Model to Full Scale Numerical Considerations and Analysis

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Qais Khraisat*, Martin Persson†, Marko Vikström† and Rickard Bensow*

* Department of Mechanics and Maritime Sciences
Chalmers University of Technology
412 96 Gothenburg, Sweden
e-mail: qais.khraisat@chalmers.se, rickard.bensow@chalmers.se

† Kongsberg Hydrodynamic Research Centre
Kongsberg Maritime
681 91 Kristinehamn, Sweden
e-mail: martin.persson@km.kongsberg.com, marko.vikstrom@km.kongsberg.com

ABSTRACT

In recent years, there has been a growing interest in gaining in-depth understanding of ship hydrodynamics at full-scale conditions. Currently, there are only well-established procedures and guidelines for scaled models provided by the ITTC and supported through research findings. Although model testing and simulations give an insight into understanding ship hydrodynamics such as wake, resistance, propeller cavitation [1], and noise; scale effects create variations relative to actual operating conditions. In geometrically relative terms, it is well known that the boundary layer at full scale is generally thinner than model scale with delayed separation and weaker bilge vortices. Therefore, one can only obtain an accurate understanding of ship hydrodynamics under actual operation by conducting full-scale studies. However, such investigation raises additional considerations and challenges such as surface roughness modeling [2]. The development of robust numerical methods aided by the continuous increase of available computational power has now opened the opportunity to perform such analysis. For this reason, the aim of this research is to showcase numerical considerations for full-scale simulations together with comparisons of model-scale results.

REFERENCES

[1] M. Ge, U. Svennberg, R. Bensow, “Investigation on RANS prediction of propeller induced pressure pulses and sheet-tip cavitation interactions in behind hull condition”, *Ocean Engineering, Vol. 209, (2020).*

[2] J. Anderson, D. R. Oliveira, I. Yeginbayeva, M. Leer-Andersen and R. Bensow, “Review and comparison of methods to model ship hull roughness”, Applied Ocean Research, Vol. 99, (2020).