Boundary layer stagnation-point flow and heat transfer past a permeable exponentially shrinking sheet

ABSTRACT

An analysis is carried out to investigate the steady two-dimensional stagnation-point flow past a permeable exponentially stretching/shrinking sheet in its own plane. Using a similarity transformation, the governing mathematical equations are transformed into coupled, nonlinear ordinary differential equations which are then solved numerically. Effects of uniform suction and injection on the flow field and heat transfer characteristics are thoroughly examined. Different from a stretching sheet, it is found that the solutions for a shrinking sheet are non-unique. The range of the stretching/shrinking parameter where the similarity solution exists is larger for the exponentially stretching/shrinking case compared to the linearly stretching/shrinking case. The results indicate that suction delays the boundary layer separation, while injection accelerates it.