MHD stagnation point flow and heat transfer of a nanofluid over a permeable nonlinear stretching/shrinking sheet with viscous dissipation effect

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ABSTRACT

The magnetohydrodynamic (MHD) stagnation point flow and heat transfer of an electrically conducting nanofluid over a nonlinear stretching/shrinking sheet is studied numerically. Mathematical modelling and analysis are attended in the presence of viscous dissipation. Appropriate similarity transformations are used to reduce the boundary layer equations for momentum, energy and concentration into a set of ordinary differential equations. The reduced equations are solved numerically using the built in bvp4c function in Matlab. The numerical and graphical results on the effects of various parameters on the velocity and temperature profiles as well as the skin friction coefficient and the local Nusselt number are analyzed and discussed in this paper. The study discovers the existence of dual solutions for a certain range of the suction parameter. The conducted stability analysis reveals that the first solution is stable and feasible, while the second solution is unstable.

KEYWORDS:

MHD stagnation; permeable nonlinear; stretching/shrinking