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Vortex topology of rolling and pitching wings[1] KYLE JOHNSON, BRIAN THUROW, Auburn University, KEVIN WABICK, JAMES BUCHHOLZ, RANDALL BERDON, University of Iowa — A flat, rectangular plate with an aspect ratio of 2 was articulated in roll and pitch, individually and simultaneously, to isolate the effects of each motion. The plate was immersed into a Re = 10,000 flow (based on chord length) to simulate forward, flapping flight. Measurements were made using a 3D-3C plenoptic PIV system to allow for the study of vortex topology in the instantaneous flow, in addition to phase-averaged results. The prominent focus is leading-edge vortex (LEV) stability and the lifespan of shed LEVs. The parameter space involves multiple values of advance coefficient J and reduced frequency k for roll and pitch, respectively. This space aims to determine the influence of each parameter on LEVs, which has been identified as an important factor for the lift enhancement seen in flapping wing flight. A variety of results are to be presented characterizing the variations in vortex topology across this parameter space.

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