RADIATION AND SLIP EFFECTS ON UNSTEADY BOUNDARY LAYER STAGNATION POINT FLOW OVER A STRETCHING SHEET IN A POROUS MEDIUM

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ABSTRACT

Thermal radiation in unsteady boundary layer stagnation point flow and heat transfer is important to optimise the process in industrial applications. This study considers thermal radiation effect on unsteady stagnation point flow with velocity and thermal slips in a porous medium over a stretching sheet to fill the knowledge gap due to incomprehensive investigations in the past. The governing equations of the fluid flow was transformed from partial differential equations into ordinary differential equations using the similarity transformation. The transformed governing equations were solved with the utilisation of Runge-Kutta method with shooting technique using MAPLE software. The results of thermal radiation and other parameters effect on skin friction coefficient, heat transfer rate, velocity profile and temperature profile were presented in the form of tables and graphs. It is found that thermal radiation parameter has not affected skin friction coefficient while decreasing the heat transfer rate of the boundary layer flow. The velocity profile of the fluid flow does not change, while the temperature profile increases with the increasing thermal radiation parameter values. Furthermore, when thermal parameter increase, the skin friction coefficient for permeability parameter and unsteadiness parameter increase, while it decrease for velocity slip parameter and remain constant for thermal slip parameter and Prandtl number. The heat transfer rate increases with the increase of Prandtl number and unsteadiness parameter, and decreases with the increase of permeability, thermal slip, and velocity slip parameter with the presence of thermal radiation parameter.

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