

## Hydromagnetic Stagnation Point Flow Towards a Porous Stretching Sheet with Variable Surface Heat Flux in the Presence of Heat Generation

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The influence of heat generation or absorption on the steady, two-dimensional flow of an electrically conducting fluid near a stagnation point on a stretching permeable surface with variable surface heat flux in the presence of a magnetic field is investigated. The governing system of partial differential equations describing the problem are converted into highly non-linear ordinary differential equations using similarity transformation. Numerical solutions of these equations are obtained using the fourth-order Runge-Kutta integration scheme with the shooting method. The effects of the heat generation or absorption parameter and the velocity ratio parameter on the velocity and the temperature are displayed graphically and discussed. The numerical values of the local skin-friction coefficient and the local Nusselt number for various values of physical parameters are presented through tables and discussed.

Keywords Heat generation/absorption; MHD; Stagnation point; Stretching surface; Variable surface heat flux

## Introduction

In many engineering applications, the problem of flow and heat transfer of an incompressible viscous fluid over a stretching surface has gained considerable attention. Applications include hot rolling, paper production, wire and fiber coating, drawing plastic films, foodstuff processing, glass blowing, continuous casting of metals and spinning of fibers, annealing and tinning of copper wires, among others Crane (1970) first investigated the flow caused by an elastic sheet whose velocity varies linearly with the distance from a fixed point on the sheet. Many authors (Gupta and Gupta, 1977; Rajagopal and Na, 1984; Chen and Char, 1988; Lin and Chen, 1998; Afzal, 2003; Fang, 2004; Abel et al., 2007; Tsai et al., 2008; Cortell, 2008; Xu and Liao, 2009; Chakrabarti and Gupta, 1979) extended the work of Crane (1970) under different situations. The study of viscous flow of an electrically conducting fluid over a stretching surface in the presence of a magnetic field has gained considerable interest because of its applications in industry. For example, in the extrusion of polymer sheet from a die, the sheet is sometimes stretched. During this

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