

NUMERICAL VALIDATION OF LOW REYNOLDS NUMBER AIRFOIL FOR UAV

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Abstract

Low Reynolds flow continues to get researchers attention for its relevance in a number of areas including the flight regimes of Micro Air Vehicle (MAV). The Laminar Separation Bubble (LSB) which is largely responsible for the non-linear aerodynamic characteristics have been studied both numerically and experimentally. In this work, a high fidelity computation was carried out to study LSB as well as the dependence of aerodynamic characteristics on a symmetrical thick airfoil at low Reynolds numbers. Flow structure in the bubble is clearly brought out with the appropriate selection of turbulence model in the solver. Also, the extent of LSB was well predicted by transition SST turbulence model in the solver. A novel approach has been made to obtain the location and length of LSB using the values of wall shear stress and the results are encouraging. Also, a comparative analysis of flow transition and surface pressure distribution was made by four different turbulence models and the results are discussed.