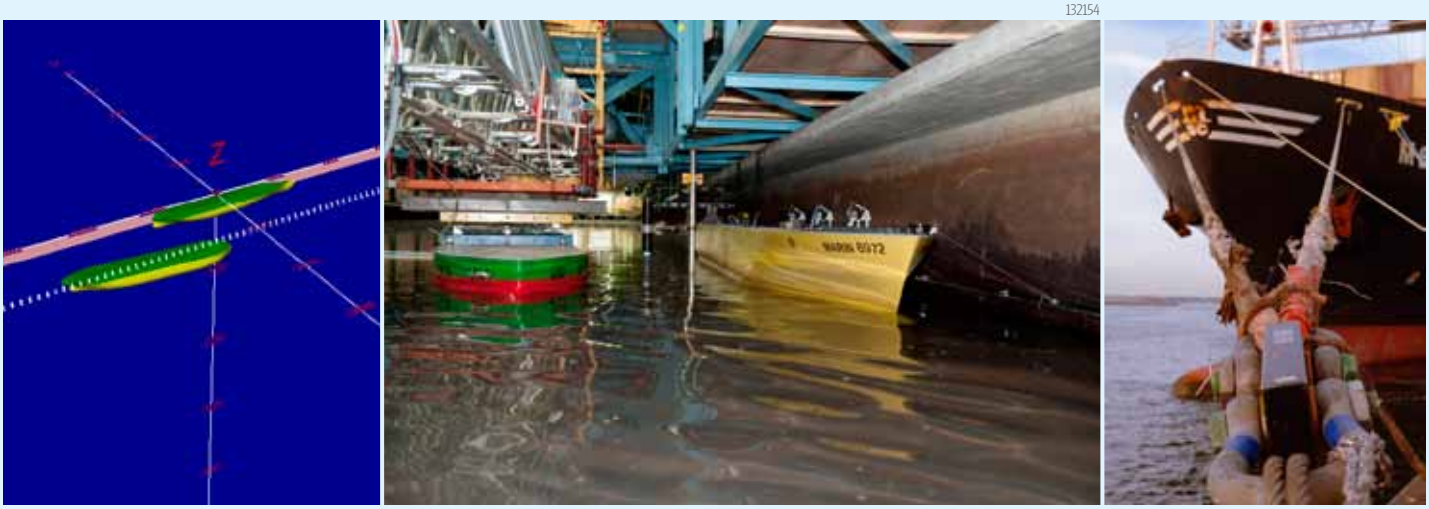

132154

Passing ship effects: simulations, model tests and full-scale measurements

MARIN examines effects of passing ships

Model tests to investigate the effects of passing ships are performed in MARIN's Shallow Water Basin.

Moored ships experience suction effects from passing ships. This effect increases with the size and speed of passing vessels in restricted water. A passing event may lead to excessive motions, interruption of loading and offloading operations or even mooring line failures. A thorough understanding of this effect and the possibility of predicting motions are important for both safety and for the economics of loading/discharging operations.

The Joint Industry Project ROPES is developing a potential theory computer model to calculate the excitation of moored vessels caused by passing vessels. This tool is being extensively validated by a combination of full-scale measurements and controlled laboratory tests. (Full-scale measurements in the Port of Rotterdam were illustrated in Report 103.)

Model tests have been performed at Flanders Hydraulics Research and Deltares will investigate different port geometries and the effect of currents. At MARIN, model tests with relatively large-scale models were performed in the Shallow Water Basin.

When passing ships sail under a drift angle or when the keel clearance is small, viscous effects are expected to be important, therefore model tests were performed for a range of drifting angles and passing speeds.

Reliable tool During the model tests a container vessel was moored to the basin wall to mimic a quay, similar to the situation shown in the picture above which was taken during the full-scale measurements. In close cooperation with the Rotterdam boatsmen and a supplier of mooring lines, a representative mooring system consisting of head, stern, breast and spring lines and fenders, was modelled. The motions of the moored vessel, loads in the line and loads in the fenders were measured.
In addition, tests were performed with the vessel rigidly fixed at a certain distance from the basin wall, which enabled MARIN to accurately measure the forces acting on the vessel. These loads could then be directly compared with the results of the computations.

With this extensive set of data from model tests and full scale measurements combined with contributions from the participants we now have a unique set of data to validate the computer model and deliver a reliable tool to the JIP partners.

Willemijn Pauw
w.pauw@marin.nl