MHD stagnation point flow over a nonlinear stretching/shrinking sheet in nanofluids

ABSTRACT

In this study, an investigation of the steady 2-D magnetohydrodynamiic (MHD) flow of stagnation point past a nonlinear sheet of stretching/shrinking within of a non-uniform transverse magnetic intensity in nanofluids had been analysed. Considered material of nanoparticles such as copper (Cu) in water base fluid with Pr = 6.2 to analyze the influence of volume fraction parameter of nanoparticles and the stretching/shrinking sheet parameter. The governing nonlinear partial differentialequations (PDEs) are converted in to the nonlinear ordinary differential equations (ODEs) and use the boundary value problem solver bvp4c in Matlab program to solve numerically through the use of a similarity transformation. The impact of the parameter ofthe magnetic field on the coefficient of skin friction, the local number of Nusselt and the profiles of velocity and temperature are portrayed and explained physically. The analysis reveals that the magnetic field and volume fraction of nanoparticles affect the velocity and temperature. The dual solutions are achieved where for the shrinking sheet case and the solutions are non-unique, different from a stretching sheet.

Keywords: Magnetohydrodynamic; Flow of stagnation point; Nonlinear sheet of stretching/shrinking; Nanofluids; Dual solutions