عنوان مقاله:

Size-Dependent Nonlinear Dynamics of a Non-Uniform Piezoelectric Microbeam Based on the Strain Gradient Theory

محل انتشار:

تعداد صفحات اصل مقاله: 11

نویسندگان:

Faculty of Mechanical Engineering, Urmia University of Technology, Urmia, Iran - - -

Faculty of Mechanical Engineering, Urmia University of Technology, Urmia, Iran - - -

خلاصه مقاله:

In this research, the nonlinear dynamics of an electrostatically actuated non-uniform microbeam equipped with a damping film and a piezoelectric layer have been studied. The nonlinear behaviour of the system was modelled using the von Karman geometrical strain terms. In addition, the strain gradient theory was utilized and the Hamilton principle was applied to obtain equations of motion and boundary conditions, respectively. The obtained equations were reduced using the Galerkin method, and the reduced equations were solved with the multiple scale method. The size-dependent responses were then investigated for primary, super-harmonic, and sub-harmonic resonances. The influence of beam width, beam thickness, and distance between electrodes on the resonant frequency response was studied along with nonlinearity of the system. The results showed that the static and forced vibration behaviours of microbeams strongly depended on the size of the electrodes.

کلمات کلیدی:

Piezoelectric, Microbeam, strain gradient theory, Nonlinear geometry, Primary resonance, Sub/super harmonic

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