1096-76-1249 **Mohammad Salim Zannon*** (zanno1ms@cmich.edu), Department Of Mathematics, Central Michigan University, Mount Pleasant, MI 48859, and **Mohamad S. Qatu** and **Leela Rakesh**.
Free Vibration Analysis of Thick Cylindrical Composite Shells Using Higher Order Shear Deformation Theory.

This paper presents the free vibration analyses of laminated cylindrical shells using higher order shear deformation theory. Equilibrium equations are used from the mathematical formulations of stress resultants and strain displacement from our previous work [Zannon et al.2012] and are then solved for free vibrations. Such analog gives us various lumped frequencies, if any present, in the system using different boundary conditions, and various thickness and depth ratios present in the thick cylindrical composite shells. For the present formulations the boundary conditions considered are simply supported lamination cross ply. Here, we specifically developed mathematical equations by considering transverse normal stress, shear deformation and rotary inertia in the shell system. The governing equations of motion are expressed in terms of eight kinematic equations using the constitutive and kinematic relationships based on the theory of elasticity. The free vibrational analysis using the third -order shear deformation shell theory leads to a system of generalized eigenvalue problem, which then numerically solved using MATLAB. The first five natural frequency parameters are reported and compared with previously published research (first order approximation and 3D finite element). (Received September 13, 2013)