

Abstract Submitted  
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**The Effects of Including Piezoelectric Film as Part of a Wing Surface**<sup>1</sup> CHARLOTTE SAPPO, Smith College — Micro air vehicles (MAVs) are size- and weight-restricted, unmanned, flying vehicles that often exploit biology for inspiration. Membrane wings, one commonly employed biological adaptation, improves aerodynamic efficiency. These efficiency gains are due to the passive deformations and vibrations of the membrane. Piezoelectric films have the potential to further utilize these vibrations through the conversion of this motion into measurable electrical energy. In this investigation, an amplifier circuit was designed to measure the charge generated by a flexible polyvinylidene fluoride (PVDF) film adhered to a rectangular wing frame (aspect ratio of 2). The trailing edge was unattached and free to vibrate. The circuit consisted of two charge amplifiers, to convert the high impedance charge of the piezoelectric film into an output voltage, and an instrumentation amplifier, to reject common-mode noise. Amplifying and filtering the output signal appropriately, through the use of the feedback capacitance and resistance, was discovered to be of the utmost importance for this endeavor. Results from shaker and wind tunnels tests are presented.

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