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Flow Field of Flexible Flapping Wings ERIK SÄLLSTRÖM, LAWRENCE UKEILEY, University of Florida — The flow field around several flexible flapping Zimmerman planform wings of aspect ratio 7.65 and a semispan of 75 mm is investigated using particle image velocimetry (PIV) in a quiescent environment. The wings are made from carbon fiber skeletons and covered with a thin layer of Capran. The skeletons consist of reinforced leading edges and chordwise battens in an attempt to decouple chordwise and spanwise flexibility as much as possible. The flow field from several phases throughout the flapping cycle will be presented. These flow fields consist of the phase averaged velocities in multiple PIV planes. These planes will include both those orientated in the streamwise and spanwise directions to build up a three dimensional representation of the flow in the vicinity of the wing and calculate the resultant vorticity field. The vortical features of these flow fields will be identified and discussed through the use of vortex identification methods. The discussion of the flow measurements will be coupled with force measurements and wing deflection data for a detailed view of mechanisms related to flapping flight and study how the formation of vorticity relates to the generation of aerodynamic forces.

Lawrence Ukeiley
University of Florida

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