

Abstract Submitted  
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**The Effects of AR on Membrane Wing Performance in Low Re Flight**<sup>1</sup> ALEX JORDAN, Purdue University, JAMES HUBNER, University of Alabama — There is increased interest in the design of micro air vehicles (MAVs) due to their military reconnaissance and surveying capabilities. Research has shown that the use of membrane wings in low Reynolds number flight results in performance characteristics that, when compared to rigid wing counterparts of similar geometry, are beneficial. An experimental study was performed to determine if the benefits of membrane wings change when AR is decreased. The membrane wings used silicon rubber affixed to aluminum frames of repeated cell geometry. The wings tested employed 1, 3, 5 and 9 cells and had ARs of 0.9, 2.6, 4.1, and 4.33 respectively. Measurements of lift and drag at a Reynolds number of 49,000 were acquired over a range of angles of attack. Vibration frequencies of the membranes were obtained via high-speed imagery. Comparisons of lift and drag data for the flat plates and membrane wings showed that the membrane wings with ARs of 0.9 and 2.6 did not show the same performance benefits as the higher AR membrane wings.

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