

Plane wave propagation in transversely isotropic magneto-thermoelastic rotating medium with fractional order generalized heat transfer

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Abstract. The aim of the present investigation is to examine the propagation of plane waves in transversely isotropic homogeneous magneto thermoelastic rotating medium with fractional order heat transfer. It is found that, for two dimensional assumed model, there exist three types of coupled longitudinal waves (quasi-longitudinal, quasi-transverse and quasi-thermal waves). The wave characteristics such as phase velocity, attenuation coefficients, specific loss, penetration depths, energy ratios and amplitude ratios of various reflected and transmitted waves are computed and depicted graphically. The conservation of energy at the free surface is verified. The effects of rotation and fractional order parameter by varying different values are represented graphically.

Keywords: thermoelastic; transversely isotropic; magneto-thermoelastic rotating medium; fractional-order heat transfer; plane wave propagation

1. Introduction

The medium which deforms due to thermal shock and application of the magnetic field, produces an induced magnetic and electric field. The composite materials such as magneto-thermoelastic material gained considerable importance since last decade because these materials show the coupling effect between magnetic and thermal fields. The study of plane wave propagation in a thermoelastic solid gained considerable importance, due to its applications in the area of geophysics, nuclear fields, and related topics. In last decade significant attention has been given in the area of plane thermoelastic and magneto-thermoelastic wave propagation in a medium.

Borejko (1996) deliberated the reflection and transmission coefficients for 3D plane waves in elastic media. Wu and Lundberg (1996) examined the problem of reflection and transmission of the energy of harmonic elastic waves in a bent bar. Marin (1997) had proved the Cesaro means of the kinetic and strain energies of dipolar bodies with finite energy. Sinha and Elsibai (1997) discoursed the reflection and refraction of thermoelastic waves at an interface of two semi-infinite media with two relaxation times. Ting (2004) explored a surface wave propagation in an anisotropic rotating medium. Othman and Song (2006, 2008) presented different hypotheses about

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