PhD Topic: Ship collision simulation accuracy and the effect on consequence prediction

Description:

Current efforts in the naval architecture are focused on reducing the overall weight to develop lighter, fuel-efficient and eco-friendly structural solution that reduce carbon emission. Along with the development of lightweight innovative structures, the safety margins are going down, while maritime traffic is increasing. Within these efforts, assessing the consequences of ship collision using simulation based design has become increasingly important. Moreover, increasing computational power has paved the way for more complex multi-step simulations where damage prediction is followed by ship survivability and/or oil outflow assessment. Consequently, number of parameters affecting the simulation outcome has increased. The effect of these developments on the reliability of simulations is unknown.

Ship survivability (in case of a ropax ship) and the size of the spill (in case of a tanker) is directly linked to the damage size used in simulations. Current regulations impose maximum damage size that must be used in simulations, which however does not fit well into a goal-based standards framework and leaves little room for optimization of structures.

The focus of this project will be to assess the accuracy of multi-step simulation tools to predict ship survivability as well as behaviour once damaged. This objective is reached by combination of simulations and model scale experiments. Theoretical modeling and numerical simulations (finite element method) will be used to estimate damage size, ship survivability and volume of the spill. On the experimental side, project involves the use of manufacturing techniques to create damaged model scale ship structures and performing experiments in the test basin under different environmental conditions. The aim is to quantify the uncertainty in numerical simulations and develop guides to overcome these uncertainties.

Requirements:

The call is open for candidates with a wide range of backgrounds 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 and skills with programming tools Matlab, C, C++, Python or Fortran is considered as a plus. The applicant for the position must have a Master's degree and must fulfill the requirements for doctoral students at the Tallinn University of Technology (https://www.ttu.ee/studying/phd-studies/admission-4/).

Closing Date and Start Date:

Deadline for this application is 31/05/2018 (applicants outside EU) and 01/07/2018 (from EU). The work contract is made starting from September 2018.

Employment:

The position is at the School of Maritime Engineering and may include some work as a teaching assistant in our courses. The expected duration of doctoral studies is four years, but a contract is first made for one year, and the extension is subject to advance of studies and research. 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 master´s degree certificate and official transcript of records, and their translations, if the originals are not in English.
4. An English abstract or summary the MSc thesis.
5. Any other supporting documents, like recommendation letters
6. Proof of proficiency in English or Estonian if the applicant is not a native speaker of them

All material should be submitted in English.

Applications with attachments (in pdf-format) are to be submitted no later than 31/05/2018 through the link "Apply for this job" below. The position will be fulfilled as soon as a suitable candidate is found.

Further information

For additional information, please contact Assistant Professor Mihkel Kõrgesaar (email: mihkel.korgesaar@ttu.ee).