Difference schemes for time dependent heat conduction models with delay

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Abstract

Non-Fourier models of heat conduction have been increasingly considered in the last years in the modeling of microscale heat transfer in engineering and biomedical problems. Models that incorporate time lags in the heat flux and/or the temperature gradient result in heat conduction modeling equations in the form of partial differential equations with delay, while some approximations may yield partial differential equations of hyperbolic type.

Different numerical schemes to obtain approximate solutions of constant coefficients lagging models of heat conduction have already been considered. In this work, numerical schemes for a 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, Time dependent coefficients, Finite differences, Convergence and stability.

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