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HRZZ Research Projects

Greener Approach to Ship Design and Optimal Route Planning
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Cover Page:
Name of the Principal Investigator (PI): **Jasna Prpić-Oršić**
Name of the PI's host institution for the project: Faculty of Engineering, University of Rijeka
Project proposal full title: **Greener Approach to Ship Design and Optimal Route Planning**
Project proposal duration in months: 48

Project proposal summary
The accurate calculation of attainable ship speed at actual sea is essential from economical and also environmental aspects. Reliable ship speed loss estimation under real environmental conditions allows a more accurate prediction of the power increase and fuel consumption as well as gas emissions from ships. Nowadays this second issue becomes very important because of the problem of global warming. Following the increasing awareness of the environmental and human health concerns of shipping, legislative actions have been taken on global and national levels making mandatory (from January 1st 2013) that new ships over 400 gross tonnage, to comply with the regulations, should have emissions of CO_2 under limiting value. Technological enhancement to ships like improved hull designs as well as improvement in power and propulsion systems could potentially reduce CO_2 emission up to 35 %. These measures could effectively be combined with several other operational measures, such as weather routing and voyage planning, in order to ensure that fuel consumption and CO_2 emissions from ships are minimized on every voyage.
The proposed research will be conducted in three main areas: 1. Improvement of the methodology of ship speed, fuel consumption and greenhouse gases (GHG) emissions (especially CO_2) calculation on actual weather conditions, 2. Optimization of the ship hull (bow and stern) and ship propulsion system operating in actual weather condition, 3. Optimization of ship route by taking into account all relevant parameters: weather prediction, attainable ship speed on waves, main engine performance and navigation constrains.
The objective is to improve ship design and performance taking into accounts the environmental issue, creating a so called eco-efficient or "green" ship design. The project team consists of the scientists who are experts in the naval architecture, mechanical engineering and marine engineering field which allow solving this problem multidisciplinary.

Team members
1. Prof. Jasna Prpić–Oršić, FE
2. Prof. Odd Magnus Faltinsen, NTNU
3. Prof. Roko Dejhalla, FE
4. Prof. Tomislav Mrakovčić, FE
5. Prof. Vladimir Medica, FE
6. Prof. Duško Pavletić , FE
7. Prof. Igor Rudan, FMS
8. Ozren Bukovac, PhD (postdoc), FE
9. Dunja Matulja, PhD (postdoc) FE
10. Nikola Račić, PhD (postdoc), MFS
11. Marko Valčić, PhD student, FMS
12. Natalija Vitali, PhD student, FE

Results

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