as possible into the ship design phase. Improving powering, seakeeping and maneuvering performance may have a major impact on design aspects such as the capabilities and General Arrangement plan. Improving hydrodynamic performance at more advanced stages of the design is hardly possible. This led MARIN to develop the hydrodynamic suites QSHIP and QPROP.

Both QSHIP and QPROP are Quaestor based, which is a computational modeling system applied in a variety of design and analysis applications in the shipbuilding and offshore industry. The workflow of MARIN's Quaestor-based suites provides guidance and ease-of-use for complete chains of pre-processing, hydrodynamic calculations and post-processing.

QPROP is an advanced propeller design and analysis suite. The required resistance and propulsion characteristics for the displacement ships are predicted by the integrated DESP program. DESP predictions are based on formulas obtained from regression analyses on data from MARIN model experiments and sea trials.

QPROP greatly reduces the time spent on iterative propeller design, analysis and reporting activities as all of the incorporated tools make use of the same pool of project related input data and (intermediate) results.

QSHIP forms a workflow around the frequency domain program SHIPMO for the prediction of ship motions in a seaway. SHIPMO is based on 2D linear diffraction theory – known as strip theory - and theoretical empirical formulations of the viscous roll damping coefficients. The Response Amplitude Operators (RAO), as a result of a SHIPMO calculation, can be visualised with the RAO viewer, which is also included in QSHIP. With the integrated, Operability Viewer the user can easily see the effects of climate, sailing direction, speed and any predefined criteria.

Both suites provide automated data exchange between the included software and reduce the time-to-market for new designs. With hydrodynamic tools, designers can focus on analysing a variety of design concepts in a convenient and efficient way.

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