

Mixed Convection of the Stagnation-point Flow Towards a Stretching Vertical Permeable Sheet

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ABSTRACT

An analysis was done for the steady two-dimensional stagnation-point mixed convection flow of an incompressible viscous fluid towards a stretching vertical permeable sheet in its own plane. The stretching velocity and the surface temperature are assumed to vary linearly with the distance from the stagnation-point. Two equal and opposite forces are impulsively applied along the x -axis so that the wall is stretched, keeping the origin fixed in a viscous fluid of constant ambient temperature. The transformed boundary layer equations were solved numerically for some values of the parameters considered using an implicit finite difference scheme known as the Keller-box method. Flow and heat transfer characteristics were analyzed and discussed. Both cases of the assisting and opposing flows were considered and it was found that dual solutions exist for the opposing flow, whereas a unique solution resulted for the assisting flow.

Keywords: Boundary layer, heat transfer, mixed convection, permeable sheet, stagnation-point flow, stretching sheet