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D4.1 Report on physical model experiments with ship model

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<p>Abstract: This deliverable D4.1, “Report on physical model experiments with ship model” consists of several parts. Each part describes a set of physical model experiments aiming at characterizing stochastic process of the time it takes for the vessel to capsize/sink after a hull breach event. The tests have been carried out at SSPA Sweden AB in the Maritime Dynamics Laboratory. A RoPax vessel model in scale 1:40 was used in all tests. A two compartment damage was modelled in all test series:</p> <p>Part 1, D4.1a, is a test report of a series of tests performed with a free drifting model at beam-on-to-waves and the results.</p> <p>Part 2, D4.1b, is a test report of a series of tests performed with a soft moored model at stationary beam-on-to-waves and the results.</p> <p>Part 3, D4.1c, is a test report of a series of tests performed with a model at stationary and at 2 knots towing speed head-on-to-waves and the results.</p> <p>This cover document includes also a summary of all tests carried out and the conclusions that can be made regarding the stochastic process of the time it takes for the vessel to capsize/sink after a hull breach event.</p>	

EXECUTIVE SUMMARY

A set of physical model experiments aiming at characterising stochastic process of the time it takes for the vessel to capsize/sink after a hull breach event has been carried out at SSPA Sweden AB in the Maritime Dynamics Laboratory. A RoPax vessel model in scale 1:40 was used. A two compartment damage was modelled.

Model tests at three different tests setup were carried out.

- free drifting at beam-on-to-waves
- soft-moored model at beam-on-to-waves
- towed model at head-on-to-waves at stationary and at 2 knots towing speed

The aim of the first tests series was to determine the probability of capsize within 30 minutes in different sea states when the model was free to drift with the waves. 83 tests were carried out in waves with significant wave height ranging from 2 to 3 m.

In order to get more information about the time to capsize, up to three hours, for the lower wave heights, 2 m and below, the second set of tests were carried out. In the tests the model was kept in position by means of a soft mooring system. These tests showed considerable different results than for the free drifting model due to the constraints that the soft-mooring system was put on the model. Six tests were carried out in 1.5 m and 2.0 m significant wave height.

To simulate a rescue situation with a tug boat connected to the bow of the ship a third series of tests at stationary and at 2 knots towing speed in head-on waves was performed. A total of 32 tests were carried out in waves with significant wave height between 3.5 m and 4.25 m.

The results from the different tests series are given in part 4.1a, 4.1b and 4.1c respectively of this deliverable.

The results from 4.1a and 4.1c are summarised in the figure below.

