Abstracts

Pressure Measurement on Propeller Blade Surface and Thrust-Torque Characteristics in Low Reynolds Number Flow Field

by

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Abstract
Since the propeller is one of the useful thrust devices even today, understanding the behaviors of a propeller and optimization of propeller geometry are important. By referring to the pressure distribution on a propeller blade surface, the geometry of the propeller was designed and optimized, and the suitable state of operation was determined. Four types of propellers were made and aerodynamic performances were investigated by the direct measurement of the surface pressure of a rotating blade in a wind tunnel experiment for a low Reynolds number flow field. In addition, in order to compare with the results of the pressure measurement, thrust and torque were measured using a six-component force balance and torque meter, respectively. The relationships between propeller efficiency, thrust coefficient, and torque coefficient were obtained for several propeller types.

Keywords: Propeller, Thrust, Torque, Pressure Distribution, Wind Tunnel Experiment

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Experimental Studies on Characteristics of a Wing Tip Vortex and Reduction with Suction

by

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Abstract
A wing tip vortex occurs in the wing tip neighborhood on an aircraft in flight and induced drag is generated. There are many studies on a wing tip vortex and flow control techniques near the wing tip for the reduction in the wing tip vortex. However, there are few studies on the control of a wing tip vortex by suction. In this study, the characteristics of a wing tip vortex were investigated in detail by low-speed wind tunnel experiments using a two-dimensional hot wire anemometer with a three-dimensional traverse system. The effects of controlling the flow near the wing tip by suction on the reduction in the wing tip vortex were investigated. Suction was carried out at various positions near the wing tip. As the result it was shown that the wing tip vortex is decreased by appropriate suction and the amount of reduction varies according to suction points. The most effective suction point is near the trailing edge of the wing tip.

Keywords: Wing Tip Vortex, Suction, Wind Tunnel Experiment, Hot Wire Anemometer

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