

Abstract

Hossam E. Shawky

A study for MHD boundary layer flow of variable viscosity over a heated stretching sheet via Lie-group method

The present work deals with the study of Magnetohydrodynamic (MHD) boundary layer flow over a heated stretching sheet with variable fluid viscosity. The fluid viscosity is assumed to vary as a linear function of temperature in the presence of uniform transverse magnetic field. The fluid is assumed to be electrically conducting. Lie-group method is applied for determining symmetry reductions for the MHD boundary-layer equations. Lie-group method starts out with a general infinitesimal group of transformations under which the given partial differential equations are invariant. The determining equations are a set of linear differential equations, the solution of which gives the transformation function the infinitesimals of the dependent and independent variables. After the group has been determined, a solution to the given partial differential equations may be found from the invariant surface condition such that its solution leads to similarity variables that reduce the number of independent variables of the system. The effect of the Hartmann number (M), the viscosity parameter (A) and the Prandtl number (Pr) on the horizontal and vertical velocities, temperature profiles, wall heat transfer and the wall shear stress (skin friction), have been studied and the results are plotted.