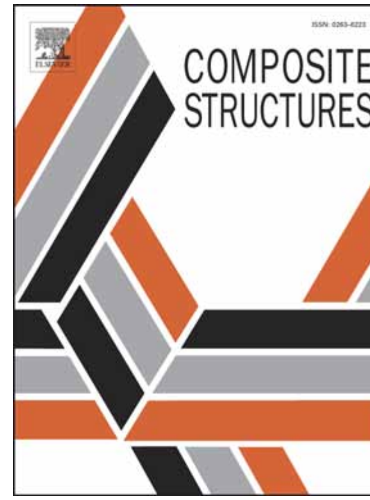


# Dynamic stability analysis of temperature-dependent functionally graded CNT-reinforced visco-plates resting on orthotropic elastomeric medium

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# Dynamic stability analysis of temperature-dependent functionally graded CNT-reinforced visco-plates resting on orthotropic elastomeric medium

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**Abstract**

In this study, nonlinear dynamic stability analysis of embedded temperature-dependent viscoelastic plates reinforced by single-walled carbon nanotubes (SWCNTs) is investigated. The equivalent material properties of nanocomposite are estimated based on the rule of mixture. For the carbon-nanotube reinforced composite (CNTRC) visco-plate, both cases of uniform distribution (UD) and functionally graded (FG) distribution patterns of SWCNT reinforcements are considered. The surrounding elastic medium is modeled by orthotropic temperature-dependent elastomeric medium. The viscoelastic properties of plate are assumed based on Kelvin–Voigt theory. Based on orthotropic Mindlin plate theory along with von Kármán geometric nonlinearity and Hamilton's principle, the governing equations are derived. Generalized differential quadrature method (GDQM) in conjunction with Bolotin method is applied for obtaining the dynamic instability region (DIR) of system. The effects of different parameters such as distribution type of SWCNTs in plate, volume fractions of SWCNTs, elastomeric medium, temperature, boundary condition and viscoelastic properties of plate are discussed on the DIR of the visco-plate. Results indicate that CNT distribution close to top and bottom are more efficient than those distributed nearby the mid-plane for increasing the DIR.

***Keywords:*** Dynamic stability; viscoelastic; Temperature-dependent; orthotropic elastomeric medium; FG materials.