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Energy harvesting of wind-driven piezoelectric membranes in the wake of bluff bodies.[1] TODD NOVAK, IVAN MARUSIC, WILLIAM ROBBINS, University of Minnesota — In recent years a unique method of passive energy harvesting has been developed for off-grid applications. This method utilizes piezoelectric membranes, commonly called piezoelements or bimorphs, placed in a fluid flow. The resulting strain from the periodic undulations of the membrane is converted into a voltage across the surfaces of the membrane via the piezoelectric effect. In our present study we have examined the oscillatory nature of the membrane when placed in the wake of a bluff body in an air flow. Our aim has been to determine the appropriate geometry and spacing given a range of wind speeds such as to achieve optimal power harvesting. We present results from experiments using high-speed digital photography and hotwire anemometry where we analyze the motion of the membrane under varying wind speeds, aspect ratios, and membrane stiffness.

[1]NSF (ECS-0501187).

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