

عنوان مقاله:

Experimental investigation on piezoelectric-based energy harvesting from onedegree of freedom model in acceleration and deceleration stages

محل انتشار:

اولین کنگره ملی کاربرد مواد و ساخت پیشرفته در صنایع (سال: 1396)

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خلاصه مقاله:

Piezoelectric materials convert mechanical vibration to electrical energy and vice versa. This facilitates designing environmental friendly products as well as vibration controlling features in terms of sensors and actuators. We successfully designed and manufactured a dedicated car-road model that simulates one degree of freedom mechanism. Our model was equipped with different piezoelectric ceramic materials to generate electrical energy of the body movement in acceleration and deceleration stages using damped oscillations. Our dedicated model produces sliding mechanism equipped with two parallel springs, a cubic mass, rail, and a carriage that oscillates using an external periodic forces. Vibration of the one degree offreedom simulator assumed in one direction and vibrations in other direction are neglected. Vibration of the motion actuates the piezoelectric ceramic material to generate electrical energy. Motion options include changing the piezoelectric material -to analyze the best characteristics for the best frequency- and springs stiffness that changes the frequency of the simulator. Moreover, we compared various parameters regarding the capacity of piezoelectric ceramic materials to generate in both acceleration and deceleration stages. Our results showed that the outcome would be best if we install piezoelectric ceramic materials on vehicle's body and oscillation components with a finding a balance between high deflection and high frequency. In this study, we analyzed various piezoelectric ceramic material characteristics using a dedicated car-road model with one degree of freedom mechanism. We also investigated where we should install the install piezoelectric materials in .vehicle's body and oscillation components to achieve the best results

کلمات کلیدی:

Piezoelectric ceramic, Energy harvesting, vibration, acceleration and deceleration

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