

## Aerodynamic Analysis of Dimple Effect on Aircraft Wing

**Authors :** E. Livya, G. Anitha, P. Valli

**Abstract :** The main objective of aircraft aerodynamics is to enhance the aerodynamic characteristics and maneuverability of the aircraft. This enhancement includes the reduction in drag and stall phenomenon. The airfoil which contains dimples will have comparatively less drag than the plain airfoil. Introducing dimples on the aircraft wing will create turbulence by creating vortices which delays the boundary layer separation resulting in decrease of pressure drag and also increase in the angle of stall. In addition, wake reduction leads to reduction in acoustic emission. The overall objective of this paper is to improve the aircraft maneuverability by delaying the flow separation point at stall and thereby reducing the drag by applying the dimple effect over the aircraft wing. This project includes both computational and experimental analysis of dimple effect on aircraft wing, using NACA 0018 airfoil. Dimple shapes of Semi-sphere, hexagon, cylinder, square are selected for the analysis; airfoil is tested under the inlet velocity of 30m/s at different angle of attack ( $5^\circ$ ,  $10^\circ$ ,  $15^\circ$ ,  $20^\circ$ , and  $25^\circ$ ). This analysis favours the dimple effect by increasing L/D ratio and thereby providing the maximum aerodynamic efficiency, which provides the enhanced performance for the aircraft.

**Keywords :** airfoil, dimple effect, turbulence, boundary layer separation

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020