

## Case-Wise Investigation of Body-Wave Propagation in a Cross-Anisotropic Soil Exhibiting Inhomogeneity along Depth

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**Abstract :** The article investigates the propagation behavior of SV-wave, SH-wave, and P-wave in a continuously inhomogeneous cross-anisotropic material, where the material properties such as Young's moduli, shear modulus, and density vary as an arbitrary continuous function of depth. In the considered model, Hook's law, strain-displacement relations along with equilibrium equations have been used to derive the governing equation. The mathematical formulation of this physical problem gives rise to an eigenvalue problem with displacement components as fundamental variables. This leads to achieving the closed-form expressions for quasi-wave velocities of SV-wave, SH-wave, and P-wave in the considered framework. These characteristics of wave propagation along with the above-stated variation have been scrutinized based on their numerical results. This parametric study reveals that wave velocity remarkably fluctuates as the magnitude of inhomogeneity parameters increases and decreases. The prominent effect has been shown depicting the dependence of wave velocity on the degree of material anisotropy. The influence of phase angle and depth of the medium has been remarkably established. The present study may facilitate the theoretical foundation and practical application in the field of earthquake source mechanisms.

**Keywords :** cross-anisotropic, inhomogeneity, P-wave, SH-wave, SV-wave, shear modulus, Young's modulus

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