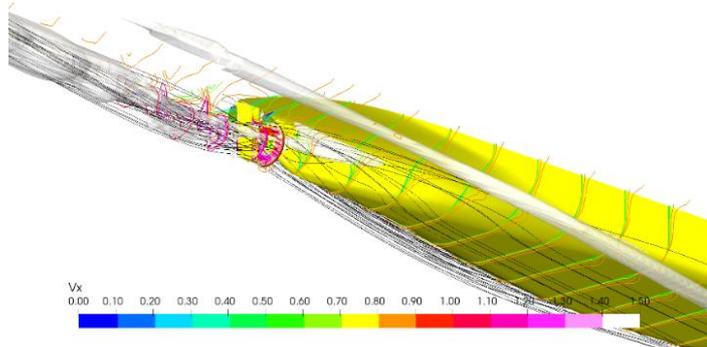


Recent Research: MARIN Research: Propellers, Seakeeping & Manoeuvring with Wind Propulsion

During the Wind Propulsion conference in November at RINA in London, MARIN presented some of its recent research work.

In wind propulsion, apart from the forward thrust, also a side force is generated. This is compensated by the hull and appendages, resulting in a leeway angle. Even due to small leeway angles the inflow to the ship's propeller can change significantly, mainly due to vortices passing the propeller plane. This can consequentially change the propeller efficiency, the propeller delivered power and cavitation inception. MARIN planned research to look specifically at the performance changes due to leeway for one twin-screw vessel and three



single screw vessels with a gondola stern. The results show that indeed the propeller efficiency and delivered power change. Depending on the propeller rotation direction and leeway to port side or starboard, the performance can improve or worsen. However, the average effect of leeway is a loss in propeller performance. However, often a propeller may operate at lower loading in a wind assistance scenario. It is known that for most propellers, a lower loading will result in a higher propeller efficiency, potentially compensating for the loss due to leeway. The study also showed how these effects can be predicted in the design stage.

Moreover, MARIN is active to evaluate the impact of wind assistance on the seakeeping and manoeuvring of ships. To this end, MARIN recently evaluated a novel test set-up where aerodynamics and hydrodynamics are directly modelled in the laboratory: a unique combination of a model test basin and a (simplified) wind



tunnel. The test set-up was evaluated regarding its usefulness and accuracy. Calculations were done in parallel to quantify the impact of some simplifications adopted in the test set-up. The test results indeed indicate that the seakeeping and manoeuvring behaviour of ships change wind assistance. Besides this novel test set-up, the alternative set-up of applying aerodynamic forces with dynamically controlled winches in a basin test remains practical to use.

The MARIN conference papers will shortly be available at <https://www.rina.org.uk/>. For any question or remark, please contact the authors J.J.A.Schot@marin.nl (propeller efficiency) and R.Eggers@marin.nl (seakeeping and manoeuvring).