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Abstract

A numerical study based on finite difference scheme to investigate the effect of variable viscosity and thermal conductivity with chemical reaction on a transient MHD free convective mass transfer flow of an incompressible viscous electrically conducting, Newtonian fluid past a suddenly started infinite vertical plate with ramped wall temperature and concentration in presence of appreciable radiation heat transfer with viscous dissipation and Joulian heat and uniform transverse magnetic field is presented. The fluid is assumed to be optically thin and the Magnetic Reynolds number considered small enough to neglect the induced hydro magnetic effects. The equations governing the flow are solved by an iterative technique based on Gauss-Seidal method. Effects of various flow governing parameters on the fluid velocity, temperature, concentration, skin friction , heat transfer rate and Sherwood number at the plate are presented graphically and in tabular form. The results are physically interpreted. It is observed that the fluid motion is retarded due to the effect of chemical reaction irrespective of the plate temperature being ramped or isothermal.

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Index Terms

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Keywords

Variable viscosity variable thermal conductivity thermal diffusion thermal radiation

ramped temperature

chemical reaction

viscous dissipation.