

Experimental and Numerical Investigation of Trailing Edge Wing Morphing to Improve the Aerodynamic Performance and Stability Characteristics of a Fixed Wing UAV

This study presents a wing design with the NACA 0018 airfoil and integrating the trailing edge morphing feature. Through 3D printing and testing in a low-speed wind tunnel, the wing aerodynamic performance was comprehensively estimated under diverse conditions. Simultaneously, computational fluid dynamics analysis using the ANSYS software provided valuable insights into the wing behavior with results closely aligned with experimental findings. Additionally, the wing was enhanced with sensors and electronic components, enabling autonomous functionality. This advancement allows the wing configuration to be real-time adjusted, enhancing its adaptability and responsiveness. By leveraging the capabilities of artificial intelligence and sensor technology, the possibilities for optimizing aerospace system performance and efficiency have been expanded.

S. BABU,

L. LIVIN,

L. PRAWIN,

S. VENKATACHALAM,

A.R. RAJENDRAN

*(Karunya Institute
of Technology and Sciences,
Coimbatore, Tamil Nadu, India)*
ajithraj@karunya.edu

Wing morphing, aerodynamic performance, fixed wing UAV, wind tunnel testing