

Abstract

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CYCLOIDAL PROPELLER PERFORMANCE PREDICTION USING 2D-VORTEX WAKE

A two dimensional vortex wake model for predicting the hydrodynamic performance of cycloidal propellers is presented. Propeller blades are replaced by bound vortices with time dependent strength. The wake model is also represented by discrete vortices shed from the blades and washed downstream. The bound and shed vortex systems are used to predict the perturbation velocity at the blades and at other various points in the flow field. The system is solved through equating hydrodynamic lift per unit span as obtained by Kutta-Joukowski law and airfoil section force data. The model was tested on a single bladed cycloidal propeller and the results are compared to predictions made by a double multiple streamtube analysis. A good agreement was obtained for the global performance. The proposed model can be used to study the effects of different propeller geometry variations on the overall performance as well as the associated flow fields.