Osaka University
Graduate School of Engineering
Department of Naval Architecture & Ocean Engineering

Hydro-Seminar

by Lab. of Floating-Body Dynamics in Waves

The speaker in the 50th Hydro-Seminar is

Dr. Wengang Mao

Associate professor
At Department of Mechanics and Maritime Sciences
Chalmers University of Technology, Gothenburg, Sweden
Visiting Associate Professor of Osaka University

Date: Friday, 18 January, 2019
Time: 15:00 – 16:00
Venue: S1-412 (Lecture room, 4F of S1 building)
          Suita Campus, Osaka University

Reduce uncertainties in weather forecast and wave induced ship resistance for more reliable optimum voyage planning

Abstract

Current maritime industry is facing great challenges to increase ships' energy efficiency and reduce greenhouse gas emissions from the shipping, in addition to the traditional safety issues. One of the most promising measures to achieve such purposes is to implement computer aided voyage optimization system to guide a ship's operation. The reliability of a ship's optimum voyage planning strongly depends on the accuracy of the ship's performance models that are used to describe, e.g., a ship's motions, damage accumulation and added wave resistance in seaways, as well as short-term weather forecast. However, large uncertainties are often associated with these models, leading to unstable voyage planning services. This seminar will first present some sources that contribute to these performance model uncertainties, as well as how large uncertainty that can be expected for various models. Furthermore, our research ideas to reduce these modelling uncertainties will be briefly presented. That is to combine theoretical performance estimations with machine learning statistical techniques based on historical and real-time ship performance and operational data. In addition, we will present how to use spatio-temporal metocean correlation structures to increase the reliability of weather forecasts for actual short sea navigation. Finally, some preliminary research results will be presented by implementing these methods.

The Speaker: Dr. Wengang Mao

Dr. Wengang Mao got his master degree in Shanghai Jiao Tong University in China in the field of naval architecture and ocean engineering. After working in the China Classification Society for 2 years, he joined Chalmers University of Technology in Sweden as a PhD student cooperated with DNV. His PhD project was to develop models to estimate the fatigue damage accumulation and extreme loading during a ship's service time. He got his PhD degree in the field of Applied Mathematical Statistics in 2010. In 2014, he moved back to the division of Marine Technology as an associate professor at Chalmers University. His research activities in the early stage at Chalmers were mainly focusing on fatigue and reliability analysis of ship structures, statistical modelling of ocean environment and structural stresses due to wave loading & high frequency vibrations. Dr. Wengang Mao also served as the committee member of International Ship and offshore Structure Congress (ISSC) on ship fatigue and fracture, and ISSC on Environment. He is now participating in several Swedish and EU maritime projects aiming to develop Spatio-temporal ocean environment models and ship weather routing systems to increase ship's safety and energy efficient. His current research effort is to develop generic models to describe a ship's fuel consumption, ship motion and fatigue damage accumulations in terms of various operation conditions, in particular to implement machine learning techniques to increase the accuracy of these ship performance models for more reliable voyage optimization.

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