



## Experimental Investigation of Propeller-Wing Aerodynamic Interaction of VTOL UAV

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### **Abstract**

This paper will present an experimental investigation of propeller-wing aerodynamic interaction for vertical take-off and landing unmanned aerial vehicle. Due to one type of VTOL UAV is called Dual System or QuadPlane which is similar fixed-wing UAV with quadcopter and has separated operation of propeller during hover and forward flight. Main objective was to show the effect of the aerodynamic interaction compared between clean wing and wing with propellers in forward flight and found the position which provided the best aerodynamic performance. All tests were conducted in the range of freestream 6 to 18 m/s and varied the incidence angle -6 to 12 degrees in the subsonic wind tunnel at Kasetsart University Sriracha Campus. The half-span wing model was a rectangular platform with an NACA 4412 airfoil and aspect ratio of 8 which installed two motor-propellers at leading and trailing edge and shut off. The position of propellers had several configurations such as the changing position in X-axis which shift motor-propellers along fuselage, the changing position in Y-axis which shift motor-propellers along spanwise and the changing position in Z-axis which shift motor-propellers in Perpendicular spanwise. The result of the experiment found that the wing with propellers configuration XYZ111, which was installed the nearest motor-propellers in all direction, provided the best aerodynamic performance in forward flight. However, the result especially shows the aerodynamic force. It should be additional test flow visualization.

**Keywords:** Aerodynamic, Propeller-Wing Interaction, UAV, VTOL