

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF MULTIPLE-ELEVON
DEFLECTION ON THE
AERODYNAMIC AND MOMENT
COEFFICIENT OF A TAIL-LESS BWB**

MUHAMMAD AIMAN BIN AHMAD

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ABSTRACT

The study on BWB UAV begins in UiTM in 2005, focused on the design and fundamental aerodynamics and flight dynamics of small Blended Wing-Body (BWB). The objective of this research was to measure the aerodynamic characteristics on BWB Baseline 7 aircraft. It also to analyse pitching, rolling, and yawing moment, on the BWB Baseline 7 due to four elevon configuration. The objective was also to determine the control surface configuration for -30, 0, and +30 deflection angle of control surface. The experiments were done in three different wind tunnel to compare each results for aerodynamic characteristic value such as lift coefficient, drag coefficient, and lift to drag ratio. The three wind tunnels used were from UPNM LST Maritime Wind Tunnel, UTM LST Wind Tunnel, and UiTM LST Wind Tunnel. When the value of angle of attack at zero, the lift coefficient for UTM data was 17.54% more than that UPNM and UiTM data. When at zero lift coefficient, the data from UTM was 14.29% when compared to UPNM data and 32.22% when compared with UiTM data. The proposed result suggested that the suitable elevon configuration for pitching the aircraft was when four elevon were deflected with unison manner regardless whether the aircraft wanted a positive or negative pitching moment. The high rate of roll moment coefficient due to elevon deflection angle acted as an aileron was when all four elevon were deflected in opposite deflection angle on different side of the wing. The value of percentage difference of outboard port was 43.48% more compared to inboard starboard. The negative yaw moment coefficient, the percentage difference of outboard starboard was 7.69% more compared to inboard port. The flaps were assigned when the value of lift coefficient at minimum. The inboard positive were assigned as a flap control surface as the configuration have 71.95% higher lift coefficient as compared to outboard positive. Therefore, the airbrake control surface was assigned to outboard positive configuration. The suggested post-data collection shall be in Computational Fluid Dynamics. With the help of simulation, the value from wind tunnel can be compared and evaluated more and reduce the uncertainties occurred in previous research.

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