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45
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ON

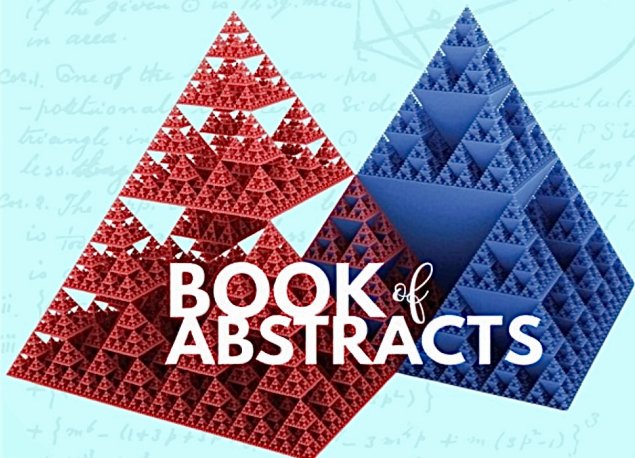
**THEORY AND APPLICATIONS OF MATHEMATICS
(ICTAM-2024)**

September 28-29, 2024

To Commemorate

45th Anniversary of

Tripura Mathematical Society (1979-2024)



BOOK of
ABSTRACTS



"The product of mathematics is clarity and understanding. The real satisfaction from mathematics is in learning from others and sharing with others. The question of who is the first person to ever set foot on some square meter of land is really secondary."

~ William Thurston on "What can one contribute to mathematics?"



International Conference on Theory and Applications of Mathematics (ICTAM-2024)

Book of Abstracts

Editor:

Dr. Jaydip Bhattacharya

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Address for Communication

Dr. Jaydip Bhattacharya, Contact No. +91 9436180490

Prof. B.C. Tripathy, Contact No. +91 9864087231

tms.agartala@gmail.com

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Patron TMS

Conference Chair

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ABOUT TRIPURA MATHEMATICAL SOCIETY

Reg. No. 662/1979, Agartala, Tripura

Tripura Mathematical Society was established on January 7, 1979. Presently there are 509 life members who are mostly teachers of schools, colleges and different universities/institutions of India and abroad. There are several life members from other professions also besides student members/annual members.

Objective:

Popularization of Mathematics, Eradication of Mathematics phobia if any among the students. To create interest about Mathematics among the learner. To inspire students to have joy of learning Mathematics. To unfold beauties, excitement and fun in Mathematics & Promotion and creation of awareness of Mathematics and mathematical studies among the learners and teachers. To identify a group of talents in mathematics. To motivate teachers to have pleasure of teaching Mathematics. Creation of research environment in Mathematics in Tripura. To highlight rich Indian heritage and culture of Mathematical Sciences.

Target Groups:

Students of schools (main target group).

& Students of colleges and universities.

Teachers of schools, colleges and universities.

Activities:

Aptitude Test (for Class - V), Prashna Manch (for Class VI), Speech competition for the students of class -VII, & Junior Mathematical Olympiad (for Class VIII). Mathematics Olympiad (for students of classes IX & X). Inter-School Quiz Contest on Mathematics (IX and X). Regional Mathematical Olympiad (for students of IX to XI). & Indian National Mathematical Olympiad (INMO). Mathematics Day Celebration on 22' December (since 1987).

Seminar at Schools: Generally held at several Schools of different sub-divisions of Tripura throughout the year by organizing Popular lectures, Model demonstration, Exhibitional quiz, Prashna Manch on Mathematics etc.

The Publications:

The society generally publishes the following annually (i) *Bulletin of the Tripura Mathematical Society*-mainly containing popular; semi-popular and expository articles, since 1981. ISSN no.2395-3071 (ii) *Journal of the Tripura Mathematical Society*: The journal of the Tripura Mathematical Society ISSN-0972-1320 is devoted to publish original research papers in different branches of mathematics and mathematical physics. The first issue of this journal is published in 1999 and Prof. R.N. Bhaumik was the founder Editor-in-chief of the Journal.

(iii) Publications of the Proceedings of Conferences, Symposium, Work-shops, Seminar etc. - 11 nos.

Participation in Exhibitions: The Society participates in the exhibitions with different attractive and instructive models organized by Tripura State Councils for Science & Technology and also organizes a Mathematics Corner at Agartala. Organization of Lectures on advanced level of mathematics This programme is organized for the teachers and research scholars to acquaint with modern development of mathematics and enhance research in mathematics at different colleges and at the Tripura University. Organization of Annual prize giving ceremony: The society awarded more than 200 prizes at Agartala (and more than 200 prizes at different Units) and cash awards, Trophy, Silver Medal (5) etc. every year to the students for their achievement in different competitions organized by the Society. Conferences, Symposium, Workshops, Seminar etc. organized - 14 nos.

Messages from the desk of the Organizers

TRIPURA MATHEMATICAL SOCIETY



Reg. No. 662/1979

Website : www.tmsagartala.in : : e-mail : tms.agartala@gmail.com

Office : 32 Dhaleswar, A.A.Road, P.O. Agartala College,
Tripura (W), PIN - 799004

Prof. Debasish Bhattacharya
President TMS
Conference Chair, ICTAM-2024
International Conference on Theory and
Applications of Mathematics
(ICTAM – 2024)



Agartala the 23rd Septmeber,2024

From the desk of conference Chair

It gives me immense pleasure to see that with our collective endeavor we are going to organize an International Conference on Theory and Applications of Mathematics during September 28-29, 2024 on hybrid mode to commemorate the glorious Forty-five Years (1979 – 2024) of establishment of Tripura Mathematical Society.

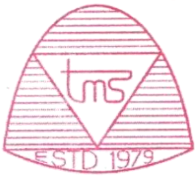
This conference will give a unique opportunity to our young researchers to present their findings amidst such an august ambience of internationally acclaimed scientists are present and will be delivering their Key-Note addresses.

I wish every success of the Conference and hope that it will be a landmark for the years of further achievements of our Society to come.

DBhattacharya.

Prof. Debasish Bhattacharya

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Dr. Jaydip Bhattacharya.
General Secretary, TMS &
Convener,

International Conference on Theory and
Applications of Mathematics
(ICTAM – 2024)



Agartala the 23rd Septmeber, 2024

From the desk of Convener

With great joy, we are arranging a two-day international conference on "Theory and Applications of Mathematics" on September 28–29, 2024, in honour of the Tripura Mathematical Society's 45th anniversary.

The 45th anniversary of the Tripura Mathematical Society marks a significant milestone in promoting mathematics education and research in the state of Tripura. Established to foster mathematical talent and enhance the understanding of mathematical sciences, the society has been instrumental in organizing seminars, workshops and conferences. The anniversary celebration highlights its ongoing efforts to inspire students, teachers and researchers while reflecting on its contributions to the academic community over the past four and a half decades.

Mathematics is a field of study focused on understanding patterns, structures, and relationships using numbers, shapes, symbols, and logical reasoning. Its theory involves abstract concepts such as Algebra, Calculus, Geometry and Number theory, which explore fundamental properties of space, quantity and change.

Applications of mathematics are vast and include fields like Physics, Engineering, Economics, Biology and Finance. It is used to solve practical problems, models, real-world phenomena, optimize processes, and make predictions in areas ranging from technology and medicine to data analysis and decision making.

This conference aims to bring together mathematical researchers from around the world to foster communication and idea sharing, as well as to inspire the next generation of researchers by exposing them to the newest developments in many domains and disciplines.

This conference is unique in that it will feature eight invited talks and nearly sixty research papers from distinguished professors, research scholars, and faculty members from both domestic and foreign universities. The papers will cover a variety of topics and areas, including Analysis, Riemannian manifolds, Dynamics, Thermodynamics, Hypergeometric series, Maximal graphs, Fuzzy set, Neutrosophic spaces and more.

I would like to express my sincere appreciation to each and every participant for providing us with the chance to learn from their scholarly perspectives.

Finally, I would like to thank the Tripura Mathematical Society members for their unwavering cooperation and tireless efforts in planning this conference.

I hope that every delegate and participant has a happy learning experience.

Dr. Jaydip Bhattacharya

TRIPURA MATHEMATICAL SOCIETY



Reg. No. 662/1979

Website : www.tmsagartala.in : : e-mail : tms.agartala@gmail.com

Office : 32 Dhaleswar, A.A.Road, P.O. Agartala College,
Tripura (W), PIN - 799004

Prof. Binod Chandra Tripathy.
Organising Secretary,
International Conference on Theory and
Applications of Mathematics
(ICTAM – 2024)



Agartala the 23rd Septmeber, 2024

From the desk of Organising Secretary

Greetings from the Organising Committee of the International Conference on Theory and Applications of Mathematics (ICTAM – 2024).

The subject Mathematics plays a vital role in every aspect in our life. It has lots of applications in other areas research in science and technology. Many times people use the concepts of Mathematics, but they do not know that they are making the practical application of some deeper concepts of Mathematics. It is observed that at a traffic point with 4 routs, one can say that they are meeting at the traffic point or coming out, the traffic light allows oppositely faced routes to cross the traffic point. Some vehicle drivers do not wait for the green light, which symbolizes their permission to cross over. They make a loop at that point and cross over. This concept is based on the area of mathematics “Graph theory”. Also, in the computer programming, people use the concept of loop. The base for the computer science is mathematics. Similarly there are many other instances; even a layman uses the deeper concepts of mathematics easily.

Keeping in mid the value of mathematics, the mathematics community of Tripura, decided to have a society, which will organize different programmes for the development of mathematics. Accordingly, the Tripura Mathematical Society was established in the year 1979. Many reputed mathematician around the capital city Agartala joined the society and extended their cooperation for the development of the Society. The society has climbed 45 successful steps (years) and at present is at its youth. Also, I am glad to know that most of the life members of the society are youth and they have shouldered the responsibility of the society. The society is organizing different programmes every year, such as the Olympiad examinations at different units to cater the service to the students across the state of Tripura. The society is organizing the lectures at different places and gives exposure to the students to the reputed mathematicians of the country and sometimes from abroad.

Another objective of the Society is to give a chance to the mathematicians, in particular the younger people to the recent developments of the new and emerging areas of mathematics. This is possible on organizing Symposiums/Conferences/workshops at regular intervals. Where the new finds of the mathematicians of Tripura can be presented and they will get a chance to listen to others. In an executive committee meeting of the Tripura Mathematical Society this year, it was decided to celebrate the 45th year of its establishment. Accordingly it was decided to organize an International Conference in 2024 and in hybrid mode. This conference is the outcome of the decision of the meeting. The researcher from USA, Serbia, Kosovo, Poland, Nepal and Bangladesh and from our country accepted our invitation to deliver talks in this conference.

My sincere thanks to all the resource personals and the members of the Tripura Mathematical Society for extending their cooperation for organizing this conference and for its success.

Abstract of Keynote Speaker

How To Beat Mathematics Anxiety

Prof. R. N. Bhaumik

Patron, Founder Member - Tripura Mathematical Society

Founder President - Fuzzy & Rough Sets Association

Emeritus Fellow – UGC

*Ex Dean of Science, Retd. Prof. of Mathematics -
Tripura University*

Mathematics is considered as the one of the most prominent subjects in school level education due to its importance in day-to-day function of the people. It has long been recognized as an essential requirement for everyday life and for most occupations.

The article seeks to investigate the disposition of mathematics phobia. It studies the fear of mathematics, its causes, symptoms and ways to overcome regarding the school level students. Out of the root causes of mathematics phobia, curriculum structure, schools facilities, instructional techniques, teachers' teaching performance, use of tools and technology and evaluation system are the main.

In the same way, lack of proper incentives for mathematics teachers and the negative perception of the students and teachers about mathematics are also the important causes. The study has revealed that mathematics phobia exists among students, which are characterized into negative perceptions of the students towards mathematics and others too. The main causes of mathematics phobia include test and examination, individuals, teachers, parents, peers and the nature of mathematics. The only way to overcome mathematics phobia is the intensive efforts made by all the stakeholders.

Abstracts of Invited Speakers

“Various G- Continuous Functions in Generalized Interval Valued Neutrosophic Topological Spaces.”

Prof. Anjan Mukherjee

Abstract: Recently Mukherjee and Das introduced the notion of Generalized Interval Valued neutrosophic set (GIVNset). In this work the concepts of various g-continuous functions in the GIVN - topological spaces are introduced. Further we study their properties. Some examples and some theorems are also studied. We define the concept of generalized interval-valued neutrosophic g-continuous function(GIVN g-continuous function) and Strongly generalized interval-valued neutrosophic g-continuous function(SGIVN g-continuous function) between two generalized interval-valued neutrosophic topological spaces. Lastly an application has been shown in decision making problem.

Keywords Neutrosophic Set, Neutrosophic Topology, Interval-Valued Neutrosophic Set, Generalized Neutrosophic Set, Generalized Interval-Valued Neutrosophic Set, Generalized Interval-Valued Neutrosophic Topological Space.

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“Minimal Structures in Topological Spaces”

Binod Chandra Tripathy

Department of Mathematics, Tripura University, Agartala – 799022, Tripura, India

E-mail: binodtripathy@tripurauniv.ac.in, tripathybc@yahoo.com, tripathybc@gmail.com

Abstract: The introduction of the concept of topology brought a break through development in Science and Technology. In particular the development of point set topology opened the door for other branches to make applications of the concepts of topology for investigations. It is observed that based on the situation, different weaker forms of the existing concepts were developed for investigation and modelling. The building bricks of the concept of topology are the collection/class of open sets. Over the years, the weaker forms of the open sets have been introduced accordingly. These weaker forms were found to satisfy many properties of topological spaces. These were clubbed together and named as minimal structures in topological spaces. In this lecture, the introduction to the topological spaces will be given. Then different types of topological space will be discussed based on different notions of the sets introduced time to time. Then minimal structures in topological spaces of different types will be discussed. A brief overview of the concepts will be discussed in this presentation to give the basics.

Key Words: Open set, Closed set, Fuzzy set, Intuitionistic fuzzy set, Soft set, Neutrosophic set, Fuzzy topology, Soft topology, Intuitionistic topology, Neutrosophic topology, Minimal structure, Fuzzy minimal structure.

AMS Subject Classification no. (2020). 03E72, 54A05, 54A140

“New approaches to topological hyper structures”

Ljubiša D. R. Koćinac

University of Niš, 18000 Niš, Serbia

State University of Novi Pazar, 36300 Novi Pazar, Serbia

Email: lkocinac@gmail.com

Abstract: We present a few new results on the functor of idempotent probability measures concerning preservation of some topological properties. Also, for a metric space X we consider the hyperspace $\exp X$ equipped with a new, recently introduced metric.

“Optimal Control in Modeling for Sustainable Management of Natural Resources”

Md. Haider Ali Biswas

Mathematics Discipline, Science Engineering and Technology School

Khulna University, Khulna-9208, Bangladesh

Email: mhabiswas@yahoo.com

Abstract: Global warming is rapidly increasing the temperature of seawater and introducing acidification that adversely affects marine ecosystems. Consequently, temperature-sensitive fishery resources are under great threat. Thus the devastating aftermath of climate change due to global warming is rather a reality, no more a prediction. If the current situation continues, global marine ecosystems could turn into an ecological desert by the end of the century. So, it is burning issue to find out an optimal and efficient management of our ecosystems for sustainable environment. Mathematical model of nonlinear dynamical systems may play crucial role to appropriately design such ecological model and obtain better control strategy for a sustainable future. In this talk, we discuss a nonlinear dynamic mathematical model to illustrate the adverse effects of global warming and rapid concentrations of greenhouse gas (GHG) on marine ecosystems. We develop an optimal control model adopting coastal forestation and plankton nutrients as two control techniques, where coastal forestation can be adopted to lessen the concentration GHGs by absorbing carbon dioxide through photosynthesis, whereas plankton nutrients can be applied to improve planktonic diversity that can provide more food to marine fishes. We analyze the model applying the optimal control technique in the form of *maximum principle* to efficiently manage our marine ecosystems. This study establishes a mathematical relationship between the environment and marine ecosystems that could contribute to environmental and fisheries management. We investigate the model simulated numerically and the simulation results are well illustrated to justify the theoretical findings. The results show that the proposed model could be more effective if both control strategies are applied.

Keywords: Mathematical model, climate change, Marine resource, optimal control, sustainable management, numerical application.

“Some sequence spaces and their geometric properties”

Naim L. Braha

*The University of Prishtina,
Department of Mathematics and Computer Sciences
Avenue "Mother Teresa" Nr=5
Prishtine, 10000, Kosove
Email: nbraha@yahoo.com*

**“Augmented Lagrangian Methods for Optimal Control Problems
Governed by Mixed Variational-Hemivariational Inequalities
Involving a Set-Valued Mapping”**

Ram N. Mohapatra

*University of Central Florida
Orlando, FL. 32816, USA
Email: ram.mohapatra@ucf.edu*

The optimal control problems considered in this work is an optimization problem in infinite-dimensional Banach spaces where the objective function is nonconvex and nonsmooth, and whose state is a solution to a mixed variational-hemivariational problem depending on the control itself involving set-valued mapping and a pseudomonotone bifunction in the sense of Brezis. Since their emergence in early sixties and eighties, variational inequalities and hemivariational inequalities have gone through substantial developments and provided us with a convenient mathematical apparatus for studying a wide range of problems arising in diverse fields such as engineering sciences, physics, contact mechanics, economics etc.. The object of this talk is to provide a formulation and some possible solutions of problems arising in this interesting field of investigations.

“Dynamics of Complex Valued Functions – A Revisit”

*Prof. (Dr.) Sanjib Kumar Datta
Department of Mathematics, University of Kalyani,
P.O.: Kalyani, Dist.: Nadia, West Bengal, PIN: 741235,
Mail Id: sanjibdatta05@gmail.com.*

Abstract: Sometimes the evolution of the system can be expressed as a function on a suitable set. Complex dynamics is basically the study of analytic functions under iteration. The development of the theory of complex dynamics is divided into two principal aspects: the iteration of rational functions and that of transcendental functions. The dynamics of transcendental functions are quite different from the dynamics of rational functions, mainly because of essential singularity. In this talk I will highlight different flavour of Dynamics of Complex Valued Functions.

Keywords and Phrases: Complex Dynamics, Rational and Transcendental Functions, Julia and Fatou Sets.

“On Almost Statistical Convergence of Fuzzy Variable Sequences”

*Ömer Kişi **

** Burdur, Turkey Department of Mathematics, Bartın University, Bartın, Turkey,*

**(okisi@bartin.edu.tr) Email of the corresponding author*

Abstract: In this study, we introduce various concepts related to statistical almost convergence for fuzzy variable sequences in credibility space. These include statistical almost convergence in almost surely, mean, measure, distribution, and uniformly almost surely. We also explore the interconnections among these concepts.

Abstracts of Oral Presenters

Some Multi Sequence Spaces Related to the p -absolutely Summable Sequence

Amaresh Debnath¹, Runu Dhar² and Binod Chandra Tripathy³

^{1,2}Department of Mathematics, M.B.B.University, Agartala, Tripura, India

³Department of Mathematics, Tripura University, Agartala – 799022, Tripura, India

E-mail: ¹debnathamaresh91@gmail.com, ²runu.dhar@gmail.com and ³tripathybc@gmail.com

Abstract: In this article we introduce multi sequence spaces of real numbers related to p -absolutely summable sequence spaces associated with the multiplicities of elements. We investigate some of their basic topological and algebraic properties such as completeness, sequence algebra, symmetricity, convexity, uniformly convexity, balancedness etc. We establish some inclusion relations too. Some examples will be discussed to give a clear idea about the concepts.

Key words : Multi sequence; ℓ_p -space of multi sequences; symmetric; convexity; completeness. .

AMS(2010) Classification No : 40A05, 03E99.

A Competitive Closed-Loop Supply Chain Considering Emission Control Strategies In Presence Of Environmental Awareness Efforts

Anindya Mandal*

*Department of Mathematics, Tehatta Sadananda Mahavidyalaya, Purba Bardhaman,
West Bengal, India, 713122
E-mail: bmpphs@gmail.com*

Abstract: This study examines a competitive supply chain model with imperfect production for recycling products in an environment with emission controls using a cap-and-trade policy. To reduce carbon emissions during production, the manufacturer makes investments in green technology. Recyclers gather used goods at a recovery rate that is influenced by the buy-back price and the level of environmental awareness. The rival retailers vie with one another for both retail pricing and marketing expenditures. The linear type market demand is sensitive to the retail price, promotional activity, and product greenness. A centralized system and five decentralized systems are applied to analyze the proposed model both analytically and numerically. To support the proposed model's feasibility, numerical examples and sensitivity analyses of the key parameters are examined. The current study shows that to maximize each retailer's profit in a competitive market, retail prices are critical. Regarding the environment, the government ought to impose restrictions on the sale of surplus carbon quotas and lower the carbon cap to reduce excessive emissions.

Keywords: Competitive supply chain; green investment; product recycling; environmental awareness effort

Rough Statistical Convergence Of Double Sequences In Neutrosophic Normed Spaces

Arghyadip Debroy¹ and Runu Dhar²

^{1,2}Department of Mathematics, Maharaja Bir Bikram University, Agartala-799004, Tripura, India.

¹dxarghyadip@gmail.com and ²runu.dhar@gmail.com

Abstract: The main purpose of this article is to introduce the notion of rough convergence and rough statistical convergence of double sequences in neutrosophic normed spaces. We also study the sequence of convergence with the help of neutrosophic norm in neutrosophic normed spaces. We wish to introduce the concept of statistically convergent and statistically Cauchy of double sequence of functions with the help of neutrosophic norm in neutrosophic normed spaces. Some basic properties and characterization theorems of these concepts are investigated in neutrosophic normed spaces. Our purpose is also to introduce statistically Cauchy sequence and statistically completeness in neutrosophic normed spaces. Additionally, we introduce statistically Cauchy and statistically completeness of double sequences with the help of neutrosophic norm in neutrosophic normed spaces. Statistical limit and Statistical cluster point concepts are utilized to establish certain features in the context of double sequences.

Keywords: Rough statistical convergence, neutrosophic normed space, statistically convergent, statistically Cauchy, double sequences.

Thermal stability and Phase Transitions of Charged AdS Black Holes in the background of Dark Energy Candidates: Analysis of crucial Thermodynamic Parameters and Joule-Thomson Expansion

Arpan Bhattacharya

*Department of Mathematics, The University of Burdwan
arpanbhattacharya616@gmail.com*

Abstract: In this article, we chose a charged AdS black hole embedded in the universe filled with dark energy candidates. By making use of the equation of states of Linear Redshift Parametrization dark energy model we find out the corresponding energy density of the concerned black hole. Consequently thermodynamic construction is analyzed for various parameters of the concerned black hole. In the study of Gibbs free energy the corresponding curves show cuspidal nature. Physical significance of those cusps analyzed. While discussing the Joule-Thomson expansion, the corresponding curves show discontinuities for the dark energy models. Significance of such discontinuities are interpreted in this paper. For the concerned, the corresponding temperature curves show asymptotic behavior for the different values of charge parameters. Implications of this type of nature of such curves are represented in this article. In charge-potential phase space critical points up to first order are found. From criticality analysis, the initial and final phase of the black hole is investigated in this work.

Keywords: AdS black hole, dark energy , Gibbs free energy, heat capacity, Joule Thomson expansion.

Conformal Ricci Soliton in Sasakian Manifolds Admitting General Connection

Ashis Biswas

Assistant Professor, Department of Mathematics, Mathabhanga College, Mathabhanga Dist:

Coochbehar Pin: 736146 State: West Bengal

Email: biswasashis9065@gmail.com

Abstract. The object of the present paper is to study the Conformal Ricci soliton in Sasakian manifold admitting general connection, which is induced with quarter symmetric metric connection, generalized Tanaka Webster connection, Schouten-Van Kampen connection and Zamkovoy connection. Furthermore, we study C^G -semi symmetric and C^G -semi symmetric Sasakian manifolds admitting Conformal Ricci Soliton.

Influence of Thermal Radiation and Dufour Effect on Magnetohydrodynamic Flow Over A Stretching Sheet Embedded in A Porous Medium

Dr. Bandita Das

Guwahati College, Guwahati-781021, Assam, India

banditadas1234@gmail.com

Abstract: This Paper investigate the flow dynamics of a compressible viscous fluid in stable and unstable MHD flows over a heated, stretched sheet in a porous medium. This intricate process is influenced by a multitude of factors, including a magnetic field, heat radiation, chemical reactions, thermal diffusion, viscous dissipation, and the Dufour effect. The governing partial differential equations are transformed into nonlinear ordinary differential equations using similarity transformations. This mathematical maneuver enables a deeper understanding of the underlying dynamics. The resulting equations are then solved numerically using the bvp4c method, a robust and reliable technique for tackling nonlinear boundary value problems. The investigation focuses on the interplay between various parameters and their impact on the concentration, velocity, and temperature profiles. The results are presented through a series of graphs, each revealing the subtle nuances of the system's behavior. By examining the effects of magnetic field strength, heat radiation, chemical reaction rates, and other factors, this study provides valuable insights into the intricate

dance of forces governing the fluid's motion. The findings of this research have far-reaching implications for various fields, including engineering, physics, and materials science. By elucidating the flow dynamics of compressible viscous fluid flow, this study contributes to the development of more efficient and effective technologies, from heat transfer systems to chemical processing and beyond. As the world grapples with increasingly complex challenges, the understanding and manipulation of fluid dynamics will play an ever-more critical role in shaping our future.

MHD flow over a Permeable Stretching sheet with convective boundary conditions in the presence of a Chemical reaction by the Physics-informed Neural Network Method

Bhaskar Jyoti Dutta^{1} and Bhaskar Kalita²*

¹*Department of Mathematics, Gauhati University, Guwahati, Assam, India.*

²*Principal, Barkhetri College, Nalbari, Assam, India.*

*E-mail: *duttajyotibhaskar86@gmail.com*

Abstract: This research aims to study the MHD flow over convective boundary conditions through a permeable stretched surface in the presence with a chemically reacting solute. The governing equations for momentum, heat transfer and concentration of the flow are converted into non-linear ordinary differential equations by using the similarity transformation. Using the Physics-informed neural network approach, the resultant system of the differential equations is computed. When Magnetic parameters increase, the velocity boundary layer thickness decreases. According to the study, during injection, the fluid travels away from the surface, causing the velocity gradient to reduce; in suction, the reverse effect is seen. As the concentration and thermal boundary layer decrease due to an increase in Schmidt number and Prandtl number. Increasing the convective parameter raises the temperature of the plate surface, while increasing the reaction rate parameter reduces the thickness of the concentration boundary layer. Comparison between the current findings of the paper and those of previous studies reveals a significant level of agreement.

Keywords: MHD, Horizontal plate, Boundary layer, Suction/injection, First-order chemical reaction, PINNs.

Category: Fluid Dynamics.

Difference Lacunary Weak Convergence of Sequences Defined By Orlicz Function

Bibhajyoti Tamuli.

*Research Scholar, Department of Mathematics, Tripura University (A Central University),
Agartala Tripura(W), 799022,
Email : bibhajyotit@gmail.com.*

Abstract: In this paper, we introduce the notion of difference lacunary weak convergence for sequences defined by an Orlicz function. Utilizing the difference operator and Orlicz function, we have defined new classes of sequences. We examined several algebraic and topological properties of these sequences, such as solidness, monotonicity, and symmetry. We gave appropriate examples and detailed discussions to validate our established failure instances and definitions. We have established a few inclusion relations between these spaces. Additionally, we established several inclusion relations among these spaces.

Keywords: Weak convergence, Orlicz function, Lacunary convergence

AMS Classification No: 40A05, 40A30, 40A30, 40G05

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MODELING THE ENVIRONMENTAL BENEFITS OF BIOMASS ENERGY OVER FOSSIL FUELS TO MITIGATING CLIMATE CHANGE IN UREA MANUFACTURING

*Bristy Alam Nupur*¹, Farzana Ahmed Ritu², Sonali Tarafder³, Sabrina Sultana Toma⁴, Shahrin Tamanna Rimmi⁵ and Md. Haider Ali Biswas⁶*

^{1,2,3,4,5} B.Sc Student, ⁶ Professor, Mathematics Discipline, Khulna University, Bangladesh, Mathematics Discipline, Khulna University, Bangladesh, 201230@ku.ac.bd¹, 201255@ku.ac.bd², 201217@ku.ac.bd³, 201205@ku.ac.bd⁴ 201229@ku.ac.bd⁵, mhabiswas@yahoo.com⁶

Abstract

Fossil fuels are indispensable to modern life. We cannot think of the norms and expectations of the modern era without using it. However, the convenience and necessity of fossil fuels in our day-to-day activities is undeniable, the environmental consequences of their widespread use can no longer be ignored. Urgent action is needed to transition towards more sustainable energy alternatives to mitigate the detrimental impacts of fossil fuel combustion on the planet's climate system. A total 994 billion cubic feet (BCF) of natural gas was produced in 2019-20 and 5%, was used in fertilizer sector, while all the 7 urea fertilizer factories are dependent on natural gas for feedstock. The combustion of fossil fuels in urea manufacturing releases large amount of carbon dioxide (CO₂), a potent greenhouse gas. Using biomass energy instead of fossil fuels in urea production can significantly reduce greenhouse gas emissions and move towards more sustainable agriculture. This process also reduces production costs and CO₂ emissions compared to conventional urea production from fossil fuels. Our main target is to work on the factors contributing to a potential reduction in atmospheric temperature. We have introduced a five compartmental model in order to diminish the amount of ambient CO₂. The analysis has identified multiple equilibrium points. By thoroughly investigating the equilibrium points and their stability, the analysis has yielded valuable insights into the dynamics and behavior of the mathematical model. The identification of these equilibrium points is crucial for understanding the long-term behavior of the system.

Keywords: Mathematical Modeling, GHG emission, Urea fertilizers, Fossil fuel, Biomass energy.

Optimal Pricing and Greening Decisions in a Dual-channel Competitive Supply chain

Brojeswar Pal

*Department of Mathematics, The University of Burdwan, Burdwan - 713104, India.
Email: bpal@math.buruniv.ac.in*

Abstract: With the rapid development of internet usage, the online market has emerged as the preferred option for customers. This shift in consumer behaviour urges manufacturers to adapt and develop an online channel alongside their retail channel. A shop must source items from various manufacturers to carry multiple items from the same category to meet diverse product demand types, underlining the importance of the online market.

Due to the close connections between sustainability and the importance of environmental issues today, most nations are attempting to achieve sustainability in various ways. One key aspect of these issues is the production of innovative green products.

This article presents a model of a dual-channel supply chain involving a retailer. It is assumed that both producers make items with varying levels of green improvement. The analysis of the competition market structures also encompasses the members' decision-making techniques. This study examines the market's demands in relation to greenness and the availability of substitute products. The model explores the potential benefits of optimal online prices, retail and wholesale prices, and levels of environmental improvements. The best results are determined and compared using a numerical example, offering a promising outlook for the application of this model.

Additionally, a sensitivity analysis is carried out to examine the impact of a few key parameters carefully. It is discovered that a double dual-channel model has a higher green level than a single dual-channel model. Additionally, the own-channel price sensitivity characteristics hurt the members' profit functions. The cost-coefficients of greening must be under the producers' control if they are to raise the level of greenness in their manufactured goods.

Key words and phrases: Dual-channel supply chain; Green innovation; Competition, Pricing.

Lacunary Statistical Convergence of Sequences of Fuzzy Functions of Order Γ Using Matrix Transformation

¹Devia Narrania , ²Kuldip Raj

Email: devia.narrania@gmail.com¹ , kuldipraj68@gmail.com²

Abstract: In this paper, we explore lacunary statistical convergence of order γ and strong lacunary summability of order γ for sequences of fuzzy functions, employing the modulus function and a regular matrix. We investigate the inclusion relationships between the newly developed spaces. We also analyze properties associated with these spaces and derive several noteworthy results.

Key words: Fuzzy number, lacunary sequences, modulus function, infinite matrix

Multiplication Operation of Neutrosophic Fuzzy Matrices

Deepraj Das¹ and Runu Dhar²

^{1,2}*Department of Mathematics, MaharajaBirBikramUniversity, Agartala-799004, Tripura, India.*

Email: ¹deeprajd43@gmail.com, ²runu.dhar@gmail.com

Abstract: Matrices have important role in science and technology. However, the classical matrix theory sometimes fails to solve the problems involving uncertainties, occurring in an imprecise environment. In order to solve real life problems in decision making, fuzzy matrices and neutrosophic fuzzy matrices are very important. The neutrosophic algebra was introduced over the idea of inserting the indeterminacy element I into classical algebraic structures. In classical algebra, matrices play an important role in the theory of vector spaces. This concept has been generalized to neutrosophic matrices. The main purpose of this paper is to introduce neutrosophic fuzzy matrices. We would define addition and subtraction operations of neutrosophic fuzzy matrices. We would study different properties of these two operations by citing general and numerical examples. We would wish to introduce the multiplication operations of two neutrosophic fuzzy matrices. Some algebraic properties on multiplication operation are to be investigated of neutrosophic fuzzy matrices. We would study commutative and associative properties of neutrosophic fuzzy matrices. These properties would be verified by giving general and numerical examples. We would also study distributive

property with respect to multiplication operation over addition and subtraction of neutrosophic fuzzy matrices. Lastly we would introduce identity of neutrosophic matrices.

Keywords: Neutrosophic fuzzy matrix, neutrosophic set, commutativity, associativity, distributive of neutrosophic fuzzy matrices.

A Study of Double Integrals Involving Generalized Hypergeometric Functions and Their Applications

¹Ganesh Bahadur Basnet & ²Narayan Prasad Pahari

¹Department of Mathematics, Tribhuvan University, Tri-Chandra Multiple Campus, Kathmandu, Nepal

*²Central Department of Mathematics, Tribhuvan University, Kathmandu, Nepal
¹gbbmath@gmail.com, ²nppahari@gmail.com*

Abstract: This presentation aims to evaluate double integrals involving generalized hypergeometric functions, using Edwards's double integral method. The integration of generalized Gauss hypergeometric functions, which extends the classical Gauss hypergeometric function ${}_2F_1$, plays a crucial role in various areas of mathematical analysis. We explore both definite and indefinite integrals, highlighting special cases where the results can be expressed in terms of elementary functions or other well-known special functions.

Key Words: Gauss's Hypergeometric Function, Gamma function, Edwards's Double integral, Gamma Function, Watson's Theorem, Dixon's Theorem, Gauss's Theorem.

Fuzzy Arithmetic–Based Algorithm for Identifying Medical Conditions

¹Gyan Prasad Paudel, ²Parbati Kumari Upadhyay,

¹Graduate School of Science and Technology, Mid-West University, Surkhet,, Nepal

² Graduate School of Education, Mid-West University, Surkhet, Nepal

Email: ¹gyan.math725114@gmail.com, ²parbatipaudel725114@gmail.com

Abstract: Making the right medical decision is challenging work because, in our daily life, decision-making problems may have the components of membership and non-membership degrees with the possibility of hesitation. Since soft theory offers a theoretical framework for dealing with ambiguous, fuzzy, and ill-defined objects, it is a key development in the field of computer programming as well as other scientific disciplines. Intuitionistic fuzzy soft sets provide an effective tool for solving multiple attribute decision-making with intuitionistic fuzzy information. The most essential issue is how to derive the ranking of alternatives from the information quantified in terms of intuitional fuzzy values. This theory also has the potential to be used to solve such real-world problems. In this work, we explore how Sanchez's medical theory could be used in medical diagnosis and provide a fuzzy arithmetic-based algorithm for identifying medical conditions to address this.

AMS Subject Classification: 03E72; 92C50

Keywords: Fuzzy logic, fuzzy soft set, Intuitionistic fuzzy set , patient- symptom matrix .

On I-statistical convergent sequence spaces in gradual normed linear space

Hamari Debbarma

Department of Mathematics, Tripura University, Agartala, India

Corresponding Author Email: hamari.mathematics@tripurauniv.ac.in

Abstract: The combination of the notion of statistical convergence and ideal convergence is called I-statistical convergence. In 2011, Savas and Das introduced the notion of I-statistical convergence of sequences of real numbers. This article is devoted to the study of I-statistical convergent, I-statistical null and I-statistical bounded sequence spaces in gradual normed linear space $(U, \|\cdot\|_G)$, denoted by $c^{GI(S)}$, $c_0^{GI(S)}$ and $\ell_\infty^{GI(S)}$ respectively. We study some basic algebraic and topological properties of these classes. Also, we investigate some inclusions involving these classes.

Keywords: Gradual number, Gradual normed linear space, Ideal, I-statistical convergent, Monotone space.

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On Topological Structure of Total Paranormed Double Sequence Space

$$(\ell^2(\mathbf{X}, \|\cdot\|), \bar{\gamma}, \bar{\mathbf{u}}, \mathbf{G})$$

*Jagat Krishna Pokharel, #Narayan Prasad Pahari

Department of Mathematics Education, Sanothimi Campus, Tribhuvan University,
Nepal

Central Department of Mathematics, Tribhuvan University, Kirtipur, Kathmandu, Nepal.

*jagatpokhrel.tu@gmail.com , #nppahari@gmail.com

Abstract: The main aim of this paper is to introduce $\ell^2(\mathbf{X}, \|\cdot\|), \bar{\gamma}, \bar{\mathbf{u}}$ of double sequences with their terms in a normed space \mathbf{X} as a generalization of the familiar sequence space ℓ . Besides the investigation of the condition pertaining to the containment relations of the class $(\ell^2(\mathbf{X}, \|\cdot\|), \bar{\gamma}, \bar{\mathbf{u}})$ of same kind in terms of $\bar{\gamma}$ – and $\bar{\mathbf{u}}$, our primarily interest is to explore some of the preliminary results that characterize the linear topological structures of $(\ell^2(\mathbf{X}, \|\cdot\|), \bar{\gamma}, \bar{\mathbf{u}})$ when topologized it with suitable natural paranorm .

Keywords: Paranormed space, Sequence space, Double sequence

Further Results on I And I*- Convergence of Sequences Of Bi- Complex Numbers

J. Hossain^a , S. Debnath^b

^{a,b}Department of Mathematics Tripura University (A Central University) Suryamaninagar-799022,
Agartala, India.

juweljoya123@gmail.com^a , shyamalnitamath@gmail.com^b

Abstract: During the last few years, enormous works by different researchers have been carried out in summability theory by linking different notions of convergence of sequences. In this paper, following a very recent and new approach, we introduce the notion of I-limit point, I- cluster point, and prove certain properties of both the notions. We also investigate some new properties of I-Cauchy and I*-Cauchy sequences and show that the condition (AP) plays a crucial role to relate both the notions. Finally, we investigate the notion of I and I*-divergence of sequences of bi-complex numbers and prove the essence of the condition (AP) again to establish the relationship between the notions.

Keywords: Bi-complex number, I- convergence, I*- convergence.

AMS subject classifications: 40A35, 40G15.

Concerning on Some Operators on Intuitionistic Fuzzy Sets

Jaydip Bhattacharya

Department of Mathematics, Bir Bikram Memorial College,
Agartala, West Tripura, India, 799004

Email: jay73bhattacha@gmail.com

Abstract: In intuitionistic fuzzy sets, several operators and operations were introduced and discussed by many researchers time to time. The characteristics of modal operators have been examined and their applications in different fields have been studied. Atanassov introduced modal operators in intuitionistic fuzzy sets and he examined some properties of these modal operators. The main objective of this paper is to investigate further some new results related to these operators over intuitionistic fuzzy sets.

An Interval Type 2 Fuzzy AHP-ARAS Approach in mHealth Applications for Type 2 Diabetes Mellitus Management

¹Korbi Debbarma, ²Susmita Roy, ³ Paritosh Bhattacharya

Department of Mathematics, National Institute of Technology, Agartala, India

Email: korbidebbarma123@gmail.com¹, susmitaroy.nita@gmail.com², pari76@rediffmail.com³

Abstract: The usability of mobile health (mHealth) application is critical in managing chronic conditions like Type 2 Diabetes Mellitus (T2DM). Recent advancement have significantly transformed the medical industry. This research examines several mHealth applications that empower patients to independently manage T2DM. As the number of mHealth application continues to increase, selecting the most user-friendly and satisfying option has become increasingly challenging. Multi-criteria decision making methodologies are among the most effective techniques for addressing such decision making challenges. This study aims to assess and rank the usability of mHealth applications designed for T2DM management by employing a hybrid decision making approach that integrates Interval Type 2 Fuzzy Analytic Hierarchy process (IT2F-AHP) for determining criteria weights and Interval Type 2 Fuzzy Additive Ratio Assessment (IT2F-ARAS) for ranking the alternatives. IT2F-AHP is utilized to handle the inherent uncertainty and vagueness in expert judgement when assigning importance to various usability criteria, such as learnability, efficiency, memorability, aesthetic etc. The IT2F-ARAS method is then applied to evaluate and rank mHealth applications based on these weighted criteria, providing a robust framework for decision making at last comparison and sensitivity analysis are performed. The result offer insights into the most critical factor influencing the usability of mHealth applications for T2DM, guiding developers in enhancing the effectiveness of these tools for better diabetes management .

Keywords: T2DM mHealth application, IT2F-AHP, IT2F-ARAS, MCDM.

Bi-complex Valued Extended b-Metric Space and Contraction Principles

Krishna Bhattacharjee^{1}, Rakhal Das² and Binod Chandra Tripathy³*

^{1,2} Department of Mathematics, The ICFAI University, Tripura, 799210, India.

³ Department of Mathematics, Tripura University Agartala, Tripura-799022, India.

Email: bhattacharjeekrishna413@gmail.com; rakhaldas95@gmail.com; tripathybc@gmail.com.

Abstract: In this paper, we present a new space that is bi-complex valued extended b-metric spaces which is the extension of bi-complex valued b-metric space. As a result, we have obtained some new results regarding the complete bi-complex valued extended b-metric spaces. We employed some well-known contraction to investigate fixed points in our findings. We also present several non-trivial cases to support the accuracy of our established findings.

Keywords: Fixed point; Common fixed point; b-metric space, Bi-Complex valued metric space.

AMS Subject Classification 2020: 47H09; 54H25; 30G35.

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DOI: 10.2478/tmmp-2024-001.

Darboux Normal Curves on Smooth Surfaces Under Conformal Transformations.

Kuljeet Singh

Research Scholar

SMVD, University, Katra, J&K, India

Kulljeet83@gmail.com

Abstract: This paper presents a comparative analysis of the Darboux frame and the Frenet frame, describing the invariant sufficient conditions for the conformal image of a Darboux normal curve on smooth surfaces, employing the Darboux frame in place of the Frenet frame. Furthermore, we examine the variations in the components of the position vector of a Darboux normal curve along any tangent vector and the normal vector to the curve under conformal and homothetic transformations.

Keywords: Darboux normal curve; conformal transformation ; smooth surfaces; normal curvature.

A Note on a New And General Summation Formula For The Generalized Hypergeometric Series ${}_4F_3$

¹Madhav Prasad Poudel, ²Narayan Prasad Pahari, ³Vijay Yadav, & ⁴Arjun K. Rathie

¹School of Engineering,, Pokhara University, Kaski, Pokhara, Nepal,
pdmadav@gmail.com

²Central Department of Mathematics, Tribhuvan University, Kirtipur, Kathmandu, Nepal
nppahari@gmail.com

³Department of Mathematics, SPDT College, Andheri East, Mumbai 400059, Maharashtra India,
vijaychottu@yahoo.com

⁴Department of Mathematics, Vedant College of Engineering & Technology, (Rajasthan Technical University), Tulsi,Jakhamund, Bundi,, Rajasthan, India,
arjunkumarrathie@gmail.com

Abstract. Shoukat Ali et al. demonstrated how one can obtain six new and interesting summation formulas for the generalized hypergeometric series ${}_3F_2$ and ${}_4F_3$ from an identity due to bailey. In this note, our aim is to demonstrate how one can obtain a new and general summation formula for the generalized hypergeometric series ${}_4F_3(1)$. This is achieved by employing two generalizations of the Gauss's second summation theorems obtained earlier by Rakha and Rathie in an identity due to Bailey. Several results obtained earlier by Ali et al. follow special cases of our main findings.

Growth of Entire Solutions of Non-Linear Complex Differential Equation

Manab Biswas

Department of Mathematics, Kalimpong College,
Kalimpong, Dist- Kalimpong, PIN- 734301, West Bengal, India.
E-mail: dr.manabbiswas@gmail.com

Abstract: This study aims to examine the growth of entire solutions of the non-linear complex differential equation: $P[f] - \beta_1 = (f^n - \beta_2)\phi$, or, $(\sum_{j=1}^t a_j(z) \cdot \prod_{l=0}^{l_j} (f^{(l)})^{(n_{jl})}) - \beta_1 = (f^n - \beta_2)\phi$, with $n = \max \{ \sum_{i=0}^k n_{ij} : n_{ij}, s \text{ are non - negative integers.} \}$ under some appropriate growth conditions assumed for all the functions ϕ , β_1 , and β_2 .

Nonlinear Propagation of Dust Ion Acoustic Solitary Waves in Magnetized Negative Ion Plasma with Electron Inertia and Stationary Charged Dust Grains

Muktarul Rahman^{1} and Satyendra Nath Barman²*

¹*Department of Mathematics, Gauhati University, Guwahati, Assam, India.*

²*Principal, B. Borooah College, Guwahati, Assam, India.*

*E-mail: *mrahman23.math@gmail.com*

Abstract: In this paper, the nonlinear propagation of dust-ion-acoustic (DIA) solitary waves in a four-component magnetized plasma system, consisting of both positive and negative ions, inertial electrons and negatively charged stationary dust grains is theoretically studied. For this purpose, considering three-dimensional fluid dynamical equations for positive-negative ions and electrons, and the Poisson equation to derive the corresponding nonlinear Korteweg-de Vries (KdV) equation by applying reductive perturbation method, in the small amplitude limit. The KdV equation with its solution is analysed to examine the existence regions and basic features (e.g., speed, amplitude, energy, width, etc.) of the DIA solitary structures. The result shows the coexistence of compressive and rarefactive DIA solitons strongly depend on the mass ratio of the negative to positive ions (Q) with various ion temperature. Also, two distinct kind of wave modes are found to exist in the linear regime, namely fast mode (cyclotron waves) and slow modes (acoustic waves). Moreover, the effects of relevant plasma parameters such as ion-to-electron temperature ratio (σ), dust-to-positive ion density ratio (μ_d) and negative-to-positive ion density ratio (μ_j), obliqueness angle (θ), strength external magnetic field (B_0) over the propagation of DIA soliton are numerically analysed within the paper in detail. This investigation should be helpful in understanding the salient features of the nonlinear DIA solitary waves in space and laboratory plasmas, where the considered plasma system exists.

Keywords: Dust-ion-acoustic soliton, Solitary waves, Reductive perturbation method, Electron inertia, Magnetized plasma.

AMS 2020 Subject Classification: 35C08, 35Q51, 35Q53.

Category: Mathematical Physics.

Developments and Applications of Neutrosophic Number Theory: A Review

Dr. Munmi Saikia

*Assistant Professor, Department of Mathematics, Patharkandi College, Patharkandi,
Karimganj-788724, Assam*

Abstract: Neutrosophic number theory, an extension of classical number theory by integrating the notion of indeterminacy, has witnessed significant advancements in recent years. This paper highlights pivotal progressions within this domain, encompassing the formulation of neutrosophic arithmetic operations, the investigation of neutrosophic divisibility and prime numbers, the examination of neutrosophic congruences, and the analysis of solutions pertaining to neutrosophic Diophantine equations. The potential of neutrosophic number theory is then emphasized by reviewing the applications in diverse areas.

Keywords: Neutrosophic Number Theory; Neutrosophic linear Diophantine equation, Neutrosophic divisibility, Neutrosophic congruences; Applications

A Novel Entropy-Based MCDM Framework Under Fermatean Fuzzy Environment

¹Naima Debbarma, ²Susmita Roy, ³ Paritosh Bhattacharya

Department of Mathematics, National Institute of Technology, Agartala, India

Email: naimadebbarma29@gmail.com¹, susmitaroy.nita@gmail.com², pari76@rediffmail.com³

Abstract: The usability of mobile health (mHealth) application is critical in managing chronic conditions like Type 2 Diabetes Mellitus (T2DM). Recent advancement have significantly transformed the medical industry. This research examines several mHealth applications that empower patients to independently manage T2DM. As the number of mHealth application continues to increase, selecting the most user-friendly and satisfying option has become increasingly challenging. Multi-criteria decision making methodologies are among the most effective techniques for addressing such decision making challenges. This study aims to assess and rank the usability of mHealth applications designed for T2DM management by employing a hybrid decision making approach that integrates Interval Type 2 Fuzzy Analytic Hierarchy process (IT2F-AHP) for determining criteria weights and Interval Type 2 Fuzzy Additive Ratio Assessment (IT2F-ARAS) for ranking the alternatives. IT2F-AHP is utilized to handle the inherent uncertainty and vagueness in expert judgement when assigning importance to various usability criteria, such as learnability, efficiency, memorability, aesthetic etc. The IT2F-ARAS method is then applied to evaluate and rank mHealth applications based on these weighted criteria, providing a robust framework for decision making at last comparison and sensitivity analysis are performed. The result offer insights into the most critical factor influencing the usability of mHealth applications for T2DM, guiding developers in enhancing the effectiveness of these tools for better diabetes management .

Keywords: T2DM mHealth application, IT2F-AHP, IT2F-ARAS, MCDM.

Theory and Applications of Mathematics

Mrs. Nilima Chakraborty,

Retired Head Mistress, Vice President of Tripura Mathematical Society

Abstract: Mathematics, often described as the language of the universe. The concept of the Theory and Applications of Mathematics explains the dual role of mathematics as both theoretical and practical discipline. Theoretical mathematics provides the abstract foundation for understanding complex concepts and structures, while its applications demonstrate how these principles solve real-world problems and drive innovation. The interplay between mathematical theory and its applications are diverse, illustrating how they complement and enhance each other.

Theoretical Foundations

Mathematical theory includes various divisions, each exploring different concepts:

1. **Algebra:** Focuses on structures like groups, rings, and fields, providing tools to solve equations and understand mathematical operations.
2. **Geometry:** Studies shapes and sizes including both Euclidean and non-Euclidean geometries, which have applications in areas like computer graphics and architecture.
3. **Calculus:** Developed by Newton and Leibniz, calculus deals with change and motion through limits, derivatives, and integrals, forming the basis for analyzing dynamic systems.
4. **Number Theory:** Examines properties of integers, including prime numbers and divisibility, with applications in cryptography and coding theory.
5. **Topology:** Investigates properties preserved under continuous transformations, influencing our understanding of space and continuity.

Applications of Mathematics

Mathematics finds practical applications in various fields, illustrating its versatility:

1. **Engineering:** Utilizes mathematical principles for designing and analyzing structures and systems, including calculus and linear algebra for modeling physical phenomena.
2. **Physics:** Depends on mathematical theories to describe the physical world, from classical mechanics to quantum physics, using differential equations and statistical methods.

3. **Computer Science:** Applies algorithms, data structures, and cryptography based on mathematical foundations, including graph theory and discrete mathematics.
4. **Economics:** Uses mathematical concept and optimization techniques to analyze market behaviors, predict economic trends, and allocate resources efficiently.
5. **Biology and Medicine:** Employs mathematical models to understand biological processes and diseases, applying techniques like differential equations and statistical analysis in medical research and diagnostics.

Integration of Theory and Applications

The interplay between mathematical theory and its applications is crucial:

- **Modeling:** Theoretical mathematics provides tools for modeling complex systems, such as weather patterns and fluid dynamics.
- **Technology Advancement:** Theories in mathematics often drive technological innovation, including developments in cryptography and computational methods.
- **Interdisciplinary Research:** Mathematics intersects with other scientific fields, enhancing research and providing new insights through its theoretical and practical applications.

In summary, the Theory and Applications of Mathematics represent the dual essence of mathematics in theoretical discipline and in practical tools. The theoretical aspect of mathematics provides a rich framework of concepts and structures that support the entire field. It includes various branches such as algebra, geometry, calculus, number theory, and topology, each offering deep insights into the nature of mathematical relationships and principles.

On the other hand, the practical applications of mathematics illustrate how these abstract theories are used to address real-world challenges. Mathematics plays a crucial role in diverse domains such as engineering, physics, computer science, economics, and medicine. The applications range from designing structures and analyzing physical phenomena to optimizing resources and advancing technology.

A study on a fractional order mathematical model of deforestation and pollution due to Industrialization with Atangana-Baleanu-Caputo derivative

Nobin Daimary¹, Ranu Paul²

Department of Mathematics, Gauhati University, Guwahati-14, Assam, India

E-mail: nobindaimary1998@gmail.com, ranupaul1984@gauhati.ac.in

Abstract: In this manuscript, we study the fractional order model on the level of pollution and deforestation due to industrialization with the Atangana-Baleanu-Caputo (ABC) derivative. The positivity and boundedness of the solution of the model are studied. Using the fixed point theory, we prove the existence and uniqueness of a solution to the model system. The model system possesses two non-negative equilibrium points. We determine the threshold parameter R_0 . We find that the equilibrium point E_0 is locally asymptotically stable when $R_0 < 1$; the unique endemic equilibrium point exists and is locally asymptotically stable if $R_0 > 1$. The sensitivity analysis of the threshold number R_0 for different parameters is studied. Lagrangian polynomials are used to provide an approximation solution for the model. Further, to demonstrate the theoretical findings for various values of the fractional derivatives' order, numerical simulations are carried out.

Subject Classification Codes (MSC 2020): 34D20, 34A08.

Keywords: Atangana-Baleanu-Caputo derivative, stability, sensitivity analysis, industrialization.

Laplacian Spectrum and Wiener index: A joint investigation in Maximal graphs

Pallabi Bora^{1*} and Kukil Kalpa Rajkhowa² and Bikash Barman³

¹Department of Mathematics, Cotton University, Guwahati, Assam, India.

²Assistant Professor, Cotton University, Guwahati, Assam, India.

³Assistant Professor, Assam Engineering College, Guwahati, Assam, India.

E-mail: *borapallabi47@gmail.com

Abstract: This paper investigates the maximal graph constructed over the ring of integers modulo n , Z_n . We characterize the graph's connectedness and spectral properties by representing it as a G-generalized join graph. Furthermore, we explore the relationship between the Wiener index and Laplacian spectrum of the graph, revealing insights into its structural and spectral characteristics.

Keywords: Maximal graph, Laplacian spectrum, Wiener index, G-generalized join graph.

2010 Mathematics Subject Classification: 05C50, 05C25, 05C75.

Analysis of Star γ Covers in the Context of Weighted Statistical Density

Parthiba Das¹, Prasenjit Bal^{2,*}

Department of Mathematics, ICFAI University Tripura,

Kamalghat, West Tripura, INDIA-799210

Abstract: In this work, we develop a version of the statistical γ cover of a topological space by utilizing the concept of the star operator and the class of weight function defined on the set \mathbb{N} of all natural numbers. In this variant, the chosen weight function heavily determines the rate of statistical convergence. A number of γ cover variants have been linked to one another, and numerous counter examples have been provided to help in their differentiation. We examine the properties of weighted statistical γ covers under different topological processes and topological sub-spaces. An open challenge is presented along with the concept of a sg -St-dense subset to address the possibility that a sg -dense subset of a sg -St- γ cover might not be an sg -St- γ cover.

Keywords: Weighted density, weight functions, γ -covers, sg - γ -covers, star operator.

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Characteristics of normal curves in Euclidean space

Pushpinder Badyal¹, Sandeep Sharma^{2,}.*

^{1,2}School of Mathematics, Shri Mata Vaishno Devi University,

Katra-182320, Jammu and Kashmir, India

¹pushpinder4970@gmail.com, ²sandeep.greater123@gmail.com.

Abstract: This paper presents several characterizations of normal curves in both three- and four-dimensional Euclidean spaces, \mathbb{E}^3 and \mathbb{E}^4 , respectively. We begin by establishing a differential equation involving curvature and torsion that characterizes normal curves in \mathbb{E}^3 . We derive corollaries showing that normal curves with constant non-zero curvature are congruent to circles in the normal plane and a helix cannot be a normal curve. Additionally, we show that for a normal curve in \mathbb{E}^3 with a unit-speed, the distance function is constant, and the normal and binormal components satisfy specific relationships. Extending these results to \mathbb{E}^4 , we characterize normal curves using the curvatures k_1 , k_2 , and k_3 , deriving conditions under which these curvatures are constant and determining the relationships among the components of the curve.

Keywords: Serret-Frenet frame; normal curve; curvature; torsion

Application of Mathematics in different fields of Sciences

*Dr. Premtosh Majumder
Ex-President, Tripura Mathematical Society
Ex- Controller of Examinations, Tripura University*

**Smaller Relativistic effects of solitons in a cold Plasmas
with electron Inertia**

Rafia Khanam

Department of Mathematics, Gauhati University, Guwahati-781014, Assam, India.

Abstract: The ion-acoustic solitary waves (IASWs) traversing in multicomponent plasmas with smaller order relativistic effects in positive and negative ions together with inertial electron under pressure variation have been theoretically studied. The basic set of normalized fluid equations are reduced to the Korteweg-de Vries (KdV) equation by using reductive perturbation method. The characteristic role of physical plasma parameters such as negative to positive ion mass ratio (Q'), number density ratio (α) and ion relativistic factor $\left(v_{i0}/c\right)$ etc. on the propagating ionacoustic solitons are numerically examined. In this investigation both compressive and rarefactive solitons are found to exist only fast ion-acoustic modes due to variation of Q' . Moreover, the amplitude of soliton reduces as $\left(v_{i0}/c\right)$ increases. The soliton's amplitude is also raised by the variation of α .

Keywords: Solitary waves, KdV equation, Solitons, Relativistic plasma, Negative ions.

Impact of Yogachara on Communicable Disease Dynamics: SIQS Model Analysis at Saturated Incident Rate

Raghu Bir Bhatta
Associate Professor of Mathematics
Aishwarya Multiple Campus, DhangadhiKailali
PhD Scholar Nepal Sanskrit University
bhattaraghu2029@gmail.com

Abstract : Communicable diseases are major health problems and affect the whole economy of the nation. So it should become the prime agenda of developed and developing countries to prevent them. It seems necessary to educate people about disease transmission dynamics and to develop a new prevention strategy. This paper investigates the effects of Yogachara(prevention strategy) with quarantine at a saturated incident rate. Yogachara (Ahar, Vihar, achar and Vichar) provides public health information as well as maintains the physical fitness of practitioners improves the whole metabolic system of the human body and helps to achieve physical, mental, social and spiritual well-being of the practitioners.and make them aware of the disease. Mathematical epidemiology describes all the possible risk factors of communicable diseases, treatment modalities, human health policies and new opportunities for the planning, prevention and treatment of the diseases. Motivated by the Eastern philosophy of Yoga an SIQS mathematical model has been developed with Yogacharawhich contains three governing ordinary differential equations that describe disease transmission dynamics.Mathematical techniques have been used to analyzethese ODEs. Next next-generation matrix method has been used to calculate the reproduction number. Sensitivity analysis of parameters has indicated that reproduction number decreases with increased preventive measures like Yogachara. Local and global stability analysis at disease-free and endemic equilibria are calculated. Our results highlight that the theory-based and data-based Yogachara effect terms have almost the same result. Numerical simulations suggest that Yogachara has a positive influence in preventing disease dynamics. It reduces susceptibility and infectivity.

Riemann Solitons admitting general connection in Sasakian manifolds

Raghujyoti Kundu

Department of Mathematics, Raiganj University of Uttar Dinajpur,
P.O.Box Raiganj, india.raghujyotiblg@gmail.com

Abstract: The object of the present paper is to study the Riemann solitons admitting general connection in Sasakian manifolds, which is induced with quarter symmetric metric connection, generalized Tanaka Webster connection, Schouten-Van Kampen connection and Zamkovoy connection. In this paper we consider Riemann soliton $(M^n, g, \phi, \xi, \eta)$ in Sasakian manifolds with respect to general connection.

Keywords : Riemann soliton, Quarter symmetric metric connection, Schouten-Van Kampen connection, generalized Tanaka Webster connection, Zamkovoy connection.

AMS(MSC 2010): 53C15, 53C25

A Study of Transformation of Gauss Hypergeometric Function and its Applications

¹ Resham Prasad Paudel & ²Narayan Prasad Pahari

¹Department of Mathematics, Tribhuvan University, Tri-Chandra Multiple Campus, Kathmandu, Nepal

²Central Department of Mathematics, Tribhuvan University, Kathmandu, Nepal
Email: ¹reshamprdpaudel@gmail.com, ²nppahari@gmail.com

Abstract: This paper presents a comprehensive study of the transformations of the Gauss hypergeometric function, a branch of a fundamental special function. Besides these, we explore some classical and modern transformation formulas, including linear and quadratic transformations, and their results. The presentation highlights how these transformations simplify complex expressions and extend the applicability of the Gauss hypergeometric function across different domains and are useful in both theoretical and applied mathematics.

Keywords: Hypergeometric Function, Gamma function, Linear Transformations, Quadratic Transformations, Differential Equation.

Dynamical Model to Analyze the Post-Traumatic Stress Disorder: A Neuroscientific Approach

R.Tasnia¹, S. Mondal², M.H.A. Biswas³,

^{1,2,3}Mathematics Discipline, Khulna University, Khulna.

Email: rifahbeng@gmail.com¹; shantunu181214@gmail.com²; mhabiswas@yahoo.com³

Abstract: The human brain is wired in a very delicate way. The most sophisticated machine on earth is the human brain. Though it is high in functionality, often faces troubles when it goes through traumatic events. The human brain is incapable of understanding the difference between reality and imaginative stimuli. It perceives both as the same. The difficulty arises when a person who has gone through events of trauma and stress in life starts having an impact on the neurological circuits of the brain. In our research, we have formulated a model to describe how traumatic events intervene the brain's neurological pathways. Our work mainly focuses on the logical-mathematical formulation with a dynamical system. We have used a set of non-linear differential equations to describe how the outer world's stimuli of traumatic events make an impact in our neuron and how the neurological disorder is formed after a big incident in life. Mathematical psychology and computational cognitive modeling have been a great tool for discovering the ways how human learn, think, and recreate. However, to unveil the neuroscience of post-traumatic stress mathematical modeling is applied in our study. This study will contribute to the development of mental health problems, and neurological dysfunctions.

Keywords: Mathematical psychology, Mathematical modeling, Computational neuroscience, Dynamic neural circuit, Post-traumatic stress disorder.

Extremum Mass for an Anisotropic Neutron Star Embedded in Chaplygin Gas Filled d-Dimensional Cosmos : Tally with a Gravitational Wave Data

Ritabrata Biswas

Department of Mathematics, The University of Burdwan

Golapbag Academic Complex, Burdwan-713104

biswas.ritabrata@gmail.com

Abstract: A main sequence star holds itself by the hydrodynamic balance sourced out of the energy generated by its nuclear fusion and gravitational inward pull. As the star burns out all of its available fuel, collapse is initiated and second phase ignition is started through helium flash. In this phase, in spite of hydrogen, helium is burned to form heavier elements. Such a way, an onion-like layer by layer of heavy to heavier elements are constructed and as the innermost core is formed of iron, the ignition process stops. Collapse is restarted and the heat generated causes neutrino floods due to proton electron capturing. A core of neutrons are formed and the neutrino flood causes a supernova. The remnant object is mathematically able to hold itself if its mass is around 1.44 solar mass. If the mass exceeds 5.5 solar masses, black hole is formed. The range in between is called the mass gap. Here we expect either a heavily massive neutron star or light weight black holes. LIGO scientific collaboration has received a signal named GW230529 in May, 2023. This phenomenon is caused by two bodies of masses 1.2 to 2 solar masses and 2.5 to 4.5 solar masses respectively. We have modelled a d-dimensional space and an anisotropic neutron star embedded there. Modified Chaplygin gas is chosen as the background exotic fluid. The system is found to be stable by its different pressure, gravitational force etc. Mass of such an anisotropic object is found to accumulate mass almost equal to 5.2 solar mass. It is concluded that theoretically also such a huge neutron star may exist.

Keywords: Neutron star, gravitational wave, mass gap, Chaplygin gas, Anisotropic universe

An Assessment of Rainfall variation of Jorhat region, Assam (India)

Dr. Rubul Bora

HOD, Department of Mathematics, C N B College, Bokakhat, Assam

E-mail: rubulboracnbc@gmail.com

Abstract: In this study, daily rainfall variation has been carried out by using 2-State Markov Chain model. For this purpose daily rainfall data for 19 years of Jorhat station are collected from the Indian Meteorological department (IMD), Guwahati. The expected dry and wet spells together with their length are calculated. The Conditional, Unconditional Probabilities, Observed and Expected frequencies of wet and dry spells for Pre-monsoon and Monsoon seasons are discussed. A dry day is likely after 2 to 3 consecutive wet days, while a wet day is likely after 2 to 3 consecutive dry days for this region. The weather cycle for this time period is forecast to last 4 to 6 days. The expected wet and dry days for the Pre-monsoon seasons are 28 to 56 days and 36 to 64 days respectively. And for the Monsoon seasons, these values are 2 to 26 days and 66 to 90 days respectively.

Algebra of Bi-Complex Numbers

Ruhit Bardhan¹, Paras D. Uchat²

¹Student, ²Assistant Professor, Centre of Education, Department of Mathematics, Indian Institute of Teacher Education, Gandhinagar-382016, Gujarat, INDIA

E-mail : ¹rbardhan.tripurauniv@gmail.com, ²parasu@iite.ac.in

Abstract: In this article we will study different theories of bi-complex numbers associated with algebra, we will study how all non-zero bi-complex polynomials have at least one solution (root). It also shows that these polynomials can be broken down into smaller parts (factors) and that the number of solutions equals the degree of the polynomial.

Keywords: algebraic structures, bi-complex number, , fundamental theorem of algebra

Cognito – Mathematical Signatures In Managerial ‘Decision’ Path

¹Prof. Dr. S. Sandhya, ² Col. Prof. Dr. J. Satpathy

¹Professor and Research Head, NITTE School of Business, India, ²Director Research, Neurointegral Scientific Institute, Bogotá, Colombia

Abstract: Making cogent - tactical decisions is a complex mathematical action. Hominids share designed structural sphere and project stimulus on decision processes. Neuroscience, along with cognito - mathematical, has made tremendous advances in recent decades, bringing unprecedented insights into human brain and nature. Fissures amongst judiciousness - based scrutiny adopt proxies and anthropological comportment in shepherding behavioural exploration on decision making. Managers (‘actors’) contract high uncertainty, ambiguity, time pressure and emotional stress. Cognito - mathematical investigates decision making by using cognito - tactical monikers (CTM) to investigate how brain behaves in circuit of higher cognitive functions. This has transitioned from mapping confined effects to evolving extrapolative models that assimilate data scattered across brain structures. Business actor’s decision dynamics has extended from behaviourist approach to cognitive that focuses on processes prior to response. ‘Deciding to Decide’, ‘Preferring to Prefer’, ‘Deciding to Prefer’ and ‘Preferring to Decide’ are four ‘bordered boundaries’ where business actor has to arrive at an optimal decision.

This paper attempts to analyze new modes of behavioural thinking in neuroscientific philosophy of biology experiments, in both technical and philosophical ways, aiming a broader understanding of relevance, scope and limitations of managerial decision making experiments. In this paper, CTM techniques explain neural basis of philosophy of biology in decision making; experiments with a unique but uncertain answer and experiments in which no unique external cued answer could be considered correct. Both protocols address philosophy of biology in managerial decision scholarship. This meta-analytical paper derives inspiration to investigate, develop and contribute by conveying research questions in philosophy of biology and applications into perspective of complexity in decision making. Objective is to screen theoretic contexts and empirical methods philosophy of biology in behavioural models for understanding heterogeneity of decision circuit. Methodology includes a hybrid modeling attempt with an empirical part, questionnaire was circulated amongst business actors. Data collection was via single - phase process. For clinical tests, one (01) volunteer respondent (single - subject) was chosen. Purpose is to assess that eye movements have stimulus on business actor’s choice. Focus is on comparing observations by eyes to replicate philosophy of biology in research. Results with reference to managerial relevance and implications of the decision

demonstrate indications for spontaneous counterfactual replication in province of high - level reasoning. Major sound and justified finding is that tactical - oriented business actor attempts to decide, create options, address potential responses to decision circuit problems and evaluates métiers and faintness of a prospective circuit action using CTM medium. Paper discusses add new findings, insights and knowledge to the body of literature possible future directions to internally guided philosophy of biology indecision study.

Key Words: Decision Circuit, CTM, Actor's Choice and Cognito - Monikers Movements.

On a generalization of the nil-symmetric property of rings

Sagar Pal¹ and Krishnendu Das²
Department of Mathematics, Women's College, Agartala
E-mail: ¹spal71441@gmail.com, ²krishnendu82@gmail.com

Abstract: Nil-symmetric rings were introduced by Chakraborty and Das in 2014 and in 2023 Datta and Buhphang introduced weakly nil-semicommutative rings. Motivated by these developments we introduce weakly nil-symmetric rings which are a generalization of nil-symmetric rings and contained in weakly nil-semicommutative rings. A ring R is called right (left) weakly nil-symmetric if for a, b in $\text{nil}(R)$ and c in R , $abc = 0$ ($cab=0$) implies acb in $\text{nil}(R)$. R is weakly nil-symmetric if it is both right and left weakly nil-symmetric. Clearly a right nil-symmetric ring is right weakly nil-symmetric and a right weakly nil-symmetric ring is a weakly nil-semicommutative ring. In this article we explore the reverse implications, several properties of weakly nil-symmetric rings.

Geometric features of Rectifying Curve Under Isometry Using Darboux Frame in Euclidean 3-Space

Sandeep Sharma and Kuljeet Singh
School of Mathematics Shri Mata Vaishno Devi University,
Katra-182320, Jammu and Kashmir, India.
Email: sandeep.greater123@gmail.com

Abstract: This paper deals with the study of characterization of a rectifying curve in 3-dimensional Euclidean space, and investigate the conditions about the invariance of a rectifying curve on regular surfaces under isometric transformations by using the Darboux frame $\{T_1, P_1, U_1\}$. Moreover, we

investigate the extent to which the positional vector of this rectifying curve on regular surfaces, along the unit tangent vector T_1 , along the unit normal U_1 oriented perpendicular to the surface, and along P_1 (the cross product of U_1 and T_1) changes due to isometric transformations.

Keywords: Darboux frame, rectifying curves, isometry, geodesic, asymptotic curves.

Portfolio adjusting optimization with newly added stocks and transaction costs using uncertainty theory

Sanjoy Chhatri¹, Debasish Bhattacharya²

*Dept. of Mathematics,
NIT, Agartala, India, 799046
chhatrisanjoy54321@gmail.com*

Abstract: In response to changeful financial markets and investor's capital, this paper deals with a mean-semi absolute deviation-skewness model for portfolio selection, allowing adjustment of stocks and transaction costs, using uncertain theory. Here, the returns of the stocks are regarded as uncertain variables and are estimated by an experienced expert instead of historical data. A numerical example is presented to illustrate the effectiveness of our proposed model. The example given has been constructed by taking secondary data from the Bombay Stock Exchange (BSE), India.

A Survey of Topological Data Analysis in Aviation Industry

Saogari Basumatary
PhD Scholar, Central Institute of Technology, Kokrajhar.
Email: ph23math1002@cit.ac.in

Abstract: This paper aims to give an overview of topological techniques called Topological Data Analysis (TDA), to study underlying features and interaction in increasingly high dimensional aviation data sets. In this paper we will go through a technique called Persistent Homology (PH) from topological data analysis, which is applied to aviation data analytics. We will discuss the effectiveness of Persistent Homology technique in aviation data set, based on the articles available where TDA has been applied in the context of aviation industry. This work is meant to direct future

research efforts focusing on implementation of TDA in aviation industry for managing, discovering patterns and trends in aviation data to do proper aviation analysis for enhancing airport operation.

Lacunary Statistical Convergence Of Complex Uncertain Sequences Using Matrix Transformation

Samrati Gorka and Kuldip Raj

School of Mathematics, Shri Mata Vaishno Devi University, Katra-182320, J&K, India

Email: samratigorka@gmail.com, kuldipraj68@gmail.com

Abstract: In this paper, we introduce and analyze lacunary A-statistical convergence of complex uncertain sequences using Orlicz functions. We explore different aspects of uncertainty such as mean, measure, almost sure convergence, uniform almost sure convergence, and distribution. Additionally, we strive to provide examples that illustrate the relationships within the constructed sequence spaces.

Keywords: Uncertain sequence, lacunary sequence, orlicz function, regular matrix, statistical convergence and complex uncertain variable.

On Generalised Statistical Convergence of Sequences in Neutrosophic Normed Spaces

¹Santonu Debnath, ²Shyamal Debnath*

^{1,2} Department of Mathematics Tripura University (A Central University)

Email: ¹santonudebnath16@gmail.com ²shyamalnitamath@gmail.com

Abstract. The concept of sets has advanced over time. Classical set theory, developed by Cantor in the late 19th century was based on binary logic where an element either belongs to a set or does not. However, as the need to model more complex systems grew, it became clear that this binary approach was insufficient. This resulted in the development of fuzzy set theory by Zadeh in 1965, which gives the idea of membership. In fuzzy sets, each element has a degree of membership ranging between 0 and 1. Fuzzy set theory found applications in various fields such as artificial intelligence, control systems, decision-making, pattern recognition and more. Additionally, fuzzy set theory has been applied in areas such as image processing where it enables the representation and manipulation of fuzzy images with varying degrees of clarity.

Despite its progress, fuzzy set theory could not effectively handle scenarios with non-membership and conflicting information. This gap led to the creation of intuitionistic fuzzy sets by Atanassov in 1986, which refined the concept by including both a degree of membership and non-membership for each element. However, even intuitionistic fuzzy sets were limited in handling all aspects of indeterminacy found in real-world problems. To address these limitations, Smarandache in 1998 introduced neutrosophic sets. A neutrosophic set extends the idea of fuzzy and intuitionistic fuzzy sets by including three functions: truth (M), falsity (N) and indeterminacy (I). These functions are independent and take values between 0 and 1. Compared with all other logic like fuzzy logic, intuitionistic logic and Boolean logic, neutrosophic logic has been introduced a percentage of “indeterminacy” due to unexpected parameters hidden in some propositions.

In 2001 the idea of rough convergence was first introduced by Phu in finite-dimensional normed spaces. This idea of rough convergence has motivated many authors to use this concept not only in usual sense but also use in statistical convergence sense. In 2008, the idea of rough statistical convergence was introduced by Aytar. Recently Antal et al. introduced rough statistical convergence in intuitionistic fuzzy normed spaces.

In this article, using the concept of rough statistical convergence, we introduce the notion of rough statistical convergence in neutrosophic normed spaces. Further, we have established the relationship between the rough statistical cluster point and rough statistical limit set in neutrosophic normed spaces.

Keywords. Statistical convergence, rough statistical convergence, neutrosophic normed spaces.

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Generalization of Equivalence Relation

Sarat K. Parhi,

Former. Asst. Prof. Math.F.M, University, Balasore -756019

L. Das, Delhi Technological University, New Delhi-110042

Abstract : The "Relation" can be interpreted as the association or dissociation, interaction or interconnectedness of elements of two sets. In the mathematics various form of relation are available. Most commonly used relation are "Pre-order ", "Order relation ", "Partial order relation ", "Strict ordering relation", "Binary relation ", "n-ary relation", "Fuzzy set and Rough Set relation", "Equivalence relation" etc. The form of any relation is special type of set that connects some other sets in a proper way. In this paper I want to discuss certain type of relation partial equivalence relation. This relation is said to be partial reflexive, partial symmetric and partial transitive is called partial equivalence relation.

Key words: partial reflexive, partial symmetric, partial transitive.

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A Mathematical Model Unraveling the Impact of Plastic Pollution on Marine Ecosystems and Global Warming

*Shantunu Mondal^{*1}, Rifah Tasnia² and Md. Haider Ali Biswas³*

*^{1,2}M.Sc. Student, ³Professor, Khulna University, Bangladesh,
E-mail: shantunu181214@gmail.com¹, rifahtasnia191214@gmail.com²,
mhabiswas@yahoo.com³*

Abstract: Atmospheric carbon dioxide (CO₂) concentrations have increased from around 280 parts per million (ppm) in pre-industrial times to over 400 ppm due to the combustion of fossil fuels and deforestation. Rising CO₂ levels may promote plant growth and production, but they also harm ecosystems by changing the relationships and species composition. Seawater's pH is lowered as a result of high concentration of carbon dioxide, which is harmful to marine ecosystems. Marine ecosystems, particularly phytoplankton, play a crucial role in carbon cycling and sequestration. Plastic debris hinders phytoplankton growth and health, reducing their ability to absorb carbon dioxide from the atmosphere and thus exacerbating climate change. This study presents a mathematical model that explores the intricate relationships between plastic pollution, marine ecosystems, and global warming. The findings underscore the urgent need for comprehensive strategies to mitigate plastic waste and protect marine environments, ultimately contributing to global climate resilience.

Keywords: Global climate; Marine ecosystem; Mathematical model; Plastic pollution;

Dynamics of a prey – predator model with cannibalism in both of prey and predator

Shekhar Das

Department of Mathematics, Maharaja Bir Bikram University, Agartala, Tripura

Email Id: shekhar2018agt@gmail.com

Abstract: Cannibalism, also known as intraspecific predation, is a significant and widely observed phenomenon in various animal species ranging from protozoa to mammals. Numerous researches suggest that cannibalism can significantly alter the dynamics of the interacting species, especially the prey-predator systems. Most of the research found so far emphasize on predator cannibalism where adult predators predate on juvenile ones. However, in nature there are also evidence of cannibalism in prey population. In this study we consider a prey-predator system where both of prey and predator practices cannibalism. We have proposed and analyzed a simple three dimensional model with the help of nonlinear ordinary differential equations. Predator population has been divided age structurally in two groups, namely adult and juvenile. The existence and stability conditions of the equilibrium points have been determined analytically and numerically. The obtained results are significant in understanding the impact of cannibalism on prey – predator systems as well as on the survival of the interacting species.

Keywords: Prey-predator system, age-structure, cannibalism, mathematical model, stability analysis, bifurcation.

γ -Chiral is same as Chiral

Shrinit Singh

Department of Mathematics, Shiv Nadar University, Dadri, Greater Noida. Uttar Pradesh

E-mail – ss101@snu.edu.in

Abstract: A word w in a free group is called chiral if there exists a group G such that image of word map corresponding to word w is not closed with respect to inverse. Similarly a group G is said to be chiral if there exists a word w in free group such that w exhibits chirality on the group G . Gordeev et al. extended the concept of chirality to introduce γ -chirality in both cases. We show that the notion of γ -chirality is equivalent to chirality.

Key Words: Word Maps, Free Group, Chiral Word

Mathematical Modeling For Climate Change Mitigation: Harnessing Tidal And Wave Energy As Alternatives To Fossil Fuels

*Sonali Tarafder*¹, Farzana Ahmed Ritu², Bristy Alam Nupur³, Sabrina Sultana Toma⁴,
Shahrin Tamanna Rimmi⁵ and Md. Haider Ali Biswas⁶*

^{1,2,3,4,5} B.Sc. Student, ⁶Professor, Mathematics Discipline, Khulna University, Bangladesh, e-mail:

, Mathematics Discipline, Khulna University, Bangladesh, e-mail:

*E-mail: 201217@ku.ac.bd¹, 201255@ku.ac.bd², 201230@ku.ac.bd³, 201205@ku.ac.bd⁴,
201229@ku.ac.bd⁵,
mhabiswas@yahoo.com⁶*

Abstract: At present, climate change is a burning issue which is changed with the rising of atmospheric temperature as well as emissions of greenhouse gases (GHGs) in the environment. A developing country like Bangladesh where economy is gradually raising upwards needs huge supply of power. Now-a-days consumption of fossil fuel is the main source of power generation. But amount of fossil fuel is very limited. In this time renewable energy sources can be the alternatives. Besides, burning of fossil fuels is associated to climate change effects such as rising of atmospheric temperature, emission of greenhouse gases. Due to steadiness of nature and predictable characteristics, tidal energy and wave energy are potential forms of renewable energy. Both have a great deal of potential for producing energy. This study analyzes the advantages of using tidal energy and wave energy instead of fossil fuel. This work develops a dynamic behavior of a five compartmental nonlinear model to illustrate adverse effects of climate change as temperature rising and GHGs' due to fossil fuel consumption. Our main target is to work on the factors contributing to a potential reduction in atmospheric temperature. The analysis has identified several equilibrium points. By thoroughly investigating the equilibrium points and their stability, the analysis has yielded valuable insights into the dynamics and behavior of the model. The identification of the equilibrium points is crucial for understanding the long-term behavior of the system. After investigating the proposed model analytically and numerically, the numerical simulations have been performed.

Keywords: Mathematical Modeling, GHG emission, Fossil fuel, Tidal energy, Wave energy.

On The Identification and Flow Topology of Taylor-Görtler-Like Vortices in The Lid-Driven Cavity Flow

Sougata Biswas and Rathindra Nath Basak

*Department of Mathematics, Siksha-Bhavana, Visva-Bharati (A Central University),
Santiniketan-731235*

E-mail: sougata.biswas@visva-bharati.ac.in

Abstract: A closer look into the existing literature reveals numerous researchers merely mentioning the existence of Taylor-Görtler-Like (TGL) vortices at moderate Reynolds number in the three-dimensional (3D) lid-driven cavity flow. To identify the exact location and find out the reason behind the formation of TGL vortices have not been rigorously studied to date in the literature. ‘Energy Gradient Theory’ has been developed in recent years for a better understanding of the flow instability and transition from laminar to turbulence in the fluid flow. In the current study, we first reconstruct the energy gradient theory to establish a relation between the point of inflection and TGL vortices in the rectangular cavity flow and identify the exact location from where the TGL vortices start to be formed. Further, we attempt to explore the dynamics of TGL vortices with a rigorous topological approach. Our aim is to gain some physical insight into the vortical flow using a theoretically rigorous topological theory. We notice that node and saddle points occur in an alternate fashion and separation/attachment line is formed along the span-wise direction of the cavity which ensures the presence of TGL vortices along the span of the cavity. The presence of U-shaped and mushroom-shaped vortices is also observed through the visualization of iso-surfaces.

Keywords: Taylor-Görtler-Like vortices; lid-driven cavity; energy-gradient theory; topological fluid dynamics; U-shaped vortices; mushroom-shaped vortices.

**Co-infection dynamics between HIV-HTLV-I disease with the effects of
Cytotoxic T-lymphocytes, saturated incidence rate and
study of optimal control**

Sourav Chowdhury

Research Scholar, Dept. of Applied Mathematics, University of Calcutta

souravformanu@gmail.com

Abstract: The spreading of HIV or HTLV-I among the cells has received the great attention in recent modelling study to explore the virus infection dynamics. The co-infection of HIV and HTLV-I with the effect of Cytotoxic T-lymphocytes (CTLs) immune response is also important from epidemiological point of view. To identify the co-infection scenario of HIV and HTLV-I with the CTLs effect we proposed in this paper a six compartmental ODE-model with uninfected, HIV infected, HTLV-I infected CD4+ T-cells and free HIV virus particles with HIV specific CTLs and HTLV-I specific CTLs. The rates of infection of the cases are considered here saturated type and proliferation rate of uninfected and HIV infected CD4+ T-cells are of logistic terms. To establish the well-posedness of the model we have shown that the solution of the proposed model is non-negative and bounded. We obtain the basic reproduction number which is the maximum of the HIV-related reproduction and the HTLV-I related reproduction number. Along with the disease free equilibrium point the system contains other seven endemic equilibrium points containing infection by single disease or both. Analytically, we establish the local and global stability conditions of the equilibrium points and also we establish that the system experiences transcritical bifurcation by the generation of only HIV or HTLV-I infected endemic equilibrium point. Using numerical simulations, we validate the theoretical results and found two infection paths, one initiating with HIV and other with HTLV-I, both cases ultimately become co-infected.

Finally, using the optimal control analysis we found the optimal policy for treatment using AVR, RTI & PI for HIV or AZT for HTLV-I control and lastly concluded by some recommendations.

Value Sharing between Entire and Meromorphic Functions and their Derivatives: A Comprehensive Study

Sourav Kar

*Department of Mathematics, Alipurduar University (Erstwhile Alipurduar College),
Alipurduar- 736122, West Bengal, India, E-mail: drskar1981@gmail.com*

Abstract: In this paper, we examine the findings related to entire and meromorphic functions that share values with their derivatives, as developed by various researchers over time. Additionally, we aim to shed light on the potential directions for future research in this area.

2020 Mathematics Subject Classification: 30D30, 30D35

Keywords and Phrases: Entire function, Meromorphic function, Sharing, Derivatives, Uniqueness

Further Growth Properties of Special Type Of Differential Polynomial on The Basis of Central Index in The Light of (α, β, γ) - Order.

Sudipta Kumar Pal

*Department of Mathematics, Jangipur College, P.O. Jangipur, Dist.
Murshidabad, Pin-742213, West Bengal, India .Email :palsudipto2017@gamil.com*

Abstract: In this paper, the author study the comparative growth properties of composite entire functions and a special type of differential polynomial generated by one of the factor of composite entire function on the basis of central index in terms of (α, β, γ) -order.

Keywords and Phrases : Entire function, differential polynomial, central index, (α, β, γ) -order, (α, β, γ) -lower order.

AMS Subject Classification (2020) : 30D35, 30D20.

Difference Almost Convergent Double Sequences of Bi-complex Numbers

Sujeet Kumar¹ and Subhajit Bera^{2*}

^{1,2}Department of Mathematics, Tripura University, Agartala799022, India

¹sksujeetjai@gmail.com, ²berasubhajit0@gmail.com

*Corresponding author. (Subhajit Bera, E-mail: berasubhajit0@gmail.com)

Abstract: In this paper, we have introduced the notion of difference almost convergent, difference almost null, difference strongly almost convergent, and difference strongly almost null double sequences of bi-complex numbers. We have discussed some relations between almost convergent double sequences of bi-complex numbers and difference almost convergent double sequences of bi-complex numbers.

Keywords: double sequences, almost convergence, difference sequences, bi-complex numbers.

AMS Subject Classification No: 46A45, 46B45, 30G35, 40A05, 40C05.

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Thick Accretion Disc around Black Holes : Brief Study of Properties

Sukanya Dutta

Department of Mathematics, The University of Burdwan
Golapbag Academic Complex, Burdwan-713104
&
Vidyasagar Mahavidyalaya, Suchia, Mosat-712701, Hoogly
sduttasukanya@gmail.com

Abstract: Accretion disc is formed when angular momentum transport is observed in the interstellar fluid present around a massive star, neutron star or a black hole. Active galactic nuclei, Quasars, pulsars are the examples of such high energy physics phenomena. Different parameters like radial inward speed, angular speed, vertical speed and height, components of magnetic field produced in such an accretion discs, fluid density and pressure etc are the identification properties of an accretion disc. To govern these parameters, components of Navier Stokes equation, equation of continuity, Gauss divergence for magnetic field, second law of thermodynamics etc are used. Keplerian or other nature of the disc are followed. Stability of the disc are analysed.

Keywords: Navier Stokes equation, Quasars, pulsars, Black Holes

Selection Principles in The Context of Star - γ Covers

Tanmayee Datta ¹, Prasenjit Bal*²

^{1,2}Department of Mathematics, ICFAI University Tripura, Kamalghat, INDIA-799210

Abstract: The idea of st- γ covers is established by applying the star operator on γ covers. Various counterexamples have been demonstrated to discriminate between the numerous contemporary versions of γ covers, as well as the relationships among them. The fundamental topological characteristics of these covers have been studied. Regarding the class of st- γ coverings, we have also investigated the connections between topological games and different selection principles.

Keywords: selection principles, γ -covers, topological games, star operator.

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Some Properties of Ideal Convergent Sequence Spaces of Bi-Complex Numbers

Tapasi Deb¹ and Binod Chandra Tripathy²
Department of Mathematics, Tripura University (A Central University)
Suryamaningar, Agartala-799022, Tripura, INDIA,

E-mail : ¹tapasideb.dnr@gmail.com , mathephas@gmail.com and
²tripathybc@gmail.com , binodtripathy@tripurauniv.ac.in .

Abstract: In this article, we study the properties of ideal convergence of a sequence of bi-complex numbers. We shall discuss some of the basics of Bi-complex numbers. We have introduced and explored the classes of sequences $I_c^{\mathbb{BC}}$, $I_\theta^{\mathbb{BC}}$, $I_{Ca}^{\mathbb{BC}}$, $I_\infty^{\mathbb{BC}}$, and $I_p^{\mathbb{BC}}$, of I -convergent, I -null, I -Cauchy, I -bounded, I - p summable sequences of bi-complex numbers and studied their properties. Throughout the article, we use the notation \mathbb{BC} as the set of bi-complex numbers with respect to the imaginary units i_1 and i_2 and $w(\mathbb{BC})$, as the class of all sequences of bi-complex numbers.

Key Words: Ideal, Bi-complex number, I-Convergence, Metric space.

AMS Subject Classification Number: 40A05, 40A35, 40G15, 46A45

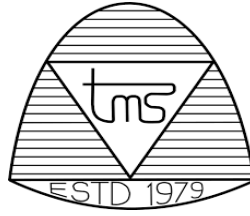
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Programme Schedule



**International Conference on
“Theory and Applications of Mathematics”
(ICTAM – 2024)**

(Hybrid Mode; September 28-29, 2024)

Organized by

Tripura Mathematical Society, Agartala, Tripura

Programme Schedule

Day – 1: 28.09.2024 (Saturday)

(Academia, BBM College)

Programme	Time (Indian Standard Time)
Registration (Offline)	10 am – 11 am
Formation of Dias	11 am
Inauguration of the Conference by watering a plant	11.05 am
Welcome Address by Dr. Jaydip Bhattacharya , Convever, ICTAM-2024	11.06 am – 11.10 am
Address by Prof. R.N. Bhaumik , General Chair ICTAM-2024	11.10-11.20 am
Address by Dr. Ratan Deb , Guest of Honour, ICTAM-2024	11.20 am – 11.30am
Address by Prof. Ajay Krishna Saha , Chief Guest, ICTAM-2024	11.30 am – 11.45 am
Presidential Address by Prof. Debasish Bhattacharya , Conference Chair, ICTAM-2024	11.45 am – 11.55 am
Vote of Thanks by Prof. B. C. Tripathy , Organizing Secretary, ICTAM-2024	11.55 am – 12 noon
Tea Break 12.00 pm – 12.15 pm (IST)	
Key Note Address (12.15 pm – 1.00 pm) (IST) Chairperson: Prof Anjan Mukherjee	
Speaker: Prof. R.N. Bhaumik Patron, Founder Member, TMS	Topic: How to beat Mathematics anxiety
Invited Talk (1.00 pm – 1.30 pm) (IST) Chairperson: Prof. Anjan Mukherjee	
Speaker: Prof. Naim L. Braha The University of Prishtina, Kosove	Topic: Some sequence spaces and their geometric properties

Lunch Break
1.30 pm – 2.30 pm (IST)

Invited Talk (2.30 pm – 3.00 pm) (IST) Chairperson: Prof. B. C. Tripathy	
Speaker: Prof. Ram. N. Mohapatra University of Central Florida Orlando, USA	Topic: Augmented Lagrangian Methods for Optimal Control Problems Governed by Mixed Variational-Hemivariational Inequalities Involving a Set- Valued Mapping

Parallel Technical Session : 1.1-A

Online Presentation (3.00 pm – 4.20 pm) (IST)

Chairperson: Prof. Debasish Bhattacharya

Sl. No.	Name	Title of the Paper	Time (IST)
1.	Raghujiyoti Kundu, <i>Department of Mathematics, Raiganj University of Uttar Dinajpur</i>	Riemann solitons admitting general connection in Sasakian manifolds	3.00 pm
2.	Sourav Chowdhury, <i>Department of Applied Mathematics, University of Calcutta</i>	Co-infection dynamics between HIV-HTLV-I disease with the effects of Cytotoxic T-lymphocytes, saturated incidence rate and study of optimal control	3.10 pm
3.	Ritabrata Biswas, <i>Department of Mathematics, The University of Burdwan</i>	Extremum Mass for an Anisotropic Neutron Star Embedded in Chaplygin Gas Filled d-Dimensional Cosmos : Tally with a Gravitational Wave Data	3.20 pm
4.	Madhav Prasad Poudel, Narayan Prasad Pahari, Vijay Yadav, & Arjun K. Rathie <i>School of Engineering, Pokhara University, Nepal</i>	A Note on a New And General Summation Formula For The Generalized Hypergeometric Series ${}_4F_3$	3.30 pm
5.	Muktarul Rahman and Satyendra Nath Barman <i>Department of Mathematics, Gauhati University, Assam.</i>	Nonlinear Propagation of Dust Ion Acoustic Solitary Waves in Magnetized Negative Ion Plasma with Electron Inertia and Stationary Charged Dust Grains	3.40 pm
6.	Sukanya Dutta, <i>Department of Mathematics, The University of Burdwan</i>	Thick Accretion Disc around Black Holes : Brief Study of Properties	3.50 pm
7.	Raghu Bir Bhatta <i>Department of Mathematics, Nepal Sanskrit University</i>	Impact of Yogachara on Communicable Disease Dynamics: SIQS Model Analysis at Saturated Incident Rate	4.00 pm
8.	Dr. Rubul Bora <i>Dept. of Mathematics, CNB College, Assam</i>	An Assessment of Rainfall variation of Jorhat region, Assam (India)	4.10 pm

Parallel Technical Session: 1.1-B
Offline Presentation (3.00 pm – 4.20 pm) (IST)

Academia

Chairperson: Dr. Premtosh Majumder

Sl. No.	Name	Title of the Paper	Time (IST)
9.	Mrs. Nilima Chakraborty, <i>Vice President, TMS</i>	Theory and Applications of Mathematics	3.00 pm
10.	Jaydip Bhattacharya, <i>Department of Mathematics, Bir Bikram Memorial College</i>	Concerning on some operators on intuitionistic fuzzy sets	3.10 pm
11.	Sanjoy Chhattri & Debasish Bhattacharya <i>Dept. of Mathematics, NIT, Agartala</i>	Portfolio adjusting optimization with newly added stocks and transaction costs using uncertainty theory	3.20 pm
12.	J. Hossain & S. Debnath <i>Department of Mathematics, TU</i>	Further results on I and I*- convergence of sequences of bi- complex numbers	3.30 pm
13.	Korbi Debbarma <i>Department of Mathematics, NIT, Agartala</i>	An Interval Type 2 Fuzzy AHP-ARAS Approach in mHealth Applications for Type 2 Diabetes Mellitus Management	3.40 pm
14.	Sujeet Kumar & Subhajit Bera, <i>Department of Mathematics, TU</i>	Difference Almost Convergent Double Sequences of Bi-complex Numbers	3.50 pm
15.	Parthiba Das & Prasenjit Bal, <i>Department of Mathematics, ICFAI</i>	Analysis of Star γ covers in the Context of Weighted Statistical density	4.00 pm
16.	Arghyadip Debroy & Runu Dhar <i>Department of Mathematics, MBB University</i>	Rough statistical convergence of double sequences in neutrosophic normed spaces	4.10 pm

Technical Session : 1.2-C

Online Presentation (4.20 pm – 5.40 pm) (IST)

Chairperson: Prof. B. C. Tripathy

Sl. No.	Name	Title of the Paper	Time (IST)
17.	Arpan Bhattacharya, <i>Department of Mathematics, The University of Burdwan</i>	Thermal stability and Phase Transitions of Charged AdS Black Holes in the background of Dark Energy Candidates: Analysis of crucial Thermodynamic Parameters and Joule-Thomson Expansion	4.20 pm

18.	Gyan Prasad Paudel & Parbati Kumari Upadhyay, <i>Mid-West University, Nepal</i>	Fuzzy Arithmetic–Based Algorithm for Identifying Medical Conditions	4.30 pm
19.	Brojeswar Pal, <i>Department of Mathematics, The University of Burdwan</i>	Optimal pricing and greening decisions in a dual-channel competitive supply chain	4.40 pm
20.	Pallabi Bora, Kukil Kalpa Rajkhowa & Bikash Barman <i>Guwahati, Assam</i>	Laplacian spectrum and Wiener index: A joint investigation in Maximal graphs	4.50 pm
21.	Ashis Biswas, <i>Department of Mathematics, Mathabhanga College, Coochbehar</i>	Conformal Ricci soliton in Sasakian manifolds admitting general connection	5.00 pm
22.	Dr. Bandita Das, <i>Guwahati College, Guwahati</i>	Influence of Thermal Radiation and Dufour Effect on Magnetohydrodynamic Flow Over a Stretching Sheet Embedded in a Porous Medium	5.10 pm
23.	Samrati Gorka & Kuldip Raj <i>Shri Mata Vaishno Devi University, Katra, J&K</i>	Lacunary statistical convergence of complex uncertain sequences using matrix transformation	5.20 pm
24.	Saogari Basumatary, <i>Central Institute of Technology, Kokrajhar</i>	A Survey of Topological Data Analysis in Aviation Industry	5.30 pm

Day -2 : 29.09.2024 (Sunday)

Invited Talk		
Chairperson: Prof. Md. Haider Ali Biswas		
Prof. (Dr.) Sanjib Kumar Datta, <i>Department of Mathematics, University of Kalyani, West Bengal</i>	Dynamics of Complex Valued Functions - A Revisit	10.00 am - 10.30 am (IST)
Prof. Anjan Mukherjee, <i>Delhi</i>	Various g-continuous functions in Generalized Interval Valued Neutrosophic topological spaces	10.30 am – 11.00 am (IST)
Prof. Ömer Kişi, <i>Department of Mathematics, Bartın University, Bartın, Turkey</i>	On Almost Statistical Convergence of Fuzzy Variable Sequences	11.00 am - 11.30 am (IST)

Tea Break
11.30 pm – 11.45 pm (IST)

Technical Session : 2.1-D**Online Presentation (11.45 am – 1.05 pm) (IST)**

Chairperson: Prof. Sanjib Kumar Datta

Sl. No.	Name	Title of the Paper	Time (IST)
25.	Sougata Biswas & Rathindra Nath Basak <i>Siksha-Bhavana, Visva-Bharati, Santiniketan</i>	On the identification and flow topology of Taylor-Görtler-Like vortices in the lid-driven cavity flow	11.45 am
26.	Resham Prasad Paudel & Narayan Prasad Pahari <i>Tribhuvan University, Kathmandu, Nepal</i>	A Study of Transformation of Gauss Hypergeometric Function and its Applications	11.55 am
27.	Prof. S. Sandhya & Prof. J. Satpathy NITTE School of Business, & Neurointegral Scientific Institute, Colombia	Cognito - mathematical signatures in managerial 'decision' path	12.05 am
28.	R.Tasnia, S. Mondal & M.H.A. Biswas, <i>Khulna University, Khulna.</i>	Dynamical Model to Analyze the Post-Traumatic Stress Disorder: A Neuroscientific Approach	12.15 am
29.	Ganesh Bahadur Basnet & Narayan Prasad Pahari <i>Tribhuvan University, Kathmandu, Nepal</i>	A Study of Double Integrals Involving Generalized Hypergeometric Functions and Their Applications	12.25 am
30.	Manab Biswas, <i>Kalimpong College, Kalimpong, West Bengal</i>	Growth of entire solutions of non-linear complex differential equation	12.35 pm
31.	Shantunu Mondal, Rifah Tasnia & Md. Haider Ali Biswas <i>Khulna University, Bangladesh</i>	A Mathematical Model Unraveling the Impact of Plastic Pollution on Marine Ecosystems and Global Warming	12.45 am
32.	Kuljeet Singh <i>SMVD University, Katra, J&K, India</i>	Darboux Normal Curves on Smooth Surfaces Under Conformal Transformations.	12.55 am

Technical Session : 2.1-E**Offline Presentation (11.45 am – 1.05 pm) (IST)**

Academia

Chairperson: Prof. Debasish Bhattacharya

Sl. No.	Name	Title of the Paper	Time (IST)
33.	Prof. Binod Chandra Tripathy, <i>Department of Mathematics, Tripura University</i>	Minimal Structures in Topological Spaces	11.45 am – 12.05 pm
34.	Dr. Premtosh Majumder, <i>Ex-President, TMS</i>	Application of Mathematics in different fields of Sciences	12.05 pm – 12.25 pm

35.	Naima Debbarma <i>Dept. of Mathematics NIT, Agartala</i>	A novel entropy based MCDM framework under Fermatean fuzzy environment	12.25 am
36.	Hamari Debbarma <i>Department of Mathematics, Tripura University</i>	On I-statistical convergent sequence spaces in gradual normed linear space	12.35 pm
37.	Tanmayee Datta & Prasenjit Bal, <i>ICFAI University, Tripura</i>	Selection principles in the context of star $-\gamma$ covers	12.45 pm
38.	Shekhar Das, <i>Dept. of Mathematics, MBB University</i>	Dynamics of a prey – predator model with cannibalism in both of prey and predator	12.55 pm

Lunch Break
1.05 pm – 2.00 pm (IST)

Invited Talk Chairperson: Prof. Anjan Mukherjee		
Ljubićsa D. R. Koćinac, <i>University of Niš, Serbia State University of Novi Pazar, Serbia</i>	New approaches to topological hyper structures	2.00 pm- 2.30 pm (IST)
Prof. Md. Haider Ali Biswas <i>Khulna University</i>	Optimal Control in Modeling for Sustainable Management of Natural Resources	2.30 pm – 3.00 pm (IST)

Online Technical Session : 2.2-F
Online Presentation (3.00 pm – 4.10 pm) (IST)
Chairperson: Prof. Anjan Mukherjee

Sl. No.	Name	Title of the Paper	Time (IST)
39.	Jagat Krishna Pokharel & Narayan Prasad Pahari, <i>Tribhuvan University, Nepal</i>	On Topological Structure of Total Paranormed Double λ Sequence Space $(\gamma_2((X, \ \cdot\), -, \mathbf{u}), G)$	3.00 pm
40.	Anindya Mandal, <i>Tehatta Sadananda Mahavidyalaya, Purba Bardhaman, West Bengal,</i>	A competitive closed-loop supply chain considering emission control strategies in presence of environmental awareness efforts	3.10 pm
41.	Sonali Tarafder, Farzana Ahmed Ritu, Bristy Alam Nupur, Sabrina Sultana Toma, Shahrin Tamanna Rimmi & Md. Haider Ali Biswas <i>Khulna University, Bangladesh</i>	Mathematical modeling for climate change mitigation: harnessing tidal and wave energy as alternatives to fossil fuels	3.20 pm

42.	Nobin Daimary & Ranu Paul <i>Dept. of Mathematics, Gauhati University, Assam</i>	A study on a fractional order mathematical model of deforestation and pollution due to Industrialization with Atangana-Baleanu-Caputo derivative	3.30 pm
43.	Sarat K. Parhi & L.Das, <i>Delhi Technological University, New Delhi</i>	Generalization of Equivalence Relation	3.40 pm
44.	Rafia Khanam, <i>Dept. of Mathematics, Gauhati University, Assam</i>	Smaller Relativistic effects of solitons in a cold Plasmas with electron Inertia	3.50 pm
45.	Bristy Alam Nupur, Farzana Ahmed Ritu, Sonali Tarafder, Sabrina Sultana Toma, Shahrin Tamanna Rimmi & Md. H. A Biswas <i>Khulna University, Bangladesh</i>	Modeling the environmental benefits of biomass energy over fossil fuels to mitigating climate change in urea manufacturing	4.00 pm

Technical Session : 2.2-G

Offline Presentation (3.00 pm – 4.10 pm) (IST)

Academia

Chairperson: Dr. Premtosh Majumder

Sl. No.	Name	Title of the Paper	Time (IST)
46.	Bibhajyoti Tamuli <i>Dept. of Mathematics, Tripura University</i>	Difference Lacunary Weak Convergence of Sequences Defined by Orlicz Function	3.00 pm
47.	Amaresh Debnath, Runu Dhar & Binod Chandra Tripathy, <i>MBB University</i>	Some Multi Sequence Spaces Related to the p -absolutely Summable Sequence	3.10 pm
48.	Santonu Debnath & Shyamal Debnath <i>Department of Mathematics, Tripura University</i>	On Generalised Statistical Convergence of Sequences in Neutrosophic Normed Spaces	3.20 pm
49.	Tapasi Deb & Binod Chandra Tripathy, <i>Department of Mathematics, Tripura University</i>	Some Properties of Ideal Convergent Sequence Spaces of Bi-Complex Numbers	3.30 pm
50.	Krishna Bhattacharjee, Rakhal Das & Binod Chandra Tripathy, <i>Dept. of Mathematics, The ICFAI University</i>	Bi-complex Valued Extended b-Metric Space and Contraction Principles	3.40 pm
51.	Sagar Pal & Krishnendu Das, <i>Women's College, Agartala</i>	On a generalization of the nil-symmetric property of rings	3.50 pm
52.	Deepraj Das & Runu Dhar, <i>Dept. of Mathematics, MBB University, Agartala</i>	Multiplication Operation of Neutrosophic Fuzzy Matrices	4.00 pm

Technical Session : 2.3-H
Online Presentation (4.10 pm – 5.10 pm) (IST)
Chairperson: Ljubiša D. R. Koćinac

Sl. No.	Name	Title of the Paper	Time (IST)
53.	Pushpinder Badyal & Sandeep Sharma, <i>Shri Mata Vaishno Devi University, Katra, J & K</i>	Characteristics of normal curves in Euclidean space	4.10 pm
54.	Shrinit Singh <i>Shiv Nadar University, Greater Noida. UP</i>	γ - Chiral is same as Chiral	4.20 pm
55.	Dr. Munmi Saikia <i>Department of Mathematics, Patharkandi College, Assam</i>	Developments and Applications of Neutrosophic Number Theory: A Review	4.30 pm
56.	Sandeep Sharma & Kuljeet Singh, <i>Shri Mata Vaishno Devi University, Katra, J&K</i>	Geometric features of Rectifying Curve Under Isometry Using Darboux Frame in Euclidean 3-Space	4.40 pm
57.	Sourav Kar, <i>Alipurduar University, West Bengal</i>	Value Sharing between Entire and Meromorphic Functions and their Derivatives: A Comprehensive Study	4.50 pm
58.	Ruhit Bardhan & Paras D. Uchat, <i>Indian Institute of Teacher Education, Gandhinagar, Gujarat</i>	Some Properties of Algebra and Sequence Spaces of Bi-Complex Numbers	5.00 pm

Valedictory Session

(5.10 pm – 6.00 pm) (IST)

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