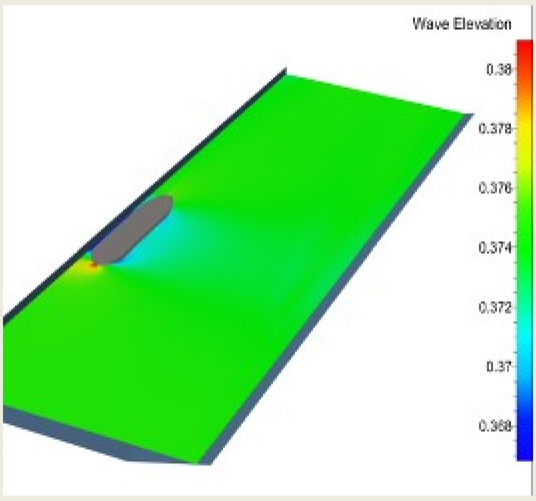
This is the sixteenth newsletter of the *Knowledge Centre Manoeuvring in Shallow and Confined Water*, which aims to consolidate, extend and disseminate knowledge on the behaviour of ships in shallow and confined water. In this newsletter, we present an item on the first Triple-E class container vessel arriving at the Port of Antwerp and a second item discussing our recent CFD activities. We wish you a Merry Christmas and all the best for the New Year.

On October 19th the first Triple-E container carrier, the Mary Maersk, arrived at the Port of Antwerp. The arrival of the world's largest ship was preceded by a study executed at Flanders Hydraulics Research in cooperation with the Flemish and Dutch pilotages and the Flemish and Dutch Governmental Agencies. The real-time simulations executed at the full mission bridge simulators SIM225 and SIM360 revealed that manoeuvres were feasible in the access channels to the Port of Zeebrugge and on the Western Scheldt to the Port of Antwerp. Even meetings between these two gigantesque container carriers were examined under different weather and tidal conditions upbound of the bend of Hansweert and the results showed safe passings on condition that some additional measures are taken nearby the bend of Bath.

The most crucial part of the simulation study was the validation of the manoeuvring mathematical models of the Triple-E 18,000 TEU container carriers. Relevant information of the ships before their delivery was provided by Maersk Sealand. At Flanders Hydraulics Research two versions of the manoeuvring mathematical models were developed as some uncertainty remained about the shallow water behaviour of these carriers due to a lack of experimental data in shallow water. A first version corresponded with the data provided, while a second version was for the shallow water behaviour based on the many years' experience of the Knowledge Centre Manoeuvring in Shallow and Confined Water. During the simulation study, which was executed from January to March 2013, the more course stable first version of the simulation model was used. A one way trip from and to the Flemish ports without meetings with other Ultra Large Container Ships was feasible, while the procedures for a two-way trip with meetings between two Triple-E's had to be adjusted near the bend of Bath, which is the narrowest bend on the Western Scheldt.

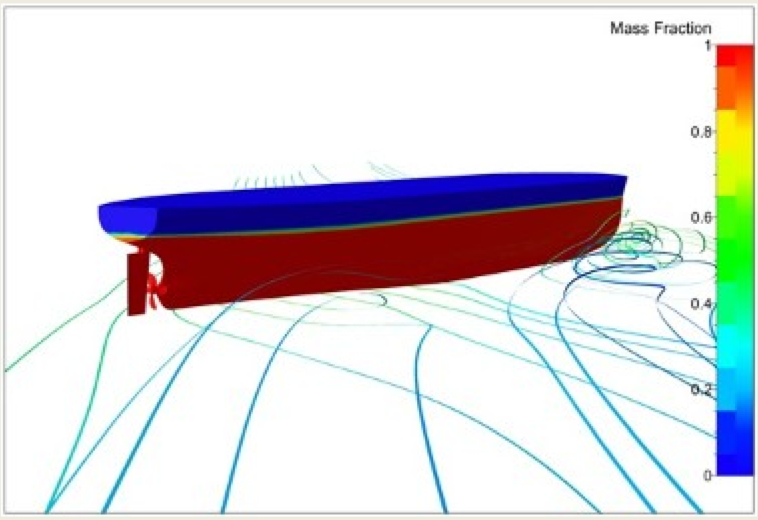
With the delivery of the first Triple-E, the simulation models could be further validated, based on the IMO required standard manoeuvres at ballast condition and the overall experience of the captains of Maersk Sealand with these ships. It turned out that the real ship was manoeuvring better than what was predicted by the first version of the simulation model. The Flemish pilot who was responsible for the first arrival of a Triple-E in Antwerp, trained the day before the arrival on the full mission bridge simulator SIM360 with the second version of the simulation model. After a successful trip, he could confirm that the simulation model was close to reality. The special conditions imposed by the Common Nautical Management for the first trial are now under further investigation in order to decide what will be the inbound and outbound regulation for the world's largest container carriers.

By its international involvements, such as the ITTC and the NATO Science and Technology meetings, the Knowledge Centre keeps an active interest in the developments that take place within the Computational Fluid Dynamics (CFD) world. This exciting field of research offers the opportunity to study specific hydrodynamic problems which are difficult or impossible to study by experimental means. In addition, due to the relative short computing times, CFD can be used as a practical and cost-effective alternative for one-off experimental research. With decreasing costs of computing facilities and improvements in numerical algorithms, more complicated configurations can be tackled by CFD.



However , shallow water conditions and confined environments are still a challenge. The interaction with a nearby bottom or wall leads to a highly complex flow, which requires a much finer mesh in certain critical areas and thus longer computing times.

In order to contribute to this area of research, the Knowledge Centre uses the CFD software package FINE™/Marine developed by NUMECA. The turbulent air-water flow around a vessel is computed with the Reynolds-Averaged Navier-Stokes equations. Initial research focused on recreating experimental cases that were investigated in the towing tank at Flanders Hydraulics Research, such as ship-bank interaction and ship-ship interaction. Currently, research focuses on the behaviour in shallow water of ships with a drift angle of 30 degrees. The figure at the right shows the mass fraction on the hull and streamlines to visualize the massive separation region that originates at the bow in this condition.



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