International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 11 Issue 5 Ser. II || May. 2022 || PP. 52-56

A Study on Fluid Flow through Porous Media

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ABSTRACT
The first to concentrate on the effect of mass exchange on free convection stream past a semi endless isothermal vertical plate Studied on the joined intensity and mass exchange normal convection in immersed thermally defined permeable medium. Taking into account normal convection from an upward plate researched a coupled intensity and mass exchange in a permeable medium considered the issue of intensity and mass exchange in MHD non-Darcian Flow of a scaled down scale polar liquid over an extending sheet implanted in a permeable media with non-uniform intensity source and warm radiation.
KEYWORDS: *MHD, Flow, Fluid*

I. INTRODUCTION

Dissemination of mass in any physical and synthetic cycles prompts an adjustment of the fixation. Accordingly, in the examinations of the issues including mass exchange it becomes critical to notice the variety of the focus profile impacted by the material boundaries engaged with the issue. Mass dispersion in light of compound response was concentrated on by numerous scientists since most recent few decades.

As of late, considered MHD free convection stream past an endless vertical plate with first solicitation synthetic response and intensity source/sink, researched the revolution consequences for stream past a sped up isothermal vertical plate with compound response of first solicitation.

Geothermal cycles, fluid metal liquids, MHD control generators and so forth are several models where hypotheses of MHD are utilized. Clearly MHD comes to activity when the liquid is electrically leading had made a definite study on MHD in his book particularly in the field of electrically directing liquid. Contemporarily likewise formed a book on MHD which in its items contains bunches of data in regards with the impacts of attractive field on the electrically leading liquids.

Broad works has been finished on electrically directing liquids impacted by various actual boundaries. The impacts of dynamically applied uniform attractive field on stream past a limitless vertical wavering plate with steady intensity movement was explored MHD insecure free convection stream past an upward permeable plate. Concentrated because of thick dissemination and radiation on precarious MHD free-convection stream past a limitless warmed vertical plate in a permeable medium with time subordinate pull concentrated on the effect of MHD stream over a moving plate in a pivoting liquid with attractive field, Hall ebbs and flows and free stream speed Transverse attractive field likewise influences on mass exchange. Along these lines, concurrent impacts of attractive field on intensity and mass exchange are fascinating points to study.

A concentrated on MHD intensity and mass dispersion stream by regular convection past a surface imbedded in permeable medium, Das and Jana examined intensity and mass exchange impacts on precarious MHD free convection stream close to a moving vertical plate in permeable medium, considered the dissemination thermo and radiation consequences for temperamental MHD course through permeable medium beyond a rashly begun boundless vertical plate with variable temperature and mass dispersion.

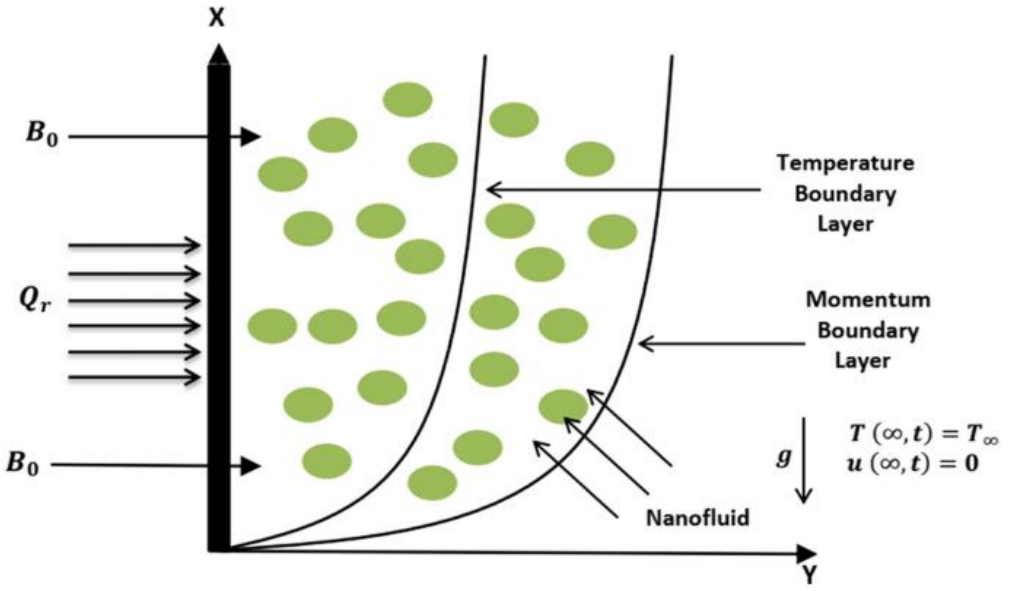

Figure 1: Analysis of MHD convection Flow

Investigations of Visco-versatile liquids go under the investigation of non-Newtonian liquids. As the greater part of the liquids have both gooey and flexible properties and these two properties essentially influence the movement and intensity/mass exchange design, accordingly their examinations become significant with the headway of advancements. The constitutive conditions of these liquids had given by numerous analysts and are named after their creators. One such class of visco-flexible liquid is Walter's fluid Model-B, proposed by Walter.

In late past numerous analysts worked on the investigation of elastico-vicsous liquids. Transient free convection stream of an elastico-gooey liquid beyond an endless vertical plate was concentrated by Deka Prakash researched the impacts of warm dispersion and synthetic response on MHD stream of dusty visco-flexible (Walter's fluid model-B) liquid, Theoretically concentrated on hydrodynamic free convection stream of a turning visco-versatile liquid beyond an isothermal vertical permeable plate with mass exchange.

Elements of liquid, intensity and mass exchange, attractive impacts and so on happened in permeable medium have been considered as a significant part of liquid mechanics as it is pertinent to a few disciplines of science and innovation. It has likewise significance in many fields of commonsense interest. There are two fundamental ways to deal with tackle the issues of intensity move in permeable media viz. Darcian model for low speed of permeable liquids and non-Darcian or Forchheimer condition model for permeable liquid with medium or high speed. Research deals with stream of permeable liquid have been completed by a respectable quantities of researchers under various actual circumstances alongside the impacts of various boundaries. Obviously, the greater part of them are viewed as under consistent state conditions.

UNSTEADY FREE CONVECTIVE MHD FLOW THROUGH A POROUS MEDIUM

Natural convection and mass transfer problems under boundary layer assumptions of Darcian fluids have been studied by a large number of researchers etc are some of the mentionable. All of them obtained the solutions of the governing equations under varied surface conditions by employing different methods and investigated the effects of different physical parameters involved in their problems. On the other hand some authors such as Lakshmi etc. chipped away at non-Darcian porous medium. Further, because of the coupling of temperature and concentration new parameters like buoyancy ratio, Lewis number (diffusion ratio) get involved in the governing equations, which also influence the convective mechanism. Had discussed these new parameters in their non-Darcian models of heat and mass transfer Moreover, exhaustive volume of works on convection in porous media can be found.

Thermal stratification occurs when the fluid mass is composed of some layers with different temperature (thermal layer). Although thermal stratification presents in many environmental situations, its concept was started a couple of decades back. Notwithstanding, because of the presence of stratified fluids in environmental and engineering flows, importance of its study has developed day by day in fluid mechanics and heat transfer research. Some fundamental works on free convection in a thermally stratified fluid were done by Gill etc. They studied steady state stratified solutions.

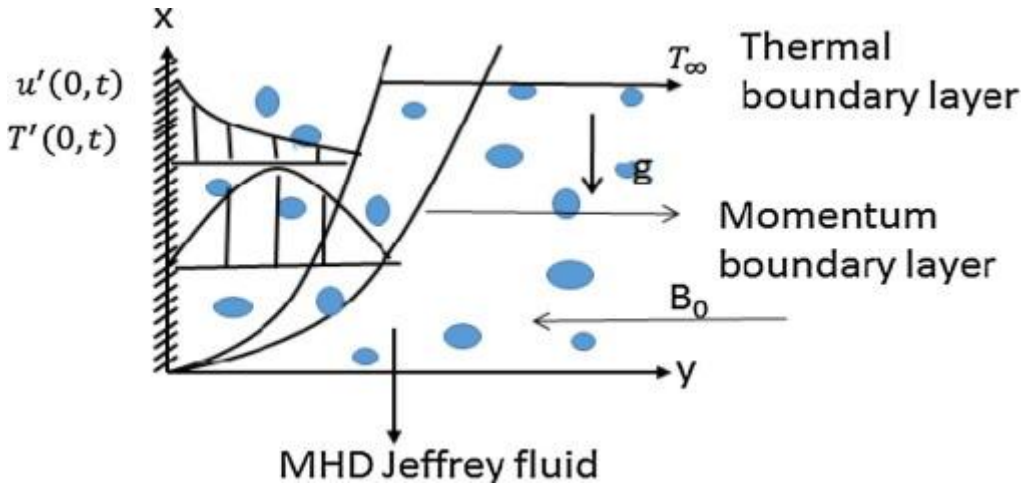

Figure 2: MHD Fluid

Effects of thermal stratification on non-Darcy porous medium was investigated by Lakshmi they found numerical solution using series solution techniques. Investigated convection from a continuously-moving vertical surface in thermally-stratified non-Darcian high-porosity medium

Because of this the investigations on stratified fluid done in the last century was not finished to some degree. Thus, extension of one dimensional convection became necessary with the inclusion of ambient thermal stratification in the vitality equation. Recently, made a refinement in the classical theory of one dimensional flow by introducing stratification parameter in the vitality equation of their study they obtained analytical solutions for the cases of impulsive change in plate perturbation temperature by sudden application of plate heat motion and for arbitrary temporal variations in plate perturbation temperature. They found that inclusion of thermal stratification provides a negative feedback to the mechanism whereby warm fluid rises and cooled relative to the environment, while subsiding cool fluid get warmed relative to the environment. Expanded their work on stratified fluid past a vertical plate for variable number (near unity) and also for fluid flow past plates and cylinders using regular perturbation technique.

Investigations on radiation in both free and forced convection process are necessary. Nuclear power plants, gas turbines, missiles, space vehicles, various propulsion devices are some examples where radiation effects are quite considerable. In high operating temperature, radiation becomes dominant.

Investigated the thermal radiation effects on the laminar free convection boundary layer flow of an absorbing gas limited by a vertical plate studied the radiation effects on the combined free and forced convection of an electrically conducting fluid flowing inside an open finished vertical channel in the presence of a uniform transverse magnetic field for the case of optically thin limit.

Considered impact of radiation on blended convection along a vertical plate with uniform surface temperature. In all these studies the fluids considered by them were optically thin gray gas and the plate was stationary. For similar sort of gas carried out investigations on radiative effects on flow past an impulsively started vertical plate with variable temperature and mass transition.

Attempted to investigate the combined impact of thermal stratification and radiation on unsteady natural convection MHD flow past an impulsively started Infinite vertical plate in fluid saturated porous medium considered radiation and mass transfer effects on unsteady MHD free convective fluid flow embedded in a porous medium with heat generation absorption. Further, radiation effects on MHD free convection flow in a rotating vertical porous channel partially loaded up with porous medium was studied.

In our study, we have considered some unsteady free convective heat transfer problems with or without thermal stratification effects. Problems in which thermal stratification is considered are based on model in which Boussinesq model of free convection is slightly modified by including the pressure work term in the vitality equation.

Consequently the vitality equation involves a term – γU, which arises as result of the combined impact of pressure work and vertical temperature advection term, and because of this the vertical velocity and fluid temperature become coupled beyond the buoyancy force term in the vertical equation motion. Each issue of this sort was solved with the assistance of Laplace transform method. Included pressure work term in their study of unsteady natural convection flow past an accelerated vertical plate in a thermally stratified fluid.

II. DISCUSSION

Rotation of fluid is an indispensable part of fluid dynamics. Rotation in fluid motion is critically important across a wide range of scientific, engineering and item applications which have been providing ideas to design and modeling capacity for diverse products such as fly engine, pumps, vacuum cleaners etc., as well as geophysical flows.

Studied rotation effects on MHD flow past an impulsively started vertical plate with variable plate temperature, flow over a moving plate in a rotating fluid with magnetic field, Hall currents and free stream velocity. Rotation also effects on mass transfer and consequently on concentration difference.

Considering the impact of rotation on radiation and mass transfer investigated heat and mass transfer of an unsteady MHD natural convection flow of a rotating fluid past a vertical porous flat plate in the presence of radiative heat transfer considered radiation effects on natural convection MHD flow in a rotating vertical porous channel partially loaded up with porous medium.

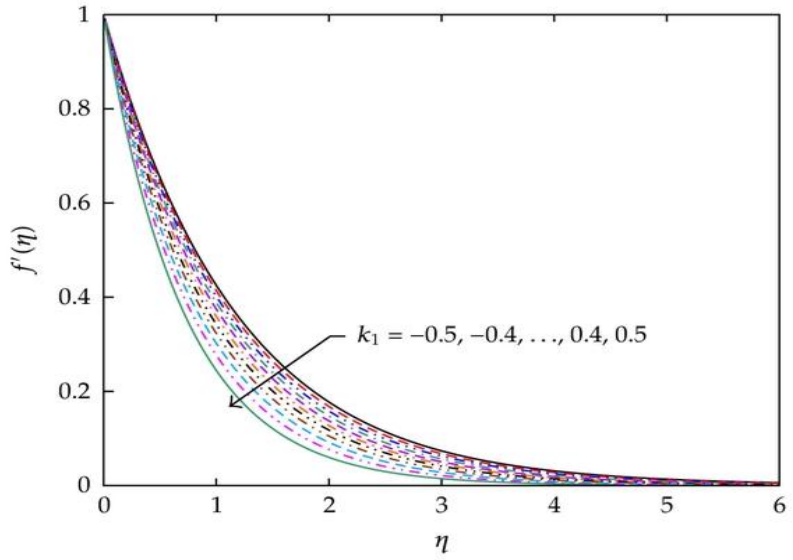

Figure 3: MHD Analysis

Considered the impact of rotation on unsteady hydro magnetic natural convection flow past an impulsively moving vertical plate with ramped temperature in a porous medium with thermal diffusion and heat absorption, on the other hand studied rotation effects on flow past an accelerated isothermal vertical plate with chemical reaction of first request

A rock mass consisting of mineral grains and pore spaces, or voids, is alluded to as a porous medium An actual porous medium is a very heterogeneous body containing physical discontinuities marked by the boundaries of pore walls which separate the solid framework from the void space.

The common quantitative description of fluid flow within rocks is based on a mathematical idealization of the real physical system by a continuum. In the continuum representation of a porous medium, the physical variables describing the system, which are discontinuous on the pore scale, are replaced by continuous functions on the macro scale.

Specific problem of the longitudinal dispersion of miscible fluids flow through porous media is discussed under certain assumptions and solution is obtained in terms of confluent hyper geometric functions. Result expressed suits well for the meaningful interpretation of the physical phenomenon. The analytical solution is almost straight line with negative slope which interprets that for increasing values of x ($t > 0$), the concentration of one fluid is decreasing which is physically a fact and consistent with restricted values of t ($4t<x^2$).

III. CONCLUSION

It can be concluded the behavior of the concentration in the longitudinal dispersion is oscillatory as well as exponential. Thus, concentration distribution behavior of contaminants is depicted by an analytical solution of homogeneous semi- infinite porous medium along unsteady groundwater flow with time dependent source of contaminants. The outputs may help to know the position and the time period of harmless concentration level of the contaminated porousmedium. The solution may be used as a preliminary predictive tool for simulating the contaminant migration in porous medium due to the release of a time-dependent source.

REFERENCES

[1]. Later Gebhart."A theory of dispersion in a porous medium"; Fluid Mech. 2000, 6,21
[2]. Goldstein and Briggs "Statistical approach to miscible displacement in porous media"; Can. Min. Metallurgy Bull. 2003, 52,26
[3]. Schetz and Eichhorm "A statistical mode for flow in non-uniform porous media"; Proc. ASCE–ECM Specially conference on Probabilistic Methods and Concepts,1999, pp 91.
[4]. Harring, R.E. and Greenkorn, R.A. "A statistical model of a porous medium with non-uniform porous" A.I. Che. E. J. 1990, pp 16,477.
[5]. Carrier, G.F. "The mixing of groundwater and seawater in permeable sub soils"; J. Fluid Mechanics; 1998, 4,5.
[6]. Bear, J. "On the tensor from of dispersion in porous media" J. Geophys. Res. 2001, 66,1185.
[7]. Greenkorn, R.A. "Flow phenomena in porous media; Marcel Dekker" Inc., New York and Based;1993, pp 183.
[8]. Bhathawala, P.H. "Two parametric singular perturbation method in the fluid flow through porous media; Ph.D. Thesis" S.G. Uni., Surat (India), 1998, p.255.
[9]. Raval, D. "On confluent hyper geometric functions in miscible fluid flow through porous media" Mathematics Today, 2005, 13,25.
[10]. Patel, S.S. An approximate solution of displacement process in porous media; Ph.D. Thesis, S.G. Uni., Surat (India),1997, pp108.