

## Documents

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**Transient natural convective heat transfer in a trapezoidal cavity filled with non-Newtonian nanofluid with sinusoidal boundary conditions on both sidewalls**

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**Abstract**

Transient, laminar natural convection in a trapezoidal cavity filled with a non-Newtonian nanofluid with sinusoidal boundary conditions on both sidewalls is studied numerically by using the finite element method. The sloping walls of the cavity are heated by sinusoidal temperature distributions, while the horizontal walls allow no heat transfer to the surrounding. Water-based nanofluids with Ag or Cu or Al<sub>2</sub>O<sub>3</sub> or TiO<sub>2</sub> nanoparticles are chosen for investigation. The governing parameters of this study are the Rayleigh number ( $104 \leq Ra \leq 106$ ), phase deviation ( $0 \leq \gamma \leq \pi$ ), amplitude ratio ( $0 \leq \varepsilon \leq 1$ ), power-law index ( $0.6 \leq n \leq 1.4$ ), sidewall inclination angle ( $0^\circ \leq \phi \leq 21.8^\circ$ ), nanoparticle volume fraction ( $0 \leq \phi \leq 0.2$ ), and dimensionless time ( $0 \leq \tau \leq 0.2$ ). The results show that the heat transfer rate increases significantly by the addition of phase deviation. Strong heat transfer enhancements are obtained by higher sidewall inclination angles. However, for a square cavity, the heat transfer approaches the steady-state condition with the increment of the dimensionless time. © 2016 Elsevier B.V.

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