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STANDARDIZED WORKFLOW FOR CFD PLANING HULL MODELLING

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ABSTRACT

During last years the Computational Fluid Dynamics (CFD) technique has rapidly developed as a novel tool to address calm water resistance prediction and study of complex phenomena characteristic for the planing regime such as whisker spray, air trapping and pressure area wetted surface. However, CFD modelling of planing hulls requires expert users to decide on different moving mesh techniques (overset/chimera and morphing grid), turbulence models, domain boundaries and convergence criteria. In [1] Authors presented an automatic and web-based application of virtual towing tank, named LincoSim, specifically designed to perform automatic CFD modelling of planing hulls. The tool uses only open-source software and deploys High Performances Computing infrastructures to take advantage of well-established yet innovative technological bricks. Validation and verification of the Lincosim has been performed in [2] for the planing hull systematic series [3] showing how the same standardized workflow for every hull at every velocity condition was effective. In other words it has been showed that if the mesh is topologically standardized then the stopping criteria and the solver setup are coherent, allowing for safe data comparison of different hulls at different flow conditions.

In the present work, further validation of calm water performances for a 43 ft yacht [4] is performed comparing numerical simulations and experimental tests. The possibilities of standardized workflow for CFD modelling of hull behaviour also in regular waves is explored, again investigating the effect of the different wave lengths and different speeds to validate the robustness of the procedure. Comparison of the results is given and discussed with the aim of further improvements of solver setups.

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