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# Thermal postbuckling of nanotube-reinforced composite cylindrical panels resting on elastic foundations

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## Abstract

This paper presents an investigation on the thermal postbuckling behavior of nanocomposite cylindrical panels resting on elastic foundations and subjected to a uniform temperature rise. The cylindrical panels are made of carbon nanotube reinforced composite (CNTRC) material with the carbon nanotube reinforcement being distributed along the thickness of the panels either uniformly (UD) or functionally graded (FG). A micromechanical model together with molecular dynamics simulation results is employed to obtain the material properties of the FG-CNTRC panels. The governing equations for the cylindrical panels are based on a higher-order shear deformation theory with a von Kármán-type of kinematic nonlinearity. The panel-foundation interaction and thermal effects are also included. The material properties of CNTRCs are assumed to be temperature-dependent and an iterative scheme is developed to obtain numerical results. The results reveal that the nanotube volume fraction, foundation stiffness, and the panel curvature ratio have a significant effect on the thermal postbuckling behavior of CNTRC cylindrical panels. It is found that in most cases the CNTRC panel with intermediate nanotube volume fraction does not necessarily have intermediate thermal postbuckling strength.

*Key words*: Nanocomposites; Functionally graded materials; Cylindrical panel; Thermal postbuckling; Temperature-dependent properties; Elastic foundation

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