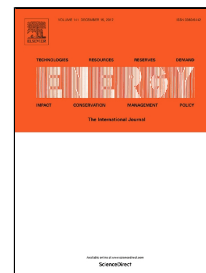


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Energy harvesting with the piezoelectric material integrated shoe

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Abstract

In our times, the importance of energy efficiency is known by anyone. Besides, it is possible to reclaim the energy consumed by means of the developed technology. In this study, it is aimed to reclaim the energy transferred to the ground while people are walking in their daily lives by using piezoelectric materials, which convert mechanical energy into electrical energy. Having designed a sole to serve this goal, different piezoelectric materials are placed into the sole. Its behaviors under human weight are observed using computer software. For this reason, parametric analyses were carried out using 50, 60, 70, 80, and 90 kg, PZT-5H and PZT-8 piezoelectric ceramics and frames made of steel and aluminum materials as holding bodies of piezoelectric ceramics as human bodies. As a result of the analysis, a system of PZT-5H piezoelectric ceramic with a steel frame integrated into a human shoe of a weight of 90 kg used, showing that 0.4% of the applied force can be harvested to 1.43 mW of electrical power.

Keywords: Piezoelectric, energy harvesting, human walking, shoe-based generator, PZT, Comsol Multiphysics

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