Motion response and added resistance of ship in head waves based on RANS simulations

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This research applies the CFD solver naoe-FOAM-SJTU to simulate the motion response of Wigley III model in head waves.The naoe-FOAM-SJTU solver is developed under the framework of the open source package OpenFOAM for hydrodynamic problems of naval architecture and ocean engineering,in which the RANS equations are discretized by finitevolume method,the surface interface is captured by VOF method and motions of ship is handled by dynamic deformation mesh approach.The response of ship motions is obtained by 6DOF rigid-body equations.In this paper,three speeds of model ship and different head waves with a wide range of wave lengths are considered.The computational results,including motion response and added resistance,are compared with experiments.The comparison shows fair agreements.In addition,this paper presents an additional case with extreme wave height and large-amplitude motion to test the ability of this simulation for treating strong nonlinear problem.In this case,obvious nonlinear properties and severe green water on deck are observed.

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