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Aerodynamic Design of a Light Long Range Blended Wing Body Unmanned Vehicle

Authors : Halison da Silva Pereira, Ciro Sobrinho Campolina Martins, Vitor Mainenti Leal Lopes

Abstract : Long range performance is a goal for aircraft configuration optimization. Blended Wing Body (BWB) is presented in many works of literature as the most aerodynamically efficient design for a fixed-wing aircraft. Because of its high weight to thrust ratio, BWB is the ideal configuration for many Unmanned Aerial Vehicle (UAV) missions on geomatics applications. In this work, a BWB aerodynamic design for typical light geomatics payload is presented. Aerodynamic non-dimensional coefficients are predicted using low Reynolds number computational techniques (3D Panel Method) and wing parameters like aspect ratio, taper ratio, wing twist and sweep are optimized for high cruise performance and flight quality. The methodology of this work is a summary of tailless aircraft wing design and its application, with appropriate computational schemes, to light UAV subjected to low Reynolds number flows leads to conclusions like the higher performance and flight quality of thicker airfoils in the airframe body and the benefits of using aerodynamic twist rather than just geometric.

Keywords : blended wing body, low Reynolds number, panel method, UAV
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