

Energy harvesting from vibrations as autonomous source of energy for sensing and monitoring

This contribution deals with an introduction and a review of energy harvesting technologies as an autonomous source of electrical energy for sensing. Many applications provide very high level of vibration and deformation which could be converted into useful electricity. The vibration energy harvester uses ambient energy of mechanical vibration and it provides an autonomous source of energy for autonomous sensing or monitoring. The principle behind the vibration energy harvesting is a resonance operation of an oscillating mass and consequent an electro-mechanical conversion of kinetic energy into electrical energy. The vibration energy harvesters use usually principles of a piezoelectric, magnetostriction, electrostatic or electromagnetic mechanical conversion.

Recent development of modern communication and ultra-low power electronics allows to use energy harvesting systems as autonomous source of electrical energy for wide range of engineering applications. Due to maintenance and safety reasons railway applications include sensing systems and number of sensor nodes is increased for modern transportation and autonomous source of energy is required. There are several potential principles of energy harvesting from vibration, rail deformation and sleeper or rail sag. These devices are developed under European project ETALON and this research is presented at this conference.