

Universiti Teknologi MARA

**Aligned MHD Mixed Convection Flow
Of Hybrid Nanofluid Over A Vertical
Plate With Convective Boundary
Condition**

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**Report submitted in fulfillment of the requirements for
Bachelor of Science (Hons.) Management Mathematics
Faculty of Computer and Mathematical Sciences**

July 2020

STUDENT'S DECLARATION

I certify that this report and the research to which it refers are the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.



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AUGUST 5, 2020

ABSTRACT

The present study investigate the behavior of aligned MHD mixed convection flow of hybrid nanofluid passing through the vertical plate with convective boundary conditions. In this study, it was assumed that the hot fluid was connected on the left surface of the plate, while the cold fluid connected on the right surface of plate. The analysis on the behaviour of hybrid nanofluid and nanofluid towards five different parameters which were magnetic field inclination angle, magnetic interaction, nanoparticles volume fraction, mixed convective parameter and Biot number had been done with Ag-CuO/water and CuO/water represent hybrid nanofluid and nanofluid, respectively. The governing partial differential equations together with its boundary conditions are reduced to a system of the non-linear ordinary differential equation by using similarity transformation. Then, the reduced equations and corresponding boundary conditions are solved numerically using fourth-order Runge-Kutta Method. In order to show the reliability of the numerical procedure, a comparison on the results for skin friction and Nusselt number with existing literature has been done and excellent agreement is obtained. The effect of thermophysical parameters on fluid velocity, temperature, skin friction and Nusselt number are discussed. As a result, the heat transfer of Ag-CuO/water hybrid nanofluid is higher than the CuO/water nanofluid. Ag-CuO/water hybrid nanofluid also dominated the velocity and temperature profile in all thermophysical parameters. The skin friction coefficient and Nusselt number increase with an increase in the inclination angle of magnetic field, magnetic field parameter, volume fraction of nanoparticles, mixed convective parameter and Biot number for both Ag-CuO/water hybrid nanofluid and CuO/water nanofluid.

Keywords: MHD, hybrid nanofluid, mixed convection, convective boundary condition, fourth order Runge-Kutta

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