Mathematical Statistician and Engineering Applications
ISSN: 2094-0343
2326-9865

# MHD Mixed Convection from a Horizontal Plate Embedded in a Porousmedium with a Convective Boundary Condition

**Dr. Rajeev Gandhi S**

Head of the department, Department of Mathematics SF
V H N S N College Autonomous Virudhunagar-626001
Tamilnadu, India
rajeevgandhi@vhnsnc.edu.in

***Article Info***
***Page Number: 10530 - 10542***
***Publication Issue:***
***Vol 71 No. 4 (2022)***

***Abstract***
The heat and mass transfer from a horizontal plate embedded in a porous medium experiencing a first-order chemical reaction and exposed to a transverse magnetic field was studied using an analytical approach. A convective boundary condition is used instead of the commonly used conditions of constant surface temperature or constant heat flux, making this study unique and the results more realistic and practically useful. The momentum, energy, and concentration equations are solved analytically and thoroughly tested as coupled second-order ordinary differential equations. Graphic representations of the effects of Biot number, thermal Grashof number, permeability parameter, Hartmann number, Eckert number, Sherwood number, and Schmidt number on velocity, temperature, and concentration profiles are provided. The local temperature is proportional to the temperature of the plate surface.

**Keywords:** local skin friction; MHD flows; Horizontal plate.

***Article History***
***Article Received:*** *15 September 2022*
***Revised:*** *25 October 2022*
***Accepted:*** *14 November 2022*
***Publication:*** *21 December 2022*

## 1. Introduction

The study of hydromagnetic boundary layer flow with heat and mass transfer over a vertical surface embedded in a porous medium is important in many engineering situations, such as concurrent buoyant upward gas-liquid flow in packed bed electrodes [1, 2], sodium oxide-silicon dioxide glass melt flows [3, 4], reactive polymer flows in heterogeneous porous media [5, 6], electrochemical generation of elemental bromine in porous electrode systems [7, 8], and the manufacture of intumesc Moreau's book [6] contains a comprehensive survey of magneto-hydrodynamic studies and their technological applications. Several interesting computational