

Aerodynamic performance of shark skin shape vortex generator

ABSTRACT

The performance of NACA 4415 airfoils with counter rotating triangular or shark skin shape sub-boundary layer vortex generators were evaluated. This is relevant to the improvement of lift-to-drag ratio of the airfoil which will contribute to development of a more efficient airfoil. The lift and drag coefficients of NACA 4415 airfoils without vortex generator, with triangular or shark skin shape vortex generators were obtained from wind tunnel tests. For the airfoil with shark skin shape vortex generator, its performance was compared with the results from computational fluid dynamics simulation. For all tests and simulations, the location of vortex generators was maintained at the 50% of chord length. The Reynolds number was maintained at 2.5×10^5 . The only varied parameter other than the shape of vortex generator was the angle of attack which was varied between 0° and 20° , with 2° increment. In some conditions, the performance of airfoil with shark skin shape vortex generator was better than the airfoil with triangular vortex generator. The simulated lift and drag coefficients for airfoil with shark skin shape vortex generator are comparable with the results from experiments. These findings are important for future development of highly efficient airfoil with innovative shape of vortex generator.

Keyword: Sub-boundary layer; Flow control; Counter-rotating; Lift coefficient