

Magnetopiezoelastic energy harvesting driven by random excitations

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Energy harvesting of ambient vibration is important for remote devices, for example in structural health monitoring [1]. Completely wireless sensor systems are desirable and this can only be accomplished by using batteries and/or harvested energy.

This lecture considers a nonlinear piezomagnetoelastic energy harvester driven by stationary Gaussian white noise[2]. The increase the energy generated by this device has been demonstrated for harmonic excitation with slowly varying frequency in simulation, and validated by experiment [3-4]. The present approach considers the simulated response of this validated model to random base excitation and shows that the system exhibits a stochastic resonance. If the variance of the excitation were known then the device may be optimized to maximize the power harvested, even under random excitation.

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