Variability Effects on MHD for Blasius and Sakiadis Flows in the Presence of Dufour and Soret about a Flat Plate

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Abstract

A study is considered to a steady, two-dimensional boundary layer flow of an incompressible MHD fluid for the Blasius and Sakiadis flows about a flat plate in the presence of thermo-diffusion (Dufour) and thermal-diffusion (Soret) effects for variable parameters. The governing partial differential equations are transformed into a system of nonlinear ordinary differential equations using similarity variables. The transformed systems are solved numerically by Runge-Kutta Gills method with shooting techniques. The variations of the flow velocity, temperature and concentration as well as the characteristics of heat and mass transfer are presented graphically with tabulated results. The numerical computations show that thermal boundary layer thickness is found to be increased with increasing values of Eckert number (Ec), Prandtl number (Pr) and local Grashof number (Gr_x) for both Blasius and Sakiadis flow. The Blasius flow elevates the thickness of the thermal boundary layer compared with the Sakiadis flow. The local magnetic field has shown that flow is retarded in the boundary layer but enhances temperature and concentration distributions.

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