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Research Project Title:
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF END-TABS ON THE THRUST AND VORTEX WAKE OF MARINE PROPELLERS

EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF END-TABS ON THE THRUST AND VORTEX WAKE OF MARINE PROPELLERS

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A set of experiments to quantify the effects that end tabs have on marine propellers' thrust and vortex wake is described. Three-bladed propellers are constructed based on a NACA 66-008 profile with a $+10^\circ$ twist. Blades have a span of 10cm and chord of 5cm. A base blade design with no end tips is used to obtain a referential measurement to compare against the tipped versions. A total of six propeller configurations are studied, including one with no tabs as the base configuration. The remaining five tab designs use the same NACA 66-008 profile for the tip on the high pressure side of the propeller, and were set at the angles of attack of $\pm 5^\circ, \pm 3^\circ, 0^\circ$. Thrust measurements were done using a strain gage bridge. Both flow visualization and PIV (Particle Image Velocimetry) is being carried out in a water tank up to 6 rps. Flow visualization experiments yielded clear quantitative description of the vortex wakes. PIV processing is current underway for quantification of the flow fields. Applications for this research include promoting effective centrifugal mixing, increasing efficiency and decreasing drag of wind turbines, airplane winglet design, as well as increasing the thrust while reducing cavitation phenomenon of marine propellers.

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