Hydrodynamic Flow Past A Semi- Infinite Rough Plate Embedded In Porous Medium

Mostafa A. A. Mahmoud
Department of Mathematics,
Faculty of science,
Benha University,
Benha (13518),
Egypt

Ahmed M. Megahed
The same address

Abstract:- The boundary layer flow of a fluid past a semi-infinite rough plate embedded in porous medium is investigated. The transformed non-linear ordinary differential equation describing the problem is solved numerically using the shooting technique. The effects of permeability parameter (M), inertia coefficient parameter (N) and the roughness parameter (R_w) on the velocity are shown on graphs. Numerical data for the skin fraction have been tabulated for various values of M, N and R_w.

Key-Words:- MHD, Flow, Porous, numerical solution, semi-infinite

1- Introduction

The analysis of hydrodynamic flow through porous medium is of interest in a wide range of technical problems. The importance of inertia effects were discussed by many authors [1-4].

In the a forementioned studies, the plates were asumed to be smooth. In most practical application connected with the flat plate, the wall can not be considered smooth. Consequently the flow past a rough plate is of as much practical interest [6].

To the end of our knowledge there have been no studies concerning the laminar boundary layer flow past a rough surfaces through a non-Darcian porous medium.

It is now proposed to study the effects of permeability parameter, inertia coefficient parameter and the roughness parameter on the flow past a semi-infinite plate embedded in non-Darcian porous medium.

2- Basic Equations

The boundary layer steady flow of an incompressible fluid through a porous medium bounded by a semi- infinite rough flat plate is