MHD viscous flow and heat transfer induced by a permeable shrinking sheet with prescribed surface heat flux

ABSTRACT

The problem of magnetohydrodynamic (MHD) boundary layer flow and heat transfer due to a permeable shrinking sheet with prescribed surface heat flux is studied. The viscous fluid is electrically conducting in the presence of a uniform applied magnetic field and the induced magnetic field is neglected. The transformed nonlinear ordinary differential equations are solved numerically via the implicit finite-difference scheme known as the Keller-box method. Both two-dimensional and axisymmetric cases are considered. The results for the skin friction coefficient and the wall temperature, as well as the velocity and temperature profiles are presented and discussed for various parameters. Dual solutions exist for certain range of the suction parameter and Hartmann number. It is found that the boundary layer separation is delayed with Hartmann number.

Keyword: Boundary layer; Heat transfer; Magnetohydrodynamic; Shrinking sheet; Suction; Surface heat flux