ICETCFD-2019
DAY 1

Session 1

Speaker: Dr. O.D. Makinde

Designation: Professor

Organization: Stellenbosch University, South Africa

Venue: Seminar Hall

Chaired by Dr. B. J. Gireesha

The speaker began the talk by highlighting the applications of MHD in many gadgets. He then talked about ferroliquids, their properties and applications in industrial and engineering processes. He explained the necessity of variable viscosity models, as those of Reynolds, Arrhenius, Slotte, Vogel etc since viscosity affects heat transfer greatly. In addition, the speaker also emphasized the need to propose suitable models. He went on to talk about nanofluids, their properties and how they combine the useful properties of fluids and metals. The problem in discussion was solved numerically using shooting method which was coupled with the Runge Kutta Fehlberg numerical scheme, which explained the relationship between the flow and factors such as, ferroliquid velocity, temperature, skin friction and Nusselt number. He drew several results from the graph, the most notable ones being - skin friction increases as Rayleigh number increases and that Nusselt number increases as temperature increases.

Duration of the talk: 45 minutes

Memento was given by Dr. B. J. Gireesha

Session 2

Speaker: Dr. B. J. Gireesha

Designation: Professor

Organization: Kuvempu University, India

Venue: Seminar Hall

Chaired by Dr. O.D. Makinde

A fin was introduced as an extended surface of a body. Fin structures help in reducing temperature, increasing heat transfer and enhance aerodynamic maneuverability. Heat transfer from finned surfaces was modelled using Newton's law of cooling. The governing equations were solved and the particular solutions were obtained for different boundary conditions. The speaker elaborated on the use of Chebyshev polynomials to reduce non-dimensional differential equations involving three highly nonlinear terms. He discussed the efficiency of different fin structures. An important observation was that triangular and parabolic fins reduce weights, without compromising heat transfer. A small case study was presented that detailed the optimal length of fin structures in a practical situation. The speaker also extended this problem to porous fins, which greatly increase heat transfer.

Duration of the talk: 45 minutes

Memento was given by Dr. O.D. Makinde

Session 3

Speaker: Dr. Pradeep G.Siddheshwar

Designation: Professor

Organization: Bangalore University,India

Venue: Seminar Hall

Chaired by Dr. O.D. Makinde

A brief explanation of Rayleigh Bernard Convection was given – from the way the convection process is motivated by bouyancy effects and the occurrence of roll cells moving in mutually opposite directions. This was followed by an account of the Boussinesq approximation, and the reason for considering it. The speaker further explained the significance of the Buckingham Pi theorem, especially in fluid dynamics, since it yields information about the total number of non-dimensional quantities that are associated with a system. A weakly nonlinear instability problem for rigid isothermal boundaries was solved using the Lorenz model. The speaker explained the process of local nonlinear instability analysis. He further explained how this facilitates an elegant study of bifurcation aspects on a center manifold.

Duration of the talk: 45 minutes

Memento was given by Dr. O.D. Makinde

Session 4

Speaker: Dr. Odelu Ojjela

Designation: Senior Assistant Professor

Organization: Defence Institute of Advanced Technology,Pune, India

Venue: Seminar Hall

The initial part of the discussion dealt with unsteady MHD viscoelastic flows through porous parallel plates with heat and mass transfer. The speaker spoke of stratification, free convection and variable mass diffusivity. Second grade viscoelastic fluids and their constitutive relation was assumed. The governing flow field equations were converted into non-dimensional ordinary differential equations. It was shown that heat and mass fluxes have similar effect on viscosity. He further introduced a Jeffrey fluid in the next problem, employing the shooting method and spoke about the use of simple time derivatives instead of convected time derivatives, in the constitutive relation. He concluded that thermophoresis enhances the temperature of the fluid and mass flux enhances the concentration of the fluid.

Duration of the talk: 45 minutes

Memento was given by Dr. M. S. Jagadeesh Kumar

CONTRIBUTORY SESSIONS

VENUE:4601
SUB: Fluid Mechanics
Paper:1
Speaker : Manoj Kumar
The first presentation was on four sided lid driven square cavity using stream function vorticity formation by Manoj Kumar .He is a faculty of department of mathematics from University of Delhi. Contents of his presentation includes introduction mathematical formulation which includes physical description, governing equations, stream functions- vorticity method and specification of boundary conditions. This has a vast application in the field of engineering and physical sciences. The main aim is to use stream functions vorticity formulation to investigate the considered problem .With the aid of numerical consideration he illustrated the variation of the u-velocity, concentration and temperature along the vertical line and v-velocity along the horizontal line through the geometric centre of square cavity.

Paper :2
Speaker : Deepa C Katagi
The topic of this paper is Entropy generation for peristaltic blood flow of a magneto micro polar fluid with thermal radiation in a tapered asymmetric channel. This presentation was done by Deepa C Katagi. She is a research scholar under the guidance of Dr. S K Asha Assistant professor Karnataka university Dharwad. She has given a detailed description about peristaltic fluid, concept of simple micro polar fluids etc… It is found out that magnetic field decreases with velocity, entropy decreases with an increase in N and Q and Nr have enhancing effects on temperature.Also it is observed that Bejan number decreases with an increase in coupling parameter.

Paper:3
Speaker : B C Rout
The paper on impact of thermal radiation on conducting CNT water nano fluids was presented by B C Rout from SOA University Bhubaneshwar Odisha. The concept of carbon nano tubes (CNT) has explained clearly. Among the numerous other systems carbon nano tubes appear very interesting due to their high thermal conductivity. CNT water nano fluids retards the velocity profile in comparison with pure fluid in presence of both stretching or sinking. Magnetic parameter reduces in velocity profile of both pure or CNT water nano fluid. In addition to that radiation parameter also enhance it. Convective boundary layer thickness decreases with
increse in Lewis Number

Paper:4
Speaker : Dr. Krishna b Chavaraddi
The presentation on Homotropy perturbation method on wave equation was given by Dr. Krishna b chavaraddi from S.S Gov.first grade college and pg studies center Nargunda Kranataka. He has given an outline about thE Homotropy perturbation method (HAM).J.He has proposed a new perturbation technique coupled with the homotopy technique which is called as homotopy perturbation method.He applied HPM to solve initial boundary value problem which is governed by the non linear ordinary or partial differential equation since this method is simple and efficient. This HPM method has wide application in applied mathematics, also it can handle a wide class of algebraic equation, differential euation , partial differential equation and integral equation etc…

Paper:5

Roll no:19009

The topic of this paper is Analytical solution of one dimensional advection dispersion equation for concentration distribution in miscible fluid flow through porous media. The governing equation of longitudinal dispersion phenomenon of one dimensional concentration distribution in miscible fluid flow through porous medium has been obtained in term of one-dimensional advection-dispersion equation. This equation has been solved analytically by using Laplace transform. The final solution is obtained in terms ofcomplementary error function and exponential form and it is concluded that the concentration distribution of miscible fluids decreases with time. A fluid is displaced in a porous medium by another fluid with the first fluid this is known as miscible displacement
process. From the given graphs we can conclude that concentration of the contaminated or salt water is decrease as the distance z and time t increases.

Paper:6
Speaker : Dr.Swaraj dominic lewis

This presentation was given by Dr.Swaraj dominic lewis on the topic simulation study and design optimisation of helical coil heat exchanger in metal hydride reactor part 1 hydrogen absorption under the guidance of Dr. Purushothaman chipar. Solid state hydrogen Storing is gaining more importance due to safe usage and less storage space. Storing the hydrogen in Metal is called Metal hydride . Reaction involves exothermic process where heat is liberated when metal adsorbs the hydrogen. The main objective of this paper is to develop a efficient helical coil heat exchanger,Study the influence of various parameter for helical coil like number of coil turns, coolant temperature and pressure of gas. Study the temperature distribution in the MH reactor incorporated with Helical Coil.Study the Hydrogen/metal ratio distribution in the MH reactor Incorporated with Helical Coil. Increasing the number of turns in the helical can improve the heat transfer
capacity. But number of turns is limited by the minimum pitch allowed. Decreasing the coolant fluid temperature improve the heat transfer.considerably since it brings the overall temperature of the system down. varying the supply hydrogen pressure showed paramount changes it terms of bed temperature during the initial stages of hydrogen absorption.
Using coils with 7 turns, coolant temperature of 283.15K and 10 bar pressure produced 90% absorption at 1375 sec with is much faster compared to other cases.The findings of this study could help in enhancing the understanding of hydrogen absorption in an MH bed and the influence of key parameters on hydriding kinetics.

Paper :7
Speaker : Jagadeesh Y J
The next paper is on computational fluid dynamics technique to analyses the incompressible fluid flow through a venturi meter to avoid flow separation by Jagadeesh y j. Computational Fluid Dynamics Technique To Analyze Incompressible Fluid Flow Through A Venturi meter To Avoid Flow Separation. The methodology adopted is a device with inlet diameter 26 cm, throat diameter 18 cm is used to measure the flow of water. The velocity at inlet is 8 mm/s and the pressure at the outlet of device is ambient condition. The geometry of device is shown in fig. Discuss the velocity and pressure Distribution and show the flow separation for various angles of divergence. From fig.4 it is concluded that we may see the directions of fluid
particles and also the velocity is minimum at wall. It is evident that for a divergent angle of 5° to 7 °there is no much flow reversal and wake region formation and also there is least tendency of flow separation. This shows the CFD can be used for designing a divergent portion of a device.

Paper :8
Speaker : Arun Kumar N
The paper presentation on CFD simulation and theoretical analysis of double diffusive convection in a non-Newtonian fluid was done by Arun kumar n. Convection caused by heating is a subject of longtime interest and has many applications in science and engineering. The coupling parameter N1 and micropolar heat conduction parameter N5 stabilizes the system and decreases, the rate of heat and mass transfer.The couple stress parameter N3 destabilizes the system and increases the
rate of heat and mass transfer in the system. The inertia parameter N2 increases the rate of heat and mass transfer in
the system. Chaos sets for the higher values of Rayleigh numbers The ratio of diffusivity Γ destabilizes the system.
Solutal Rayleigh number stabilizes the system and also increases the rate of heat and mass transfer in the system.

Paper:9
Speaker : Umadevi R
This presentation was on the topic Fluid flow in composite regions past a solid core by Umadevi R. She is Assistant professor in the department of mathematics at EWIT Bangalore.The topic of flow in porous media arises often, in several fields of natural science and large number of branches of technology. The hydrodynamic behaviour of such flows has received considerable attention since it is important in lubrication industry, paints, underground spreading of chemical waste etc. A two dimensional flow is considered and domain has been divided into three regions namely fluid, porous and fluid regions. The effects of porous parameters on the flow are discussed through streamlines. This paper presents the analytical solution for steady flow of an incompressible viscous fluid past a solid sphere placed in spherical porous medium. The effect of porous parameter is discussed on the streamline patterns. From the graph it is noticed that, for the increase in porous parameter,the streamlines are meandered in porous region and started to move towards the solidsphere, but further increase in porous parameter results, the streamlines are moving awayfrom the solid sphere due to lower permeability of porous medium.

Paper:10
Speaker : Manoj Kumar
This presentation was on the topic Four Sided Lid Driven Square Cavity Using Stream Function-Vorticity Formulation by Manoj Kumar, Shobha Bagai from Department of Mathematics, Faculty of Mathematical Science, University of Delhi, Delhi. Cluster Innovation Centre, University of Delhi,Delhi. The motivation for this problem is due to its vast applications in various fields like engi-neering and physical sciences. Some of these applications include cooling of electronic devices, high-
performance building insulations, float glass production, drying technologies, crystal growth, solar power collectors, transfer groundwater pollution. Few of the applications involving mass transfer areabsorption and desorption, solvent extraction etc. The numerical solution of the unknown flow variables u, v, T, C for the considered problem are computed with the help of C++ compiler. They have chosen the relevant parameters in the governing equations like Schmidt number (Sc), Prandtl
number (Pr) and Reynolds number (Re) incompatible with the considered problem. With the aid of numerical computations, they illustrated the variation of the u-velocity, temperature and
concentration along the vertical line and v-velocity along the horizontal line through the geometric center of the square cavity. They found that, the absolute value of the u-velocity increases in the vicinity of top and bottom wall of the square cavity as Reynolds number increased from Re=10 to127. The v-velocity profiles are similar to that of u-velocity profiles. The absolute value of temperature and concentration decreased as Reynolds number increased from Re=10 to 127. The isotherms contours, concentration contours are minimum and remains constant along the horizontal line through midpoint of the square cavity while isotherms contours increases as we moves alongvertical line through midpoint of the square cavity.

Paper:11
Speaker: Radhika M
This presentation was about study of velocity profile and temperature profile of rotating dusty nano-fluid over a stretching surface in a porous medium by Radhika M. She is a
research scholar in Government Science College Bangalore. An outline of the paper includesintroduction, applications, mathematical modelling and results and conclusions. This has
got a wide range of applications in the field of geothermal system, oil production, electronic cooling systems etc. The velocity and temperature profiles for different values of ϕ-volume fraction of nano particles,M-magnetic field parameter,ω,K 1- porosity parameter,α-mass concentration of dust particles are plotted. The paper concludes that Increasing value of ω intensify temperature profile of both fluid and dust phase. Increasing value of ω decline velocityprofile of both fluid and dust phase. Raise in volume fraction of nano particles ϕ declines temperature profile of both fluid and dust phase. Hike in mass concentration of dust particles α decrease both velocity profile and temperature profile of fluid and dust phase. Temperature gradient for different values of Prandtl number Pr agrees with published papers.

Venue of the talk : Seminar Hall

Chairperson: Dr Md.Abdul Hakim Khan

Paper 1

Name of the speaker: Noor Arshika

Designation of the speaker: Student

Organization: Christ(Deemed to be University)

About the talk:

Title of topic: Effect of Coriolis force on Rayleigh-Benard Convection with Internal Heat Generation

Highlights of the talk: The presentation was about the effect of Coriolis force and internal heat source on Rayleigh Benard Convection in a Boussinesquian fluid. The solution was found using a linear stability analysis is performed for mono-diffusive convection. The linear theory was based on the normal mode analysis method that determines the onset of Rayleigh-Benard Convection. The Galerkin variant of the weighted residual technique is used to obtain the eigen-value of the problem that determines the stability of the system. It was seen that the effect of various parameters, Taylor number and the internal Rayleigh number of the problem are considered for stationary convection.

Duration of the talk: 7 minutes

Chairperson: Dr.Md.Abdul Hakim Khan

Paper 2

Name of the speaker: Sameena Tarannum

Designation of the speaker: Professor

Organization: Christ(Deemed to be University)

About the talk:

Title of topic: Linear and Non-Linear analysis of Triple diffusive convection with different types of time dependent body force

Highlights of the talk: The effect of senusoidal as well as non-senusoidal triple diffusive convection with different types of time dependent body force was briefly explained.

It was observed that in the linear case the Ralyeigh number was obtained by using the perturbation method that decides the onset of convection. Therefore at the end of the presentation it was seen that the Rayleigh number advances the onset of convection and at the same time decreases the heat and mass transfer.

The applications of the Rayleigh Benard convection was explained in detail and the derivation of the Ginzburg Landau equation was also explained without the proof.

Duration of the talk: 9 minutes

Paper 3

Chairperson: Dr. Md. Abdul Hakim Khan

Name of the speaker: Mohamed El Hadramy Oumar

Designation of the speaker: Student

Organization: Christ(Deemed to be University)

About the talk:

Title of topic: The Effect of Internal Heat Generation on the Onset of Rayleigh–Benard Electro Convection in a Micropolar Fluid

Highlights of the talk: In the beginning of the presentation the effect of internal heat generation and electric field on the onset of Rayleigh-Benard convection in a micropolar fluid was explained briefly by the speaker. It was observed that the eigenvalues of the problem are obtained for rigid-rigid, rigid-free, and free-free velocity boundary combinations using the Galerkin variant of the weighted residual technique. The impact of various micropolar fluid parameters, electric Rayleigh number, and the internal Rayleigh number on the onset of convection was analyzed during the presentation. And at the end of the presentation the expression of Rayleigh number was shown as a function of the electric Rayleigh number, internal Rayleigh number, and other micropolar fluid parameters.

Duration of the talk: 7 minutes

VENUE 5 (27.02.2019)
SESSION CHAIR : DR. SMITHA S NAGOUDA
VOLUNTEERS IN CHARGE: MERINSEBASTIAN AND SHRUTHY MYSON

<u>PRESENTION 1</u>
NAME: SWETHA D.S

DESIGNATION: DEPARTMENT OF MATHEMATICS,
PES UNIVERSITY, BANGALORE RESEARCH SCHOLAR, EAST WEST INSTITUTE OF TECHNOLOGY, BANGALORE VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM

TITLE: AN ANALYSIS ON PERISTALTIC MOTION OF DUSTY JEFFREY PAST A PLANAR CHANNEL

HIGHLIHGTS

Peristaltic pumping is a form of fluid transport induced by progressive wave of area contraction or expansion propagates along the length of a distensible channel containing the fluid. Among several non-Newtonian fluids, one of the elegant types of model which best describe the rheological impacts of viscoelastic fluids and displays shear thinning qualities and yield pressure is Jeffrey fluid model

The paper provides a novel solution to the mathematical model of a peristaltic motion and heat transfer of solid particle motion of dusty non-Newtonian

The mathematical analysis are expressed through low Reynolds number and long wavelength approximations which are used to employed to convert the non-linear partial differential equations into ordinary differential equations.

The linear momentum and energy equations are used to model the governing equations.

The behaviour of pumping characteristics are discussed with the aid of pressure rise.A two-dimensional flow of an irrotational, incompressible, peristaltic waves of solid particle motion of dusty Jeffrey fluid with variable viscosity in a planar channel with flexible walls are considered.

The methodology used are integration technique, finite difference technique, mathlab and origin software.

Volumetric rate increases in free pumping region with amplitude ratio and volume fraction density whereas its behaviour is opposite in pumping and co-pumping regime.

DURATION : 4:45pm-4:50pm (10 min)

<u>PRESENTION 2</u>

NAME : Miss. USHA SHANKAR

DESIGNATION : RESEARCH SCHOLAR
UNDER SUPERVISION OF
DR. N. B. NADUVINAMANI
DEPARTMENT OF MATHEMATICS,
GULBARGA UNIVERSITY, KALABURAGI, KARNATAKA.

TITLE: RADIATIVE SQUEEZING FLOW OF UNSTEADY MAGNETO HYDRODYNAMIC CASSON FLUID BETWEEN TWO PARALLEL PLATES

HIGHLIGHTS: Squeeze flows are flows in which a material is compressed between two parallel plates and thus squeezed out radially.

The region around a magnetic material or a moving electriccharge within which the force of magnetism acts is known magnetic field.

chemical reaction, a process in which one or more substances,the reactants, are converted to one or more differentsubstances, or the products are used here.

Many of the studies were carried out in the absence of thermalradiation, Joule heating and chemical reaction effects.

Hence in the present investigation an attempt has been madeto study the radiative

squeezing flow of unsteadymagneto-hydrodynamic Casson fluid between two parallel plates.
The objective of present study is to determine the influence ofMHD and chemical reaction on transient squeezing flowbetween parallel plates.
Numerical procedures used here are RungeKutta fourth order integration scheme with shooting Technique, bvp4c mathlab solver and Validation.
Velocity and temperature fields show the opposite behavior for increasing values of S. Temperature is a decreasing function of β and R
Velocity field decreases for the increasing values of Ha.
Concentration field diminished for the increasing values of Sc.
Concentration field shows the opposite trend for the increasing values of Kr.

DURATION : 4:55PM-5:10PM (10 MIN)

PRESENTION 3

NAME: A. S ARUNA
DESIGNATION: DEPARTMENT OF MATHEMATICS RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE
TITLE: NON-LINEAR STUDY OF RAYLEIGH-B´ENARD-TAYLOR CONVECTION WITH THERMORHEOLOGICAL EFFECT AND HEAT SOURCE
HIGHLIGHTS:
Governing equations are equation of continuity, equation of linear momentum, energy equation and equation of state.
In the perturbed state, stream functions are introduced.
The solution of the linearized system is assumed to be periodic waves
Local Non-linear stability analysis is done using minimal representation of Fourier series. Here generalized Lorenz model is used.
Derivation of useful expression for the stationary critical Rayleigh numberby using the half-range Fourier cosine series expansion for the basicnonuniform temperature gradient and for the basic viscosity discountingthe possibility of oscillatory motions.
The effect of an increasing the value RI and V , is to decrease the value ofcritical Rayleigh number $R_{E_C}$and the wave number αc, hence its effect isto destabilize the system.
The effect of an increasing the value T a is to increase the value of criticalRayleigh number $R_{E_C}$and the wave number αc, hence its effect is to stabilize the system.
The effect of an increasing the value T a is to decrease the value of Nusseltnumber Nu and hence its effect is to delay the onset of convection andhence heat transfer.

DURATION : 5:15PM-5:25PM (10MIN)

PRESENTION 4

NAME : VIJAYAKUMAR
DESIGNATION: DEPARTMENT OF MATHEMATICS, RAMAIAH

INSTITUTE OF TECHNOLOGY, BENGALURU
TITLE: CONVECTION IN BIDISPERSE POROUS MEDIA
WITH LOCAL THERMAL NON-EQUILIBRIUMUNDER THE EFFECT OF
GRAVITY MODULATION
HIGHLIGHTS :
Governing equations are equation of continuity, momentum equations, thermal energy equations.
In this paper stream functions are introduced in perturbed state.
In the present paper they've made an analytical study of the effect on the onset of convection in bi disperse porous media with local thermal non-equilibrium under the gravity modulation.
The effect of small amplitude for an extensive variety of frequency of modulation and other parameters is studied in detailed and depicted graphically.
The expression for the correction critical Rayleigh number Raf 2 is estimated as function of the frequency modulation Ω and other different parameters.
The Venezi an procedure for linear stability analysis is applied to obtain an expression for the correction critical Rayleigh number Raf2 as function of frequency modulation Ω, Darcy number D_{a_f}, volumefractions φ and , permeability ratio k_r, modified thermal conductivity ratio σfthermal capacity ratio and inter phase heat transfer parameter H.
It is observed that the values of Raf 2 may be positive or negative in gravity modulation.
The sign of Raf 2 characterizes the stabilizing or destabilizing effect of modulation.
From the study they have observed the following conclusions. Gravity modulation (g-jitter) leads to delay in convection. The low frequency gravity modulation suppresses the onset of convection.
DURATION : 5:25PM-5:37PM (12 MIN)

PRESENTION 5
NAME : KAVITHA N.
DESIGNATION : ASSISTANT PROFESSOR, RAMAIAH INSTITUTE OF TECHNOLOGY, BENGALURU
TITLE : NON-LINEAR RAYLEIGH-B´ENARD MAGNETOCONVECTION IN BOUSSINESQ STOKES SUSPENSIONS WITH THERMORHEOLOGICAL EFFECT
HIGHLIGHTS :
The basic governing equations are continuity equation, momentum equation, energy equation, density and viscosity equations.
In this paper, generalized Lorenz model is used
The effect of magnetic field and suspended particles is to stabilize thesystem
Effect of variable viscosity is to destabilize the system
Both $R_{E_C}$and $\pi\alpha_c$decreases as V increases in the absence of C.
R_{E_C}increases and $\pi\alpha_c$ decreases as C increases
Nu increases with increasing values of V indicates the convective contribution to heat transport.
The Nusselt number decreases with increase in Q and C.
Couple stress effect due to suspended particles is more dominant thanmagnetic field effect on the onset of convection.
DURATION : 5:40PM-5:50PM (10 MIN)

PRESENTION 6
NAME : SUMAN GANESH B.S.

DESIGNATION: RESEARCH SCHOLAR DEPARTMENT OF MATHEMATICS
CHRIST UNIVERSITY, BANGALORE
TITLE : EFFECT OF HETEROGENEOUS/HOMOGENEOUS CHEMICAL REACTION ON DISPERSION OF SOLUTE IN A NEWTONIAN LIQUID FLOW THROUGH POROUS MEDIUM
HIGHLIGHTS :
Use the atmosphere and waters of the earth as sinks for waste products and has relied on to reduce the concentration dispersion of these wastes in the fluid.
They are then determined to see higher standards of cleanliness in the air and water of the environment.
The engineering and scientific professionals have the responsibility of ensuring that such standards are attained while allowing society to continue to enjoy the advantages of an industrial economy.
Molecular diffusion means the scattering of one fluid in another resulting from random molecular motion.
Convective dispersion means the spreading out of matter resulting from differences in convection over a cross-section.
The objective of the work is to model the problem of unsteady, shear dispersion of passive for reactive solute in a channel flow of Newtonian liquid and its scope lies in possible applications in waste water management, contaminant transport and the like.
The methods that are used for the study are Time-dependent partial differential equations, Eigen function expansion method, Regular perturbation method, Finite difference approximation, Gill and Sankar Subramanian Approach is used here.

DURATION : 6:00PM-6:15PM (15 MIN)
PRESENTION 7
NAME : CHIRAG VARUN SHUKLA
DESIGNATION : PG STUDENT CHRIST (DEEMED TO BE UNIVERSITY), BENGALURU.
TITLE : THE ONSET OF RAYLEIGH-BENARD CONVECTION OF NANOPARTICLES DISPERSED IN A FERROFLUID
HIGHLIGHTS :
The objective of this paper is to study the Rayleigh-Benard convection in a ferro fluid with dispersed nanoparticles considered between two parallel plates.
The critical Rayleigh number is obtained for different velocity and temperature boundaries using linear theory analysis.
The influence of various parameters on the onset of convection has been conducted, and it is found that the Concentration Rayleigh number and Lewis number stabilise the system, while the magnetic parameters destabilise the system.
The main aim in this paper is to check the effect of nanoparticles evenly dispersed in a ferrofluid on Rayleigh-Benard Convection.
Here they consider an infinite horizontal layer of a Boussinesquian, incompressible ferrofluid having nanoparticles evenly dispersed in it.
The governing equations are equation of continuity, equation of linear momentum, equation of energy, concentration equation magnetic equation of state and Maxwell's equation.
Magnetic parameters M_1 and M_3destabilize the system, aiding the onset of convection in the fluid.
N_A, the modified diffusivity ratio destabilizes the system and hastens the onset ofconvection.
Lewis number Le and concentration Rayleigh number Rn stabilize the system, thus delaying the onset of convection.
Rayleigh-Benard convection of a ferrofluid may be delayed by addition of suspended nanoparticles to the fluid.
DURATION: 6:15PM-6:25PM (10 MIN)

PRESENTION 8

NAME : R. K. VANISHREE

DESIGNATION : MAHARANI'S SCIENCE COLLEGE FOR WOMEN
PALACE ROAD BANGALORE

TITLE : CONVECTIVE INSTABILITY IN A DENSELY PACKED POROUS MEDIUM WITH THROUGH FLOW AND INTERNALHEAT GENERATION

HIGHLIGHTS :

Internal heat source arise due to heat released during chemical reactions in the liquid, radioactive decay, ohmic heating by current in conductive liquid, produced by radiation from external medium. Basic governing equations are equation of continuity, equation of linear momentum, equation of energy and equation of state.

Rayleigh-Ritz technique is used here

The effect of increasing cell size is to decrease the
Rayleigh number and reaches minimum for some valueof a, the critical wave number.

The effect of inverse porous parameter Da-1 is to stabilizethe system.

The effect of internal Rayleigh number, is to stabilizethe system as it increases from negative to positive.

The effect of Peclet number, Pe is to stabilize the system.

Critical Rayleigh number is an even function of Pe (proand anti gravity plots coincide).

DURATION : 6:30PM-6:45PM (15 MIN)

PRESENTION 9

NAME : S.R MISHRA

DESIGNATION : SOA UNIVERSITY, BHUBANESHWAR, ODISHA

TITLE : IMPACT OF THERMAL RADIATION ON CONDUCTING CNT-WATER NANOFLUID

HIGHLIGHTS :

DURATION : 6:45PM-6:55PM (10 MIN)

PRESENTION 10

NAME : NISHA MARY THOMAS

TITLE : FERROCONVECTIONIN A POROUS MEDIUM WITHCHEMICAL REACTION AND CONSTANTHEAT FLUX LOWER BOUNDARY

HIGHLIGHTS :

The main objective of the paper is to analyse the thermo-mechanical interaction which will be predicted for a ferromagnetic fluid in a porous medium in the presence of both chemical reaction and a uniform, vertical magnetic field with an adiabatic thermal boundary condition imposed at the lower boundary.

The methods used are normal mode analysis and Galerkian method

They consider small particle concentrations so that dipole-dipole interactions are negligible and hence the applied magnetic field is not distorted by the presence of the ferromagnetic fluid.

The Boussinesq approximations is assumed to bevalid.

Only infinitesimal disturbances are to be considered.

The governing equation are equation of continuity, equation of linear momentum, energy equation, equation of state, Maxwell's equation.

Stationary instability is preferred to oscillatory mode and hence the principle of exchange of stabilities is valid.

Basic temperature profile becomes nonlinear and asymmetric due to the presence of chemical reaction. This asymmetry is largely responsible for the destabilizing effect of chemical reaction.

Effect of departure of linearity in the magnetic equation of state is to advance ferro convection.

DURATION : 6:55PM-7:00PM (5 MIN)

INVITED TALKS

Day 2

Session 1

Name of Speaker: Dr. Md. Abdul Hakim Khan

Designation: Professor

Organization: BUET, Dhaka, Bangladesh.

Venue: Seminar Hall

The speaker began the talk with the importance of mathematics in society, by showing that mathematics has a ubiquitous presence in all features of the human enterprise. He went on to talk about Gerald Drazin, his mentor, who made significant contributions in the field of fluid mechanics. He further expounded some aspects of non-linear effects, singularities , approximant methods and Hermite-Pade approximatants. He explained that, for many problems, a solution can be found as a power series, similar to the traditional Frobenius method. One particular approximant method developed by the speaker hiself, known as the higher order differential approximant, was utilized to solve the problem in question. The speaker drew a parallel between continued fractions and the method of approximants, as the first few calculations associated with either of them yield a major part of the final answer. He then spoke about the critical exponents that were obtained in the problem, which gave useful insight into entropy generation, and singularity behaviour with respect to various parameters.

Duration of the talk: 45 minutes

Memento was given by O.D. Makinde

Session 2

Name of Speaker: Dr. Samriddhi Sankar Ray

Designation: Professor

Organization: International Centre for Theoretical Sciences, Bengaluru, INDIA.

Venue: Seminar Hall

The concept of turbulence was detailed with the help of examples, such as the billowing of storm clouds, volcanic eruptions, and the mixing of different fluids. The main objective of the study highlighted here, was to observe the behaviour of a string of tracers that interact in a turbulent flow. The primary motivation for this was the fact that preferential concentration of particles is seen in the cases of turbulent flow, and this is rather counter-intuitive. The speaker compared the behaviour of these flows to those of the non-interacting case. He further incorporated several concepts like the Okubo-Weiss parameter, chain deformability etc, to fine-tune the model. It was concluded that less elasticity results in a more uniform dispersion and more elasticity results in preferential concentration. This further posed the question as to what kind of particles or strings get trapped in the flow vortices. It was found that the important factor at

play here is the inter-bead separation, and that a low inter-bead separation results in the trapping of these particles in the vortices.

Duration of the talk: 45 minutes

Memento was given by Dr. Abdul Hakim Khan

Session 3

Name of Speaker: Dr. M. Sankar

Designation: Professor

Organization: Presidency University, Bengaluru, INDIA.

Venue: Seminar Hall

The speaker highlighted some of the ways in which heat can be supplied to the system, which naturally led to a discussion on the types of heat transfer and convection. He then spoke of the applications of natural convection. A fairly elaborate account of the finite difference method was given, and how it converts a partial or ordinary differential equation to an algebraic system of equations. For the problem under consideration, a vertical annular enclosure is subjected to three different temperature profiles, that were previously mentioned at the beginning. The speaker explained the concepts of discrete heating, linear heating and sinusoidal heating. He concluded that the position of source, in the case of discrete heating, affects heat transfer to great degree. The same problem was then considered with a sinusoidal temperature profile spatially, which gives rise to multi-cellular convection patterns, as seen from the simulations and graphs.

Duration of the talk: 45 minutes

Memento was given by Dr. S. Pranesh

Session 4

Name of Speaker: Dr. M. S. Jagadeesh Kumar

Designation: Professor

Organization: VIT, Vellore, INDIA.

Venue: Seminar Hall

The speaker introduced his work by first highlighting some of the factors that influence dispersion. He described the relevant models in his problem. After this, it was made necessary, that one must not confuse dispersion and diffusion as one – the speaker differentiated between the two using several examples. The relevance of the Darcy number in these types of problems was emphasized. Froscheimer coefficient was observed to reduce velocity, and that dispersion coefficient saturates after a set time. Mean concentration was seen to reduce with an increase in time, and concentration showed a decline with increase in axial distance. The method of solution employed was the differential transform, and the speaker stressed on the simplicity/accessibility of implementing a method such as this in other problems. The three dimensional version of the same problem gave similar results. Then, instead of an inert species, a reactive solute was considered in the governing equations. Some of the possible extensions of the work were discussed, and the speaker brought out the importance of the Darcy number once again, due to the possibility of constructing high-efficiency fuel injectors, which would make automobiles much more fuel-efficient in turn.

Duration of the talk: 45 minutes

Memento was given by Dr. M. Sankar

CONTRIBUTORY SESSIONS

Venue: Panel Room, Block 2, 2nd floor

Session chair: Dr. S Pranesh, Professor, Department of Mathematics, CHRIST (Deemed to be University)

Paper 1

The first presentation was given by Ansa Mathew, Research Scholar, CHRIST(Deemed to be University), Bangalore. She presented her paper titled 'Linear and Non-Linear Analyses of Electro- Solute Convection in a Fluid with Angular Momentum under Solute Concentration Modulation.' She started her presentation by explaining how the problem she had chosen was not the classical Rayleigh problem. The objective of the study was to examine the concentration modulation effect on the onset of electro-solute convection using an approach followed by G. Venzian. In her paper she also explored the effect of mass transfer using weakly non-linear analysis. Her presentation lasted for about 15 minutes.

Paper 2

The final presentation was given by Athira George, MSc student, CHRIST(Deemed to be University), Bangalore. She presented the paper titled 'Effect of internal heat source in a dielectric fluid on onset of Rayleigh-B́enard convection under g-jitter.' She explained how linear stability analysis was used to examine the Rayleigh-Benard convection in an electrically conducting fluid with internal heat generation under the effect of gravity modulation or g-jitter. She mentioned the steps involved in the approach that she had adopted in her paper. She then explained the various graphs plotted between critical Rayleigh number and frequency of gravity modulation for different values of dimentionless constants and ended her presentation by concluding that Internal Rayleigh number destabilizes the system, Prandtl number stabilizes the sytem and the Electric Rayleigh number enhances destabilizing effect.Her presentation lasted for about 15 minutes.

Paper 3

The third presentation was given by Joby Mackolil, MSc student, CHRIST(Deemed to be University), Bangalore. He presented the paper titled 'Exact and Statistical Analysis of Magnetohydrodynamics of Nano and Casson Fluids Past an Inclined Plane.' He explained how the exact analysis of the flow of Casson and Nano fluids past an inclined plate through a porous medium is carried out along with Dufour and heat absorption effects. He then explained the Darcy model and the Rosseland approximation that he utilized for the same. The method used by him to arrive at the exact solutions was the Laplace Transform method. The effects of various parameters on the velocity, temperature and concentration profiles was then explained with the help of graphs plotted. He concluded his presentation with the obtained result that the magnetic parameter has a decelerating effect on velocity for both nano and Casson fluids. In addition to that, Dufour number, radiation parameter and nanoparticle volume fraction was found to have a negative

impact on the rate of heat transfer whereas the heat absorption parameter was found to have a positive impact. The presentation lasted for about 15 minutes.

Paper 4

The final presentation was given by Anitha Maria S., MSc student, CHRIST(Deemed to be University), Bangalore. She presented her paper titled, 'Triple Diffusive Magneto Convection In Oldroyd-B Liquid'. She started her presentation by explaining the various keywords in the paper. The effect that magnetic field has on the onset of oscillatory Rayleigh Benard Magneto convection in an Oldroyd-B-Liquid was explained. The presentation ended with the explanation of the influence of various parameters such as stress relaxation and Chandrashekhar number advancing the onset of convection whereas parameters such as strain retardation, Prandtl number and ratio of diffusivity of solutes delaying the onset of convection. She presented for about 15 minutes.