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Numerical analysis of thermal wave behavior by the CESE Method YIN CHOU, RUEY JEN YANG, National Cheng Kung University, Department of Engineering Science — In this study, we simulate the behavior of Dual Phase Lag (DPL) thermal wave with a pulsed temperature condition in one dimension and two dimension domain by applying an extension of the Space-Time Conservation Element and Solution Element (CESE) numerical method. Both the temperature and heat flux distributions in a finite medium subject to various non-Fourier heat conduction models are calculated. In every case, the thermal waves are simulated with respect to time as the thermal wave propagates through the medium with a constant velocity. Calculations performed to exhibit various lagging thermal behavior of conduction heat transfer, such as wave, wavelike, and diffusive behavior. In general, the simulation results are found to be in good agreement with the exact analytical solutions. Furthermore, it is shown that the CESE method yields low numerical dissipation and dispersion errors and accurately models the propagation of the wave form even in its discontinuous portions.

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