

Stability of solutions in boundary layer flow and heat transfer over a stretching cylinder

ABSTRACT

The boundary layer flow and heat transfer in viscous fluid passing through a stretching cylinder with present of mass suction are investigated. The governing equations of boundary layer in the form of partial differential equation are transformed into ordinary differential equations using appropriate similarity variables. The systems of ordinary differential equations are then reduced to first order system before being solved numerically. The results for skin friction coefficient, local Nusselt number, velocity and temperature profiles are presented. The effects of mass suction with different values of curvature parameter on the flow and heat transfer characteristics indicate that the dual solutions are found to exist. The stability analysis is performed to verify which solution (first or second solution) is linearly stable and thus the physical meaning is realizable. In the presence of mass suction, the dual solutions exist along stretching cylinder.

Keyword: Boundary layer flow; Heat transfer; Stretching cylinder; Stability; Mass suction