

عنوان مقاله:

On the Stability of an Electrostatically-Actuated Functionally Graded Magneto-Electro-Elastic Micro-Beams Under Magneto-Electric Conditions

محل انتشار:

فصلنامه مکانیک جامد، دوره 8، شماره 4 (سال: 1395)

تعداد صفحات اصل مقاله: 17

نویسندگان:

A Amiri - Mechanical Engineering Department, Urmia University, Urmia, Iran

G Rezazadeh - Mechanical Engineering Department, Urmia University, Urmia, Iran

R Shabani - Mechanical Engineering Department, Urmia University, Urmia, Iran

A Khanchehgardan - Mechanical Engineering Department, Urmia University, Urmia, Iran

خلاصه مقاله:

In this paper, the stability of a functionally graded magneto-electro-elastic (FG-MEE) micro-beam under actuation of electrostatic pressure is studied. For this purpose Euler-Bernoulli beam theory and constitutive relations for magneto-electro-elastic (MEE) materials have been used. We have supposed that material properties vary exponentially along the thickness direction of the micro-beam. Governing motion equations of the micro-beam are derived by using of Hamilton's principle. Maxwell's equation and magneto-electric boundary conditions are used in order to determine and formulate magnetic and electric potentials distribution along the thickness direction of the micro-beam. By using of magneto-electric potential distribution, effective axial forces induced by external magneto-electric potential are formulated and then the governing motion equation of the micro-beam under electrostatic actuation is obtained. A Galerkin-based step by step linearization method (SSLM) has been used for static analysis. For dynamic analysis, the Galerkin reduced order model has been used. Static pull-in instability for 5 types of MEE micro-beam with different gradient indexes has been investigated. Furthermore, the effects of external magneto-electric potential on the static and dynamic stability of the micro-beam are discussed in detail.

کلمات کلیدی:

Functionally graded, MEE, MEMS, Maxwell's Equation, Pull-in instability

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/999409>

