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Analytical and numerical modeling of a clamped-clamped micro beam under electric actuation

(2019) *IOP Conference Series: Materials Science and Engineering*, 522 (1), art. no. 012008, .

Abstract

This paper studies the deflection of a clamped-clamped micro beam actuator subjected to an electric voltage. Two approaches were applied to model the micro beam under study: the first one is analytical and the second is numerical. A solution to the analytical model was developed to investigate the mechanical behaviour of the micro beam-based MEMS device under electric actuation and simulations was done using Wolfram Mathematica® software. On the other hand, a finite element model (FEM) simulation was performed using COMSOL Multiphysics® for data validation for the micro beam model, and the results showed very good agreement. The effect of changing beam length, thickness and height from the ground on both the maximum beam displacement and pull-in voltage was also analyzed. © Published under licence by IOP Publishing Ltd.

2-s2.0-85067696614

Document Type: Conference Paper

Publication Stage: Final

Source: Scopus

Access Type: Open Access