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NUMERICAL SOLUTIONS OF MHD BOUNDARY LAYER FLOW OF A NON-NEWTONIAN POWER-LAW FLUID ON A MOVING FLAT PLATE

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Abstract

The problem of steady, two-dimensional laminar flow of a power-law fluid passing through a moving flat plate under the influence of transverse magnetic field is studied. The resulting governing partial differential equation is transformed into a non linear ordinary differential equation using appropriate transformation. This non linear ordinary differential equation is 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 solution is found to be dependent on various governing parameters including magnetic field parameter M, power-law index n and velocity ratio parameter ε. A systematical study is carried out to illustrate the effects of these major parameters on the velocity profiles. It is found that dual solutions exits when the plate and the fluid move in opposite directions, near the region of separation.

Keywords : Magnetic field parameter, Non-Newtonian fluids, power-law index, Quasi-linearization and finite difference method.