

عنوان مقاله:

Vibration and Stability Analysis of Micropipes Conveying Fluid Based on Strain Gradient Theory with Surface Energy

محل انتشار:

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خلاصه مقاله:

Based on strain gradient theory with surface energy, a non-classical Euler-Bernoulli beam model is developed to study the vibration and stability behavior of micropipes conveying fluid. Applying Hamilton's principle, the equation of motion and corresponding boundary conditions are derived. The present beam model includes two length parameters which capture the effects of cross-section area and surface energy of the pipe. The numerical solutions are obtained by Generalized Differential Quadrature (GDQ) method. It is found that the results predicted by the present theory are larger than those predicted by the modified couple stress theory and the classical theory. Moreover, the cross-section area has significant influence on the fundamental frequencies and critical flow velocity when the outer diameter of the pipe is of the order of the intrinsic bulk length

کلمات کلیدی:

Micropipe conveying fluid; Strain gradient theory with surface energy; Crosssection area effect; Vibration

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