No 4 - Dec. 2014

This is the fourth newsletter of the Knowledge-building Project for the Industry "Sea Trials and Model Tests for Validation of Shiphandling Simulation Models" supported by Research Council of Norway. This project aims to improve present validation methodology for shiphandling simulation models. It includes captive and free-sailing model tests as well as sea trials with selected case vessels. The fourth newsletter describes activities taking place in the period May – December 2014 and a brief description of planned work for the first half of 2015.

Activities ongoing in May – December 2014

Case vessel R/V Gunnerus

Continued analysis of the first set of Gunnerus sea trials

NTNU has worked on uncertainty of sea trials used for validation of ship manoeuvring simulation models. PhD student Sergey Gavrilin shows in his work that repeated tests under relatively calm environmental conditions can have large uncertainties. He has investigated outcomes of IMO standard manoeuvres. The application of IMO's correction procedure for a turning circle is shown in Figure 1. In addition to analysis of sea trial results Gavrilin has studied how the 6 DOF simulation program VeSim can be used to investigate model uncertainty using Monte-Carlo techniques. Here uncertainty distribution of environmental input parameters has been applied.

Work done at MARINTEK

MARINTEK has started analyzing the model and full-scale tests with Gunnerus. Preliminary analyses of the planar motion mechanism (PMM) tests were conducted in order to identify a manoeuvring model of Gunnerus were conducted. This work is intended presented in OMAE 2015 where two draft papers are prepared and entitled "Time domain simulation model for research vessel Gunnerus" and "Identification of nonlinear manoeuvring model tests for marine vessels using planar motion mechanism tests".

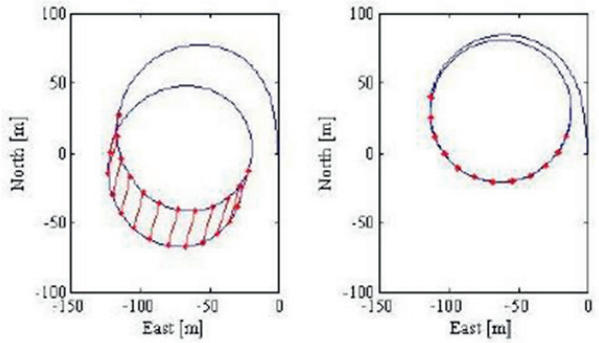

Figure 1 Comparison of raw data and data using IMO turning circle correction procedure for a turning circle

Case vessel LNG ferry Landegode

Additional PMM tests

Preliminary analyses of the PMM model tests conducted with the ferry Landegode showed that some additional tests were needed to fulfill the preparation of the manoeuvring model. The identification of the manoeuvring model parameters will be performed early next year, together with time domain simulations using VeSim.

Master thesis by NTNU student

Development of a simulation model was the topic for a Master thesis by a NTNU student (Andreas Rolland Moss – Simulation model for MF Landegode, delivered June 2014). The simulation of the manoeuvres was carried out using the simulation model VeSim. For the standard IMO tests deviation between simulated and measured parameters was in the range of 20- 50%. The model was prepared using the standard setting for hydrodynamic coefficients as the outcomes from the PMM tests were unavailable during the thesis work.

Simulation model at Bodin

In August, MARINTEK met Torghatten Nord together with Rolls-Royce Marine and Bodin Videregående skole og Maritime fagskole (Bodin) to discuss the results from the sea trials and preparation of simulation models. Torghatten

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Nord uses Bodin's simulator as a training resource for their navigators. Results from standard IMO manoeuvres turning circle and zig-zag tests were discussed, as well as newer low speed tests defined by ISO. Prior to the meeting, Bodin had received requested data from the tests in order to tune their Kongsberg simulation model.

Case vessel Offshore support vessel Island Condor

PMM test analysis

Some initial analyses of the PMM data from the tests in May are conducted. However, more work remains to finish the identification of the hydrodynamic characteristics. Work will be continued early next year.

Sea trials

After the vessel was delivered from VARD Brevik project personnel (in total 8 persons from MARINTEK, NTNU and Rolls-Royce Marine) embarked the vessel to prepare the sea trials. They were performed on 15th and 16th November while the vessel was on route from the shipyard to Stavanger. The weather conditions prevented calm water tests. Test program included speed tests, low speed thruster tests, standard manoeuvres such as turning circles and zig-zag tests. We thank the ship crew for their support, especially Captain Øystein With and Chief Engineer Svein-Ove Lingjerde. During the tests data from the ships own instrumentation was collected from the ship's DP system. This was made possible through very good assistance from the DP provider Maritime Technologies LLC. Thanks to Tore Flobakk, Håvard Hellvik and Sveinung Tollefsen from Maritime Technologies.

Figure 2 Island Condor at quay in Stavanger.

Meeting with Singapore Maritime Academy

A brief meeting was held as part of the RCN – MPA MOU in Trondheim during the MTEC Conference late October 2014.

Dissemination activities

Ørjan Selvik presented the project at Maritime- Port Technology and Development Conference 2014. The presentation title was: "Sea trials for validation of shiphandling simulation models – a case study". Project partners (MARINTEK/ NTNU/Flanders Hydraulics Research/Gent University/ University of Sao Paulo) have prepared several manuscripts for the OMAE2015 conference in St. Johns, Newfoundland.

Planned activities for January – June 2015

Early next year analyses of the PMM tests with Gunnerus, Landegode and Island Condor will be done. Further, the papers for OMAE 2015 will be updated based on reviewer comments. A report with results from the sea trials with Island Condor will be prepared, and the results will be discussed with Island Offshore, Rolls-Royce Marine and Marine Cybernetics. Meetings to discuss the results of sea trials and simulations outcomes will be held with the ship owners. At these meetings, the possibility of additional sea trials with Landegode (harsh weather) and Island Condor (calm water) will be discussed.

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