Abstract Submitted
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Application of Piezoelectrics to Flapping-Wing MAVs[1] ALEX WIDSTRAND, Smith College, J. PAUL HUBNER, The University of Alabama — Micro air vehicles (MAVs) are a class of unmanned aerial vehicles that are size-restricted and operate at low velocities and low Reynolds numbers. An ongoing challenge with MAVs is that their flight-related operations are highly constrained by their size and weight, which limits battery size and, therefore, available power. One type of MAV called an ornithopter flies using flapping wings to create both lift and thrust, much like birds and insects do. Further bio-inspiration from bats led to the design of membrane wings for these vehicles, which provide aerodynamic benefits through passive vibration. In an attempt to capitalize on this vibration, a piezoelectric film, which generates a voltage when stressed, was investigated as the wing surface. Two wing planforms with constant area were designed and fabricated. The goal was to measure the wings' flight characteristics and output energy in freestream conditions. Complications with the flapper arose which prevented wind tunnel tests from being performed; however, energy data was obtained from table-top shaker tests. Preliminary results indicate that wing shape affects the magnitude of the charge generated, with a quarter-elliptic planform outperforming a rectangular planform.

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