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EFFECT OF VISCOUS DISSIPATION ON MHD FLOW OF A FREE CONVECTION POWER-LAW FLUID WITH A PRESSURE GRADIENT

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Abstract

The paper deals with the study of steady two-dimensional flow of a electrically conducting power-law fluid past a flat plate in the presence of transverse magnetic field under the influence of a pressure gradient by considering viscous dissipation effects is studied. The resulting governing partial differential equations are transformed into set of non linear ordinary differential equations using appropriate transformation. The set of non linear ordinary differential equations are first linearized by using Quasi-linearization technique and then solved numerically by using implicit finite difference scheme. The system of algebraic equations is solved by using Gauss-Seidal iterative method. The energy equation for a special case for which similarity solution exist is also considered. The special interest is the effects of the power-law index, magnetic parameter, viscous dissipation and generalized prandtl number on the velocity and temperature profiles. Numerical results are tabulated for skin friction co-efficient. Velocity and Temperature profiles are drawn for different controlling parameters which reveal the tendency of the solution.

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keywords: Non-Newtonian fluids, Magnetic field effects, Prandtl number, Quasi-linearization, finite difference method and Viscous dissipation.