

Abstract Submitted
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The effect of aspect ratio on the generation of lift and drag of a compliant membrane flapping wing COSIMA SCHUNK, KRISTEN MICHAELSON, TRISTAN PAINE, SHARON M. SWARTZ, KENNETH S. BREUER, Brown University — Aspect ratio is frequently used to describe differences between the large variety of bat wing shapes. Bats with high aspect ratio wings are expected to fly with a high efficiency and to have superior lift-to-drag ratios. In contrast, bats with lower aspect ratio wings are thought to exhibit higher maneuverability. However, those assumptions are often based on theoretical models based on fixed wing aerodynamic theory. To examine the performance of highly compliant wings with different aspect ratios in flapping flight, we measure lift and drag generated by a mechanical flapping wing. A two degree of freedom shoulder joint allows for independent control of flapping amplitude and wing sweep. Several bat-like wings with different aspect ratios but identical surface area were built, and tested in a wind tunnel, and the variations of lift and drag over the wingbeat cycle are measured over a flapping frequency range of 2 - 10 Hz.

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