PREFACE

The solution of the problem of transfer of energy, mass and electrically conducting fluids has considerable importance to many practical processes, which involve transfers. It is widely known that in engineering technology one encounters great difficulty in obtaining a solution for problems using the method of mathematical physics. Fluids (gas and liquid) flows are governed by partial differential equations which represent conservation laws for the mass, momentum and energy. Computational Fluid Dynamics is the art of replacing such PDE system by a set of algebraic equation which can be solved using digital computers.

The term MHD Darcy Forchheimer in porous medium plays the role in momentum equation. Dufour, Viscous dissipation, Thermophoresis, Radiation are the dimensionless parameters occur in energy equation and Soret, thermophoresis and chemical reaction parameter play a keen role in concentration equation. The flow governing problem are continuity, momentum, energy and mass equations with boundary conditions are Non-linear in nature. The governing equations are non-dimensionlized by using the dimensionless quantities. The coupled non-linear PDE’s are then converted to ordinary differential equations by using the similarity transformations.

The set of differential equations are coupled non-linear ordinary differential equations. These equations are linearized first, by using
Quasi-linearization technique (Bellman Kalaba). The obtained linearized set of ordinary differential equations are solved using implicit finite difference method through the Gauss Seidel iterative scheme with the help of C programming. In order to obtain a clear insight into the physical situation of the problem we have computed the numerical values on profiles such as velocity, temperature and concentration for the different flow parameters such as magnetic parameter $Ha$, Prandtl number $Pr$, Thermophoretic parameter $\tau$, mixed convection parameter $Ra_x/Pe_x$, buoyancy ratio $N$, Inertia parameter $\Lambda$, thermal Rayleigh number $Ra_x$, Peclet number $Pe_x$ and chemical reaction $\delta$, Radiation $R$, Soret $S_r$ and Dufour $D_f$. 