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Enhanced power output from a magnetically coupled piezoelectric cantilever JI-TZUOH LIN, University of Louisville, BARCLAY LEE, DuPont Manual High School, BRUCE ALPHENAAR, University of Louisville, WALTER JONES, DEIRDRE ALPHENAAR, Genscape, Inc., — Piezoelectric cantilevers have been widely studied for energy scavenging applications, but suffer from poor output power outside of a narrow frequency range near the cantilever resonance. Here, we demonstrate how power output can be enhanced by applying a simple passive external force. A symmetrical and repulsive magnetic force is applied to a piezoelectric cantilever beam to compensate the cantilever spring force. The raised and compensated spring potential introduced by the magnetic coupling is found to broaden the frequency response without altering the resonant frequency or introducing damping at resonance. Furthermore, the modified cantilever responds chaotically outside of the resonant frequency, causing increased voltage output across a large spectral region. The total voltage output across the spectrum increases between 31% and 87%. Model calculations support these results.

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