Full-scale CFD simulations of Air Lubrication with DIS-based Air Cavity for Planing Hull

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ABSTRACT

The air lubrication system represents among the others one of the most promising solutions in the maritime industry to reduce fuel consumption and carbon emissions. However, this energy-saving solution is usually applied on displacement hulls where simulations, tests and trials have been largely investigated. The application of air lubrication systems on planing or semi-planing hulls is indeed not common, as those hulls are characterized by a different hydrodynamic behaviour that can influence the effectiveness of the air lubrication solution. In addition, full-scale analyses of this energy-saving technology are in general rather rare, in particular for its application on planing hulls.

The current investigation is part of a wide experimental and numerical research campaign that aims to analyze the application of an air injection system where the air cavity is obtained by a DIS (Double Interceptor System) installed on the bottom of a planing hull [1]. The aim of the present study is to provide an insight into the potential scale effects of an air injection system combined with the DIS system on a planing hull through Computational Fluid Dynamics (CFD) simulations and how scale effects could impact the full-scale efficiency of this energy-saving technology application.

The CFD simulations of the planing hull with DIS and air injection system have been carried out in model and full-scale. Model scale results are then compared against towing tank model tests.

REFERENCES

[1] F. De Luca, S. Mancini, C. Pensa, R. Pigazzini, and V. Sorrentino, "A DIS-Based Air Cavity Concept for Planing Hull", *Progress in Marine Science and Technology*, Vol. **6**, pp. 538 - 545, (2022).