NATIONAL CONFERENCE ON RECENT DEVELOPMENTS IN MATHEMATICS AND COMPUTER SCIENCE

13–14 March, 2023

e-book of Abstracts

Jointly organized by

Mizoram Mathematical Research Association (MMRA)

&

Department of Mathematics, Govt. Champhai College

MIZORAM, INDIA

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Chapter 1

About MMRA

The Mizoram Mathematical Research Association (MMRA) is the newly formed Association founded on February 7, 2023. The Association is formed for mathematicians and computer scientist and all academicians who are interested in advancing mathematics and computer science.

The mission of the Association is to advance research in the field of mathematical and Computer sciences, by promoting it from the collegiate level, supporting effective mathematical education at all levels, supporting research and scholarship, providing professional development, influencing public policy, and promoting public appreciation and understanding of mathematics. The Association pursues its mission by holding meetings, publishing materials, and sponsoring programs.

Chapter 2

About Department of Mathematics, GCC

The department of Mathematics, Government Champhai College was started in the year 1995 for the undergraduate course B.Sc. Since Mathematics is the backbone of science, a student with a strong background in mathematics has wide opportunities for higher studies in any field of science.

Details of the department is given below:

Name of the department	Department of Mathematics
Year of Establishment	1995
Names of Programmes/Courses offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., etc.)	(U.G with Core subject in Mathematics)
Annual/ Semester/choice based credit system (programme wise)	SEMESTER

Chapter 3

About the NCRDMCS23

On the occasion of International Pi Day 2023, the Mizoram Mathematical Research Association (MMRA) in collaboration with Department of Mathematics, Government Champhai College, Champhai, Mizoram hosts the National Conference on Recent Developments in Mathematics and Computer Science 2023 (hereafter called NCRDMCS23) during 13-14 March 2023.

The objectives of the NCRDMCS23 is to share and acknowledge the works of young mathematicians and to promote Mathematics and Computer Science throughout the country, with the main focus on Mizoram.

To fulfil the objectives of the conference, plenary talks and contributed presentations will be featured. NCRDMCS23 will be a platform for young mathematicians and computer scientist in Mizoram and in India to present their recent findings and exchange ideas in their respective works.

In view of the present trend in organizing online events, the conference will be hosted through virtual mode only.

Chapter 4

Organizing Committee

Conveners

Dr. Lalawmpuia, Chairman, MMRA

Dr. R. Lianngenga, Asst. Professor and Head, Dept. of Mathematics, GCC.

Organizing Secretaries

Mr. C. Zosangzuala, General Secretary, MMRA

Mr. A. Lalchhuangliana, President, MMRA

Mr. Vanlalruata Hnamte, Secretary, Media and Publicity, MMRA

Mr. Robert Sumlalsanga, Vice President, MMRA

Organizing Treasurer

Ms. Marina Lallawmzuali, Asso. Treasurer, MMRA

Members

Mr. P. Lalhmingliana, Asso. Professor and Principal, GCC

Dr. F. Lalfakawmi, IQAC Co-ordinator, GCC

Ms. Vanlalkroshlui, Asst. Professor, Dept. of Mathematics, GCC.

Dr. Mohan Khatri, Asso. Secretary, MMRA

Mr. Sanjay Debnath, Vice President, MMRA

Chapter 5

Invited Speakers and Abstracts of the talks

5.1 Invited Speakers

- Dr. J. Lalvohbika
  Associate Professor and Head, Department of Mathematics, Pachhunga University College

- Dr. Lalrinpuia Tlau
  Assistant Professor, Department of Mathematics, NIT Puducherry.

5.2 Abstracts of Invited Talks

Continuum Mechanics, Elastic Properties with Reference to Hooke's Law

J. Lalvohbika
Associate Professor
Department of Mathematics
Pachhunga University College
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Abstract

This talk concentrates on the basic concept of Continuum Mechanics mainly focussed on elastic properties. Stress-strain relation through generalized Hooke's law and the importance to study theory of wave propagation is discussed.

Semi-Analytical solution of hybrid nanofluid flow in a porous medium having non-uniform permeability

Lalrinpuia Tlau
Assistant Professor
Department of Mathematics
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Abstract

We present a semi - analytical solution for a coupled nonlinear differential equation arising in the flow of a hybrid nanofluid in a porous medium having variable permeability. The solution is compared with other existing techniques and found to be highly accurate. Moreover, a reduced form of the equation is solved analytically and they are found to be in good agreement. The solution of the flow is analysed and presented graphically. Effect of flow parameters on the flow will be discussed.

Chapter 6

Contributed Presentations' Session Chairs

Technical Session I:

Day 1: 13-03-2023

- ☐ Chair : **Dr. C. Zorammuana**
  Assistant Professor, Department of Mathematics, Lunglei Govt. College.
  email: mamuanac@gmail.com

Technical Session II:

Day 2: 14-03-2023

- ☐ Chair : **Dr. Mohan Khatri**
  Assistant Professor, Department of Mathematics, Pachhunga University College.
  email: mohankhatri.official@gmail.com

Chapter 7

Programme Schedule

7.1 Scheduled time of the programme

Day 1: Monday, 13-03-2023

6:00pm-6:30pm **Inaugural Function**

Joining Link: https://meet.google.com/vjb-jiuc-bta

6:35pm-7:05pm **Invited Lecture**

Joining Link: https://meet.google.com/vjb-jiuc-bta

7:10pm-9:00pm **Technical Session I**

Joining Link: https://meet.google.com/wgq-obyk-voc

Day 2: Tuesday, 14-03-2023

6:00pm-6:30pm **Invited Lecture**

Joining Link: https://meet.google.com/xqw-xpji-xzd

6:30pm-8:30pm **Technical Session II**

Joining Link: https://meet.google.com/xqw-xpji-xzd

8:30pm-8:45pm **Valedictory**

Joining Link: https://meet.google.com/xqw-xpji-xzd

7.2 Detailed programme

Day 1 (13.03.2023) Inaugural Function

Chairman	: Dr. Lalawmpuia, Chairman, MMRA
Chief Guest	: Prof. M Sundararajan, HoD, MACS-MZU
Guest of Honour	: Dr. LP Lalduhawma, Asso. Professor and HoD, AMS-PUC
Vote of Thanks	: Mr. Vanlalruata Hnamte, Secretary, Media & Publicity, MMRA

Technical Session I

Session Chair : Dr. C Zorammuana, Asst. Professor, Dept. of Mathematics, LGC
Invited Speaker : Dr. J. Lalvohbika, Asso. Professor, Dept. of Mathematics, PUC
Order of Contributed Presentation

Mr. Sanjay Debnath
Mr. Lalhriattira Fanai
Dr. Niky Baruah
Mr. A. Lalchhuangliana
Ms. Joan Laldinpuii
Ms. Marina Lallawmzuali
Mr. Robert Sumlalsanga
Ms. Bidyabati Thangjam

Day 2 (14.03.2023) Technical Session II

Session Chair : Dr. Mohan Khatri, Asst. Professor, Dept. of Mathematics, PUC
Invited Speaker : Dr. Lalrinpuia Tlau, Asst. Professor, Dept. of Mathematics, NIT Puducherry
Order of Contributed Presentation

Mr. Sajal Kanti Das
Mr. Vanlalruata Hnamte
Dr. R. Lianngenga
Ms. Panchalika Dutta
Ms. Biakkim KC
Mr. C Laltluangkima
Mr. Lalnunenga Colney
Ms. Shrabanika Boruah
Mr. PC Vanengmawia
Dr. Lalawmpuia

Valedictory

Feedback	: from Participants
Signing Off	: Organizing Secretary

Chapter 8

List of Contributed Presentation

8.1 Instructions to Participants

- ☐ Participants are expected to join the lectures and presentation sessions at least 5 minutes before the programme starts.
- ☐ Each contributed presentation shall, preferably, be of 15-20 slides. Each contributed presentation will be given 10 minutes and another 5 minutes for interaction. Both LaTeX and PowerPoint presentation are accepted.
- ☐ Attendence shall be recorded automatically for both sessions.
- ☐ For participants, e-certificate for participation and e-certificate for presentation will be sent by email within 7 working days.
- ☐ If you have any querries, kindly contact mizmathresearch@gmail.com.

8.2 List of Contributed Presentations

Technical Session I

Date & Time : 13-03-2023, 7:10 pm-9:00 pm
Session Chair : **Dr. C. Zorammuana**
Joining Link : https://meet.google.com/wgq-obyk-voc

Name	**Title**
Mr. Sanjay Debnath	Propagation of seismic waves through transversely isotropic crustal rocks under the generalized thermoelastic diffusion theory
Mr. Lalhriattira Fanai	Effect of Coefficients of Linear expansion in an incompressible thermoelastic transversely isotropic medium
Dr. Niky Baruah	Shortest path of a weighted graph in Traffic Control Problem
Mr. A. Lalchhuangliana	Periodicity and divisibility of Sterling numbers of the second kind
Ms. Joan Laldinpuii	A Mathematical model of Coronavirus Disease (COVID-19) containing Vaccination compartment
Ms. Marina Lallawmzuali	A review on Long Range Forecasting Models
Mr. Robert Sumlalsanga	Characterization of $F(R)$-gravity admitting conformally harmonic Z-recurrent spacetime
Ms. Bidyabati Thangjam	Some curvature properties of Kenmotsu manifolds with Generalised Tanaka Webster Connection

Technical Session II

Date & Time : 14-03-2023, 6:30 pm-8:30 pm
Session Chair : **Dr. Mohan Khatri**
Joining Link : https://meet.google.com/xqw-xpji-xzd

Name	**Title**
Mr. Sajal Kanti Das	Efficiency and Performance trends in Indian Software Industry over: A longitudinal analysis
Mr. Vanlalruata Hnamte	An Efficient DDoS Attack Detection Mechanism in SDN Environment
Dr. R. Lianngenga	Effect of initial stress on the elastic waves in micropolar porous thermoelastic solids
Ms. Panchalika Dutta	Recent Developments of Mathematical Models on Reservoir Sedimentation-A Review
Ms. Biakkim KC	Some results on Lorentzian para-Sasakian manifold admitting $*-\eta$-Ricci-Yamabe solitons
Mr. C. Laltluangkima	A new type of non-symmetric non-metric connection in Sasakian manifolds
Mr. Lalnunenga Colney	On a type of semi-symmetric non-metric connection on Riemannian manifold
Ms. Shrabanika Baruah	A two dimensional problem for a half-space in generalized magneto thermoelastic material
Mr. PC Vanengmawia	Effects of Momentum Slip and Convective Boundary Condition on a Forced Convection in a Channel Filled with Bididperse Porous Medium (BDPM)
Dr. Lalawmpuia	Specific heat and magnetic effects in orthotropic piezoelectric micropolar medium under three-phase-lag thermoelastic model

Chapter 9

Abstracts of Contributed Presentations

On a type of semi-symmetric non-metric connection on Riemannian manifold

Lalnunenga Colney[1] **and Rajesh Kumar**
Department of Mathematics and Computer Science
Mizoram University, Pachhunga University College Campus

Abstract

In the present paper, we define and obtain a new type of semi-symmetric non-metric connection on Riemannian manifold and study its curvature tensor and projective curvature tensor, we investigate some properties of curvature tensor and projective curvature tensor with respect to our connection.

References

1. Tripathi, M. M. (2008). A new connection in a Riemannian manifold. International electronic journal of geometry, 1(1), 15-24.

2. Kumar, R., & Chowdhury, J. (2013). A Note On The Quasi-Conformal And M-Projective Curvature Tensor Of A Semi-Symmetric Recurrent Metric Connection On A Riemannian Manifold. Suleyman Demirel Universitesi Fen Edebiyat Fakultesi Fen Dergisi, 8(2), 190-194.

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Propagation of seismic waves through transversely isotropic crustal rocks under the generalized thermoelastic diffusion theory

Sanjay Debnath[1] **and S. Sarat Singh**
Department of Mathematics and Computer Science
Mizoram University

Abstract

This paper investigates the propagation of Stoneley wave through bonded and un-bonded interfaces between two dissimilar transversely isotropic generalized thermoelastic diffusion half-spaces. The characteristic polynomial equation in terms of penetration depth have been deduced for both the medium. These characteristic equations are solved using Ferrari's method and the variation of the penetration depths of three quasi-longitudinal waves and one quasi-transverse wave with angular frequency and wave number have been presented graphically. The secular equations of Stoneley waves are derived using appropriate boundary conditions. These secular equations are solved numerically for phase velocity and attenuation coefficients of the Stoneley wave considering the elastic parameters of crustal rocks. This analysis explicates the position and permeability of fractures and helps in the assessment of valuable materials under Earth's crust. Some known results are recovered from the present analysis to validate our model.

Keywords: Generalized Thermoelasticity; Stoneley wave; crustal rocks; Transverse isotropy; attenuation.

References

1. Singh SS, Tochhawng L. Stoneley and Rayleigh waves in thermoelastic materials with voids. J Vib Control 2019; 25(14):2053-2062.

2. Kumar R, Kansal T. Propagation of Lamb waves in transversely isotropic thermoelastic diffusive plate. Int J Solids Struct 2008; 45(22-23):5890-5913.

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A Mathematical model of Coronavirus Disease(COVID-19) containing Vaccination compartment

Joan Laldinpuii[1] **and Jamal Hussain**

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Mizoram University

Abstract

Coronavirus, one of the families of Coronaviradae started invading human civilization in the late 20th centuries. Over the years, coronaviruses have caused three significant outbreaks. In 2003 (SARS),2012 (MERS) and 2015 (MERS). In late 2019 Coronavirus once again made its appearance to be the fourth Coronavirus outbreak and cause a great crisis all over the world. In this research work we attempt to describe the outbreak of Coronavirus Disease (COVID-19) with the help of mathematical model using a system of non-linear ordinary differential equation. A disease transmission model with demographic factor is formulated. Since vaccination drive has been carried all over the world, we include vaccination compartment, reduction in risk of infection is also took into consideration. We brought in the consideration of both asymptomatic and symptomatic with the possibility that asymptomatic has lower chance of transmission. Stability analysis of the proposed model are investigated in terms of basic reproduction number locally as well as globally. It was found that the proposed model has two equilibrium points; the disease-free equilibrium point (DFE) and the endemic equilibrium point (EE). Stability analysis of the equilibrium points shows DFE is locally asymptotically stable whenever the basic reproduction number, $R_0 < 1$ and is globally asymptotically stable whenever $R_0 > 1$. Also EE is locally asymptotically stable whenever the basic reproduction number, $R_0 < 1$ and is globally asymptotically stable whenever $R_0 > 1$. Sensitivity analysis for the effect of the parameters involved in the expression of basic reproduction number, R_0 is conducted. The most sensitive parameters is found out to be μ also vaccine induce rate has high impact. Numerical simulation is also performed using MATLAB.

References

1. Killerby, M. E., Biggs, H. M., Midgley, C. M., Gerber, S. I., & Watson, J. T. (2020). Middle east respiratory syndrome coronavirus transmission. Emerging infectious diseases, 26 (2), 191.

2. Korobeinikov, A., & Wake, G. C. (2002). Lyapunov functions and global stability for sir, sirs, and sis epidemiological models. Applied Mathematics Letters, 15 (8), 955–960.

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Shortest path of a weighted graph in Traffic Control Problem

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Abstract

Finding the shortest path between one points in the network to another is a typical problems in traffic control problems. Various attributes like costs and profits are usually considered in a shortest path problem in many real occasions. There is a need to develop a well-organized procedure for managing these problems, because of the frequent occurrence of such network structured problems. The purpose of this paper is to examine the problem and its solution to the modeling induced by graph theory, algorithms and related theorems. Also, using the properties of vertex weighted graphs a vertex weighted structures is developed in terms of traffic networks and choose those vertices with maximum weights and rearrange the network. After doing this, the aim is to develop a doubly weighted structure to find the shortest path between two vertices with maximum vertex weights.

References

1. Deo N , Graph Theory with Application to Engineering and Computer Science, Prentice Hall of India 2002

2. Dijkstra, E. W., Shortest Path Algorithm 1959

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Some curvature properties of Kenmotsu manifolds with Generalised Tanaka Webster Connection

M.S. Devi and Bidyabati Thangjam[1]
Department of Mathematics and Computer Science
Mizoram University

Abstract

The aim of the present paper is to study some results on conharmonically flat, ξ conharmonically flat and Quasi conharmonically flat Kenmotsu Manifold with respect to generalised Tanaka Webster Connection. We study generalised conharmonic ϕ-recurrent Kenmotsu manifolds equipped with generalised Tanaka Webster connection. Moreover, we also study Kenmotsu manifolds satisfying $\tilde{R}(\xi, X) \cdot \tilde{K} = 0$ where $\tilde{R}$ denotes conharmonic curvature tensor and $\tilde{K}$ denotes Riemannian curvature tensor equipped with generalised Tanaka Webster connection respectively. And this paper also includes the study of projectively flat, ξ-projectively flat and locally projectively ϕ-symmetric Kenmotsu manifolds with respect to generalised Tanaka Webster connection.

Keywords: Kenmotsu Manifold, Generalised Tanaka Webster Connection, Conharmonic Curvature Tensor, Projective Curvature Tensor.

References

1. Kenmotsu, K., "A class of almost contact Riemannian manifolds", Tohuku Math. J., 24 (1972), 93-103.

2. Mandal, A. and Das, A., "Projective Curvature Tensor with respect to Zamkovoy connection in Lorentzian Para-Sasakian Manifolds ", J. Indones. Math. Soc., 26(03) (2020), 369-379.

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A review on Long Range Forecasting Models

Marina Lallawmzuali[1] **and Sundararajan Muniyan**
Department of Mathematics and Computer Science
Mizoram University

Abstract

Heavy rainfall prediction is a key issue for the Indian Meteorological Department as it is intimately related to the economy and human life. In recent years, more attentions are being made towards the scientific research on understanding climate change for a hope of reducing as it affects disasters global temperatures and precipitation, natural calamities and effects, in turn, controls the intensity. In some cases, there is a great influence over the frequency of extreme environmental events such as forest fires, hurricanes, heat waves, storms, floods and droughts. One of the major areas in which the climate change has made a great alternation is rainfall patterns. Studies on rainfall patterns in various regions of India could be beneficial for farmers, even minor change of rainfall can have divesting consequences for the agriculture economy. In the recent years, the Long Range Forecast models, which is the combination of statistical, empirical and dynamical models, have failed in forecasting rainfalls. Therefore, there is a need for improving the models incorporating with some more influencing components for getting better prediction. This paper presents a concise literature review and critical appraisals on existing forecasting models.

References

1. Rajeevan, M., Pai, D. S., Anil Kumar, R. and Lal, B., 2007, "New statistical models for long-range forecasting of southwest monsoon rainfall over India", Climate Dynamics, 28, 7, 813-828.

2. Gadgil, S. and Srinivasan, J., 2012, "Monsoon prediction: are dynamical models getting better than statistical models", Curr. Sci, 103, 3, 257-259.

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Effects of Momentum Slip and Convective Boundary Condition on a Forced Convection in a Channel Filled with Bidisperse Porous Medium (BDPM)

PC Vanengmawia[1] **and Surender Ontela**

Department of Mathematics

NIT Mizoram

Abstract

Forced Convection in a parallel plate channel occupied with a Bidisperse porous medium (BDPM) is investigated analytically. Employing the two velocity two temperature model, the flow and the temperature fields for the fluid phase and the solid phase are investigated taking into account the momentum slip and convective boundary condition at the channel walls. The governing equations are solved using the Homotopy Analysis Method (HAM) to obtain the velocity and temperature profiles for both fluid phase and solid phase. The effects of various parameters such as Darcy number, Biot number, slip parameter, Brinkman number on velocity, temperature, Nusselt number and skin friction are discussed.

References

1. D. Nield and A. Kuznetsov, A two-velocity two-temperature model for a bi-dispersed porous medium: Forced convection in a channel, Transport in Porous Media, vol. 59, no. 3, pp. 325(339), 2005.

2. K. Wang and P. Li, Forced convection in bidisperse porous media incorporating viscous dissipation, Applied Thermal Engineering, vol. 140, pp. 86(94), 2018.

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Characterization of $F(R)$-gravity admiting conformally harmonic Z-recurrent spacetime

Mohan Khatri, Jay Prakash Singh, Robert Sumlalsanga[1] and C. Zosangzuala

Department of Mathematics and Computer Science

Mizoram University

Abstract

In this paper, we give some classification of conformally harmonic Z-recurrent spacetime in the context of $F(R)$-gravity theory based on its scalar curvature and obtained the expression for energy density and isotopic pressure. Their behaviors along with EoS parameter are analyzed by considering two $F(R)$-gravity models. Moreover, the energy conditions for the considered models are studied and found to support the accelerated expansion of the universe.

Keywords: Z-recurrent, F(R)-gravity, GRW spacetime, Perfect fluid spacetime.

References

1. M. Visser, Jerk, snap and the cosmological equation of state, Class. Quantum Grav. 21(2004), 2603.

2. J. Santos, J. S. Alcaniz, M. J. Reboucas, F. C. Carvalho, Energy conditions in $f(R)$-gravity, Phys.Rev.D, 76(2007), 083513.

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A new type of non-symmetric non-metric connection in Sasakian manifolds

C. Laltluangkima[1] **and Rajesh Kumar**
Department of Mathematics and Computer Science
Mizoram University, Pachhunga University Campus

Abstract

We studied a new type of non-symmetric non-metric connection in Sasakian manifolds. Some properties of the curvature, the conformal curvature and the conharmonic curvature of Sasakian manifolds with respect to a new type of non-symmetric non-metric connection are studied.

References

1. S. K. Chaubey, On semisymmetric non-metric connection, Prog. of Math, Vol-41-42(2007),11-20.

2. S. K. Chaubey and A. C. Pandey, Some properties of a semisymmetric Non-metric connection on a Sasakian Manifold, Int. J. Contemp. Math. Science, Vol-8, 2013, no. 16, 789-799.

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Recent Developments of Mathematical Models on Reservoir Sedimentation- A Review

Panchalika Dutta[1] **and Sunsararajan Muniyan**
Department of Mathematics and Computer Science
Mizoram University

Abstract

Water is the most essential resource for living things to exist on earth. But it is has been observed that the sources of water are not properly maintained as a result of which it is becoming difficult for the living things to survive on this planet. The main problem is with the reservoirs which are losing its capacity every year gradually. The underlying causes behind this problem are the some anthropogenic causes like deforestation, overgrazing of cattle and less plantation of trees which together with natural factors lead to erosion of the top soil. Along with the topsoil sediments are carried into the reservoirs and they deposit on the bed of the reservoirs, thus filling up the reservoirs gradually as time pass by. In this way, it has been brought into light by several researchers that till date almost 25% of the live storage capacity of the reservoirs is lost and very soon the remaining 75% will also be lost in the long run. Therefore, this problem is a threat to the reservoir management team. Although from some research work it has been observed that the mentioned problem of the reservoirs cannot be fully eliminated. However, necessary steps and actions can be taken in order to minimize the causes and problems behind it and also contribute to the reservoir management team for sustainable environment.This article is a review that highlights several published research works that projects on studies related to sediment deposits on reservoirs, erosion and reservoir management techniques. This article consists of about several appreciative research works and as per the observations it has been found that no appropriate step could be taken as to reduce the problem the reservoirs are facing in today's time. Although very many steps were taken in hand based on different studies, still the mentioned problems could not be given a proper end.

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A two-dimensional problem for a haf-space in generalized magneto thermoelastic material

S. Sarat Singh[1] **and Shrabanika Boruah**
Department of Mathematics and Computer Science
Mizoram University

Abstract

The present paper is concerned with the problem of reflection of homogeneous plane waves from the free surface of a generalized magneto thermoelastic half spaces. The phase speeds of longitudinal, transverse and thermal waves are derived. The amplitude ratios and energy ratios are obtained by using boundary conditions. These ratios are computed theoretically and numerically for different values of magnetic and thermal parameters. The results are verified with the conservation of energy with two special cases.

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SOME RESULTS ON LORENTZIAN PARA-SASAKIAN MANIFOLD ADMITTING $* - \eta$-RICCI-YAMABE SOLITONS

M.S. Devi and Biakkim KC[1]

Department of Mathematics and Computer Science

Mizoram University

Abstract

The present paper is to study certain type of metric such as $* - \eta$-Ricci-Yamabe soliton on Lorentzian Para sasakian manifold with respect to semi-symmetric non-metric connection. We obtain some curvature properties of Lorentzian Para Sasakian manifolds admitting semi-symmetric non-metric connection. Here, we develop the relation of soliton constants on Lorentzian Para Sasakian manifold admitting $* - \eta$-Ricci-Yamabe soliton with respect to semi-symmetric non-metric connection. Later, we have acquired Laplacian equation from $* - \eta$-Ricci-Yamabe soliton when the potential vector field ξ of the soliton is of the gradient type. Finally, we have shown the nature of the soliton when the vector field is conformal killing, admitting semi-symmetric non-metric connection in a Lorentzian Para sasakian manifold.

Keywords: Ricci Yamabe solitons, -Ricci-Yamabe soliton, conformal killing vector field, Einstien soliton, Lorentzian Para-Sasakian manifold.

References

1. Roy S, Dey S, Bhattarcharya A ,Siddiqi D. $* - \eta$-Ricci-Yamabe solitons on α–cosympletic manifolds with a quarter-symmetric metric connection. arXiv:2109. 04700V1[math.DG] 2021.

2. Hamilton R.S. The Ricci flow on surface.Contemporary Mathematics, 71(1998):237-261.

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Effect of Coefficients of Linear expansions in an incompressible thermoelastic transversely isotropic medium

J. Lalvohbika, R. Lianngenga and Lalhriattira Fanai[1]

Department of Mathematics

Pachhunga University College

Abstract

To investigate thermoelastic waves in an incompressible transversely isotropic solid half-space based on Lord and Shulman theory of generalized thermoelasticity. The existence of quasi longitudinal wave (qP) and quasi transverse wave (qS) with different phase velocity in this material are observe. It is found that the velocities are functions of angle of incidence, elastic constants, angular frequency, coefficients of thermal conductivity, increment in temperature, thermal relaxation time and specific heat. Numerically, the phase speed and attenuation are computed for a particular model and discuss the effects of linear thermal expansions.

References

1. M.A. Biot, "Thermoelasticity and irreversible thermodynamics." J. Appl. Phys., vol. 27, pp. 240-253, 1956.

2. J.P. Benthem, "Note on the Boussinesq-Papkovich stress-functions.". J. Elast. vol. 9, pp. 201–206, 1979. https://doi.org/10.1007/BF00041327

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Efficiency and Performance trends in Indian Software Industry over: A longitudinal analysis

Sajal Kanti Das[1] **and Jamal Hussain**
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Abstract

The Indian software market, software companies and IT enables services had significantly contributed in the India's progressive economy. The company had performed over long times and also seen the ups and down over long period of 32 years in India. It had many phases. This study analyses and compares the performance of the few selected companies in the software industry of India. The efficiency measure is very crucial for the assessment of the companies and also to understand the trends of growth and productivity of the companies.. The various types of efficiency measures are considered and assess to the growth, productivity, performance and efficiency of the companies under a chosen industry. The scale efficiency, technical efficiency, overall technical efficiency is generally estimated. This study is an attempt to estimate the function functional efficiency of few selected companies in the Indian software industries considering the all variables from the data from authentic repository. Using the different contributing input and output variables the functional efficiency of the selected software companies being estimated. The quality of the functional efficiency intergraded and the Integrated Functional Efficiency Quality of the companies are assessed. Finally the companies are categories on the basis of IFEQ. The decision making can be assisted with the supplement of the estimated values of the proposed measure.

Keywords: Performance analysis, quality of efficiency, Indian software industry, determinants. Performance analysis, quality of efficiency, Indian software industry, determinants.

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Specific heat and magnetic effects in orthotropic piezoelectric micropolar medium under three-phase-lag thermoelastic model

Lalawmpuia[1], **S.S. Singh and Sanjay Debnath**
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Abstract

This paper investigates the nature of physical variables and phase speed of elastic waves in the heat conducting orthotropic magneto-micropolar piezoelectric material under the three-phase-lag model. Using normal mode analysis and appropriate boundary conditions, we obtain the expression of these physical variables of the material. It is evident that five elastic waves can propagate through such a continuum material. The physi- cal variables and phase speed of elastic waves are computed numerically. The effects of magnetic intensity and specific heat of the material on these variables and phase speed are illustrated graphically. Two-dimensional graphs which are of sinusoidal form and three-dimensional graphs of these physical variables are also presented.

References

1. Aouadi, M. [2008] "Aspects of uniqueness in micropolar piezoelectric bodies," Math. Mech. Solids 13, 499–512.

2. Singh, B., Sangwan, A. and Singh, J. [2019] "Reflection and transmission of elastic waves at an interface between two micropolar piezoelectric half-spaces," J. Ocean Eng. Sci. 4, 227–237.

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An Efficient DDoS Attack Detection Mechanism in SDN Environment

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Abstract

Traditional intrusion detection systems are insufficient to identify recent and sophisticated attempts with unpredictable patterns. The ability to reliably detect modern cyberattacks is vital. Current machine learning-based intrusion detection methods in the field of information technology cannot keep up with the exponential growth of network data and features. Deep convolutional neural networks (DCNN) can be an effective way to choose the best and fewest high-dimensional incursion characteristics. Traditional convolutional neural networks (CNN) are still limited to several parameters and susceptible to local optimality. In this paper, we propose a DCNN model to detect attacks and test it in a Software Defined Network (SDN) environment. We use the InSDN dataset, specifically developed for the SDN environment. The model has also been trained using the CIC-IDS2017 and the CIC-DDoS2019 datasets to show that it can be used. Most of the new attack detection methods aren't as good as our model. It could find attacks 99.99% of the time with only a 0.0016 loss rate.

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Effect of initial stress on the elastic waves in micropolar porous thermoelastic solids

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Abstract

The present paper aimed at studying the effect of initial stress on the propagation of elastic waves in micropolar porous thermoelastic solid materials. The basic equations of micropolar porous thermoelastic materials in the presence of initial stress are treated using Helmholtz decomposition theorem to obtain the six elastic waves having different phase velocities. We see that four longitudinal waves and one of the two coupled shear waves are homogeneous in nature but they are all dispersive. The problem of reflection coefficients of waves at the stress-free boundary of the considered solid is investigated and the effect of initial stress on the reflection coefficients are studied. This effect of initial stress are also illustrated graphically for a particular model.

Key words: Initial stress, reflection coefficient, initial stress and phase velocity.

References

1. Francesca Passarella (1996), Some results in micropolar thermoelasticity
2. S.S. Singh, R. Lianngenga (2017), Effect of micro-inertia in the propagation of waves in micropolar thermoelastic materials with voids.

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Periodicity and divisibility of Stirling numbers of the second kind

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Abstract

We study the periodicity properties of Stirling numbers of the second kind $S(n,k)$. We also investigate the relationship between the minimum periods and the p-adic valuations of $S(n,k)$ for an odd prime. We present some exact values and estimates of $v_p(S(n,k))$. We find that some values of $v_p(S(n,k))$ depend entirely on the p-adic valutions of the partial Stirling numbers.

Key words: congruence, p-adic valuation, partial stirling numbers
2020 MSC: 11A07, 11B73, 11E95

References

1. On alternating sums of binomial and q-binomial coefficients. Ars Combinatoria 151: 257–272.

2. Divisibility by 2 of partial Stirling numbers. Funct. et Approx. Comment. Math. 49(1): 29–56.

3. Minimum periods of $S(n,k)$ modulo M. The Fibonacci Quart. 27: 217–221.

4. A divisibility property for Stirling numbers. J. Number Theory 10: 35–54.

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Chapter 10

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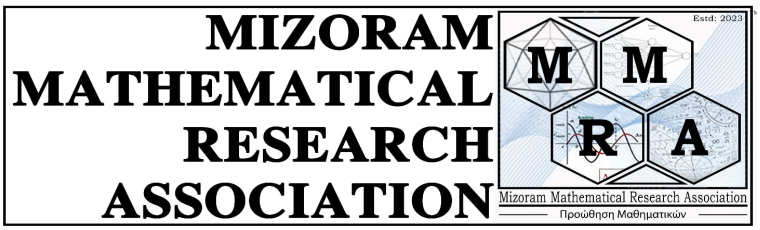
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