

عنوان مقاله:

Critical Angle and Fundamental Frequency of Symmetric Airfoils at Low Reynolds Numbers

محل انتشار:

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خلاصه مقاله:

The unsteady vortex evolution of NACA ۰۰۱۲ airfoil is numerically investigated at low angles of attack ranging from 0° to 10° where the separation is performed from the trailing edge. The Reynolds number ranges between ۱۰۰۰ and ۴۰۰۰. The laminar separation bubble at the trailing edge is observed and the main flow features are presented. It is found that, the increase of the angle of attack and Reynolds number result higher lift to drag ratio by an extensive decrease of the drag coefficient below 8° angle of attack. The transition from the steady condition to periodic force evolution has been revealed with a detailed flow field analysis at different angles of attack and Reynolds numbers. The critical angle is defined as the angle of attack where the onset of oscillations starts with a dominant fundamental frequency of oscillation. The angle of attack where the laminar separation bubble (LSB) is observed is also revealed in the current study. Both the LSB formation angle and the critical angle of attack is found to decrease with the increase of the Reynolds number from ۱۰۰۰ to ۴۰۰۰.

کلمات کلیدی:

Micro air vehicles, Vortex shedding, Unsteady aerodynamics

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