عنوان مقاله:

Research on Active Flow Control Method of NACA۰۰۱۲ Airfoil with Traveling Wave Structure

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خلاصه مقاله:

Traveling wave is an innovative active flow control technique that can remarkably mitigate flow separation. This paper employs numerical simulation to examine how traveling wave structures affect the NACA۰۰۱۲ airfoil. The traveling wave structure is situated at ۰.۵%c from the leading edge. In the chord direction, its projection length is ۰.۱c. Through numerical simulation, the impacts of dimensionless length-width ratio and velocity of traveling wave on flow separation are investigated, and the relationship between the traveling wave's optimal parameters and angle of attack is explored. The outcomes demonstrate that traveling waves with suitable length-width ratios and velocities can effectively suppress flow separation. When AoA=۱۶°, traveling wave airfoil with dimensionless velocity U=۱.۱ and length-width ratio A=۱ achieves the best performance, and its lift-drag ratio is ۹.۲۴ times that of the original NACA۰۰۱۲ airfoil. The optimal dimensionless length-width ratio and velocity of the traveling wave airfoil are associated with the angle of attack, .and different parameters need to be chosen at various angles of attack to attain optimum effect

کلمات کلیدی:

Traveling wave airfoil, Flow control, Aerodynamic performance, Numerical simulation, NACA۰۰۱۲ airfoil