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Numerical computation of Chemical Reaction, Heat Generation, Thermal Radiation, and Viscous Dissipation Effects on Magnetohydrodynamic (MHD) Convective Flow Through a Porous Medium

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This research explores the effect of viscous dissipation on free convection magnetohydrodynamic (MHD) flow through a porous medium over an exponentially stretching surface in the presence of a chemical reaction. The fundamental governing partial differential equations (PDEs) governing the problems are transformed into nonlinear ordinary differential equations (ODEs) using similarity variable. Numerical solutions are then obtained through the shooting method combined six order Runge Kutta Scheme. Maple software is used for the simulation of the problem. The characteristics of boundary layer flow, along with the behaviour near the bounding surface, and the effect of embedded flow parameters on velocity, temperature and concentration profiles are examined and interpreted through graphical illustrations. The findings indicate that an increase in the Eckert number, radiation, and magnetic parameter (M) enhances the temperature profiles, whereas a rise in the chemical reaction parameter, porosity, and Schmidt number reduces the concentration profiles. To ensure accuracy, a comparative analysis between the present results and previously published outcomes for a specific case is performed, revealing strong agreement.

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