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Time Depended Deformation and Buckling of Viscoelastic Thick Plates by a Fully Discretized Finite Strip Method Using Third Order Shear Deformation Theory

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Abstract

Time depended deformation and critical buckling load of viscoelastic thick plates were studied using finite strip method with the trigonometric functions in longitudinal direction and the polynomial functions in transverse direction. The plates were considered to be thick and the third order shear deformation theory was used to consider the effect of shear stresses in thickness. The mechanical properties of the material were considered to be linear viscoelastic by expressing the relaxation modulus in terms of Prony series. Time history of maximum deflection of viscoelastic plates subjected to transverse loading and unloading on plates was calculated using a fully discretized formulation. In addition, the critical in–plane load of plates was calculated by a nonlinear procedure in different times of loading. Moreover, the effect of thickness and the interaction of biaxial in–plane loading on critical load of plate were studied.

Keywords: Viscoelastic Thick Plates; Buckling; Stress Relaxation; Third Order Shear Deformation Theory; Finite Strip Method.

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