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Experimental Study of Thin and Thick Airfoils at Low Reynolds Numbers VIBHAV DURGESH, ELIFALET GARCIA, HAMID JOHARI, Cal State Univ - Northridge — A recent surge in applications of unmanned air vehicles in various fields has led to increased interest in understanding the characteristics of airfoils at Reynolds number regime $\sim 10^4$. At these low Re numbers, aerodynamics of an airfoil is influenced by laminar separation and its possible reattachment, which is in contrast to airfoil behavior at high Re numbers. This study focused on comparing the load characteristics of symmetric, thin (NACA-0009) and thick (NACA-0021) airfoils at low Re numbers $\sim 2 - 4 \times 10^4$, and angles of attack between 2° to 12°, along with simultaneous flow visualization. The experiments were performed in a low speed flow visualization water tunnel facility, and two-component Laser Doppler Velocimetry was used to quantify the inflow conditions and turbulence intensity. A high precision force/torque transducer was used for the load measurements, while hydrogen bubble technique was used for flow visualization on the suction side of the airfoils. The presentation will discuss the correlation between observed flow structures and instantaneous load on the airfoils, as well as the aerodynamic load characteristics of thin and thick airfoils at low Re numbers.

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