Effect of variable uid properties and nth order of chemical reaction on MHD boundary layer ow of upper convected Maxwell fluid past a vertical surface in a doubly stratified porous medium

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The ow of temperature dependent viscosity and thermal conductivity of free convective MHD upper convected Maxwell uid over a surface with stratification and nth order of chemical reaction is considered. It is assumed that buoyancy forces induce a free convection boundary layer in which the heated fluid rises vertically. The governing partial differential equations are transformed into non-linear ordinary differential equation by introducing suitable similarity variables and the approximate analytical solution is obtained through Homotopy Analysis Method. The effect of some pertinent parameters like Deborah number, stratication, chemical reaction, and variable thermophysical parameters are presented on velocity, temperature, concentration distributions to illustrate the details of ow of heat and mass transfer characteristics. It is observed that for the case of n = 1&2, the concentration of species reduces for increasing chemical reaction parameter. It is also noticed that, the values of f'' (0) decreases while '(0) and ϖ(0) increases with increasing Deborah number β

Keywords: Maxwell fluid; stratication; thermo-physical properties; chemical reaction; homotopy analysis method.