

Stagnation-point flow and heat transfer over an exponentially shrinking sheet: a stability analysis

ABSTRACT

Numerical solutions for the stagnation-point flow and heat transfer over an exponentially shrinking sheet have been investigated. The governing boundary layer equations are transformed into an ordinary differential equation using a non-similar transformation. By using the `bvp4c` solver in MATLAB, the results of the equations can be solved numerically. Numerical results indicate that in certain parameter, the non-unique solutions for the velocity and the temperature do exist. A linear stability analysis shows that only one solution is linearly stable otherwise is unstable. Then, the stability analysis is performed to identify which solution is stable between the two non-unique solutions.

Keyword: Stagnation-point flow; Heat transfer over; Shrinking sheet; Shrinking rate