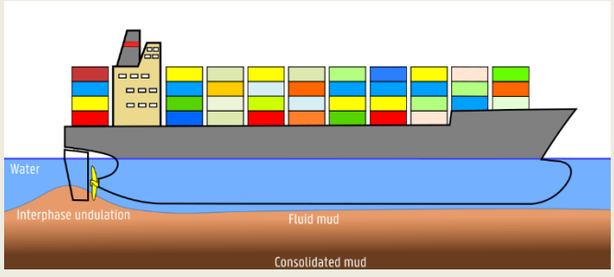
This is the 47th newsletter of the *Knowledge Centre Manoeuvring in Shallow and Confined Water*, which aims to consolidate, extend and disseminate knowledge on the behaviour of ships in shallow and confined water. In this newsletter, we present an item on the research we are carrying out to study the influence of mud layers at the bottom of navigation areas on the accessibility and navigability of these waterways.

The formation of mud layers on the bottom of navigation areas, such as access channels and harbours, may result in serious issues with respect to the accessibility and navigability of these waterways. PIANC, the World Association for Waterborne Transport, defines the nautical bottom as "the level where physical characteristics of the bottom reach a critical limit beyond which contact with a ship's keel causes either damage or unacceptable effects on controllability and manoeuvrability". This concept is applicable to any bottom for guaranteeing safe shipping traffic. Due to the complex structure and behaviour of mud, it is difficult to find a straightforward physical limit which is relevant for ship controllability and manoeuvrability, and for which a clear, simple and unequivocal survey technique is available.



The Nautical bottom project granted by Research Fund - Flanders (FWO) is a joint Ghent University and KU Leuven research project in collaboration with Flanders Hydraulics Research, which runs from 2019 to 2022. The objective is to develop a numerical methodology to calculate the interaction between water, natural mud and a moving object, which will lead to a better understanding of the physical reality in such cases.

Flanders Hydraulics Research supports the project by providing access to equipment for nautical and sedimentary research and substantial inputs from former projects, dedicated to fluid mud behaviour and ship behaviour in muddy navigation areas. The experiments will focus on the study of bluff bodies moving through stratified flow where the different densities of water and mud are taken into account. The flume used for these experiments is 18.5 m long and will be filled with water and natural mud from the Port of Zeebrugge. Tests at different velocities and at various under keel clearances will be executed. Load cells and pressure sensors installed in the carriage and the towed object will measure the hydrodynamic forces acting on the body. Additionally, the pore pressure of the mud layer will be monitored at 5 levels. The evolution of the mud layer properties will be monitored through continuous sampling and rheological measurements throughout the test plan. Validation and verification computations will be performed using the newly developed solver and the final outcome will be implemented in real time simulations to incorporate the effect of natural mud in manoeuvring models.

The results of the project will lead to a better understanding of the propulsion and manoeuvring of ship in muddy navigation areas, but will also stimulate the development and improvement of measurement techniques and dredging methods in such areas.

Researchers associated with the Knowledge Centre recently published:

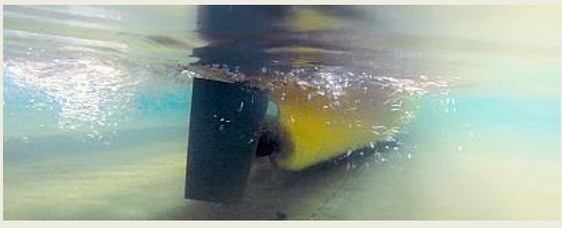
Mansuy, M.; Candries, M.; Eloot, K. (2021). Nautical Access Study Based On Real Time Bird's Eye View Simulations. TRANSNAV, Vol. 15(1). DOI: 10.12716/1001.15.01.04

Chen, C., Delefortrie, G. and Lataire, E. (2021). Effects of water depth and speed on ship motion control from medium deep to very shallow water. Ocean Engineering, Vol. 231: 109102.

Marc Mansuy discussed his paper entitled '' Nautical Access Study Based On Real Time Bird's Eye View Simulations" at the TransNav 2021 conference, which took place online from 16-18 June 2021.

Guillaume Delefortrie attended the 29th International Towing Tank Conference which took place between 13 and 18 June online. Djahida Boucetta was elected member of the Specialist Committee on Cavitation and Noise.

On 22 June, Changyuan Chen defended his PhD thesis on "Numerical and Experimental Study on Ship Motion Control Systems in Shallow Water" at Flanders Maritime Laboratory in Ostend.



A second call for abstracts has now been launched for the 6th MASHCON conference, which will be held in Glasgow from 22 to 26 May 2022. The conference will have a non-exclusive focus on port manoeuvres, where several shallow and confined water challenges are present. A lot of these manoeuvres occur in the vicinity of moored ships, leading to passing ship effects on moored ships.

Papers which focus on the comparison between the output of numerical models and benchmark model test data are encouraged. Specifically for the 6th MASHCON conference, a new set of benchmark data containing selected model test data which were obtained during the PESCA (Passing Effects in Shallow and Confined Areas) captive model test program, which was executed in the Towing Tank for Manoeuvres in Confined Water at Flanders Hydraulics Research. The captive model tests present results with the KCS as passing ship and a Neo-Panamax container carrier and an Aframax tanker as moored ships. The benchmark data and accompanying explanatory paper have been updated to include the ship models in numerical form and are available upon simple request.

Authors are invited to submit an abstract of 250 - 300 words to info@shallowwater.be before 30 September 2021. Once accepted, authors will be expected to write and present a full paper, which will be reviewed by the international scientific committee.

The 6th MASHCON conference is organized jointly by the University of Strathclyde, Ghent University and Flanders Hydraulics Research.

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