

Investigation of the Aerodynamic Characteristics of a Vertical Take-Off and Landing Mini Unmanned Aerial Vehicle Configuration

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Abstract : The purpose of the paper is to model and evaluate the aerodynamic coefficients and stability derivatives of a Vertical, Take-off and Landing Unmanned Aerial Vehicle configuration (VTOL UAV), which is a fixed wing UAV and a quad-copter hybrid capable of both vertical and conventional take-off and/or landing. The aerodynamic analysis of this configuration was carried out using CFD commercial package Ansys Fluent. Also, the aerodynamic coefficients for the case of the UAV without the quad-copter is carried out analytically using MATLAB programmed codes, and the resulting data is verified using Lifting Line Theory and potential method programs. The two results are then compared to understand the effect of adding the quad-copter on the aerodynamic performance of the UAV.

Keywords : aerodynamics, CFD, potential flow, UAV, VTOL

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