Manoeuvring performance prediction of a bulk carrier using numerical methods

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Manoeuvring performance prediction of the ships is an important aspect in ship hydrodynamics, especially during ship design or retrofit. The change in loading condition also influences the manoeuvring behaviour of a ship. This study investigates the full-scale manoeuvring performance of a bulk carrier in calm water using a viscous- based unsteady Reynolds-averaged Navier Stokes (RANS) solver and Manoeuvring Performance Prediction (MPP) program based on slender body theory. Turning circle and zigzag manoeuvre simulations are performed using these methods and the obtained results are validated against sea trial data. Also, the manoeuvring performance of the ship is investigated under a change in the vertical centre of gravity (i.e., metacentric height (GM)) due to the retrofit. The results show that the increase in KG does not significantly change the manoeuvring characteristics of the vessel, even though a slight increase in roll angle is observed.

Key words: CFD, Ship Manoeuvring, CFD, RANS, MPP