

Similarity solutions for the stagnation-point flow and heat transfer over a nonlinearly stretching/shrinking sheet

ABSTRACT

This paper presents a numerical analysis of a stagnation-point flow towards a nonlinearly stretching/shrinking sheet immersed in a viscous fluid. The stretching/shrinking velocity and the external flow velocity impinges normal to the stretching/shrinking sheet are assumed to be in the form $U \sim xm$, where m is a constant and x is the distance from the stagnation point. The governing partial differential equations are converted into ordinary ones by a similarity transformation, before being solved numerically. The variations of the skin friction coefficient and the heat transfer rate at the surface with the governing parameters are graphed and tabulated. Different from a stretching sheet, it is found that the solutions for a shrinking sheet are non-unique for $m > 1/3$.

Keyword: Nonlinear stretching/shrinking; Boundary layer; Dual solutions; Similarity solution