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Abstract

Control Volume Finite Element Method (CVFEM) is a new approach in which all advantages of finite volume method and finite element method are combined together. In this research, CVFEM is employed to simulate the impact of radiative heat transfer on magnetohydrodynamic free convection of water based nanofluid. Fe_3O_4 – H_2O ferrofluid has been used and viscosity of nanofluid is variable respect to magnetic field. Roles of the radiation parameter (Rd), numbers of undulations (N), Fe_3O_4 -water volume fraction (ϕ), Hartmann number (Ha) and the Rayleigh number (Ra) are depicted. Nu_{ave} is present as a formula according to effect of various parameters. Results prove that the inner surface temperature decreases with the augment of buoyancy forces. Nu_{ave} enhances with the augmentation of the thermal radiation parameter while it decreases with the augment of Ha and N .

***Keywords*:** Numerical simulation; Nanofluid; Radiation; Magnetic field; Sinusoidal cylinder; Natural convection.

Nomenclature

B	Magnetic induction	α	Thermal diffusivity
A	Amplitude	ζ	Rotation angle

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