A CONICAL SHELL THEORY OF HYBRID ANISOTROPIC MATERIALS

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ABSTRACT

We start with the unique coordinate system of a conical shell and the generalized Hook's law of a three dimensional anisotropic body which is subjected to 6 different stresses and strains together with 21 elastic coefficients. Applying equilibrium and stress displacement equations and non-dimensionalize all the variables before asymptotically expanding, we are now allowed to perform the asymptotic integration process which will derive the first approximation theory of an anisotropic conical shell. The theory is valid for anisotropic non-homogeneous materials, which can be applied to the layered walls of conical shells with different materials. A choice of small length scale allows a system of differential equations accurately formulated for different loading and boundary conditions. The derived differential equations of homogeneous isotropic material are equivalent to classical theory.

Keywords: Conical Shell, Three Dimensional Anisotropic Element, Non-Homogeneous Anisotropic Materials, Generalized Hook's Law, Boundary Layer, Asymptotic Integration, Classical Shell Theory.