Thesis entitled **"EIGENVALUE APPROACH TO STUDY SOME PROBLEMS OF THERMOELASTICITY"**

Submitted by

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Abstract

The present research work has been accomplished in the application oriented area of continuum mechanics regarding the thermoelastic and magneto thermoelastic properties of solids. The dissertation contains four chapters discussing six problems of which two problems (Problem-1 and Problem-2) concern the refined multi-phase lag model of generalized thermoelasticity. One of these deals with an anisotropic three dimensional half space, whereas the other one is about a two dimensional isotropic half space medium. Unlike these two problems, in curvilinear coordinate system, the refined multi-phase lag theory is applied to solve a thermoelastic problem (Problem-5) on an infinite solid containing a spherical cavity. All of these three problems are solved by obtaining vector matrix differential equations by normal mode analysis technique.

On the other hand, the theory of generalized magneto thermoelasticity consisting of non-local heat conduction equations used to study (Problem-4) a two dimensional isotropic and homogeneous half space in presence of heat flux at the boundary surface. Same theory is imposed for a homogeneous, isotropic and semiconducting medium associated with a dual-phase-lag model (Problem-3). Here the boundary surface of the medium is subjected to a prescribed time dependent exponential order compression along with a prescribed temperature and carrier intensity gradient. For these two problems (Problem-3 and Problem-4) the vector matrix differential equations are derived using Laplace transform and Fourier transform. It is to be noted that Laplace transform is also applied to obtain the vector matrix differential equation for another problem (Problem-6) concerning the longitudinal vibration of a circular cylinder in the context of generalized thermoelasticity where the fundamental equations, for a homogeneous isotropic solid regarding Lord-Shulman theory, are reduced to cylindrical coordinate system.

Throughout the research work the vector matrix differential equations are solved using eigenvalue method. The results thus obtained are used to analyze the behavior of several physical entities, such as displacement, temperature, stress etc., through graphical and numerical illustrations. Comparisons are also made graphically with different established theories for different values of physical parameters. Analytical remarks are made to conclude each problem.

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