SYNOPSIS
The contents of this thesis are arranged under six chapters. The first chapter is a general introduction of Newtonian and non-Newtonian fluids in hydrodynamics and Magnetohydrodynamics with particular reference to the following methods to solve the fluid dynamical equations.

1) Perturbation Method
   a) Regular perturbation  b) Singular perturbation
2) Laplace Transform Method
3) Using Special function (Hh function)

In every problem the flow phenomena have been characterized by a number of parameters and the effects of these parameters on the flow have been studied.

CHAPTER-1

The first chapter is a general introduction to the various aspects of fluid flow studied in this thesis. In this chapter the basic principles of Newtonian and non-Newtonian fluid flow, MHD flow, the electromagnetic equations, momentum equations, etc, have been discussed.
CHAPTER-2

EFFECTS OF VOLUME SOURCES AND SINKS OF MASS ON THE FLOW OF AN ELECTRICALLY CONDUCTING FLUID IN A CHANNEL

In this chapter, the problem of hydromagnetic flow in a non-porous channel when there is a uniform distribution of sources or sinks of mass is considered to study the effect of uniform magnetic field, in the presence of electric field. A similarity solution for the velocity field is found to exist when the induced magnetic field is assumed to be negligible. This problem reduces to a singular perturbation problem when the Hartmann number is very large and a solution is obtained by the method of matched asymptotic expansions. The velocity field is also determined when the strength of the volume sources or sinks of mass is considered to be small.

CHAPTER-3

FREE CONVECTION FLOW WITH MASS TRANSFER OF AN ELASTICO-VISCOUS FLUID PAST AN ACCELERATED VERTICAL PLATE WITH CONSTANT HEAT FLUX

In this chapter, the flow and mass transfer of an elastico-viscous fluid (Walters Liquid B') due to uniformly accelerated motion of an infinite vertical plate in the presence of foreign species are considered when there is a constant heat flux between fluid and the plate. The expressions for the velocity field, temperature, concentration and the skin-friction have been obtained by the Laplace
transform method. The influence of various parameters is discussed with the help of graphs and tables.

CHAPTER-4

EFFECTS OF MIXED CONVEXTIVE HEAT AND MASS TRANSFER OF AN ELECTRICALLY CONDUCTING FLUID FLOW PAST AN ACCELERATED VERTICAL INFINITE PLATE WITH VARIABLE SUCTION

In this chapter, the problem of simultaneous heat and mass transfer of an electrically conducting fluid flow past an accelerated vertical infinite plate with variable suction has been studied. The solutions of the equations are obtained by using Special Function (Hh function). The effects of the magnetic parameter, the Grashoff number for heat transfer, the Grashoff number for mass transfer, the Schmidt number have been studied by the help of graphs and tables.

CHAPTER-5

HYDROMAGNETIC FLOW AND HEAT TRANSFER BETWEEN TWO HORIZONTAL PLATES, BOTH THE PLATES BEING STRETCHING SHEETS

In this chapter, hydromagnetic flow and heat transfer between two horizontal parallel plates, the lower one is a stretching sheet and the upper one is a porous stretching sheet, are studied in the presence of transverse magnetic field. The effects of transverse magnetic field parameter and suction parameter on the velocity field and temperature field are obtained by perturbation method. Interesting observations are discussed with the help of graphs.
CHAPTER-6

MIXED CONVECTIVE HEAT AND MASS TRANSFER OF A VISCOUS
FLOW PAST A HOT VERTICAL PLANE WALL WITH PERIODIC SUCTION AND
HEAT SOURCES

In this chapter, the problem of mixed convective heat and mass transfer of a viscous flow past a hot vertical plane wall with periodic suction and heat sources in the presence of magnetic field has been studied. Perturbation method has been applied to obtain the velocity, temperature and concentration variations. The effects of various flow parameters are exhibited through a number of graphs and tables and some interesting observations are made during the discussions of the results.

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