Difference schemes for numerical solutions of lagging models of heat conduction

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Abstract

Different non-Fourier models of heat conduction have recently been considered in the modeling of microscale heat transfer in engineering and biomedical heat transfer problems. The dual-phase-lagging model, incorporating time lags in the heat flux and the temperature gradient, and some of its particular cases and approximations, result in heat conduction modeling equations in the form of retarded or hyperbolic partial differential equations.

In this work we discuss the application of difference schemes for the numerical solution of lagging models of heat conduction. Numerical schemes for some DPL approximations, and for a new model with coefficients variable in time, are developed, characterizing their properties of convergence and stability. Examples of numerical computations are included.

Keywords-Non-Fourier heat conduction, DPL models, Finite differences, Convergence and stability.

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