



**AERODYNAMIC PERFORMANCE OF O-RING  
PAPER PLANE**

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## ABSTRACT

The O-ring paper plane can be categorized as one of the Micro Air Vehicle (MAV) based on their characteristics and size, however, the aerodynamics performance of the O-ring paper plane are not fully discovered by previous researchers due to the complexity of the aerodynamics and design. Thus, the objectives of this research are to compare the aerodynamics performance of O-ring paper plane based on the different hoop sizing and to find the effect of hoop size on the aerodynamic of O-ring paper plane. The O-ring CAD designs are initially developed by using the ANSYS-Design Modeler before the aerodynamic simulation executed based on ANSYS-CFX simulation. Three types of O-ring paper plane known as Design 1, 2 and 3 which has different hoop size for front and rear hoop are used for ANSYS-CFX simulations. The results shows that the lift coefficient ( $C_L$ ) for Design 2 and Design 3 stall at  $30^\circ$  which is higher  $4^\circ$  than Design 1. The maximum lift coefficient ( $C_{L_{max}}$ ) results also shows that Design 3 has the better  $C_{L_{max}}$  at 0.613482 which is 6.32% and 14.22% higher than the Design 2 and Design 1, respectively. Based on the minimum drag coefficient ( $C_{D_{min}}$ ) analysis, all design produce almost similar  $C_{D_{min}}$  at  $AOA=0^\circ$ . However, at this stage, Design 3 produces the lowest  $C_{D_{min}}$  at 0.015459 which is 3.5% and 1.43% lower than Design 1 and Design 2, respectively. The moment coefficient analysis shows that Design 3 produce the steepest curve slope value at  $\Delta C_L/\Delta C_M = -0.444$  which is 5.16% and 12.12% higher than Design 2 and Design 1, respectively. This result signifies a potential in Design 3 to be more stable compared