

Universiti Teknologi MARA

**Aligned MHD Free Convection Flow of
Magnetic Nanofluid along a Moving
Inclined Plate**

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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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ABSTRACT

The present study analyzed the influence of aligned and transverse magnetic field effects on the inclined plate. The numerical investigation is carried out for the MHD free convection laminar boundary layer flow that allows heat transfer of an electrically conducting on two different base fluids Fe_3O_4 -kerosene and Fe_3O_4 -water-based ferrofluids. The governing boundary layer equations along with appropriate boundary conditions convert into a coupled nonlinear ordinary differential equation. By using the Fourth Order Runge Kutta method is used to solve the transform equations numerically. Numerical results for the skin friction coefficient and Nusselt number were presented inclined angle of the magnetic field, the interaction of the magnetic, angle of the inclined plate, Grashof number, and volume fraction of magnetic nanoparticles were discussed. The result of an increase on inclined angle of the magnetic field reduce the temperature profiles and enhances the velocity profile for both ferrofluids. Besides, increasing of inclination angle of magnetic field enhances the value of skin friction for the static plate, follows the flow and moving against the flow for Fe_3O_4 -water and Fe_3O_4 -kerosene magnetic field while the value of Nusselt number for both ferrofluids also increase. The velocity and temperature profile illustrated graphically and analyzed. The numerical values obtained and tabulated for skin friction coefficient and heat transfer from the various value of physical parameters. The result compares with the previously published work were found to be an excellent agreement.

Keywords: Aligned MHD, Convective boundary condition, ferrofluid, Free convection, Inclined plate

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