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**Fluid-structure interactions on compliant membrane wings** RYE WALDMAN, SHARON SWARTZ, KENNETH BREUER, Brown University — Membrane wings are characteristic of flying animals such as bats, as well as low Reynolds number Micro Air Vehicles. These wings exhibit interesting features such as self-cambering, soft stall, and good performance at large angles of incidence. The interaction between the membrane and the vortical structures over the wing play an important role in the wing's performance. Vortices shed from the leading edge and tip interact with the membrane to select vibration modes, which depend on the details of the wing loading. However, the vibration modes are sensitive to the boundary conditions of the membrane. Here, we present results using force and membrane displacement measurements as well as Particle Image Velocimetry (PIV) from wind tunnel experiments on rectangular membrane wings with identical planform, but with different kinds of perimeter support. The different boundary conditions on the membrane affect the wing shape, support different vibration modes at different frequencies, and affect aerodynamic performance.

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