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Effects of Sweep Angle on Flow Features and Leading Edge Vortices of Thin, Cambered Wings at Re=5,000[1] JOHN MCARTHUR, GEOFFREY SPEDDING, University of Southern California — The aerodynamic performance of wings at chord-based Re $< 10^5$ is highly sensitive to the laminar boundary layer separation and possible reattachment, and even simple fixed geometries can have complex, three-dimensional, unsteady flows. It has been suggested that fixed wings with strong sweep (such as those of the swift in certain configurations) can induce favorable three-dimensional effects in the form of a stable leading-edge vortex (LEV), but no systematic parametric study has been performed to test the idea. New results from an array of qualitative dye-visualization experiments on fixed wings with constant aspect ratio and varying sweep (Λ=0, 20, 40, 60°) will be presented. There is always significant three-dimensionality in the flow over the suction surface, even for Λ=0°. Structures that might be termed LEVs appear at Λ=60°, but they are small and not significant in the dynamics. Selected quantitative force and flow field measurements confirm the qualitative findings, and sweep, by itself, is not sufficient to generate a significant stable LEV. Implications for swifts and micro-air vehicles are considered.

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