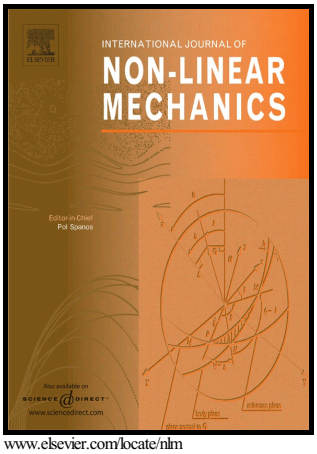

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Vibration of thermally postbuckled carbon nanotube-reinforced composite beams resting on elastic foundations

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Abstract

This paper investigates the small- and large-amplitude vibrations of thermally postbuckled carbon nanotube-reinforced composite (CNTRC) beams resting on elastic foundations. For the CNTRC beams, uniformly distributed (UD) and functionally graded (FG) reinforcements are considered where the temperature-dependent material properties of CNRTC beams are assumed to be graded in the thickness direction and estimated through a micromechanical model. The motion equations are derived based on a higher order shear deformation beam theory with including the beam-foundation interaction. The initial deflection caused by thermal postbuckling is also included. The numerical illustrations concern small- and large-amplitude vibration characteristics of thermally postbuckled CNTRC beams under uniform temperature field. The effects of carbon nanotube (CNT) volume fraction and distribution patterns as well as foundation stiffness on the vibration characteristics of CNTRC beams are examined in detail.

Keywords: Nanocomposites; Functionally graded materials; Temperature-dependent properties; Beams; Buckling; Vibration