Abstract Submitted
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Kinematics and Flow Evolution of a Flexible Wing in Stall Flutter[1] JOHN FARNSWORTH, University of Colorado - Boulder, JAMES AKKALA, JAMES BUCHHOLZ, University of Iowa, THOMAS MCLAUGHLIN, United States Air Force Academy — Large amplitude stall flutter limit cycle oscillations were observed on an aspect ratio six finite span NACA0018 flexible wing model at a free stream velocity of 23 m/s and an initial angle of attack of six degrees. The wing motion was characterized by periodic oscillations of predominately a torsional mode at a reduced frequency of k = 0.1. The kinematics were quantified via stereoscopic tracking of the wing surface with high speed camera imaging and direct linear transformation. Simultaneously acquired accelerometer measurements were used to track the wing motion and trigger the collection of two-dimensional particle image velocimetry field measurements to the phase angle of the periodic motion. Aerodynamically, the flutter motion is driven by the development and shedding of a dynamic stall vortex system, the evolution of which is characterized and discussed.

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