MHD STAGNATION POINT FLOW IN FERROFLUID OVER A FLAT PLATE

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ABSTRACT

In recent times, a new type of heat transfer equipment equipped with superior effect has been requested by many industries to boost the multidisciplinary growth of miniaturization technology, for instance microelectromechanical system (MEMS), nanoelectromechanical system (NEMS) and nanotechnology. A major effort to develop the advanced fluid and the concept of microchannel cooling technology has been carried out. The development of the advanced fluid has led to the invention of nanofluid that helps the equipment to transfer heat as well as increase the thermal conductivity of fluid. Nanofluid comprises of tiny volumetric amounts of nanometer-sized particles, namely nanoparticles. Nanoparticles are highly useful in heat transfer applications owing to its convective properties as well as thermal conductivity performance over the base fluid. Therefore, this study aims to focus on the convective heat transfer of MHD stagnation point flow in ferrofluid over a flat plate. Formulation of the mathematical models includes the transformation of non-linear partial differential equations to ordinary differential equations by using the appropriate similarity transformation variables. The resulting ordinary differential equations are then solved by using the Runge-Kutta-Fehlberg Fourth-Fifth method encoded in Maple software. The behaviour of fluid flow and heat transfer are discussed over several pertinent parameters including solid volume fraction parameter, magnetic parameter, radiation parameter, conjugate parameter and Prandtl number. The results have shown that the velocity profile increases due to increasing magnetic parameter and decreases due to volume fraction parameter. Meanwhile, temperature profile enhances with increasing volume fraction, radiation and conjugate parameter and declines with increasing magnetic parameter and Prandtl number.

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