ANALYSIS OF DOUBLE STRATIFICATION ON MAGNETO-HYDRO-DYNAMIC BOUNDARY LAYER FLOW AND HEAT TRANSFER OF AN EYRING-POWELL FLUID

BY

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DECLARATION

This research is an original project which none has presented for a Degree in any University or for any award.

Signature...Date...6/4/2022..............

Wekesa Waswa Simon.

I confirm that the work reported in this Research Project was carried out by the candidate under my supervision.

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ABSTRACT

Eyring-Powell fluids play important roles in many industrial and engineering applications. As technology advances, the demand for efficient and effective heat transfer systems,minimally available, increases.Fluids are being improved time after time to increase the efficiency of heat dissipation systems.Eyring-Powell, one of the fluid on advancement, has numerous applications in life such as coolant in diesel engines, heat exchangers, electronic circuits, nuclear reactors, manufacture of syrups, gels ,liquid medicines , yoghurt and the design of shapes of aircrafts and cars in that order. Among the non-Newtonian's possessing varying characteristics is Eyring-Powel fluid.Due to the demand, mathematicians have formulated unlike models to describe fluid by appropriate substitution into Navier-Stokes equations. The complexity and nature of the equations attract numerous investigations. The current work aims at filling the demand gap by numerically analysing the effect of double stratification of magneto-hydro-dynamic boundary layer flow and heat transfer of a steady Eyring Powell fluid flow. The nonlinear differential equations governing the flux with appropriate boundary conditions were formulated, transformed to linear differential equations by appropriate similarity transformations. The simulation of predictor-corrector method in MATLAB ode113 function invoked with bvp5c call numerically solved the equations. The impacts of various parameters on the fluid velocity and temperature were illustrated graphically. Increasing the magnetic field strength, thermo-phoresis, thermal stratification, and solutal stratification leads to speed, temperature, Sherwood number, Nusselt number, and skin friction decrease. An increase in the magnetic field strength, thermal stratification, solutal stratification, and thermo-phoresis increases the fluid concentration. It is clear that an increase in mangetic,thermal stratification and solutal stratification reduces the velocity and temperature of the fluid under the study.