

Master's Thesis project

CFD analysis of a planing high-speed vessel

The primary objective of the proposed master's thesis is to develop a CFD methodology to investigate different instability phenomena for planing high-speed boats. The method will be validated against available literature, experimental tests and experience. The secondary objective is to develop a reduced, time efficient, methodology that can be used in the design process of new hulls.

The master's thesis is a cooperation between FS Dynamics Sweden AB and Hydrolift A/S. The hull shape to be investigated is provided by Hydrolift, and the CFD model will be used to simulate accelerations, instability phenomena, and steady conditions. It is of particular interest to analyse the hull at the planing threshold and for the porpoising instability.

The CFD method will primarily be developed using the general purpose CFD-software STAR-CCM+. The free water surface is modelled using a Volume of Fluid formulation, and the hull is free to move in several degrees of freedom using the 6DOF-solver available in STARCCM+. Typically, two to three degrees of freedom are employed depending on the specific problem under investigation. The simulated results will be validated against measurements and experience provided by Hydrolift.

Based on the results and experience from the CFD simulations, an attempt to develop a reduced model will be undertaken. The purpose of the reduced model is to create a fast and robust method to be used in the early design process of new hulls.

This master's thesis will be conducted at the FS Dynamics office in Gothenburg in collaboration with Hydrolift A/S and Chalmers University of Technology.



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