

## عنوان مقاله:

Analysis of Axisymmetric Vibration of Functionally-Graded Circular Nano-Plate Based on the Integral Form of the Strain Gradient Model

## محل انتشار:

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## خلاصه مقاله:

In this paper, it is aimed to analyze the linear vibrational behavior of functionally-graded (FG) size-dependent circular nano-plates using the integral form of the non-local strain gradient (NSG) model. The linear axisymmetric vibration of the circular FG nano-plates based on the non-local strain gradient (NSG) model is the focal point of this study. In this regard, the non-local elasticity theory (NET) and strain gradient (SG) models are used in conjunction with Hamilton's principle to obtain the governing equations. Discretization of the obtained governing equations is performed with the help of generalized differential quadrature rule (GDQR) and Galerkin weighted residual method (GWRM). The analysis is focused on the effect of non-local and material parameters, as well as the aspect ratio, heterogeneity index of FG material, different boundary conditions, and frequency number on the overall behavior of nano-plate. On using the Galerkin method, a system of linear differential equations is obtained and solved to determine the natural linear frequencies and mode shapes. The obtained results are then compared with the existing results in the literature. On using the proposed procedure in this paper, the dynamic behavior of nano-plate under different boundary conditions can be well described. In addition, the existing deficiencies in other non-local theories can be eliminated. The results of this investigation can be considered as a turning point in the improvement of theoretical results for achieving a better prediction of vibrational behavior in nanostructures.

## کلمات کلیدی:

Size effect, vibrational response, Functionally graded material, circular nanoplate, non-local strain gradient theory

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