

Nonlinear Radial Oscillations of Anisotropic Thin-Walled Cylindrical Tubes

G. H.-S. Maluleke, D.P. Mason

Centre for DECMA, University of the Witwatersrand, Johannesburg, South Africa

Nonlinear radial oscillations of a thin-walled cylindrical hyperelastic tube with either radial, tangential or longitudinal transverse isotropy are investigated. For isotropic materials and longitudinal transverse isotropy, the Ermakov-Pinney equation is obtained. It is well known that it has three Lie point symmetries from which a non-linear superposition principle can be derived. The differential equations for radial and tangential transverse isotropy each have one Lie point symmetry which exist only for special values of the parameters and for special time dependent net applied pressures. The differential equations are transformed to autonomous equations using the Lie point symmetries. The results are compared with radial oscillations of an isotropic cylindrical tube.

[View the extended summary](#)