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Half Model Testing for Canard of a Hybrid Buoyant Aircraft

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Abstract : Due to the interference effects, the intrinsic aerodynamic parameters obtained from the individual component testing are always fundamentally different than those obtained for complete model testing. Consideration and limitation for such testing need to be taken into account in any design work related to the component buildup method. In this paper, the scaled model of a straight rectangular canard of a hybrid buoyant aircraft is tested at 50 m/s in IIUM-LSWT (Low-Speed Wind Tunnel). Model and its attachment with the balance are kept rigid to have results free from the aeroelastic distortion. Based on the velocity profile of the test section's floor; the height of the model is kept equal to the corresponding boundary layer displacement. Balance measurements provide valuable but limited information of the overall aerodynamic behavior of the model. Zero lift coefficient is obtained at -2.2o and the corresponding drag coefficient was found to be less than that at zero angles of attack. As a part of the validation of low fidelity tool, the plot of lift coefficient plot was verified by the experimental data and except the value of zero lift coefficient, the overall trend has under-predicted the lift coefficient. Based on this comparative study, a correction factor of 1.36 is proposed for lift curve slope obtained from the panel method.

Keywords : wind tunnel testing, boundary layer displacement, lift curve slope, canard, aerodynamics
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