Hydromagnetic unsteady flow between two parallel semi-infinite plates with constant suction

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2011

ABSTRACT

In our study we have investigated hydromagnetic unsteady flow of a viscous incompressible fluid between two flat, parallel porous semi-infinite plates with constant suction in the presence of a transverse variable magnetic field. The flow variables such as velocity and thermodynamic properties at every point in the fluid vary with respect to time. The fluid is assumed to be flowing in the positive x direction between two parallel flat plates located at the y = ± L planes. We have particularly investigated the effects of Suction (V_0), Hydrodynamic Reynolds number (R_e), magnetic pressure number (R_h), Eckert number (E_c), Prandtl number (P_r), Variable magnetic field gradient (Fgrand) and magnetic field intensity (B) normal to the direction of flow on the dynamic behavior of the fluid when the lower plate is impulsively started in x direction at constant velocity U, while the upper plate remains stationary. We have employed the finite difference method to solve the coupled non-linear and dimensionless partial differential equations governing this problem. The iterations were performed using a computer program and the results have been presented graphically. Our findings show that both primary and secondary velocity profiles are largely influenced by change in $V_{0,}$ R_e, R_h, B_y, and Fgrand. Temperature profiles are unaffected by magnetic field intensity (By) but influenced by suction, Prandtl number and Eckert number.