

OPTIROUTES – A CFD based ship model for weather routing

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ABSTRACT

The aim of the OPTIROUTES project is to reduce the energy ship consumption and to increase safety and lifetime by integrating the ship response with regards to the environmental conditions into a weather routing software. CFD based ship models including performances, comfort and safety parameters are developed in order to be able to predict the effect of the wind and waves on the ship power and fuel consumption.

The ship model is composed of a calm water performances model, an in-waves performances model, an aerodynamic model and an engine model. For the hydrodynamic and aerodynamic models, a sensitivity study is performed in order to determine the influence of multiple physical and numerical parameters (draft, trim, heel, drift, free motion, geometry simplifications ...) on the resistance and power. Hydrodynamic and aerodynamic simulations are performed using respectively ISIS-CFD code from Centrale Nantes and STARCCM+® software distributed by SIEMENS. The aim of this first phase is to identify the most important parameters that must be estimated with accuracy, requiring CFD simulations. The objective is to be able to build an accurate ship model with reasonable CPU time. The results and conclusion of the sensitivity study will be described in the full paper. The engine model is developed in BV's tool SEECAT (Ship Energy Efficiency Calculation and Analysis Tool) to provide an advanced energy model allowing to estimate the fuel consumption.

A first ship model is carried out in agreement with CMA CGM on a container ship. The CFD based ship model will be presented in the full paper. A database composed of sea trials and voyage data is available for this ship. An extensive work comparing the ship model response according to weather conditions with the voyage data is under progress and will be presented in the full paper. This will enable to validate the container ship model according to real situations before its integration in the weather routing software.

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