

# Simulation model development for ship crashworthiness assessment

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## Summary

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*In this doctoral position you will develop a finite element based approach to assess the crashworthiness of ship structures in collision and grounding accidents. For accurate predictions, the model shall include the effect of surrounding fluid (external mechanics). The model development will be done with Abaqus software.*

Research field:	Mechanical Engineering
Supervisor:	Mihkel Kõrgesaar
Availability:	This position is available.
Offered by:	Estonian Maritime Academy
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

## Description

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Applications are invited for a doctoral degree (DSc) position at Tallinn University of Technology. The project involves developing a coupled simulation technique for ship collision and grounding assessment. The introduction of green renewable fuels increases the capacity requirements of ship fuel tanks compared to fossil fuels. Positioning large tanks inside the vessel poses a significant challenge because the International Maritime Organisation (IMO) prescribes minimum safe distances between fuel tanks and the ship's outer shell (sides and bottom) to protect against collisions and groundings. Alternative structural designs are permitted by IMO if the safety equivalence with conventional designs is demonstrated by the state-of-the-art non-linear finite element (FE) simulations. There is a need to develop a reliable simulation approach coupling external mechanics (ship motions) and internal mechanics (structural deformations) to assess crashworthiness and damage of ship structures, which would enable optimal design of fuel tanks. The model development will be done with FE software (Abaqus) where ship motions and structural response are evaluated simultaneously. Furthermore, simulation results will be validated at the towing tank and material lab at TalTech's Small Craft Competence Centre.

The position includes some work as a teaching assistant in courses. The expected duration of studies is four years. A contract is first made for 4 months, its extension is subject to the advance of studies and research. A salary is paid according to the salary system of Tallinn University of Technology. The minimum net salary is 13200€/year.

### **Applicants should fulfil the following requirements:**

- Master's degree in engineering, mathematics, physics, or other closely-related discipline
- solid and verifiable background in working with FE codes (LS-DYNA or ABAQUS) and programming tools (Matlab, Python or Fortran)
- high level of interest in the topic
- good writing and communication skills

A lack of experience in the abovementioned skills could be compensated by evidence of research potential. Appropriate training will be provided.

### **Applicants must provide the following additional documents and information:**

- motivation letter (maximum one A4 page): provide clear, but honest, evidence of your skills related to the position description and requirements
- abstract or summary of MSc thesis in English

- contact details of two academic referees



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