

## Computational Design, Simulation, and Wind Tunnel Testing of a Stabilator for a Fixed Wing Aircraft

**Authors :** Kartik Gupta, Umar Khan, Mayur Parab, Dhiraj Chaudhari, Afzal Ansari

**Abstract :** The report focuses on the study related to the Design and Simulation of a stabilator (an all-movable horizontal stabilizer) for a fixed-wing aircraft. The project involves the development of a computerized direct optimization procedure for designing an aircraft all-movable stabilator. This procedure evaluates various design variables to synthesize an optimal stabilator that meets specific requirements, including performance, control, stability, strength, and flutter velocity constraints. The work signifies the CFD (Computational Fluid Dynamics) analysis of the airfoils used in the stabilator along with the CFD analysis of the Stabilizer and Stabilator of an aircraft named Thorp- T18 in software like XFLR5 and ANSYS-Fluent. A comparative analysis between a Stabilizer and Stabilator of equal surface area and under the same environmental conditions was done, and the percentage of drag reduced by the Stabilator for the same amount of lift generated as the Stabilizer was also calculated lastly, Wind tunnel testing was performed on a scale down model of the Stabilizer and Stabilator and the results of the Wind tunnel testing were compared with the results of CFD.

**Keywords :** wind tunnel testing, CFD, stabilizer, stabilator

**Conference Title :** ICAAAE 2024 : International Conference on Aeronautical and Aerospace Engineering

**Conference Location :** New York, United States

**Conference Dates :** April 22-23, 2024