عنوان مقاله:

Thermoelastic Response of a Rotating Hollow Cylinder Based on Generalized Model with Higher Order Derivatives and Phase-Lags

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خلاصه مقاله:

Generalized thermoelastic models have been developed with the aim of eliminating the contradiction in the infinite velocity of heat propagation inherent in the classical dynamical coupled thermoelasticity theory. In these generalized models, the basic equations include thermal relaxation times and they are of hyperbolic type. Furthermore, Tzou established the dual-phase-lag heat conduction theory by including two different phase-delays correlating with the heat flow and temperature gradient. Chandrasekharaiah introduced a generalized model improved from the heat conduction model established by Tzou. The present work treats with a novel generalized model of higher order derivatives heat conduction. Using Taylor series expansion, the Fourier law of heat conduction is advanced by introducing different phase lags for the heat flux and the temperature gradient vectors. Based on this new model, the thermoelastic behavior of a rotating hollow cylinder is analyzed analytically. The governing differential equations are solved in a numerical form using the Laplace transform technique. Numerical calculations are displayed tables and graphs to clarify the effects of the higher order and the rotation parameters. Finally, the results obtained are verified with those in previous literature.

کلمات کلیدی:

Thermoelasticity, Higher-Order, Phase-lags, rotation, Hollow cylinder