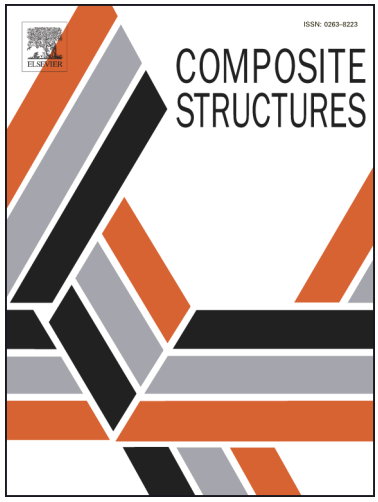


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# Vibration study of curved nanobeams based on nonlocal higher-order shear deformation theory using finite element approach

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**Abstract**

In the present work, vibration analysis of curved nanobeams is investigated using nonlocal elasticity approach based on Eringen formulation coupled with a higher-order shear deformation theory accounting for through thickness stretching effect. The formulation developed here is general in the sense that it can be deduced to examine the influence of different structural theories and analyses of nanobeams. The governing equations derived are solved employing finite element method by introducing a 3-nodes curved beam element. The formulation is validated considering problems for which solutions are available. A comparative study is made using various structural models. The effects of various structural and material parameters such as thickness ratio, beam length, rise of the curved beam, boundary conditions, and size-dependent or nonlocal parameter are brought out on the vibration behaviours of curved nanobeams.

*Key words:* Beam theories, Curved beams, Nonlocal Elasticity, Variational formulation, Finite element method, free vibration

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