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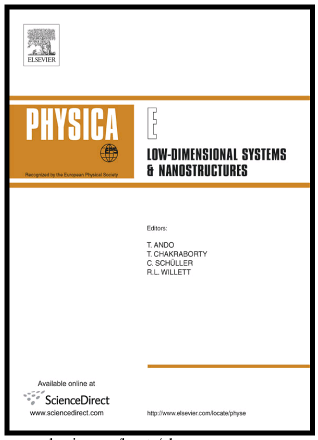

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Dynamic characteristics of curved nanobeams using nonlocal higher-order curved beam theory

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Abstract

Here, an analytical approach for the dynamic analysis, viz., free and forced vibrations, of curved nanobeams using nonlocal elasticity beam theory based on Eringen formulation coupled with a higher-order shear deformation accounting for through thickness stretching is investigated. The formulation is general in the sense that it can be deduced to analyse the effect of various structural theories pertaining to curved nanobeams. It also includes inplane, rotary and coupling inertia terms. The governing equations derived, using Hamiltons principle, are solved in conjunction with Naviers solutions. The free vibration results are obtained employing the standard eigenvalue analysis whereas the displacement/stress responses in time domain for the curved nanobeams subjected to rectangular pulse loading are evaluated based on Newmarks time integration scheme. The formulation is validated considering problems for which solutions are available. A comparative study is done here by different theories obtained through the formulation. The effects of various structural parameters such as thickness ratio, beam length, rise of the curved beam, loading pulse duration, and nonlocal scale parameter are

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