MHD stagnation point flow in nanofluid over shrinking surface using Buongiorno's model: a stability analysis

ABSTRACT

An analysis has been performed using the Buongiorno model on the nanofluid steady 2D stagnation point flow magnetohydrodynamic (MHD) over the shrinking surface to test its stability. Transforming the governing partial equations into a set of ordinary differential equation (ODE) and solved the equations numerically. In this paper, the impact of Brownian motion and thermophoresis has been considered and can be seen in ODE. The physical quantities of interest such as skin friction, local Nusselt number, local Sherwood number as well as the velocity and temperature profiles are acquired by numerical findings for some values of governing parameters such as ?, M, Pr, Le, Nb and Nt. Results show that duality of solutions exist for certain values e <-1 while unique solution exist when e >-1. On the other hand, as the parameter of M increased, the gradient of velocity increased, the rate of transmission heat and mass improved. Throughout the analysis, it demonstrates a linearly stable first solution in comparison to linearly unstable second solution.

Keyword: MHD; Stagnation point flow; Nanofluid; Buongiorno’s model; Stability analysis