

CFD code comparison, verification and validation for the semi-submersible OC4 Phase II floater

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Abstract

With the advancement of high-performance computation capabilities in recent years, high-fidelity modelling tools such as Computational Fluid Dynamics (CFD) are becoming increasingly popular in the offshore renewable sector [1, 2, 3, 4]. In order to justify the credibility of the numerical simulations, thorough verification and validation is essential [5]. In this work, decay tests for a freely floating cylinder and a linearly moored floating offshore wind turbine (FOWT) model of the OC4 (Offshore Code Comparison Collaboration Continuation) phase II semi-submersible platform are simulated. Three different viscous flow CFD codes are used: OpenFOAM (open-source), ReFRESCO (community based open-usage) and FINE/Marine (commercial). Their results are compared against each other and with water tank experiments [6], including error quantification and uncertainty analysis. The data from experimental and numerical tests is made freely available on the web hosting platform GitHub [7], inviting other researchers to join the code comparison and build a reference validation case for floating offshore wind turbines.

Keywords: Computational Fluid Dynamics (CFD), Floating Offshore Wind Turbine (FOWT), OC4, Decay test, Verification & Validation, Error & Uncertainty

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