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Leading-edge vortex trajectories under the influence of Coriolis acceleration ERIC LIMACHER, CHRIS MORTON, DAVID WOOD, Univ of Calgary — Leading-edge vortices (LEVs) can form and remain attached to a rotating wing indefinitely, but the mechanisms of stable attachment are not well understood. Taking for granted that such stable structures do form, a practical question arisesof where an LEV core persists in the body-fixed frame of reference. Noting that span-wise flow exists within the LEV core, it is apparent that a mean streamline aligned with the axis of the LEV must exist. The present work usesthe Navier-Stokes equations alongthis steady, axial streamline in order to consider the accelerations that act in the steamline-normal direction to affect its local curvature. With some simplifying assumptions, an ordinary differential equation is derivedthat describes the trajectory of the axial streamline through the vortex core. Usingempirical values of axial velocity in the vortex core from previous studies, it can be shown that Coriolis and centrifugal forces alone can account for the tilting of the stable LEV into the wake within several chord lengths from the root of rotationin the span-wise direction. This result supports an hypothesisthat LEVs are observed at inboard locations because Coriolis force must actover a finite distance to tilt the stable LEV away from the leading edge.

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