



Benchmark Study on Thruster-Hull Interaction on a Semi-Submersible Crane Vessel

During offshore heavy lift or pipelay operations the station keeping capabilities of a DP-vessel have an important influence on operability limits of these operations. Heerema Marine Contractors has two DP3-class semi-submersible crane vessels for these operations; the Thialf and Balder. An assessment of the thrust efficiency of the DP thrusters of these vessels has been made by comparing CFD computations with dedicated model tests. A numerical study using CFD is performed to assess thruster-hull interaction on a semi-submersible vessel. The CFD results are validated with a series of model tests, including an open water thruster, single thruster-hull interaction without current and full thruster-hull interaction with all thrusters active without current. The CFD calculation results show good agreement with the model test data. The forces on the semi-submersible as well as on the individual floaters with active thrusters using CFD are within 10% of the model test data. The largest discrepancies are in the bow quartering conditions when the thruster-hull interaction shows the most complex flow pattern due to the location and shape of the stern keel. The comparison between the CFD and model test data demonstrates that CFD is able to predict the relevant force components well within a sufficient accuracy for engineering purposes. The paper also addresses lessons learnt to improve the CFD computations as well as practical aspects and limitations of thrust efficiency modeling using CFD from an engineering perspective.

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