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84 Wave-Induced Motions on a Laterally Drifting Ship

By Hironori Yasukawa, Faizul Amri Adnan & Kohei Nishi

Numerical solution of strip theory equations is used for the calculation of hydrodynamic forces and wave-induced ship motions taking into account lateral drift. Calculated motions for various drift angles are compared with experiments for the container ship S-175. The results show that the presented method captures the effect of drift on the wave-induced ship motions, and that this effect is not negligible.

100 Investigation of Propeller Wake Instability using LES

By Mattias Liefvendahl

Large Eddy Simulation is employed for the investigation of the wake instability of a submarine propeller in open water conditions. The time-resolved velocity and pressure fields are computed in the near wake where the instability occurs. The study focuses in particular on the analysis of complete time series of the flow velocity at the probes in the wake. The results are compared with Laser Doppler Velocimetry measurements.

108 An Assessment Procedure of the Crashworthiness of an LNG Tanker Side Structure

By Mihkel Kõrgesaar & Sören Ehlers

In this paper a procedure is presented for the conceptual design of a crashworthy side structure of a liquefied natural gas (LNG) tanker. The crashworthiness of an LNG tanker is assessed taking into account the deformation restrictions of the containment system. A particle swarm algorithm is used for the structure optimisation. The classification society compliance of the conceptual design is checked for a characteristic service loading condition. Collision simulations are carried out with a non-linear finite element solver in order to assess crashworthiness. An element length-dependent constant strain failure criterion is used to model possible rupture. The resulting optimised conceptual side structure is compared with the initial rules-based concept and with a minimum weight concept, demonstrating the influence of the structural concepts and the containment system restrictions on the crashworthiness.

120 **Simulating Hull Dynamics in Waves using a RANSE Code**

By Marek Kraskowski

The paper presents an example of the application of RANSE method for the simulation of ship motion in waves. A finite-volume flow solver extended with the rigid body motion module and the numerical wavemaker was used for the simulation. Presented results for the free drop of a prism show good accuracy and robustness of the model. Results for the motion of a ship in regular waves agree satisfactorily with the strip theory.

128 **Accurate Capture of Propeller-Rudder Interaction using a Coupled Blade Element Momentum-RANS Approach**

By Alexander B. Phillips, Stephen R. Turnock & Maaten Furlong

This paper compares experimental results with numerical simulations using three different body-force propeller models. The results demonstrate that as long as the radial variation of axial and tangential momentum generated by the propeller are included, the influence of the unsteady propeller flow can be removed and calculations with a steady propeller model can be performed for the evaluation of the influence of the propeller on the rudder.

140 **On the Ship's Trimming using Moments of Weight and Buoyancy Forces of High Order**

By Lyuben D. Ivanov & John E. Kokarakis

The paper introduces a technique by which the hull girder shear forces and bending moments can be minimised, based on the equality of the moments of higher order of the weight and buoyancy forces. Cargo hold weights determined on the basis of these equalities can be shown to result to minimum bending moments and shear forces. The proposal is illustrated in the simplified case of a barge and a 24000 tdw bulk carrier.

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