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Scavenging low level mechanical vibrations using a magnetically coupled piezoelectric cantilever[1] JI-TZUOH LIN, BRUCE ALPHENAAR, University of Louisville — A piezoelectric cantilever can be used to scavenge power from background mechanical vibrations in the environment. Recently, we showed that nonlinear coupling of the cantilever to an external magnetic force can be used to increase the scavenged power in situations where a random, broadband vibration source is used to drive the cantilever. However, relatively large acceleration vibrations are needed to realize the improvement. Here, we show that by reducing the dimensions of the magnet from 5 mm diameter to 1 mm in diameter, it is possible to decrease the acceleration required to scavenge usable power from a broadband vibration source. The smaller diameter magnet reduces the width of the local potential minimum produced by the magnetic force, reducing the acceleration requirement from 4 mm/sec^2 to 0.9 m/sec^2 and increasing the total power production from 42% to 62%. We also show that by introducing coupling between multiple cantilevers it is possible to obtain a much broader frequency response in the voltage output.

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