Performance of high speed planing hull with stern interceptor in calm water and waves

J. Suneela
Department of Naval Architecture and Offshore Engineering, Academy of Maritime Education and Training University, Chennai 603 112, India

Using a numerical method, the present study examines the performance of planing hulls in head waves and calm water with and without interceptors. Because it is costly and challenging to measure in experiments, the hydrodynamics of planing hulls using computational models predicts both drag and the hull's free surface wave. In the present study, flow is simulated using a commercial Reynolds-averaged Navier-Stokes equation (RANSE)-based tool. The results are compared with tests conducted for the planing hull with and without an interceptor in calm water at the towing tank, Department of Ocean Engineering, IIT Madras, Chennai, in order to validate the numerical model. For further research on regular head waves for planing hulls with and without interceptors, the same computational simulations are used. The study finds that a hull equipped with an interceptor reduces resistance and free surface wave height in both calm and regular head waves.

Keywords: Calm water, CFD, interceptor, planing hull, waves.

They discovered a correlation between the square of speed and blade height and the lift force produced at the stern. Esteban[5] used a frequency domain model to study the effects of stern flaps and a T-foil in the bow on a fast-moving vessel. They saw that the effects of seasickness and wave excitement had diminished. Research on planing hulls with flaps by Villa and Brizzolara[6] showed that flaps with a narrow angle of deflection perform better. With CFD, Srikanth and Datla[7] examined interceptors attached to prismatic planing hulls using CFD.

In order to calculate the effects of drag and trim on planing vessels with interceptors mounted, Kohansal[8] developed an algorithm. They found a close connection between experimental and numerical studies. In a computational study of the hydrodynamic forces of a planing vessel with a stern interceptor, Ghasseimi[9] found that the trim decreased aft due to pressure-induced lift. Deng[10] conducted a numerical investigation into the performance of a planing hull with different interceptor heights. According to them, the proper interceptor height helps reduce the drag of the vessel. Luca and Pensa[11] experiment on planing hulls with different deadrise angles and interceptor heights. A higher deadrise and an interceptor at the right height led to a good reduction in drag and trim, according to their as-