

عنوان مقاله:

A Semi-Analytical Solution for Flexural Vibration of Micro Beams

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خلاصه مقاله:

In this paper, the flexural free vibrations of three dimensional micro beams are investigated based on strain gradient theory. The most general form of the strain gradient theory which contains five higher-order material constants has been applied to the micro beam to take the small-scale effects into account. Having considered the Euler-Bernoulli beam model, governing equations of motion are written by utilizing the Hamilton's principle. Then, the state-space solution technique is used to find some solutions for natural frequencies of the beam under various boundary conditions. The numerical results show that the resonant frequencies are significantly dependent on the length scale parameter of the micro beam. The less the non-dimensional length scale is, the more deviation appears between results obtained for natural frequencies of micro shaft by strain gradient theory and classical continuum theory. Moreover, except for a micro shaft which is simply supported at both ends, the extra type of boundary conditions emerges from using strain gradient theory significantly affects the results

کلمات کلیدی:

Micro-beams , Strain gradient Elasticity , Non-classical , Continuum theory , Size effect , Free vibrations

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