

Dual solutions in mixed convection stagnation-point flow over a vertical stretching sheet with external magnetic field and radiation effect

ABSTRACT

The purpose of this research is to study the problem of mixed convection stagnation-point flow on a vertical stretching sheet with external magnetic field, with the effect of radiation is taken into account. The partial differential equations are reduced to ordinary differential equations using similarity transformation. The transformed boundary layer equations are then solved numerically via `bvp4c` in MATLAB software. The effects of different values of radiation parameter and Hartmann number on the skin friction coefficient and local Nusselt number, velocity and temperature profiles are presented and discussed. The effect of radiation parameter and Hartmann number are also considered for both assisting and opposing flows. Dual solutions are found to exist in the opposing flow only, while for assisting flow, unique solution exists. It is also found that the radiation parameter enhances the boundary layer separation, and the Hartmann number delays the boundary layer separation.

Keyword: Dual solutions; External magnetic field; Radiation effect; Stagnation-point flow; Stretching sheet