South East Asian J. Math. & Math. Sc.
Vol.6 No.1(2007), pp.17–26

HEAT TRANSFER BY FREE CONVECTION FLOW WITH RADIATION ALONG A POROUS HOT VERTICAL PLATE IN THE PRESENCE OF TRANSVERSE MAGNETIC FIELD

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(*Received: April 04, 2005*)

Abstract: An analysis of radiation effect on steady laminar free convection flow of an electrically conducting fluid along a porous hot vertical plate has been discussed. Approximate solutions have been derived for the velocity, temperature field, skin friction and rate of heat transfer using multi-parameter perturbation technique. The obtained results are discussed with the help of graphs and tables to observe the effects of Prandtl number, radiation parameter, magnetic field parameter and Grashof number on velocity, temperature, skin-friction and the Nusselt number.

Keywords and Phrases: Free convection, radiation, magnetic field, heat transfer
2000 AMS Subject Classification: 82A22, 76B10, 76S05

1. Introduction

Free convection phenomenon has been the object of extensive research. The importance of this phenomenon is due to enhanced concern in science and technology about buoyancy induced motion in the atmosphere, in bodies of water and quasi solid bodies such as earth. Free convection flow past a vertical plate has been studied extensively by Ostrach [9-10], Riley *et al.* [11], Martynenko *et al.* [8] and Weiss *et al.* [15] in numerous ways to include various physical aspects. Magnetohydrodynamic flows have application in meteorology, solar physics, cosmic fluid dynamics, astrophysics, geophysics and in the motion of earth's core. On account of their varied importance, these flows have been studied by several authors notable amongst them are Shercliff [14], Ferraro and Plumpton [5] and Cramer and Pai [3].

Many processes in engineering areas occur at high temperatures and acknowledge radiation heat transfer becomes very important for the design of pertinent equipment. Nuclear power planets, gas turbines and the various propulsion devices for aircraft, missiles, satellites and space vehicles are examples of such