Numerical Investigation of Improved Aerodynamic Performance of a NACA 0015 Airfoil Using Synthetic Jet

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Abstract : Numerical investigations are performed to analyze the flow behavior over NACA0015 and to evaluate the efficiency of synthetic jet as active control device. The second objective of this work is to investigate the influence of momentum coefficient of synthetic jet on the flow behaviour. The unsteady Reynolds-averaged Navier-Stokes equations of the turbulent flow are solved using, k-ω SST provided by ANSYS CFX-CFD code. The model presented in this paper is a comprehensive representation of the information found in the literature. Comparison of obtained numerical flow parameters with the experimental ones shows that the adopted computational procedure reflects nearly the real flow nature. Also, numerical results state that use of synthetic jets devices has positive effects on the flow separation, and thus, aerodynamic performance improvement of NACA0015 airfoil. It can also be observed that the use of synthetic jet increases the lift coefficient about 13.3% and reduces the drag coefficient about 52.7%.

Keywords : active control, synthetic jet, NACA airfoil, CFD
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