part has studied the outcomes of the IMO standard turning circles and zig-zag tests. During the calm water tests in Trondheimsfjorden the wind speed was relatively stable in the range of 4 – 7 m/s. A wave and current buoy were moored to the sea bottom in the predefined test area. Wave height was typically 0.1 – 0.3 m that corresponds to sea state 2. The most changing effect was current (both direction and speed). Hourly measurements of current direction during second day of trials (from 8 am to 8 pm) are present ed in Figure 1. Current speed was in the range 0 – 0.5 m/s. Both tides and two rivers inflowing to the fjord near the test area influenced currents.

As can be seen in Table 1 there were some variations in the measured first and second overshoot angles of the 10°/10° zig-zag test. The variation is partly due to variations in environmental conditions during the tests, resolution of bridge indicators and the accuracy of the control system (rudder angle). A further analysis of the data will be presented in a paper for the MTEC conference in Trondheim (October 2014).
Free sailing tests with Gunnerus

In March 2014 free sailing tests with R/V Gunnerus were conducted. The tests were done in MARINTEK’s Ocean basin. The tests consist of standard IMO manoeuvring tests as zig-zag, turning circles and spiral tests. Further, the effect of varying the tow rope force were investigated due to the fact that there are questioned if manoeuvring model tests shall be conducted on the model self-propulsion point (MSPP) or ship self-propulsion point (SSPP).

Table 1 Results of 10/10 zig-zag tests (5 to port and 7 to starboard)

<table>
<thead>
<tr>
<th>Direction</th>
<th>1st OA</th>
<th>2nd OA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean [deg]</td>
<td>port</td>
<td>starboard</td>
</tr>
<tr>
<td>σ [%]</td>
<td>7.24</td>
<td>9.89</td>
</tr>
</tbody>
</table>

In May 2014 captive PMM model tests with a model of Island Condor were conducted in MARINTEK’s large towing tank using a yacht dynamometer mounted on the hexapod system on the seakeeping carriage.

Analysis of Landegode sea trials and PMM tests

Currently MARINTEK is working on the analysis of both the sea trials and PMM model tests that were conducted with M/F Landegode in 2013. Results from VeSim simulations using manoeuvring coefficients derived from the PMM tests will be compared with the results from the sea trials. A NTNU student has also been working with simulations of M/F Landegode as part of his master thesis.

Meeting with Singapore Maritime Academy

Kourosh Koushan met Singapore Maritime Academy representatives as part of the RCN – MPA MOU meeting in Singapore on 9th April.

Planned activities for May – December 2014

Project partners will have separate meetings with shipping companies operating the project’s case vessels. It is planned to arrange two workshops, one to finalize the state-of-the-art study of validation methods and one on performing manoeuvring sea trials. The 3rd Steering Committee meeting will be held mid-June at Flanders Hydraulics Research in Antwerp. Announcement of the PostDoc position will take place in June after the Steering Committee meeting.

The first conference paper based on project results has been accepted for presentation at International Maritime-Port Technology and Development Conference (MTEC 2014) in Trondheim 27-29 October 2014.

Sea trials with Island Condor are scheduled for late November 2014.

Representatives from the project plans to participate in the SIMMAN 2014 workshop in Copenhagen in December 2014.

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