

# Fuel Efficient High Speed Planing Craft by Considering Seakeeping and Maneuvering Motions

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## Summary

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*Based on the recent International Maritime Organization (IMO) strategy on the reduction of GHG emission, new market demand has arisen for fuel-efficient ships. There are different kind of ships that work out in the Baltic Sea Region. These activities lead to sea and air pollution and threat the sensitive ecosystem of the area. One of the most common ship types that works in this region is high-speed craft. There are more than 3.5 million high-speed craft that are active in the Baltic Sea, mainly close to the coastal areas. Therefore, designing fuel-efficient high-speed craft is a challenge that needs to be considered, carefully. One of the main solutions for fuel reduction of high-speed craft is the development of innovative and optimized hull forms. Stepped hulls are innovative hull forms that have been used for high-speed craft design, so far. However, there is not any specific guideline for step design. There are various step shapes that can be used for resistance reduction (and fuel efficiency), but their optimized shape and arrangement, as well as their effects on Seakeeping and Maneuvering motions, are unknown yet. Therefore, this project aims to study the hydrodynamics of various stepped hulls and find which step solution can lead to fuel-efficient hull form by considering seakeeping and maneuvering motions. For this purpose, both numerical and mathematical models for various step shapes should be developed and a design guideline has to be presented to planning hulls designers.*

Research field:	Mechanical engineering
Supervisor:	Abbas Dashtimanesh
Availability:	This position is available.
Offered by:	Estonian Maritime Academy
Application deadline:	Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

## Description

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Based on the recent International Maritime Organization (IMO) strategy on the reduction of GHG emission, new market demand has arisen for fuel-efficient ships. There are different kind of ships that work out in the Baltic Sea Region. These activities lead to sea and air pollution and threat the sensitive ecosystem of the area. One of the most common ship types that works in this region is high-speed craft. There are more than 3.5 million high-speed craft that are active in the Baltic Sea, mainly close to the coastal areas. Therefore, designing fuel-efficient high-speed craft is a challenge that needs to be considered, carefully. One of the main solutions for fuel reduction of high-speed craft is the development of innovative and optimized hull forms. Stepped hulls are innovative hull forms that have been used for high-speed craft design, so far. However, there is not any specific guideline for step design. There are various step shapes that can be used for resistance reduction (and fuel efficiency), but their optimized shape and arrangement, as well as their effects on Seakeeping and Maneuvering motions, are unknown yet.

### Responsibilities and tasks

This doctoral research aims to study the hydrodynamics of various stepped hulls and find which step solution can lead to fuel-efficient hull form by considering seakeeping and maneuvering motions. For this purpose, both numerical and mathematical models for various step shapes should be developed and a design guideline has to be presented to planning hulls designers.

### 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, marine hydrodynamics including seakeeping and manoeuvring, mathematical modelling, optimization and computational fluid dynamics are required.

The applicants should fulfill the following requirements:

- A suitable background may come from naval architecture, mechanical engineering or related disciplines.
- Prior experience on working with StarCCM+ is a significant advantage and skills with programming tools Matlab and Python is necessary.



- The candidate should prove his/her capabilities in writing the technical report and scientific papers in high quality journals.
- Priority will be given to those who got the first-class honours for his/her bachelor's degree and master by coursework course with research components and/or publications.
- 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 fulfill the requirements for doctoral students at the Tallinn University of Technology



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