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EFFECT OF VISCOUS DISSIPATION ON MHD FLOW AND HEAT TRANSFER OF A NON-NEWTONIAN POWER-LAW FLUID PAST A STRETCHING SHEET WITH SUCTION/INJECTION

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Abstract

This paper deals with the MHD effects on convection heat transfer of an electrically conducting, non-Newtonian power-law stretched sheet with surface heat flux by considering the viscous dissipation. The effects of suction/injection at the surface are considered. The resulting governing equations are transformed into 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. Then the system of algebraic equations is solved by using Gauss-Seidal iterative method. The solution is found to be dependent on six governing parameters including the magnetic field parameter M, the power-law fluid index n, the sheet velocity exponent p, the suction/blowing parameter f_w, Eckert number Ec and the generalized Prandtl number Pr. Numerical results are tabulated for skin friction co-efficient and the local Nusselt number. Velocity and Temperature profiles drawn for different controlling parameters reveal the tendency of the solution.

Keywords: MHD, Power-law stretched sheet, suction/injection, Surface heat flux and Viscous dissipation.