

Effect of stern hull shape on turning circle of ships

Abstract

Many factors such as: stern hull shape, length, draught, trim, propulsion system and external forces affecting the drift angle influence rate of turn and size of turning circle of ships. This paper discusses turning circle characteristics of U and V stern hull shape of Very Large Crude Oil Carrier (VLCC) ships. The ships have same principal dimension such as length, beam, and draught. The turning circle characteristics of the VLCC ships are simulated at 35 degree of rudder angle. In the analysis, firstly, turning circle performance of U-type VLCC ship is simulated. In the simulation, initial ship speed is determined using given power and rpm. Hydrodynamic derivatives coefficients are determined by including effect of fullness of aft run. Using the obtained, speed and hydrodynamic coefficients, force and moment acting on hull, force and moment induced by propeller, force and moment induced by rudder are determined. Finally, ship trajectory, ratio of speed, yaw angle and drift angle are determined. Results of simulation results of the VLCC ship are compared with the experimental one as validation. Using the same method, V-type VLCC is simulated and the simulation results are compared with U-type VLCC ship. Results shows the turning circle of U-type is larger than V-type due to effect stern hul results of simulation are.