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A problem on functional graded material under fractional order theory of thermoelasticity

Ibrahim A. Abbas

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Abstract

The present work is concerned with the solution of a problem on fractional order theory of thermoelasticity for a functional graded material. The governing equations of fractional order generalized thermoelasticity with one relaxation time for functionally graded materials (FGM) (i.e. material with spatially varying material properties) are established. These equations are expressed in Laplace transform domain. The analytical solution in the transform domain is obtained by using the eigenvalue approach. The inversion of Laplace transform is done numerically. Finally, the results obtained are presented graphically to show the effect of the fractional and nonhomogeneity parameters and time on displacement, temperature, and stress.

Keywords

Functionally graded materials; Fractional calculus; Generalized thermoelasticity; Eigenvalue approach

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