

A MATHEMATICAL ANALYSIS OF HEAT AND MASS TRANSFER ON MHD BOUNDARY LAYER FLOW

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Abstract:The objective of this paper is to solve a system of highly non-linear differential equation governing MHD boundary layer flow over a moving vertical porous plate. An analytical expression for dimensionless velocity profile, temperature profile and concentration profile has been derived using Q-Homotopy Analysis Method. The impact of velocity, temperature and concentration on varying parameters that are influencing the flow are discussed graphically and compared with the numerical results.

Key Words:Porous plate, Heat transfer, Mass transfer, Non-linear differential equations, Q-Homotopy Analysis Method.

1.Introduction:

MHD free convection flows have noteworthy applications in the field of stellar and planetary magnetospheres, aeronautical plasma flows, chemical engineering and electronics. The summary of the applications are explained by many researchers.[9] made a mathematical analysis of time varying two dimensional natural convective flow of an incompressible, electrically conducting fluid along an infinite vertical porous plate embedded in a porous medium. The unsteady free convection flow past a vertical plate embedded in a porous medium was examined by [11]. The study of heat and mass transfer of the fluid was demonstrated by [2] to [8] under various circumstances. In many situations, such as in geothermal operations, petroleum industries, thermal insulation, design of solid-matrix heat exchangers, chemical catalytic reactors, the transportation of the fluid through porous media and their behaviours during the process plays vital roles. The importance of inertia effects for flows in porous media was discussed by [6]. [14] examined the MHD boundary-layer flow and mass transfer past a vertical plate in a porous medium with constant heat flux. [7] made similarity solutions for boundary