

Effect of Carbon Nanotubes in Aligned Magnetohydrodynamics Mixed Convection Flow of Nanofluid Through an Inclined Plate

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ABSTRACT

This study investigates the effect of carbon nanotubes in aligned magnetohydrodynamics (MHD) mixed convection flow of nanofluid through an inclined plate. Both single-wall and multi-wall carbon nanotubes are employed. The velocities and temperature profiles of the nanofluid are being analyzed in order to comprehend its behaviors. The governing equation of non-dimensionless partial differential equations (PDE) is converted into dimensionless ordinary differential equations (ODE) by utilizing the similarity transformation. Fourth-Order Runge Kutta Method is used to solve the resulting equations numerically in Maple Software. It is discussed how various dimensionless parameters, including the angle of magnetic field, the interaction of magnetic, the angle of an inclined plate, the volume fraction of nanoparticles, and mixed convection, affect velocity and temperature profiles, as well as how carbon nanotubes with various base fluids affect skin friction and the Nusselt number. For both types of carbon nanotube nanofluids, SWCNT/kerosene and MWCNT/kerosene, an increase in angle of magnetic field, interaction of magnetic, and mixed convection parameter risen the velocity profile while an increase in angle of inclined plate and volume fraction of nanoparticles enhanced the temperature profile. The Nusselt number and skin friction coefficients increase with increasing angle of magnetic field, interaction of magnetic, and mixed convection parameter and decrease with increasing inclined plate angle and volume fraction of nanoparticle. In comparison to MWCNT with various base fluids, the skin friction coefficient for SWCNT with various base fluids has the greatest value. While for MWCNT with different base fluids, the Nusselt number has the maximum value. It was found that MWCNT transferred heat more efficiently than SWCNT.

Keywords: Carbon nanotubes, Mixed convection flow of nanofluid, Aligned MHD, Inclined plate