

Captive manoeuvring model tests

To derive high-fidelity models for manoeuvring predictions and simulator training

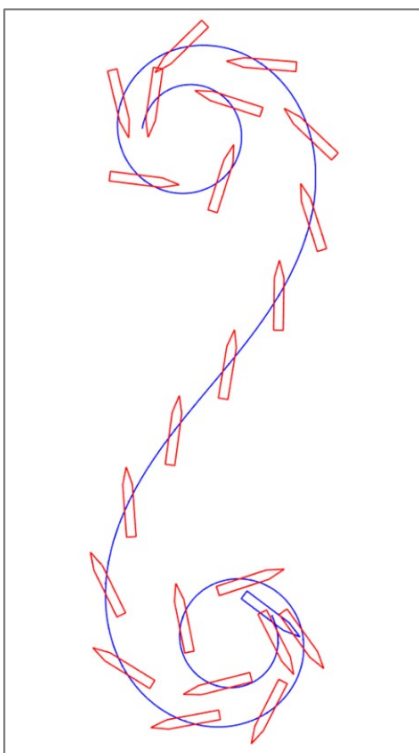
With increased size and complexity, new ship designs require extensive manoeuvring studies and captain training to guarantee safe handling once in operation. To do so, MARIN combines the best of experimental and numerical worlds: performing manoeuvring captive experiments to derive high-fidelity simulation models, and implementing these models to carry out manoeuvring predictions and captain training in simulators. This approach improves design insights, increases training quality, and minimises risks in operation.

We provide services for

- ship owners and operators
- shipyards
- design offices
- local authorities

Unique experimental capabilities...

Captive manoeuvring model tests designate the measurement of a ship's hydrodynamic loads under a large range of imposed motions in a fully controlled environment. A scale model of the ship is fixed to the moving carriage of one of MARIN's large basins, which imposes pre-defined motions and actuator controls. While the carriage pulls the ship model along a given track, the manoeuvring loads applied to the ship and its actuators are recorded. The figure on the left represents an example of track prescribed by the carriage, towing the ship model through the basin.



The flexibility and large size of MARIN's basins enable a wide variety of imposed motions, actuator controls, and sailing conditions. The Seakeeping and Manoeuvring Basin measures 170m x 40m and is appropriate for deep-water tests. Experiments in shallow water are performed in the Offshore Basin, which measures 35m x 40m and features a movable concrete floor to adjust the water depth. More dedicated applications can be carried out in other facilities, such as the Shallow Water Basin or Concept Basin.



Related services

- detailed ship design
- fast-time simulations
- full-mission bridge simulator
- harbour manoeuvring
- towing operations



Our mission

MARIN is a globally recognised top institute for hydrodynamic and nautical research. Our mission is 'Better Ships, Blue Oceans': we stand for clean, smart and safe shipping and sustainable use of the sea.

We do this as an independent knowledge partner for the maritime sector, government and society.

For more information contact MARIN:

Ships

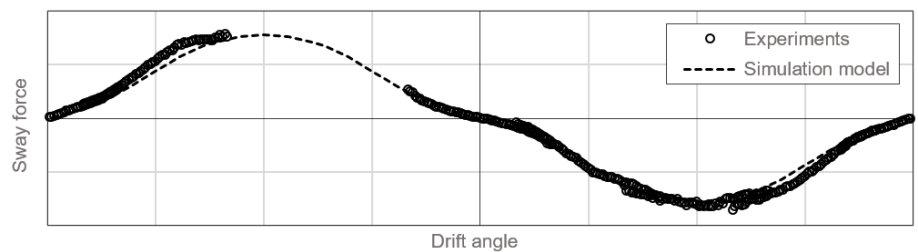
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... to derive high-fidelity simulation models...

MARIN analyses the captive manoeuvring experiments to create a high-fidelity simulation model. Unlike traditional approaches based on generic coefficients, such a mathematical model is fully tailored to the ship or offshore structure. Indeed, it is based on experimental results with the actual ship geometry. It includes an accurate description of the hull and its appendages, using MARIN's latest developments.

Captive experiments provide the best-quality data for simulation models, and are free from numerical approximations. The final model is extensively validated against the experimental results to ensure the best accuracy. The figure below illustrates how a mathematical model can look like.



... for more realistic predictions and training in simulators

Once the high-fidelity model is designed, it can be implemented in our simulation tool for advanced manoeuvring predictions and captain training. These can be done in fast time to study many scenarios, or in real-time in one of MARIN's bridge simulators involving the human factor.

Using an experiment-based simulation model greatly improves the quality of simulations. These will provide more accurate manoeuvring performance, and increase the quality and realism of simulator training, minimising risks in operation.

