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A NUMERICAL INVESTIGATION OF CHEMICALLY REACTING 2D WILLIAMSON FLUID OVER A VERTICAL EXPONENTIALLY STRETCHING SURFACE

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Abstract: This article presents a novel modeling corresponding to a mixed convective magnetohydrodynamic chemically reacting two-dimensional Williamson fluid (a non-Newtonian fluid) through a vertical exponentially stretchable impermeable surface followed by temperature and concentration distributions. Temperature, concentration, stretching velocity and applied magnetic field are treated as functions with exponential variation. Equations which are governing the flow and both transfer rates (heat & mass) are transferred into ODEs and solved them by means of a shooting technique along with RK-4th order method. Responses of dimensionless quantities (fluid velocity, temperature and concentration) including with friction coefficient, both transfer rates (heat and mass) corresponding to different parameters are illustrated by means of plots and tables. From this study, we found that the increased Williamson parameter and magnetic effect lowers the fluid velocity. Increased magnetic effect and thermal biot number elevates the temperature. Furthermore, concentration boundary layer is observed to be thicker by concentration biot number and thinner by chemical reaction parameter.