

Experimental Study on X-Wing Type Flapping Vehicle

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Summary

This research mainly discuss about the development of x-wing flapping mechanism and its experimental studies on its aerodynamic performance. This new type of flapping mechanisms has inspired many researchers to develop their own x-wing designs. We also attempt to develop our own design of x-wing flapping vehicle in order to find out the differences from other flapping mechanisms. Force measurement, aerodynamic analysis and flow visualization based on vacuum chamber test, wind tunnel test and smoke wire test were conducted as well as the study on structural design and materials used in this research. It also deals with the theory of insect flight and its flight mechanisms to define the differences between insects and mechanical flapping vehicle, especially x-wing type. Moreover, we intend to characterize the aerodynamic features and structure interaction of x-wing flapping vehicle by comparing its data from previous flapping vehicle. However, there are still problems that have to be solved for analyzing whole flight characteristics and vortex generations of x-wing due to its complicated flapping actuation, we introduce some of conclusions of analysis on x-wing under the results of specific measurements and theoretical study.

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