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Effect of controlled spanwise bending on the stability of the leading-edge vortex SAMIK BHATTACHARYA, TYLER SCOFIELD, University of Central Florida — When an airfoil is accelerated from rest at a high angle of attack, a leading-edge vortex (LEV) forms, which soon gets destabilized and convects downstream. In this work, we control the spanwise bending of a flat plate wing to actively influence the vorticity transfer from the LEV. Our aim is to investigate the effect of spanwise curvature variation on the geometry, growth, and stability of the LEV during the acceleration phase. A 3D printed flat-plate with a chord of 5 cm and span of 15 cm is towed in a small fish tank at different angles of attack greater than 15°. The plate starts from rest and reaches a Reynolds number of 5000 after travelling different multiples and submultiples of chord-length. We carry out dye-flow visualization and measure the circulation build up and the convection velocity of the LEV with the help of particle image velocimetry (PIV). The unsteady loads coming on to the wing is measured with a force sensor. An analytical scheme for computing the load from the measured displacement of the plate is presented and compared with the force sensor data. Preliminary results indicate that controlled curvature variation can influence the formation and stability of an LEV.

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