SAILING THROUGH A SHALLOW SEA

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In contrast with the wide horizon seen while standing on the Belgian coastline, the North sea is not as deep or wide as may be expected at the point of view of large seagoing vessels. These vessels sail through manmade fairways such as Het Scheur and Pas van het Zand with an under keel clearance (distance between ship's keel and seabed in terms of percentage of the ship's draft) of 15% or less, and only a few ship's beams separated from the borders of the dredged section.

Compared to the increase of the main dimensions of seagoing ship types like container carriers, LNG-carriers and RoRo vessels during the last decades, the dimensions of the access channels called by these vessels did not increase at the same rate. As a result, the behaviour of ships arriving at or departing from harbours will increasingly be influenced by the fairway's restrictions.

Because of the vicinity of banks, as horizontal restrictions of the fairway, an asymmetric flow around the vessel is induced. This asymmetry causes pressure differences between port and starboard sides. As a result, a lateral force will act on the ship, mostly directed towards the closest bank, as well as a yawing moment pushing her bow away from the channel boundary. The proximity of banks increases the blockage (ratio between the midship section and cross section of the fairway) as well as the vessel's resistance and sinkage. A reliable estimation of all these phenomena, known as bank effects, is important for determining the limiting conditions in which a ship can safely navigate a waterway. A comprehensive research project is being carried out at Flanders Hydraulics Research (Flemish Government, Antwerp, Belgium) in cooperation with Ghent University. This project consists of over 10000 captive model tests carried out in the fully automated towing tank for manoeuvres in shallow water [1].

Based upon these test data a mathematical prediction model is created and implemented in the ship manoeuvring simulators of Flanders Hydraulics Research. These virtual ship's bridges are extensively used for training purpose of the Flemish pilots and for research to support the Flemish admittance policy.

References
www.BANKEFFECTS.UGent.be