

## Quantification of Aerodynamic Variables Using Analytical Technique and Computational Fluid Dynamics

**Authors :** Adil Loya, Kamran Maqsood, Muhammad Duraid

**Abstract :** Aerodynamic stability coefficients are necessary to be known before any unmanned aircraft flight is performed. This requires expertise on aerodynamics and stability control of the aircraft. To enable efficacious performance of aircraft requires that a well-defined flight path and aerodynamics should be defined beforehand. This paper presents a study on the aerodynamics of an unmanned aero vehicle (UAV) during flight conditions. Current research holds comparative studies of different parameters for flight aerodynamic, measured using two different open source analytical software programs. These software packages are DATCOM and XFLR5, which help in depicting the flight aerodynamic variables. Computational fluid dynamics (CFD) was also used to perform aerodynamic analysis for which Star CCM+ was used. Output trends of the study demonstrate high accuracies between the two software programs with that of CFD. It can be seen that the Coefficient of Lift (CL) obtained from DATCOM and XFLR is similar to CL of CFD simulation. In the similar manner, other potential aerodynamic stability parameters obtained from analytical software are in good agreement with CFD.

**Keywords :** XFLR5, DATCOM, computational fluid dynamic, unmanned aero vehicle

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