Abstract Submitted
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Three-dimensional flow measurements of a differentially driven flapping wing mechanism[1] ERIC HARDESTER, SCOTT THOMSON, TADD TRUSCOTT, Brigham Young University — We present the results of a 3D visualization of the flow field around a differentially driven model of a ladybug wing using Synthetic Aperture PIV (SAPIV) at positions above, below, and 1 chord length behind the wing. Developments in the micro air vehicle field (chord length < 15 cm) have shown advantages in stability and lift generation for flapping wings over fixed wings. These advantages are believed to come from the increased lift caused by various flow structures such as Leading Edge Vortices (LEVs) created by flapping wings, and a "draining" process through the core. Visualizations and analysis of the wake structures of flapping wings have been made using Particle Image Velocimetry (PIV) techniques, allowing 2-dimensional slices of the flow to be analyzed. However, the wake structures of flapping wings are 3-dimensional, making traditional PIV techniques inadequate for full visualization of the wake structure. SAPIV provides a method for gathering 3-dimensional flow measurements of the flow around the model of the ladybug wing. Focus is placed on the development of the LEV and the draining process through the core.

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