

A piezoelectric nanobimorph energy harvester based on the nonlocal theory

†*H.P. Hu¹, H. Chen¹, Q. Qian¹, and Y.T. Hu¹

¹Department of Mechanics, Huazhong University of Science and Technology, China

†*Presenting and Corresponding author: huhp@hust.edu.cn

Abstract

This paper proposes a nano piezoelectric energy harvester model based on the nonlocal theory and Euler beam theory. The nano piezoelectric energy harvester consists of a nanobimorph with the same polarization direction, and connected in parallel by a microelectronic device, represented by an impedance. One end of the nanobimorph is cantilevered, and the other end is fixed by a concentrated mass. An analytical solution is obtained by solving the theoretical model. The dependence of performance of the nano piezoelectric energy harvester on nonlocal, structural and circuit parameters are investigated. Size effects on power density and efficiency of the nano piezoelectric energy harvester are discussed in detail.

Keywords: Piezoelectric nanobimorph, Energy harvester, Nonlocal theory, Size effect

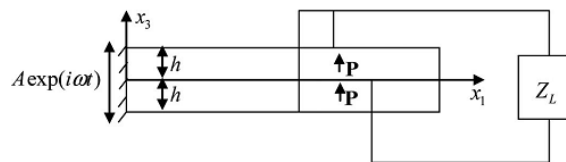


Figure 1. A nanobimorph model

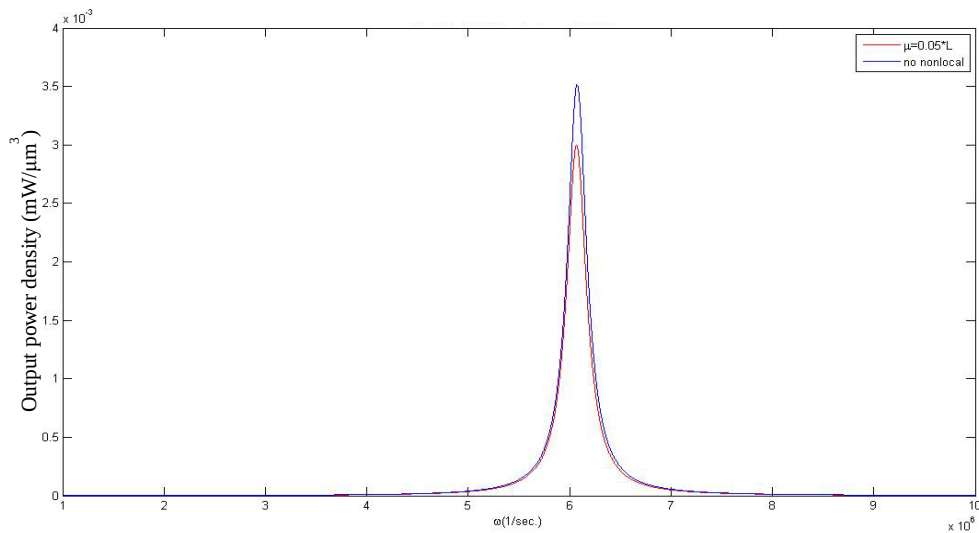


Figure 2. Comparison between nonlocal theory and classic theory