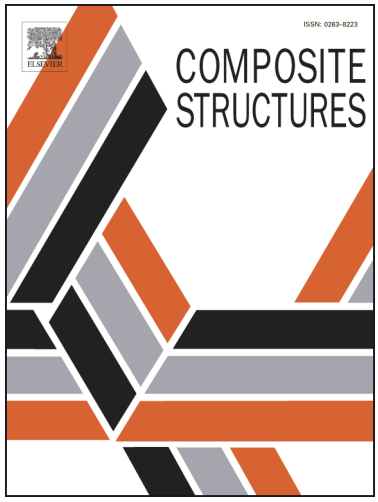

Creep and Recovery of Viscoelastic Laminated Composite Plates

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PII: S0263-8223(16)32268-1
DOI: http://dx.doi.org/10.1016/j.compstruct.2017.08.094
Reference: COST 8852

To appear in: *Composite Structures*

Received Date: 24 October 2016
Revised Date: 21 June 2017
Accepted Date: 29 August 2017

Please cite this article as: Rouzegar, J., Gholami, M., Creep and Recovery of Viscoelastic Laminated Composite Plates, *Composite Structures* (2017), doi: http://dx.doi.org/10.1016/j.compstruct.2017.08.094

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Abstract

In this study, the dynamic relaxation method is employed for higher-order bending analysis of isotropic and viscoelastic laminated composite plates. Using Prony series, a linear viscoelastic model, is considered for material behavior. The displacement field is expressed according to two-variable refined plate theory. This simple higher-order shear deformation theory, which involves only two unknown functions, predicts parabolic variation of transverse shear stresses across the plate thickness and satisfies the zero traction condition on the plate surfaces. Virtual work principle is employed to derive the governing equations. Time integrals are approximated by trapezoidal rules and the dynamic relaxation method combined with finite difference technique is used in order to solve governing equations. Creep and recovery of isotropic and laminated plates are studied under various loadings. Efficiency and accuracy of present formulation is proved by solving several benchmark problems. The effects of different parameters such as side-to-thickness ratio, types of loadings and boundary conditions, and stacking sequence are investigated on the behavior of viscoelastic laminated composite plates.

Keywords: Laminated composite plates, Linear viscoelasticity, Dynamic Relaxation method, Two-variable refined plate theory, Creep, Recovery.