

## Numerical Simulations of the Transition Flow of Model Propellers for Predicting Open Water Performance

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**Abstract :** Simulations of the transition flow of model propellers are important for predicting hydrodynamic performance and studying scale effects. In this paper, the transition flow of a model propeller under different loadings are simulated using a transition model provided by STAR-CCM+, and the influence of turbulence intensity (TI) on the transition, especially friction and pressure components of propeller performance, was studied. Before that, the transition model was applied to simulate the transition flow of a flat plate and an airfoil. Predicted transitions agree well with experimental results. Then, the transition model was applied for propeller simulations in open water, and the influence of TI was studied. Under the heavy and moderate loadings, thrust and torque of the propeller predicted by the transition model (different TI) and two turbulence models are very close and agree well with measurements. However, under the light loading, only the transition model with low TI predicts the most accurate results. Above all, the friction components of propeller performance predicted by the transition model with different TI have obvious difference.

**Keywords :** transition flow, model propellers, hydrodynamic performance, numerical simulation

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