

Investigating Flutter Energy Harvesting through Piezoelectric Materials in Both Experimental and Theoretical Modes

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Abstract : With the advancement of technology and the decreasing weight of aerial structures, there is a growing demand for alternative energy sources. Structural vibrations can now be utilized to power low-power sensors for monitoring structural health and charging small batteries in drones. Research on extracting energy from flutter using piezoelectric has been extensive in recent years. This article specifically examines the use of a single-jointed beam with a free surface attached to its free end and a bimorph piezoelectric patch connected to the joint, providing two degrees of torsional and bending freedom. The study investigates the voltage harvested at various wind speeds and bending and twisting stiffness in a wind tunnel. The results indicate that as flutter speed increases, the output voltage also increases to some extent. However, at high wind speeds, the limited cycle created becomes unstable, negatively impacting the harvester's performance. These findings align with other research published in reputable scientific journals.

Keywords : energy harvesting, piezoelectric, flutter, wind tunnel

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