

# Numerical approach to ice-structure interaction

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## Summary

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*In this position you need to develop a numerical approach for coupled ice-structure interaction assessment for ship and offshore structures.*

Research field:	Environmental, marine and coastal technology
Supervisor:	Kristjan Tabri
Availability:	This position is available.
Offered by:	School of Engineering Department of Civil Engineering and Architecture
Application deadline:	Applications are accepted between January 02, 2023 00:00 and January 22, 2023 23:59 (Europe/Zurich)

## Description

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Doctoral position focuses on the numerical assessment of ice-structure interaction process, with the focus on fixed and anchored offshore structures. A calculation approach appropriate to the problem in-hand should be able to accommodate variable structural configurations. In the context of ice structure interaction, both the moored floating structures, bottom fixed tubular or conical structures, and free-floating bodies are in the scope of this project. This presumes that not only the ice crushing and bending process is to be captured well, but also the structural response and rigid body motions induced by the ice loads. Hydromechanics of both the ice and the structure are to be modelled. Numerical model is to be developed using non-linear finite element method and commercial codes such as LS-Dyna or Abaqus Explicit. The research will exploit experimental data from model- and large- scale experiments, that are partly conducted as a part of the doctoral research.

### Why is this research necessary

- Ice covered water are exploited more intensively
- More optimized and efficient marine structures are to be designed into waters seasonally covered by ice
- New structural configurations cannot be assessed using conventional simplified models. Thus, more universal approaches and tools are required.
- Simultaneous treatment of ice loads and structural response is required for many applications in marine engineering (vibratory response, global bending of the structures etc);
- The goals of the research correspond with the priorities of the EU (greener and safer surface transport, sustainable energy resources).

### Requirements & Qualifications

The call is open for candidates with a wide range of backgrounds inside and outside of Estonia. Most importantly, high level of interest and motivation towards, and deep understanding on, solid and computational mechanics is required. A suitable background may come from mechanical/material engineering, marine engineering, civil engineering, engineering physics, applied or computational mechanics, or related disciplines. Prior experience on working with FE codes LS-DYNA or ABAQUS is a significant advantage as well as skills with programming tools such as Matlab, Python or Fortran. The candidate should prove his/her capabilities in writing the technical report and scientific papers in high quality journals. Experience in collaborative research/publication with the existing TalTech staff is also a plus. The applicant for the position must have a Master's degree and must fulfil the requirements for doctoral students at the Tallinn University of Technology (<https://taltech.ee/en/phd-admission>).

During the assessment emphasis will be put on your potential for research, motivation and personal suitability for the position.

### Employment



The position is at the School of Engineering at Tallinn University of Technology and may include some work as a teaching assistant. The expected duration of doctoral studies is four years. Following the standard practice in the School of Engineering, the contract will be made initially for one year, then extended after a successful progress review. The salary is according to the salary system of Tallinn University of Technology.

### **How to apply for a doctoral candidate position**

The application material includes:

1. Motivation letter (maximum one A4 page, important: provide clear, but honest, evidence of your skills related to the job description and requirements above)
2. CV and other proof of scientific activity (publications, conference papers etc.)
3. A certified copy of the master's degree certificate and an official transcript of records, and their translations, if the originals are not in English.
4. An English abstract or summary of the MSc thesis.
5. Introducing two referees who can be contacted, directly.
6. Proof of proficiency in English

All material should be submitted in English.

### **Further information**

- Job locations Kuressaare & Tallinn, Estonia.
- For additional information, please contact Associate Professor Kristjan Tabri (email: [kristjan.tabri@taltech.ee](mailto:kristjan.tabri@taltech.ee)).



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