

Numerical Solutions of Radiation Effect on Magnetohydrodynamic Free Convection Boundary Layer Flow about a Solid Sphere with Newtonian Heating

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Abstract: In this paper, the effect of radiation on magnetohydrodynamic free convection boundary of a solid sphere with Newtonian heating has been investigated. The basic equations of boundary layer are transformed into a non-dimensional form and reduced to nonlinear systems of partial differential equations are solved numerically using an implicit finite difference scheme known as the Keller-box method. Numerical solutions are obtained for the wall temperature, the local skin friction coefficient and the local Nusselt number, as well as the velocity and temperature profiles. The features of the flow and heat transfer characteristics for various values of magnetic parameter M , radiation parameter and the coordinate running along the surface of the sphere, x are analyzed and discussed.

Keywords: Magnetohydrodynamic (MHD); Newtonian Heating; Radiation Effects; Solid Sphere

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