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Numerical investigation of forced convective heat transfer of Fe_3O_4 -water nanofluid in presence of external magnetic source

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Abstract

In this paper, the forced convective heat transfer of water- Fe_3O_4 nanofluid in an enclosure with moving and sinusoidal walls is investigated. New numerical method is chosen namely CVFEM. Influences of Reynolds, Hartmann numbers and volume fraction of Fe_3O_4 on hydrothermal characteristics are presented. Results indicated that temperature gradient is an enhancing function of lid velocity and volume fraction of Fe_3O_4 but it is a reducing function of Lorentz forces. Besides, heat transfer improvement augments with enhance of Reynolds number but it reduces with augment of Hartmann number.

Keywords: Nanofluid; Magnetic field; CVFEM; Sinusoidal wall; Lid driven.

Nomenclature

B	Magnetic induction	α	Thermal diffusivity
En	Heat transfer enhancement	$\Omega \& \Psi$	dimensionless vorticity & stream function
Ec	Eckert number	Θ	dimensionless temperature

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