

# **Wind tunnel evaluation for control transition from elevator to stabilator of small UAV**

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## **Abstract**

Faulty control surface actuator in a small Unmanned Aerial Vehicles (sUAV) could be overcome with a few techniques. Redundant actuators, analytical redundancy or combination of both are normally used as fault accommodation techniques. In this paper, the accommodation technique of faulty elevator actuator is presented. This technique uses a standby control surface as temporary control reallocation. Wind tunnel measurement facility is set up for the experimental validation and it is compared with FoilSim software. Flat plate airfoil which was used as horizontal stabilizer, is simulated using numerical model and it is validated using the wind tunnel test. Then, a flat airfoil is designed to be used as stabilator for the recovery of faulty elevator actuator. Results show the different deflection angle is needed when transferring from one control surface to another. From the analysis, the proposed method could be implemented without affecting the pitch stability during control surface transition. The alternate control surface accommodation technique proves to be promising for higher reliability sUAV in the case of a faulty on-board actuator. © School of Engineering, Taylor's University.

## **Author keywords**

Elevator fault Fault, accommodation, Fault detection, FDI, UAV

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