Vibration of Hollow cylindrical shells with partial constrained layer damping

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A theoretical analysis is presented for determining the natural frequencies and damping factors for isotropic cylindrical shell type structures. Equations of motion for a three-layer cylindrical with partial CLD treatment are derived from equilibrium. The Galerkin method is used to find the equivalent mass and stiffness matrices from which the natural frequencies can then be obtained. The effects on the natural frequency and damping factor due to various viscoelastic core thicknesses, viscoelastic shear moduli, constraining layer thickness, constraining layer Young's moduli, and viscoelastic coverage length are discussed. The results reveal for the cylinder studied, that both an optimal coverage length and viscoelastic shear modulus exist for achieving maximum damping factor.