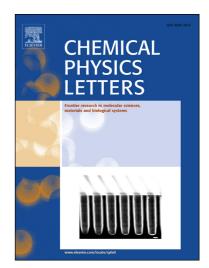
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Numerical investigation of nanofluid transportation in a curved cavity in existence of magnetic source

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Abstract

Thermal radiation impact on magnetic nanofluid heat transfer in a curved cavity is studied. Impact of external magnetic source is taken into account. Innovative numerical method is chosen namely CVFEM. Impacts of radiation parameter (Rd), Rayleigh (Ra), Hartmann (Ha) numbers and volume fraction of Fe₃O₄ (ϕ) on hydrothermal treatment are examined. Results indicate that temperature gradient enhances with augment of Ra, ϕ , but it reduces with rise of Rd, Ha. Lorentz forces cause the nanofluid velocity to reduce and augment the thermal boundary layer thickness. Impact of radiation becomes stronger for higher buoyancy forces.

Keywords: Thermal radiation; Magnetic Nanofluid; Heat transfer; Free convection.

Nomenclature

В	Magnetic induction	α	Thermal diffusivity
Ec	Eckert number	$\Omega\&\Psi$	dimensionless vorticity & stream
	0		function
Н	The magnetic field strength	Θ	dimensionless temperature
\rightarrow	Gravitational acceleration vector	ρ	Fluid density
g			
Nu	Nusselt number	μ	Dynamic viscosity
На	Hartmann number	σ	Electrical conductivity
Т	Fluid temperature	Subscrip	ts
Ra	Rayleigh number	nf	Nanofluid
V , U	Vertical and horizontal	f	Base fluid
	dimensionless velocity		
Y,X	Vertical and horizontal space	loc	Local

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