World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

MHD Chemically Reacting Viscous Fluid Flow towards a Vertical Surface with Slip and Convective Boundary Conditions

Authors : Ibrahim Yakubu Seini, Oluwole Daniel Makinde

Abstract : MHD chemically reacting viscous fluid flow towards a vertical surface with slip and convective boundary conditions has been conducted. The temperature and the chemical species concentration of the surface and the velocity of the external flow are assumed to vary linearly with the distance from the vertical surface. The governing differential equations are modeled and transformed into systems of ordinary differential equations, which are then solved numerically by a shooting method. The effects of various parameters on the heat and mass transfer characteristics are discussed. Graphical results are presented for the velocity, temperature, and concentration profiles whilst the skin-friction coefficient and the rate of heat and mass transfers near the surface are presented in tables and discussed. The results revealed that increasing the strength of the magnetic field increases the skin-friction coefficient and the rate of heat and mass transfers toward the surface. The velocity profiles are increased towards the surface due to the presence of the Lorenz force, which attracts the fluid particles near the surface. The rate of chemical reaction is seen to decrease the concentration boundary layer near the surface due to the destructive chemical reaction occurring near the surface.

Keywords : boundary layer, surface slip, MHD flow, chemical reaction, heat transfer, mass transfer
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020

Open Science Index, Mathematical and Computational Sciences Vol:14, No:12, 2020 publications.waset.org/abstracts/36170.pdf