

Experimental study on the wake characteristics of the small ducted fan using a hot-wire anemometry

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Summary

The experimental study on the wake characteristics of turbomachineries is essential, when developing the turbomachineries such as pumps, fans, compressors, turbines. Various sources of losses are analyzed by studying the wake characteristics of turbomachineries. For more accurate analysis, various types of experimental equipments are used. Because of the high frequency response characteristics, the hot-wire anemometry has been widely used to measure the wake characteristics of the turbomachinery. In this research, the flow fields of the small ducted fan as a propulsion device of small R/C aircraft were measured using a hot-wire anemometry at inlet and outlet to analyze the wake characteristics. Because the small ducted fan is able to be disturbed by cross wind in operation, it is necessary to study the wake of the small ducted fan with cross wind. To considering the cross wind, the small ducted fan was installed perpendicular to the flow direction of the wind tunnel. As a result, the wake has very complicated characteristics compare to steady state without the cross wind. The difference between axial velocities at advancing and retreating side was induced by the difference between the inflow speed of rotor according to the cross wind. The difference between axial velocities at forward and backward area relative to the cross wind was induced by the blockage effect of the duct and motor hub.

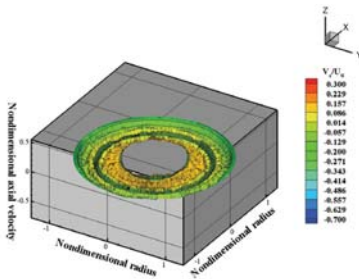


Fig. 1 Axial velocity distribution at inlet

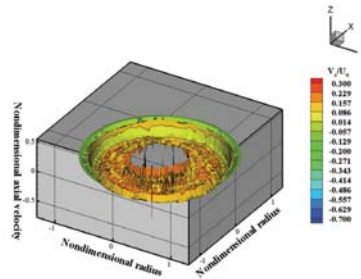


Fig. 2 Axial velocity distribution at outlet

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