

Chemical Reaction, Heat and Mass Transfer on Unsteady MHD Flow along a Vertical Stretching Sheet with Heat Generation/Absorption and Variable Viscosity

Authors : Jatindra Lahkar

Abstract : The effect of chemical reaction on laminar mixed convection flow and heat and mass transfer along a vertical unsteady stretching sheet is investigated, in the presence of heat generation/absorption with variable viscosity and viscous dissipation. The governing non-linear partial differential equations are reduced to ordinary differential equations using similarity transformation and solved numerically using the fourth order Runge-Kutta method along with shooting technique. The effects of various flow parameters on the velocity, temperature and concentration distributions are analyzed and presented graphically. Skin-friction coefficient, Nusselt number and Sherwood number are derived at the sheet. It is observed that the influence of chemical reaction, the fluid flow along the sheet accelerate with the increase of chemical reaction parameter, on the other hand, temperature of the fluid increases with increase of chemical reaction parameter but concentration of the fluid reduces with it. The boundary layer decreases on the surface of the sheet for all values of unsteadiness parameter, increasing values of the chemical reaction parameter. The increases in the values of Sc cause the species concentration and its boundary layer thickness to decrease resulting in less induced flow and higher fluid temperatures. This is depicted in the decreases in the velocity and species concentration and increases in the fluid temperature as Sc increases.

Keywords : chemical reaction, heat generation/absorption, magnetic number, unsteadiness, variable viscosity

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