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4 Application of CFD in Long-Term Extreme Value Analyses of Wave Loads

By Jan Oberhagemann, Vladimir Shigunov & Ould el Moctar

This paper discusses ways to embed time-domain field methods in extreme value predictions. Approaches are suggested that appear to give most reliable results. They rely on Monte-Carlo simulations, a reduction of parameter variations and extrapolation of exceedance rates over significant wave height. The computational effort is large, yet it can be handled with modern cluster computers.

24 Domain Preparation for RANSE Simulations about Hull and Appendage Assemblies

By Claus Abt, Erik Bergmann & Stefan Harries

Viscous flow simulations are increasingly employed for simulation-driven design of functional surfaces. While parametric modeling of complex shapes has reached a certain maturity, the transfer of data from the Computer Aided Design (CAD) model to the Computational Fluid Dynamics (CFD) code is non-trivial unless the shapes are topologically simple. Assemblies of hull and appendages, however, usually require manual preparation. A method will be presented that allows setting up watertight compositions of arbitrary shapes. The method was implemented within the CAD-CFD integration platform FRIENDSHIP-Framework. Closed surfaces are subdivided into irregular triangle meshes (trimeshes) of predefined tolerance, i.e. deviation allowed between the original shape and its finite approximation. Solids can then be made from the trimeshes. Assemblies of hull and appendages can thus be realised supporting Boolean operations. An STL-file export is offered to connect to grid generators such as HEXPRESS and SnappyHexMesh. The method automatically copes with changes in shape by means of parametric modeling. The paper elaborates on the algorithms and presents examples.

38 Methods and Tools for Risk-Based Approach to Fire Safety in Ship Design

By Richard Pawling, Angus Grandison, Philipp Lohrmann, George Mermiris & Cláudia Pereira Dias

The FIREPROOF project aims to develop a risk-based performance assessment framework for fire safety in passenger ship design. Building on previous work on probabilistic damaged stability, this framework requires developments in modelling, simulation and analysis in several areas to allow the probabilistic representation of ship performance. To support the FIREPROOF framework, an outline Ship Product Model (SPM) was developed, demonstrating the modelling and information storage methods required of future CAD tools to be compatible with the risk based approach. This supported the use of simulation based analysis on a model representative of early stage ship design.

50 Duisburg Test Case: Post-Panamax Container Ship for Benchmarking

By Ould el Moctar, Vladimir Shigunov & Tobias Zorn

Duisburg Test Case (DTC) is a hull design of a typical 14000 TEU container ship, developed at the *Institute of Ship Technology, Ocean Engineering and Transport Systems* (ISMT) for benchmarking and validation of numerical methods. Hull geometry and model test results of resistance, propulsion and roll damping are publicly available. The paper presents existing data from model tests and computations.

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