

Cu-Al₂O₃/water hybrid nanofluid flow over a permeable moving surface in presence of hydromagnetic and suction effects

ABSTRACT

In this new era of technology in fluid field, hybrid nanofluid has become a fruitful interest topic among researchers due to its thermal properties and potential which gives better result compared to nanofluid in enhancing the heat transfer rate. The intention here is to present the significant effects of suction and magnetic field over a moving plate containing hybrid nanofluid with base fluid is water, Alumina Oxide (Al₂O₃) and Copper (Cu) as the nanoparticles. A mathematical modelling consists of partial differential equation for the fluid flow are constructed and transformed to a set of ordinary differential equations hence solved numerically using bvp4c in MATLAB. Effects of magnetohydrodynamics (MHD), M , suction, S and relevant thermophysical properties on velocity, temperature, skin friction, and local Nusselt number are thoroughly examined and presented graphically. It is noted that duality exists in certain range when a unique solution exists. The range of duality of solution widens as the values of M and S increase. Due to that, a stability analysis is implied to determine which duality of solution is stable and realizable. As M increases, the skin friction increases. For rate of heat transfer, as M increases, the heat transfer rate increases while for arising of S , the heat transfer decreases. Furthermore, it is noted that the hybrid nanofluid possesses better results compared to nanofluid.

Keyword: Hybrid nanofluid; MHD; Suction; Moving plate; Dual solutions