

## Risk analysis of collision-damaged ship structures

### Background and motivation

Sweden as a shipping nation works actively and continuously for continued improvement of all types of maritime safety. Over time, Sweden has proposed important technical solutions on board ships and in their designs, but has also been involved in the development of a number of regulations, e.g. within ship stability, maneuvering, navigation and search and rescue (SAR). In the research project SHARC on the division of Marine Technology, we contribute to new knowledge and



method development for simulation and analysis of vessels damaged during collision with another vessel. The purpose is to improve maritime safety and minimize the negative environmental impact that can occur in ship collisions. This will be achieved by simulating and evaluating vessel collision scenarios with regard to the damaged ship's motions and stability, time for evacuation and rescue, emissions that pollute the sea such as oil, and risk analysis for capsizing, sinking and environmental impact.

### Objectives and goals of the project

This thesis project will contribute to the SHARC project by development of a risk analysis tool that should incorporate risks related to: (i) ship ultimate strength, (ii) ship stability conditions and (iii) emissions that pollute the sea following a ship-ship collision accident.

### Methods and tools

The students will work in close collaboration with the staff on the division that are working in the SHARC research project. The risk analysis tool should be coded in Matlab and will integrate and post-process input from the following 3 codes:

- Ultimate strength: the URSA-code developed on the division will be used as a basis.
- Ship stability: the SIMCAP-code developed on the division will be used as a basis.
- Environmental risks: SMHI has a software called Seatrack Web which is planned to be used in the project.

The former two modules are coded in Matlab while the third module requires cooperation with SMHI.

The thesis should be written in Word using a template provided by the department.

### The MSc thesis project should incorporate (at least) the following tasks:

- Literature study.
- Develop risk analysis models for risks related to (i) ship ultimate strength, (ii) ship stability conditions and (iii) emissions that pollute the sea following a ship-ship collision accident.
- Scenario-based analyses - risk analyses for a number of scenarios.
- Write a thesis report and present it on a public seminar.

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