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MARIN has an acknowledged place as one of the world's leading hydrodynamic testing facilities. But as Professor Gert Kuiper, Senior Researcher R&D projects, told MARIN Report, its ability to develop new research tools is no less significant.

Advancing the tools of the trade

One stimulus to develop tools is for use by MARIN itself, but its research wing often works very closely with clients, and also with other similar hydrodynamic institutions. Although the business of R&D is a surprisingly competitive one, and there is often pressure for MARIN to lead the international field, coming up with new tools before the rest of the hydrodynamic pack. For Prof. Kuiper one current 'hot' item is in the field of propulsion, as he explains: "I think there are distinct possibilities for improved control of the consequences of cavitation, the major obstacle in ship design in recent years."

Those worrying consequences are vibration, corrosion and noise. "One of the new tools we're developing at the moment is a calculation method for unsteady sheet cavitation on propellers, which is the basic source of vibration. This computational tool might lead us to the prediction of the precise excitation forces of a propeller." Computational techniques are edging ahead in two ways, he notes: "We've seen improvements in computer capacity, but this is not the limiting factor, as computer power is not that expensive. The key issue in calculation is always how you describe the physical phenomena which are occurring." He added: "These phenomena are so complex that there has been the need in the past to simplify considerably. Now that computational capabilities for cavitation have increased, we're on the verge of having a breakthrough in the computational field, and with the trend for experiments to become more complex by improved computational tests, we're able to concentrate on very specific aspects, such as flow fields, instead of just torque measurements." He concludes: "Every time you make a computational breakthrough, it's back to the test tank - there are so many physical properties that have to be measured and fully understood."

Gert Kuiper: "We're on the verge of having a breakthrough in the computational field."

Vibration prediction

There are several lengthy and detailed stages to the often laborious research work: "We have potential theory, in which we ignore viscosity in fluid, and with this we can probably have an improved calculation of dynamics in a few years. In fact, with the new Depressurised Towing Tank we will improve our physical testing environment considerably. All this will be especially applicable for faster ships - including for those carrying heavy loads, or ships with a high displacement." Another important research area is in the field of vibration prediction. Says Prof. Kuiper: "I think in a few years, we will be able to have significantly more accurate prediction of forces on a hull and with the new Depressurised Towing Tank, MARIN has at its disposal a far better tool for validation of these predictions at model scale." MARIN