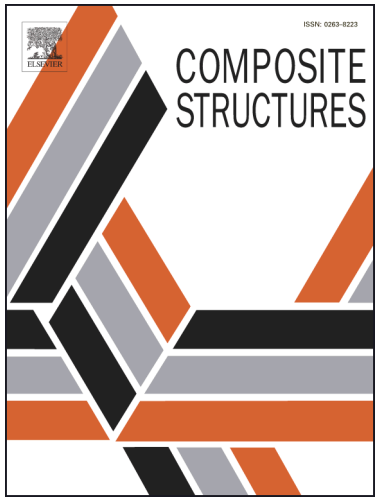

Dynamic and static behaviors of multilayered angle-ply magnetoelectroelastic laminates with viscoelastic interfaces

F.P. Ewolo Ngak, G.E. Ntamack, L. Azrar

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Dynamic and static behaviors of multilayered angle-ply magnetoelectroelastic laminates with viscoelastic interfaces

F.P. Ewolo Ngak[1], G.E. Ntamack[1], L. Azrar[2, 3]

[1]Groupe de Mécanique, Matériaux et Acoustique, B.P. 454, Département de Physique, Faculté des Sciences, Université de Ngaoundéré, Cameroun

[2]Research Center STIS, Team M2CS, Department of Applied Mathematics and Informatics, ENSET, Mohammed V University in Rabat, Morocco

[3] Department of Mechanical Engineering, Faculty of Engineering, King Abdulaziz University, Jeddah, Saudi Arabia

ewolongak@gmail.com, guyedgar@yahoo.fr, l.azrar@um5s.net.ma

Abstract:

In this paper, the state space method is used to analyze the static and dynamic behaviors of laminated magneto-electro-elastic rectangular plates with simply supported boundary conditions. Multilayers are considered as well as viscoelastic interfaces. The Kelvin-Voigt model is used to take into accounted the viscoelastic interface effects. The mathematical formulation is elaborated in a general form and an arbitrary number of layers as well as the orthotropic behavior can be considered. The coupling time and thickness variables formalism is presented in an elegant matrix way allowing a versatility and capability of the formalism to handle more general multilayered plates. The solution procedure is based on the transfer relationships coupled with the Lagrange polynomials in discretised time intervals. The static behavior of multilayered magneto-electro-elastic rectangular plates is analyzed and the main results are the viscoelastic interface effect on the dynamic behavior of multifunctional structures. New results have been obtained by this coupling state space-Lagrange polynomial methodology. The mathematical procedure, elaborated in this paper, is original and allows the numerical study of the effects of the viscoelastic interfaces. The effectiveness of the proposed methods has been demonstrated by performing variant numerical tests.

Keywords: Multilayered Plates ; Magnetoelectroelastic; Viscoelastic interface; State-Space Approach; Lagrange Polynomials; time discretisation