

Experimental Investigation of Impacting Flow between a Sub-Scale Twin-Rotor Configuration

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Abstract

The objective of this paper is to conduct the experiments for a sub-scale model of a twin-rotor helicopter's fountain flow in the ground effect based on the pressure and thrust measurements in the hover flight. Firstly, the flow pattern, which leads to form the fountain flow and tests' requirements, is summarized according to the non-overlapping rotors' flow field characteristics. Then, a multipurpose test stand design is introduced. After that, the fountain flow pressure and velocity graphs are obtained. Finally, the tuft technique is used to visualize the fountain flow below the model's body and on the ground. In addition, confirmation of the fountain flow existence hypothesis is verified by thrust measurements and its influence on the efficiency of the twin-rotor. The result indicates that in the twin-rotor configuration, ground effect improves the lift force due to the fact that the fountain flow is more than its value in the single-rotor configuration.

Keywords: hover flight, fountain flow, ground effect, twin-rotor configuration, pressure distribution

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