

ANSYS simulation study to generate pressure from various water-wind flow conditions to calculate electricity generated using piezoelectric cells

ABSTRACT

The amount of energy usage per person has shown to increase with every year. With increase in population and depletion of non-renewable sources of energy, there is a growing need for the development of energy harvesters using renewable sources of energy. This paper aims to set a base study to address the problem of lack of energy harvesters using a lesser known renewable source of energy – rain. This paper presents a theoretical rooftop model that has been subjected to a mix of wind-water fluid simulate conditions of a rainy weather and the test data were recorded. ANSYS analysis has been performed with the fluid velocity being set at 20 m/s, 30 m/s, 40 m/s and 50 m/s which strikes the roof of a building kept at 0°, 45° and 60°. The objectives of this paper is to determine the amount of voltage that can be generated from pressure developed by the fluid striking the model surface. The pressure values, obtained from ANSYS simulation, were then used to show that the method is viable to be applied on piezoelectric cells to generate electricity from rain and wind hence the study can be used to develop a sustainable model using rain as a renewable source of energy. Low level voltage can be generated from rain striking on piezoelectric material.

Keyword: Piezoelectric; ANSYS; Energy harvester; Renewable energy; Rain; Electricity