

Design and Simulation of MEMS Based Piezoelectric Vibration Energy Scavenger

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Abstract

Vibration based energy scavenging employing piezoelectric conversion of vibration into electricity is proposed in this paper. The design consists of a proof mass and a spring system which is moved in response to the applied vibration, as seen from the simulation result attached. This displaced mass is made to impact on to suitably placed piezoelectric disc that generate a charge separated depending upon the impact. The piezoelectric material generate a potential difference depend upon the stress due to impact. A suitable electronic conditioning circuit used to charge the portable device. This piezoelectric generator can be fabricated into a device in the mm range and can be attached with the adhesive layer to source of vibration. Thereby, converting the mechanical vibration to useful green power. The piezoelectric converter is used due to their higher output power density compare to electrostatic or electromagnetic transducer. The device is design and analyzed by simulation in COMSOL Multiphysics 4.2a to arrive at an optimal geometry and tuned parameter for mass efficiency of conversion.

Figures used in the abstract

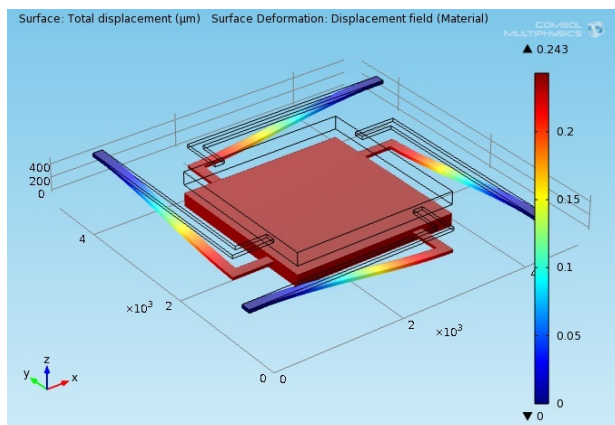


Figure 1: Simulation result showing displacement of proof mass subjected to vibration.