

Study of Heat Transfer in the Absorber Plates of a Flat-Plate Solar Collector Using Dual-Phase-Lag Model

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Abstract : The present work numerically analyzes the transient heat transfer in the absorber plates of a flat-plate solar collector based on the dual-phase-lag (DPL) heat conduction model. An efficient numerical scheme involving the hybrid application of the Laplace transform and control volume methods is used to solve the linear hyperbolic heat conduction equation. This work also examines the effect of different medium parameters on the behavior of heat transfer. Results show that, while the heat-flux phase lag induces thermal waves in the medium, the temperature-gradient phase lag smoothens the thermal waves by promoting non-Fourier diffusion-like conduction into the medium.

Keywords : absorber plates, dual-phase-lag, non-Fourier, solar collector

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