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Mathematical Modeling and Analysis of Forced Vibrations in Micro-Scale Microstretch Thermoelastic Simply Supported Beam

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Abstract : The present paper deals with the flexural vibrations of homogeneous, isotropic, generalized micropolar microstretch thermoelastic thin Euler-Bernoulli beam resonators, due to Exponential time varying load. Both the axial ends of the beam are assumed to be at simply supported conditions. The governing equations have been solved analytically by using Laplace transforms technique twice with respect to time and space variables respectively. The inversion of Laplace transform in time domain has been performed by using the calculus of residues to obtain deflection.The analytical results have been numerically analyzed with the help of MATLAB software for magnesium like material. The graphical representations and interpretations have been discussed for Deflection of beam under Simply Supported boundary condition and for distinct considered values of time and space as well. The obtained results are easy to implement for engineering analysis and designs of resonators (sensors), modulators, actuators.

Keywords : microstretch, deflection, exponential load, Laplace transforms, residue theorem, simply supported
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