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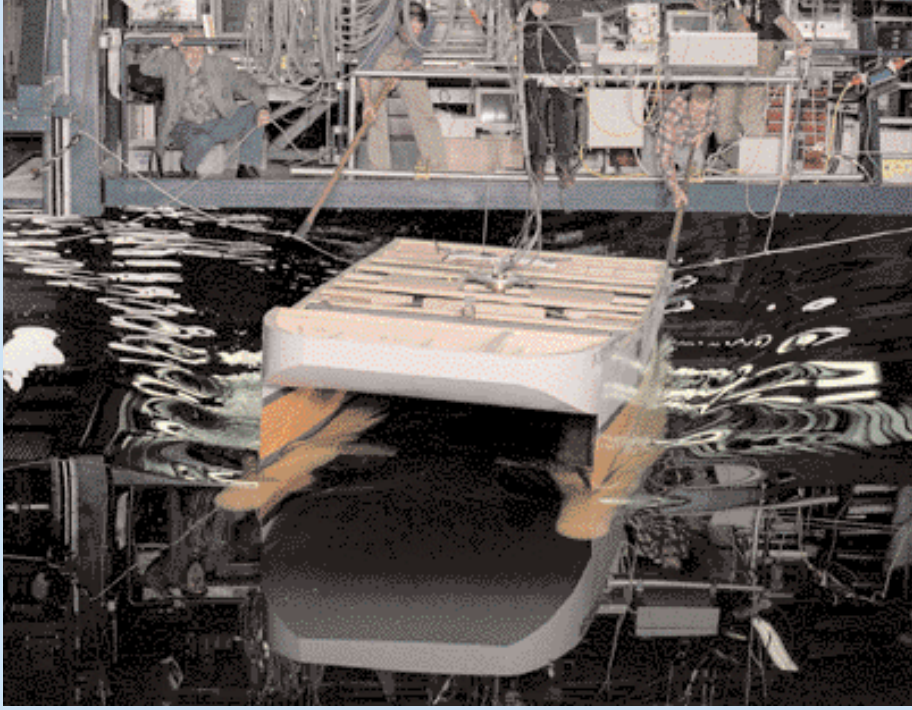

SWATH model during turning circle test.

Undeniably, the SWATH concept offers considerable freedom in design - a freedom that, when used properly, yields a platform facilitating exceptional seakeeping. However, this same freedom, in combination with limited practical operational experience, can lead to uncertainties regarding the performance of a particular design. Tests with a complete, free-running and self-propelled scale model in the most demanding combinations of speed, heading and wave conditions are necessary to eliminate these uncertainties convincingly.

MARIN assists Thyssen Nordseewerke in rigorous examination of SWATH design where seakeeping and manoeuvring ability come under the spotlight.

SWATH comes under scrutiny

In March 2001, Thyssen Nordseewerke consulted MARIN regarding a 61 m SWATH design for the German Navy. This contact led to a test program in which both manoeuvring and seakeeping were verified. In view of the limited project time, an existing large size model was used in MARIN's Seakeeping and Manoeuvring Basin.

Manoeuvring questions answered

Due to their basic configuration and lay-out, SWATH ships are very straight-line stable vessels with limited steering force, as the rudders aft of the struts are not located in the propeller slipstream. The examination focused on how sufficient steering force can be generated in order to manoeuvre safely and have adequate coursekeeping characteristics.

The above issues were addressed with free running zig-zag manoeuvres and turning circles. Tests were performed with a conventional and a flap rudder, showing that the latter was the most adequate configuration to fulfil the manoeuvring criteria. Stopping tests were carried out to verify the longitudinal stability during crash stop manoeuvres.

Seakeeping tests

Major focal points of seakeeping tests were the vertical motions and related airgap requirements in head and following seas, the coursekeeping in stern-quartering seas and the longitudinal stability at non-zero speed.

The test program was prepared with the PRECAL-SWATH code developed by the Cooperative Research Ships (CRS). The code was then used to check the airgap requirements, the optimum fin arrangement and the merits of active fin control.

The test program continued with tests in calm water to establish the effective longitudinal stability at non-zero speed. Tests in irregular waves, with emphasis on following and stern-quartering seas, were also carried out to verify its performance. They showed that the airgap was adequate in the design conditions and the coursekeeping proved very satisfactory. Active fins proved to be beneficial, especially when it came to reducing the pitch in following and stern-quartering seas. MARIN

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