Chapter 6

Conclusion and Future Scope

Concluding Remarks of the Thesis and Future Scope of the research work.
6.1 Concluding Remarks

The whole thesis is divided into four chapters. Chapter 1, is introductory/review of literature. In chapter 2, we have studied “Thermal instability of Rivlin-Ericksen elastico-viscous fluid with suspended particles through porous medium”, in chapter 3 we have studied, “Hall effect on thermal instability of visco-elastic dusty fluid through porous medium” and in chapter 4, “Double-diffusive convection in presence of compressible Rivlin-Ericksen fluid with fine dust”. In chapter 2, we found that magnetic field has stabilizing effect whereas suspended particles and medium permeability have destabilizing effect on the system. In chapter 3, we found that medium permeability have stabilizing as well as destabilizing effect only in presence of magnetic field, but in absence of magnetic field it holds the same result as in presence of suspended particles in chapter 2. As in the absence of suspended particles and presence of compressibility in chapter 3, magnetic field has stabilizing effect on the system. Also hall current is studied at here and found that hall current have destabilizing effect on the system. In chapter 4, we found that stable solute gradient have stabilizing effect, where has suspended particles have destabilizing effect on the system in the presence of compressibility.

From the observation of all these three chapters, we found that magnetic field has stabilizing effect, in presence of compressibility as well as incompressibility. Medium permeability have stabilizing as well as destabilizing effects on the system, Hall current have destabilizing effect whereas stable solute gradient have stabilizing effect on the system.

All these results are verified graphically and by computer programming, self created programming codes is the beauty of the thesis.

6.2 Future Scope

Fluid dynamics has many applications in all the branches of engineering like mechanical, aeronautical and chemical etc. In medical discipline it plays an important role. Observed problems of nature can be modelled by using fluid dynamics and can be solved by using appropriate analytical method or numerical method which gives
approximate solution. Presently technology is driven by physics, one must know the physics of the problem only then solutions can be interpreted and useful in real life. Mathematical equations tells a lot about the problem and physics behind it. The biggest challenge is always to convert the real life fluid flow problem into mathematical equations. The questions that always arise:

a) What is appropriate element (1 D, 2 D or 3D).

b) What are appropriate initial or boundary conditions.

c) Which technique or method is well suited for the problem.

Sometime experiments can not be performed because it is time consuming and expensive, moreover resources are limited. Also it is not possible to done on all the scales. All numerical methods convert continuum problem into discrete problem and give the solution at nodal points not at all the points of domain. So simulations techniques can be useful.

Simulation: Here, Firstly the problem is observed from the real life situation, then problem is defined and converted into mathematical model which is the set of differential equations (ordinary or partial). Afterwards problem is solved by using the mathematical techniques or tools and results obtained.

Numerical Simulation: If solution to the problem is approximated by using one of the numerical methods like finite difference method, Finite element method, finite volume method, runge-Kutta method, Galerkin method or any other method which is well suited to given problem is called numerical simulation. Finite element method is numerical tool for simulation. It can be used up to micro and continuum scale but cannot be used for nano scale. Numerical techniques are those which can be programmed.

Simulation through software: For this purpose various softwares of computational fluid dynamics like ANSYS (FLUENT), COMSOL Multiphysics, ABAQUS, MARK, PAFEC, ADINA are available in the market. The processing of these softwares is based on the numerical methods.

One can pursue the research in the area of fluid structure interaction (FSI) and further simulate the results by using computational software.