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Volumetric Three-Component Measurements of the Flowfield around Periodically Cambered Plates[1] REDHA WAHIDI, ZHENG ZHANG, JAMES HUBNER, AMY LANG, The University of Alabama — The small size and low speed of the micro aerial vehicles (MAVs) place them in the low Reynolds number (Re) regime. The performance of conventional airfoils severely deteriorates at low Reynolds numbers. Therefore, unconventional wing designs are necessary to meet the operational requirements of the MAVs. Periodically cambered plates with an aspect ratio of five (AR = 5) were constructed for flowfield and performance measurements. Three-dimensional three-component (3D3C) flowfield measurements were carried out at a Reynolds number of 28,000 at different angles of attack. The locations of separation, transition and reattachment are estimated based on the mean velocities and Reynolds shear and normal stresses in the streamwise, spanwise and wall-normal directions. The effects of the tip vortices on the three-dimensionality of the reattachment line are resolved by the 3C3C measurement technique. Additionally, the effects of the cell size on the separation and reattachment locations are investigated. The results also include details about the vorticity about the X, Y and Z axes.

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