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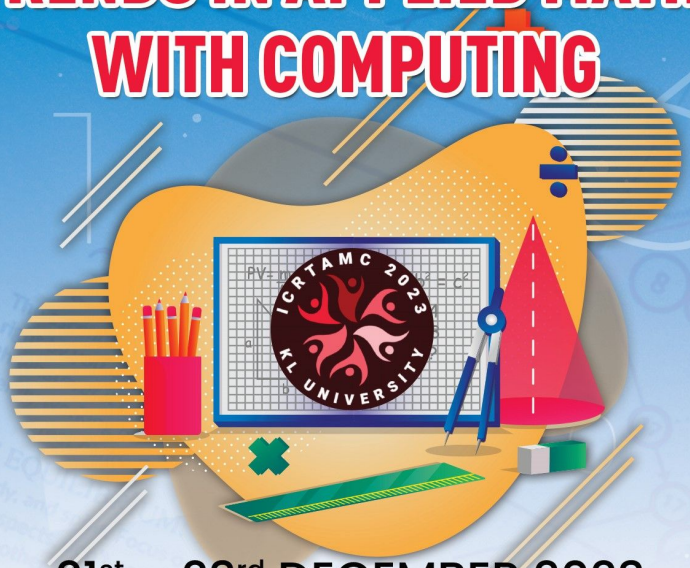
SERB Sponsored
3rd International Conference on
RECENT TRENDS IN APPLIED MATHEMATICS WITH COMPUTING



21st – 23rd DECEMBER 2023

PROCEEDINGS ICRTAMC-2023
BOOK OF ABSTRACTS

EDITORS:

Dr. B. V. APPA RAO

Dr. N. RAMESH BABU

Dr. IMRAN ALI

Organized by

Department of Mathematics

Koneru Lakshmaiah Education Foundation

Green Fields, Vaddeswaram, Guntur Dist., A.P., India. 522 302.

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PROCEEDINGS ICRTAMC-2023

BOOK OF ABSTRACTS

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3rd International Conference on

RECENT TRENDS IN APPLIED MATHEMATICS WITH COMPUTING

21-23, December 2023

CONVENOR

Dr. N. RAMESH BABU

CO-CONVENOR

Dr. IMRAN ALI

ORGANIZING SECRETARY

Dr. B. V. APPA RAO

PREFACE

Koneru Lakshmaiah Education Foundation, Vaddeswaram ,Guntur is organizing a multi-disciplinary international conference entitled **SERB Sponsored 3rd International Conference on RECENT TRENDS IN APPLIED MATHEMATICS WITH COMPUTING (ICRTAMC-2023)**, during 21-23, December 2023 has provided a global platform bringing Academia, Researchers, Engineers, Industry experts and Students together to share their knowledge, work and experiences both through the presentations from the conference and dissemination of high quality research publications in the areas of Mathematics and Science. This acts as an international forum for interactions with eminent speakers and renowned experts about the recent innovations, trends and concerns as well as practical challenges encountered and solutions adopted in the field of Mathematics and Science. We are earnestly thankful to our Management, Vice-Chansellor, Pro-VC's, Dean-RD, Director-FED, Coordinator-FED, Chair persons and members of various committees, International and National Advisory Committees for their wholehearted support and encouragement. We are also thankful for all the authors who have contributed their research works to the conference. We truly believe that the participants will find the discussions fruitful and will appreciate the opportunity for setting up future collaborations.

CONVENOR

ABOUT THE KONERU LAKSHMAIAH EDUCATION FOUNDATION

The KL College of Engineering was started in the academic year 1980-81 and achieved autonomous status in 2006. Koneru Lakshmaiah Education Foundation was conferred with Deemed to be University status in the year 2009, under Section 3 of the UGC Act 1956. The University underwent assessment by NAAC and was accredited for a period of five years from 2018 to 2023, with A++ grade and CGPA of 3.57 out of 4.0 scale. The University has been accredited with Category-1 status. KLEF has established an ecosystem to promote innovation, including a centre for Innovation, Incubation and Entrepreneurship Cell (IIEC), leading to start-ups in different disciplines. Through publishing research articles in various national and international refereed journals, particularly in Scopus/WoS/SCI Indexed journals, research has taken a quantum leap towards improving its quality, resulting in good h-index.

ABOUT THE DEPARTMENT OF MATHEMATICS

The Department of Mathematics was established in 1980. It has strong backup of 100% doctorate faculty. All the faculty are highly qualified, motivated and are specialized in various areas of Mathematics. The department focuses on Pure and Applied Mathematics catering to the professional needs of students of varied backgrounds. The department offers M.Sc. Program in Applied Mathematics, Computational Mathematics, and research programs in Ph.D. The department is also offering courses for students majoring in Science, Engineering, Commerce, Pharmacy, Law, Arts, Architecture and Business Administration. The curriculum has been designed with emphasis on the concepts and its applications. The faculty members regularly attend seminars, workshops and conferences to keep themselves upgraded with latest research inputs as well as efficient classroom management techniques which meet the challenges of a fast-changing technical world.

LOCATION:

The KL Deemed to be University is located at green fields, Vaddeswaram, Guntur Dist., Andhra Pradesh in a 100-acre green campus abutting Buckingham Canal about 9 km from Vijayawada railway station and bus stand. Vijayawada is located on the banks of river Krishna in the state of Andhra Pradesh. The city is well connected by National Highway and railways with Chennai (440km), Hyderabad (275km) and Visakhapatnam (385km). The city is the gateway for trains running from North to South India. Vijayawada is well connected by daily flights from the cities Visakhapatnam, Hyderabad, Chennai, Bangalore and Delhi.

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Dr. N. RAMESH BABU, Assistant Professor, Department of Mathematics

CO-CONVENOR

Dr. IMRAN ALI, Assistant Professor, Department of Mathematics

ORGANIZING SECRETARY

Dr. B. V. APPA RAO, Professor & Head, Department of Mathematics

PRESIDENT'S MESSAGE

An engineer needs to use mathematics and apply science for engineering solutions to many types of problems pertaining to different disciplines.

Proper knowledge of mathematics is the prime requisite requirement for engineering various kinds of applications. An engineer must know general purpose mathematics and mathematics related to a specific discipline. An engineer having clear knowledge of the mathematics will be able to engineer solutions to the problems that are to be solved with least cost and time.

I am happy that the department of Mathematics, KLEF is organizing three-day international conference on **SERB Sponsored 3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023)** which is quite apt for every engineering and also non engineering student. Various discussions and presentations on this topic should bring out various present-day usages of mathematics using which one will be able to find solutions to complex problems.

I wish the organizers good luck for successfully conducting the International Conference and come out with the proceedings and recommendations which can be circulated to all the engineers for their knowledge and usage of the findings.

Er. KONERU SATYANARAYANA

PRESIDENT

PRO CHANCELLOR'S MESSAGE

I am Happy to know that the Department of mathematics is organizing three-day international conference on SERB Sponsored **3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023)** from 21st - 23rd December 2023.

Several specialists from IITs and International Professors are participating and contributing on several challenging Industrial problems and solutions in the conference.

The Three-Day Conference is sure to provide a rich experience to the young researchers who can exchange ideas and learn from the expert participants and work towards greater achievements useful to the research community.

I wish all the delegates to interact and participate in all sessions to accomplish scientific breakthroughs.

I wish the conference a great success.

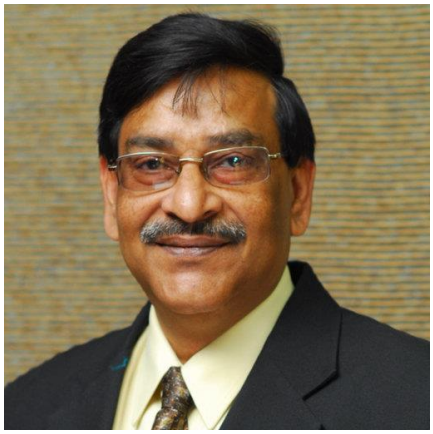
Dr. K. S. JAGANNATHA RAO
PRO CHANCELLOR

VICE-CHANCELLOR'S MESSAGE

I extend my warm welcome to all the participants and appreciate the Department of Mathematics, KLEF Deemed to be University for their commitment and superb drive in organizing this three-day international conference on **SERB Sponsored 3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023)** from 21st - 23rd December 2023. Conferences are the platforms for academic discourse. I am certain that this platform proves to be a great opportunity for the researchers, postgraduate students and industrial people for strengthening their academic and research aspirations. I believe in the virtual discussions and findings which can be generated only through these kinds of research and development (R&D) activities.

Mathematics is a rapidly growing interdisciplinary branch that incorporates many new advances in computer science and has applications in other sciences and industry. The deliberations of the delegates will undoubtedly generate lots of interesting and innovative concepts which pave the way to industrial commercialization. I extend my best wishes to the students and faculty who are a part of our University and to those who seek to join us in this conference for sharing and creating knowledge. I am sure that you will feel proud of sharing your academic excellence in our vibrant campus and wish you all a grand success.

DR. G. P. SARADHI VARMA
VICE CHANCELLOR



DIRECTOR'S MESSAGE

I congratulate the Department of Mathematics of KLEF Deemed to be University in organizing this three-day international conference on SERB Sponsored **3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023)** from 21st - 23rd December 2023. I am sure that this conference becomes a right platform for the students, researches and industrial delegates to come up with innovative deliberations. Mathematics has become more and more international, and solidarity across countries which has been increasing at a fast pace. It is not just a language of science, but it is also a science of formulating theories for other sciences. Besides fundamental research, the importance of the interaction of mathematics with other areas of science, computers and industry is now largely in demand.

I whole heartedly appreciate the efforts of the organizers of the Department of Mathematics for coming forward with such a challenging theme of contemporary relevance. I hope that this conference will definitely become a landmark event in facilitating knowledge exchange and research discourse. I wish all the participants of the conference to come up with useful research deliberations.

DR. A. JAGADEESH

CCO & DIRECTOR FED

PRINCIPAL'S MESSAGE

It is quite gratifying to note and with great pleasure, I would like to state that the Department of Mathematics of our college is hosting three-day international conference on **SERB Sponsored 3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023)** from 21st - 23rd December 2023. Organizing such an event at this point of time reinforces our objective of developing an environment for the exchange of ideas towards technological developments. I wish the conference would be able to deliberate on current issues of national and international relevance, particularly in the field of Mathematics Modelling in Ecology, Rough Set Theory and its Application, Game Theory Models and Application WSNs, Life with Mathematics and Integration of Technology in Education. There have been unprecedented numbers of quality papers that are to be presented in the conference.

I am sure that this occasion will provide an affable environment for the researchers and academicians to freely exchange the views and ideas with others. I convey my warm greetings and felicitations to the organizing committee and the participants and extend my best wishes for the success of the conference.

DR. K. SUBRAMANYAM
PRINCIPAL COLLEGE OF SCIENCES

FED COORDINATOR'S MESSAGE

As the FED Coordinator, it brings me immense pleasure to extend a warm welcome to each one of you at our SERB-sponsored 3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023) during December 21–23, 2023. It is an honor to have such a distinguished group of participants gathered for this significant occasion.

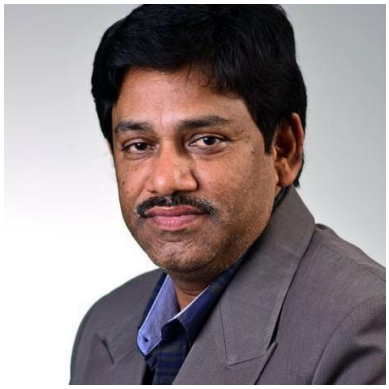
The field of applied and computational mathematics has witnessed remarkable advancements, and this event serves as a testament to the dedication and passion that each one of you brings to the table. The exchange of knowledge and ideas in the next few days promises to be both enlightening and transformative.

Our aim with this event is to create an environment that fosters collaboration, sparks innovation, and contributes to the growth of our collective expertise. I encourage you to actively engage in the various sessions, presentations, and networking opportunities that have been curated to enhance your experience. This is an invaluable chance to learn, share, and establish connections that could potentially shape the future of our field.

I would like to express my gratitude to the organizing committee, speakers, sponsors, and every individual who has played a role in making this event possible. Your collective efforts have undoubtedly contributed to the success of our endeavor.

DR. M. SIVA GANGA PRASAD

COORDINATOR, FED



HOD'S MESSAGE

It is my pleasure to extend a warm welcome to all of you to the SERB-sponsored 3rd International Conference on Recent Trends in Applied Mathematics with Computing (ICRTAMC-2023) from December 21–23, 2023.

In this diverse collection, you will find research highlights from esteemed researchers, scholars, and experts who are at the forefront of their respective fields. The breadth and depth of topics covered reflect the richness and variety of perspectives that our conference aims to bring together.

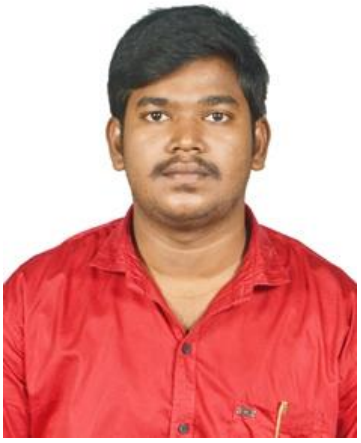
The ICRTAMC-2023 serves as a platform for intellectual exchange, collaboration, and the exploration of recent trends in various domains. I would like to express my heartfelt appreciation to all the contributors for their dedication to advancing knowledge and for sharing their research with our academic community.

I would also like to acknowledge the hard work and diligence of the organizing committee and everyone involved in bringing this conference to fruition. Their efforts have ensured that this event is a testament to the spirit of inquiry and discovery.

Wishing you a rewarding and enriching experience at the ICRTAMC-2023.

DR. B. V. APPA RAO

PROFESOR & HOD, MATHEMATICS



CONVENOR'S MESSAGE

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I am sure that this occasion will provide an affable environment for the researchers and academicians to freely exchange the views and ideas with others. I convey my warm greetings and felicitations to the organizing committee and the participants and extend my best wishes for the success of the conference.

DR. N. RAMESH BABU

CONVENOR, ICRTAMC-2023

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PROGRAMME SCHEDULE

KONERU LAKSHMAIAH EDUCATION FOUNDATION

(Deemed to be University), Vaddeswaram, Guntur, AP - 522 302

DEPARTMENT OF MATHEMATICS

SERB Sponsored

Third International Conference on "Recent Trends in Applied Mathematics with Computing (ICRTAMC - 2023)"

Session Details (Day - 1 - 21.12.2023)

TIME	SESSION	NAME OF THE SPEAKER		
09.30 AM to 10:00 AM	**REGISTRATION**			
10.00 AM to 10:45 AM	**INAGURATION**			
10.45 AM to 11:00 AM	**TEA BREAK**			
11:00 AM to 12:15 PM	Invited Talk-1	**Speaker: Dr. Kuru Ratnavelu, Professor**	Institute of Computer Science and Digital Innovation, UCSI University, Malaysia	**Chair:** Dr. V.S. Bhagavan, Department of Mathematics, KLEF
12:15 PM to 1:30 PM	Invited Talk- 2	**Speaker: Dr. Rais Ahmad, Professor**	Department of Mathematics, Aligarh Muslim University, Aligarh	**Chair:** Dr. S. Ragamayi , Assistant Professor, Department of Mathematics, KLEF
1:30 PM to 2:30 PM	LUNCH BREAK			
2:30 PM to 3:30 PM	Invited Talk-3	**Speaker: Dr. K. Ramakrishna, Professor**	Dean-Quality, KLEF	**Chair:** Dr. N. Vijaya, Assistant Professor, Department of Mathematics, KLEF
3:30 PM to 3:45 PM	TEA BREAK			
3:45 PM to 5:45 PM	Paper Presentation	**Presenter: Day 1 Candidates offline as well as online**	**Chair :** Dr. S. Ibrahim, Associate Professor, Department of Mathematics, KLEF	**Chair:** Dr. K.V. Chandrasekhar, Professor, Department of Mathematics, KLEF

KONERU LAKSHMAIAH EDUCATION FOUNDATION

(Deemed to be University), Vaddeswaram, Guntur, AP - 522 302

DEPARTMENT OF MATHEMATICS

SERB Sponsored

Third International Conference on "Recent Trends in Applied Mathematics with Computing (ICRTAMC - 2023)"

Session Details (Day - 2 - 22.12.2023)

TIME	SESSION	NAME OF THE SPEAKER		
10:00 AM to 11:15 AM	Invited Talk-4	**Speaker: Dr. G. Rajchakit, Professor**	Department of Mathematics, Maejo University, Thailand	**Chair:** Dr. N. Srimannaryana, Professor, Department of Mathematics, KLEF
11:15 AM to 11:30 AM	TEA BREAK			
11:30 AM to 12:45 PM	Invited Talk-5	**Speaker: Dr. P. Balasubramaniam, Professor**	Department of Mathematics, The Gandhigram Rural Institute, Gandhigram, India	**Chair:** Dr. Ch. V. Ramana Murthy, Professor, Department of Mathematics, KLEF
12:45 PM to 2:00 PM	LUNCH BREAK			
2:00 PM to 3:15 PM	Invited Talk-6	**Speaker: Dr. B. Nageswara Rao, Professor**	Department of Mechanical Engineering, KLEF	**Chair:** Dr. Rojalini Patro, Assistant Professor, Department of Mathematics, KLEF
3:15 PM to 3:30 PM	TEA BREAK			
3:30 PM to 5:30 PM	Paper Presentation	**Presenter: Day 2 Candidates offline as well as online**	**Chair :** Dr. S. Ibrahim, Associate Professor, Department of Mathematics, KLEF	**Chair:** Dr. K.V. Chandrasekhar, Professor, Department of Mathematics, KLEF

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DEPARTMENT OF MATHEMATICS

SERB Sponsored

Third International Conference on "Recent Trends in Applied Mathematics with Computing (ICRTAMC - 2023)"

Session Details (Day - 3 - 23.12.2023)

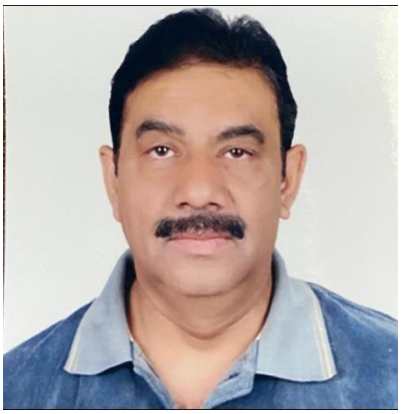
TIME	SESSION	NAME OF THE SPEAKER		
10:00 AM to 11:15 AM	Invited Talk-8	**Dr. Jayarami Reddy Konda, Professor**	CEO, Science City of Andhra Pradesh, India	**Chair:** Dr. V.B.V.N. Prasad, Professor, Department of Mathematics, KLEF
11:15 AM to 11:30 AM	TEA BREAK			
11:30 AM to 12:45 PM	Invited Talk-7	**Speaker: Dr. Cemil Tunc, Professor**	Department of Mathematics, Faculty of Science, Van Yuzuncu Yil University, Turkey	**Chair:** Dr. Imran Ali, Department of Mathematics, KLEF
12:45 PM to 2:00 PM	LUNCH BREAK			
2:00 PM to 3:00 PM	Paper Presentation	**Presenter: Day 3 Candidates offline as well as online**	**Chair :** Dr. S. Ibrahim, Associate Professor, Department of Mathematics, KLEF	**Chair:** Dr. K.V. Chandrasekhar, Professor, Department of Mathematics, KLEF
3:15 PM to 3:30 PM	TEA BREAK			
3:30 PM to 4:00 PM	**FEEDBACK & VALEDICTORY FUNCTION**			

INVITED SPEAKERS

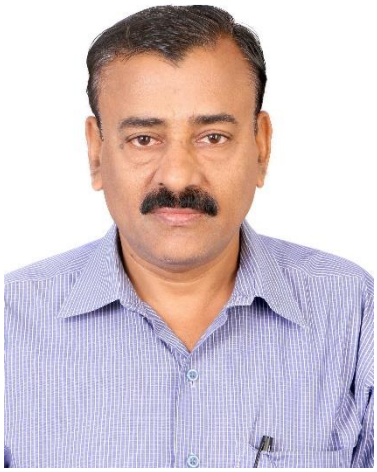
Dr. KURU RATNAVELU
PROFESSOR
ICS & DI, UCSI UNIVERSITY, MALAYSIA

Dr. G. RAJCHAKIT
PROFESSOR
DEPARTMENT OF MATHEMATICS,
MAEJO UNIVERSITY, THAILAND

Dr. CEMIL TUNC
PROFESSOR
DEPARTMENT OF MATHEMATICS,
VAN YUZUNCU UNIVERSITY, TURKEY



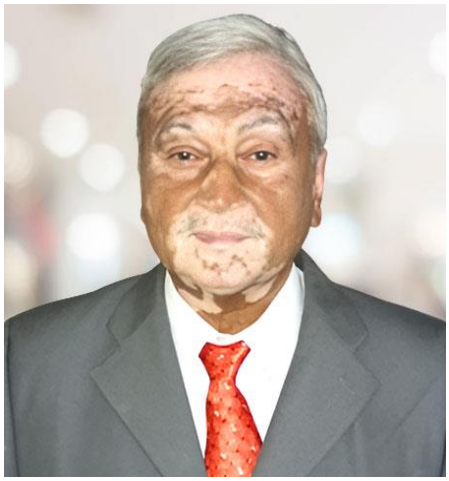
Dr. RAIS AHMAD
PROFESSOR
DEPARTMENT OF MATHEMATICS,
ALIGARH MUSLIM UNIVERSITY,
ALIGARH, U.P., INDIA



Dr. P. BALASUBRAMANIAM
PROFESSOR
DEPARTMENT OF MATHEMATICS,
THE GANDHIGRAM RURAL INSTITUTE
(DTBU), TAMIL NADU, INDIA

Dr. JAYARAMI REDDY KONDA
PROFESSOR
CCO, SCIENCE CITY OF A.P.
ANDHRA PRADESH, INDIA

Dr. K. RAMAKRISHNA
PROFESSOR
DEAN-QUALITY,
KONERU LAKSHMAIAH EDUCATION FOUNDATION (DTBU), ANDHRA PRADESH, INDIA



Dr. B. NAGESWARA RAO
PROFESSOR
DEPARTMENT OF MECHANICAL ENGG.
KONERU LAKSHMAIAH EDUCATION FOUNDATION (DTBU), ANDHRA PRADESH, INDIA

ABSTRACTS

ICRTAMC-23-001

GEPHI: A POWERFUL TOOL USED FOR VISUALIZATION OF GRAPH ANALYSIS IN NETWORKS

N. B. S Vijay Kumar[1], M. Paul Daniel[2], K. John Paul[1], K. Swathi[1], Daggubati Sunil[2], and D. Sailaja Kumari[3]

[1]Department of Computer Science and Engineering, Swarnandhra College of Engineering and Technology (Autonomous), (JNTUK), Narsapuram, West Godavari Dist., India.

[2]Department of Mechanical Engineering, Narayana Engineering College (Autonomous), (JNTUA), Gudur, Nellore Dist., India.

[3]Department of Mathematics, Swarnandhra College of Engineering and Technology (Autonomous), (JNTUK), Narsapuram, West Godavari Dist., India.

Abstract: Graph theory is widely used in different disciplines like social network analysis, transportation and routing, biological networks and artificial Intelligence. Effective graph visualization and interaction are essential for transforming raw graph data into meaningful insights. The choice of techniques depends on the characteristics of the graph, the audience, and the goals of visualization. As technology evolves, advanced visualization approaches incorporating virtual reality, augmented reality, and immersive environments are also being explored to enhance graph exploration and understanding. Graphs can be used to model a wide range of real-world situations, including social networks, transportation systems, computer networks, molecular structures, and more. They provide a visual and mathematical way to analyse and understand the relationships and connections within complex systems.

Keywords: Visualization, Graph, Social Network analysis, Graph Attributes

ICRTAMC-23-002

ESTIMATION OF THE DEGREE OF CONVERGENCE IN GENERALIZED ZYGMUND SPACE BY USING SUMMABILITY MEANS

Aradhana Dutt Jauhri, and Kush Kumar

Division of Mathematics, School of Basic Sciences Galgotias University, Greater Noida, U.P., India

Abstract: The objective of the current research is to obtain novel insights into the convergence behavior of generalized Zygmund space functions through the utilization of deferred summability means transformations. This involves deriving new results concerning the degree of convergence when approximating functions within the generalized Zygmund class using conjugate Fourier series. Additionally, the research yields further results that stem from the theorems established using these methods.

Keywords: Deffered Summability, Generalised Zygmund class, Fourier series, Product mean.

ICRTAMC-23-003

ON $A\alpha$ SPECTRUM OF THE ZERO-DIVISOR GRAPH OF THE RING Z_n

Mohd Rashid, and Muzibur Rahman Mozumder

Department of Mathematics,
Aligarh Muslim University, Aligarh, U.P., India.

Abstract: Let R be a commutative ring and Z(R) be its zero-divisors set. The zero-divisor graph of R, denoted by Γ(R), is an undirected graph with vertex set Z(R)* = Z(R) \ {0} and two distinct vertices a and b are adjacent if and only if ab = 0. In this article, for $n = p^r * q^s$, where p and q are primes (p < q) and R and S are positive integers, we calculate the Aα spectrum of the graphs Γ(Zn).

Keywords: Zero-divisor graph, Aα matrix, Aα spectral, ring of integer modulo n.

ICRTAMC-23-004

FINITE-TIME CONVERGENCE ANALYSIS OF DELAYED RECURRENT NEURAL NETWORKS WITH EFFECT OF IMPULSIVE PERTURBATIONS

J. Jayabharathi, N. Padmaja, S. Lakshmanan

Division of Mathematics, School of Advanced Sciences,
Vellore Institute of Technology,
Chennai 600127, Tamil Nadu, India.

Abstract: This paper deals with the finite-time stability problem of delayed recurrent neural networks under the effect of impulsive perturbations. To do this analysis, a suitable Lyapunov-Krasovskii functional is constructed with information about the delay bounds, and the corresponding sufficient conditions are derived from the linear matrix inequalities. Besides that, the activation functions do not necessitate boundedness or monotonicity. The sufficient conditions ensure the finite-time boundedness of the system under impulsive perturbations. Finally, the derived criteria are validated via numerical examples and simulation results, which confirm the effectiveness of the results.

Keywords: Finite-time stability, Time-varying delay, Lyapunov-Krasovskii functionals, Linear matrix inequality, Impulsive perturbations.

ICRTAMC-23-005

FURTHER SAMPLED-DATA BASED SYNCHRONIZATION CRITERIA FOR COMPLEX DYNAMICAL NETWORKS WITH TIME-DELAYS

M Haripriya, S Lakshmanan, and A Manivannan

Division of Mathematics, School of Advanced Sciences,
Vellore Institute of Technology,
Vandalur- Kelambakkam Road, Chennai-600 127

Abstract: This paper is concerned with the sample-data control to design for the synchronization of complex dynamical networks (CDNs) with time-delays. Based on the pinning control strategy, sample-data control is designed for synchronizing the complex dynamical networks. By constructing a new looped Lyapunov functional, the sufficient conditions are derived in the form of linear matrix inequalities. The derived criteria ensure the asymptotic stability of the error CDN which means that the proposed CDNs are synchronized with each other's. Finally, numerical examples and their simulation results confirm the effectiveness of the proposed control scheme.

Keywords: Synchronization, Complex dynamical systems, Time delays, Pinning control, LMI

ICRTAMC-23-006

QUANTUM GENETIC ALGORITHM BASED MEMORY STATE FEEDBACK CONTROL FOR T-S FUZZY SYSTEM

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Abstract: This paper leverages a Linear Matrix Inequality (LMI) technique for designing a Quantum Genetic Algorithm (QGA) based memory state feedback control of a nonlinear system. For the first time in the literature, the authors have introduced the QGA-based algorithm for finding the control gain matrices as a searching tool. In order to evaluate the fitness function of QGA, the LMI problem is formulated as a constrained optimization. The more general Lyapunov-Krasovskii functional is selected to analyze the closed loop system stability and the criterion for its asymptotic stability. Numerical examples are provided to verify the effectiveness of the QGA-based proposed control scheme.

Keywords: Feedback control, quantum genetic algorithm, T-S fuzzy model, time-delay.

ICRTAMC-23-007

TRIPLE CONNECTED CERTIFIED DOMINATION NUMBER ON TRIANGULAR GRID

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Abstract: A dominating set $\boldsymbol{S}$ of a graph $\boldsymbol{G}$ is called triple connected certified dominating set with the condition that, every vertex in $\boldsymbol{S}$ has either zero or at least two neighbours in $\boldsymbol{V-S}$ and $<\boldsymbol{S}>$ is triple connected. The smallest cardinality of a triple connected certified dominating set is called triple connected certified domination number and is denoted by $\boldsymbol{\gamma_{TCC}(G)}$. In this article, we have generalized this parameter for the triangular grid of power $\boldsymbol{k}$ where $\boldsymbol{1 \leq k \leq 3}$.

Keywords: Domination number, Triple connected, certified domination, triple connected certified domination, triangular grid, square graph, cube graph.

ICRTAMC-23-008

CORONA COVERING NUMBER OF GRAPHS

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Abstract: Given a graph G, set $\boldsymbol{S} \subseteq \boldsymbol{V}(\boldsymbol{G})$ is said to be vertex cover set if every edge in E(G) is incident to at least one vertex of $\boldsymbol{S}$. The minimum cardinality taken over all the vertex cover set is called vertex covering number and it is denoted by $\boldsymbol{\tau}$. A vertex cover set $\boldsymbol{S} \subseteq \boldsymbol{V}(\boldsymbol{G})$ is said to be corona cover set if every vertex in $< \boldsymbol{S} >$ is either a pendant or a support vertex. The minimum cardinality taken over all the corona cover set is called corona covering number and it is denoted as $\boldsymbol{\tau_C}$. In this paper, we introduce this parameter and investigate this for some standard and special types of graphs.

Keywords: Vertex covering, pendant vertex, support vertex.

ICRTAMC-23-009
γ_{CD} FOR CARTESIAN PRODUCT OF GRAPHS

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Abstract: In this article, we provide some contribution to study the CD-numbers for the Cartesian product of graphs. We characterize the Cartesian product of some graphs in terms of this parameter, we also identify the exact γ_{CD} value for all the graphs considered in this article. The corona domination number γ_{CD} is a minimum cardinality of a dominating set S, with the subgraph induced by S having either pendant or support vertices.

Keywords: Domination number, Cartesian product, pendant vertex, support vertex.

ICRTAMC-23-010

FUZZY OUTERPLANAR GRAPH AND ITS APPLICATION

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Abstract: A fuzzy graph is a mathematical structure that adds to the idea of crisp graphs by allowing the edges between vertices to carry degrees of membership or fuzziness. A graph that allows some imprecision or ambiguity in its planarity is called a fuzzy planar graph. This concept is based on the degrees of membership of the edges and vertices of fuzzy graphs to represent the level of certainty about their planar arrangements. This can model situations where the exact planarity of a graph is not clearly defined. The concept of crisp graph is essential in the study of outerplanar graphs because outerplanar graphs are a special class of planar graphs with additional properties. The notion of a subgraph, one of the fundamental ideas of crisp graphs, is mostly used to resolve difficult data problems. For instances, they were applied in Network Modelling, Image Processing, Bioinformatics, Traffic Flow and Transportation and etc. In this work, the concept of fuzzy outerplanar graphs is introduced and illustrated with examples. The application of fuzzy outerplanar graphs is discussed. Further, the maximum and maximal fuzzy outerplanar subgraphs are introduced with suitable illustrations.

Keywords: Fuzzy graph, Fuzzy outerplanar graph, Maximum and maximal fuzzy outerplanar graphs

ICRTAMC-23-011

QGA BASED RELIABLE SAMPLED DATA CONTROL FOR TS FUZZY SYSTEMS WITH APPLICATIONS

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Abstract: This research delves into ensuring the stabilization of the Takagi-Sugeno (TS) fuzzy system using a quantum genetic algorithm (QGA)-based reliable memory sampled data control scheme. An adequate set of two-sided looped Lyapunov functionals has been introduced to strengthen the aim of the proposed control technique. Sufficient conditions have been derived to ensure the asymptotic stability of the TS fuzzy system. Moreover, QGA-based reliable sample data control incorporates larger sampling intervals, which significantly enhances the practicality and efficiency of the control scheme and ensures the expanded stability region of the TS fuzzy system. The results given in this study are less conservative and superior to previous studies. Finally, numerical simulations were carried out using a widely accepted model to illustrate the superior performance of the derived results compared to existing ones.

Keywords: Sampled-data control, Takagi-Sugeno fuzzy system, quantum genetic algorithm, stability.

ICRTAMC-23-012

STABILITY AND HOPF BIFURCATION ANALYSIS OF PREY-PREDATOR MODEL WITH TIME DELAY

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Abstract: In this paper we proposed a prey-predator model which represent a system of delay differential equations. We investigate the model, representing a resource -prey and predator system with delay due to gestation. The co-existing state is identified and studied the local stability analysis at this point. The sufficient condition for existence of Hopf bifurcation is derived. By the simulation process the bifurcation occurring are discussed in terms of bifurcation parameters 'τ'. We have also shown that the time delay can cause a stable equilibrium to become unstable and even switching of stabilities. Further Numerical simulations are given to illustrate the results.

Keywords: Prey-predator, Time delay, Stability, Simulation, Hopf bifurcation.

ICRTAMC-23-013

OPTIMAL PRICING AND PRODUCTION LOT-SIZE FOR BERTRAND LINEAR PRICE-DEPENDENT DEMAND WITH PRICE BREAKEVEN POINT - IN THIRD ORDER EQUATION

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Abstract: In this paper, optimal pricing and production lot size for deteriorative items with the demand rate depends on Bertrand's linear price-dependent demand which is designed in third order equation and analyzed by two duopoly models for two profit-maximizing producers. Each producer is assumed to produce one product and his competitor is assumed to produce a substitute in a competing environment. The literature has a variety of demand models, like constant, time-dependent (exponential, quadratic, linear), stock-dependent, and price-dependent demand among others. For instance, no research uses Bertrand's linear price-dependent demand for studying optimum production and pricing policies. Two models are created: The 1st model uses optimal pricing and production lot size for deteriorative items with Bertrand linear price-dependent demand for producer one, and the second model uses Bertrand linear price-dependent demand for producer two. Mathematical models are defined for each model and significant instances are given to explain the suggested technique. The goal of this is to acquire the best manufacturing volumes and prices in order to maximize profit overall. Sensitivity analysis is given for both of the 2 models. Visual Basic 6.0 was used to produce the required data.

Keywords: Production Inventory, Optimum Prices, Optimum production, Bertrand linear price dependent demand, Third Order Equations.

ICRTAMC-23-014

PERFORMANCE AND ECONOMIC STUDY OF AN IMPATIENT CONSUMER QUEUE WITH WORKING VACATIONS, SECONDARY SERVICE AND SERVER FAILURES

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Abstract: This study investigates a finite buffer multiple working vacations queue with balking, reneging and server failures. There are two stages of service offered to the consumers: primary and secondary service. Primary service is required by all consumers whereas secondary service is chosen by only few consumers once the former is complete. The steady state system length distributions are derived using matrix approach and different performance metrics are presented. Cost and revenue analysis is carried out using Cuckoo search algorithm. Finally, some numerical results are shown to illustrate the impact of the model parameters on the system performance indicators including cost and revenue.

Keywords: Cuckoo search algorithm, Cost Analysis, Revenue Analysis, Consumers.

ICRTAMC-23-015

A NONPARAMETRIC ESTIMATION OF MEAN OF FAMILY OF DISTRIBUTIONS USING MAXIMUM RANKED SET SAMPLING WITH UNEQUAL SAMPLES (MRSSU)

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Abstract The maximum ranked set sampling with unequal samples (MRSSU) is proposed by Biradar and Santosha (2014). The MRSSU is a useful modification of Ranked Set Sampling (RSS). Since it is not difficult to identify the maximum in each set. It allows for an increase in set size without introducing too many ranking errors. This is one of the varied ranked set samplings which is used to estimate the mean of exponential distribution by using modified maximum likelihood estimation method. The current study focuses on non-parametric estimation of location parameter of family of distributions using MRSSU. The estimator was shown unbiased. In order to check the efficiency of the estimator, the relative efficiencies were obtained with the counter parts of simple random sampling (SRS) and ranked set sampling (RSS). The simulation results shown that the estimator is more efficient than SRS and MRSSU is good competitor for RSS with the small set size under perfect ranking. The real-life data evidence for validating the simulation results.

Keywords: Simple Random Sampling, Ranked Set Sampling, Unbiasedness, Efficiency, Simulation.

ICRTAMC-23-016

MATHEMATICAL ANALYSIS OF FLOW AND HEAT TRANSFER OF ELECTRICALLY CONDUCTING WILLIAMSON HYBRID NANOFLUID OVER A STRETCHING SURFACE WITH THERMAL RADIATION AND VISCOUS DISSIPATION

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Abstract: The present study is to investigate the velocity and heat energy characteristics of an electrically conducting Williamson hybrid nanofluid over a stretching surface with silver and aluminium oxide suspension in non-Newtonian base fluid. The incompressible, 2-dimensional, MHD, viscous dissipating fluid with thermal radiation and heat generation /absorption effect is analyzed. The problem is formulated into mathematical equations which are in PDE form, which are further reduced to ODEs by similarity transformation. RK method of order four along with shooting method is applied to minimize the higher order ODEs into first order ODEs from boundary conditions to initial condition problem. With the aid of MATLAB bvp4c software the results are obtained and interpreted. The values of local skin friction coefficient of the fluid grow with an increasing value of the physical parameters such as Magnetic parameter and curvature parameter, but it is oppositely influenced by Weissenberg number. The Nusselt number of the fluid is increasing for the higher curvature parameter whereas decreases for increasing Weissenberg number, Magnetic parameter, heat generation coefficient of the fluid flow. The results are well agreed with the earlier research works and validated.

Keywords: Electrically conducting fluid, MHD, Hybrid nanofluid, Williamson fluid model, silver, aluminium oxide

ICRTAMC-23-017

AN M/M/3 HETEROGENEOUS SERVERS QUEUEING SYSTEM WITH MULTIPLE VACATION SUBJECT TO SYSTEM DISASTER

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Abstract: This research paper investigates the dynamic behaviour of a heterogeneous three-server queuing model with multiple vacation periods. The model also accounts for the possibility that a disaster could occur during busy periods or on vacation, in which case the restoration process would begin immediately. The time-dependent probabilities of system size are presented in the work with explicit equations computed in terms of modified Bessel functions, employing generating functions. To support the theoretical conclusions, numerical examples are given.

Keywords: Three-server, Multiple vacation, Disaster, Transient analysis.

ICRTAMC-23-018

NON-HOMOGENEOUS QUINARY CUBIC EQUATION $(x^3 - y^3) = (z^3 - w^3) + 72t^2$

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Abstract: This paper aims at determining non-zero distinct integer solutions to the non-homogeneous cubic equation with five unknowns represented by $(x^3 - y^3) = (z^3 - w^3) + 72t^2$. Various choices of integer solutions to the above equation are obtained through employing linear transformations and applying the method of factorization. A few interesting relations among the solutions are presented.

Keywords: Non-homogeneous cubic, Quinary cubic, Integer solutions

ICRTAMC-23-019

OPTIMIZING SUSTAINABLE GROWTH: A FUZZY INVENTORY MODEL FOR PERISHABLE ITEMS IN SUPPLY CHAINS CONSIDERING IMPERFECTIONS, MORTALITY, SHORTAGES, AND CARBON EMISSIONS

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Abstract: The conventional economic order quantity model, though applicable in certain practical scenarios, is built on assumptions that diverge from the complexities of real-world inventory systems. This paper introduces an innovative inventory framework where ordered items have the capacity to grow during the inventory replenishment cycle, exemplified by livestock. Additionally, the model considers a fraction of items to be of suboptimal quality. The process involves ordering live newborn items, nurturing them until they reach a customer-preferred weight, and then slaughtering them. Prior to sale, carbon emissions, inspect & screening process is employed to distinguish items of superior quality from those of inferior quality. To determine the optimal inventory policy, a profit-maximizing model is developed and compared with a fuzzy model for enhanced results. Triangular fuzzy numbers are utilized for defuzzification, and numerical examples are presented for comparison, illustrating both the model and the solution procedure. Notably, the study reveals that the optimal order quantity is highly sensitive to the designated slaughter weight.

Keywords: Inventory Model, Fuzzy Numbers, Defuzzification.

ICRTAMC-23-020

OPTIMAL CONTROL OF MULTIDIMENSIONAL QUANTUM HYDRODYNAMIC SYSTEM

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Abstract: The main objective of this work is to establish the Pontryagin minimum principle (PMP) for quantum hydrodynamic systems in multidimensional space. Generally, quantum hydrodynamic systems are used in engineering and modern physics to analyze the behaviour of quantum fluids such as superfluid helium and Bose-Einstein condensates. Quantum turbulence occurs naturally in quantum fluids and controlling the turbulence in the quantum fluids helps to develop many real-time quantum models. In this work, the Cauchy problem for a multidimensional quantum hydrodynamic system (MQHDS) is considered with finite-energy weak solutions. A tracking-type integral performance index will be constructed for the purpose of controlling quantum turbulence and ensuring that the finding control is optimal. After proving the existence of optimal control, the differentiability of the control-to-state operator will be analyzed for the corresponding linearized MQHDS system in Fréchet sense. By employing the variational principle of Ekeland, the PMP for an optimal control problem is demonstrated.

Keywords: Optimal control, Multidimensional quantum hydrodynamic system, Finite-energy weak solutions, Pontryagin minimum principle.

ICRTAMC-23-021

ANALYZING THE EFFICIENCY FOR FUZZY MEASLES MODEL BY USING VARIATION ITERATION METHOD AND RUNGE KUTTA METHOD

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Abstract: We propose a fuzzy mathematical epidemic model for the dynamics of measles disease transmission. Here we use SIR (Susceptible-Infected-Recovered) mathematical model where the recovery and transmission rates are regarding as the fuzzy parameters. During our discussion about stability analysis and the disease's basic reproduction rate is hazy. Here we find the basic reproductive number, discuss the stability analysis for the disease, Fuzzy basic reproductive number and a first-order nonlinear differential equation is used to model measles mathematically. The analytical solution is find by Variation Iteration Method and Numerical solution is find by Runge kutta method for fourth order. We compare both results and get the same result with small variation.

Keywords: SIR model, Stability Analysis, Basic reproductive number, Variation iteration Method, Runge kutta method.

ICRTAMC-23-022

PROPAGATION OF SHEAR WAVE IN TWO-LAYERED PIEZO MAGNETIC/ FIBER-REINFORCED COMPOSITE PLATE

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Abstract: This study focuses on the propagation of shear waves in a composite layer plate structure. It is considered that the upper surface of the layered material is composed of piezo-magnetic material, whereas the lower layer is an inhomogeneous fiber-reinforced composite. In this work, the dispersion equation of shear wave evaluates for magnetically short case. The effects of numerous parameters, such as ratio of plate thickness, orientation of fiber alignment and inhomogeneity parameter are analysed numerically and illustrated graphically. MATLAB software has been used to analysed the graphical. The current findings have many applications in scientific and engineering fields such as oil industry mining, noise and vibration control, geophysics, signal processing, communication by wireless means, harvesting of energy, monitoring structural health, earthquake engineering, etc.

Keywords: Piezo-magnetic composite, Fiber-reinforced composite, layered plate, Shear wave.

ICRTAMC-23-023

AN ADDITIONAL ALTERNATIVE SERVICE SYSTEM WITH A COLD STANDBY SERVER THAT IS RELIANT ON THE SYSTEM SIZE

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Abstract: In this article, we examine a second optional service queueing system using two types of servers, viz. the main operating server and a reliable standby server. All arriving customers receive the first essential service (FES), and only a few may thereafter request a second optional service (SOS) with some probability. During FES and SOS services, the primary operational server may break down. The server is promptly sent for repair if a break down arises and the standby server will be replaced only if the system size is q (≥ 1); otherwise, customers would queue up while the main server is being repaired and resumes the service. We also derive the necessary and sufficient condition for the system to be stable. The model's steady state solution is discovered using the matrix geometric approach. Further, multiple system performance measures are obtained and a cost optimization problem is taken into consideration. Graphs are used to display the numerical outcomes.

Keywords: Queue, Standby Server, First Essential Service (FES), Second Optional Service (SOS), Matrix Geometric Method.

ICRTAMC-23-024

EFFECTS OF ECKERT NUMBER ON CASSON MICROPOLAR NANO FLUID FLOW OVER AN INCLINED MAGNETIC FIELD WITH THE PRESENCE OF CHEMICAL REACTION

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Abstract: The influences of Eckert number with the presence of chemical reaction on casson micropolar nanofluid flow over an inclined Magnetic field are discussed in this article. The system of Partial differential equations with various parameters indoctrinated to Ordinary differential equations. The set of these equations is naked numerically by using MATLAB bvp4c method. The effects of velocity, Eckert number, Magnetic, Micro polar, Temperature and Concentration profiles are shown graphically. The concentration of the fluid reduces with an enhancement in Eckert number and opposite reaction in the temperature profile.

Keywords: Stretching sheet, Lorentz force, Eckert number, Magnetic field, Micro polar.

ICRTAMC-23-025

A SEARCH ON INTEGER SOLUTIONS TO TERNARY NON-HOMOGENEOUS NONIC DIOPHANTINE EQUATION $\alpha(x^2+y^2)-(2\alpha-1)xy=4\alpha z^9$

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Abstract: Different sets of integer solutions to the non-homogeneous Nonic Diophantine equation with three unknowns given by $\alpha(x^2+y^2)-(2\alpha-1)xy=4\alpha z^9$ are presented in this paper.

Keywords: Nonic equation, Nonic with three unknowns, Non - homogeneous Nonic, Integer solutions.

ICRTAMC-23-026

THE EFFECTS OF HETEROGENEITY ON THE VISCOUS FINGERING INSTABILITIES OF POROUS MEDIUM

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Abstract: The displacement of one fluid by another is a widely observed phenomenon associated with interfacial instability. The phenomenon of unstable flow displacement, wherein a low-viscosity fluid infiltrates a higher viscosity fluid within a porous medium, is commonly referred to as the classical viscous fingering instability. Often porous media have diverse microstructural characteristics within porous media, leading to consequential disparities in flow resistance and subsequent variations in permeability. The interactions between permeability heterogeneities and viscously driven instabilities are of considerable significance. In this study, we focus on the examination of viscous fingering phenomena within spatially periodic heterogeneous medium. The basic nonlinear partial differential equations are solved numerically using the finite element method-based solver in COMSOL Multiphysics. The analysis is presented by the variance and the two spatial correlation scales of the heterogeneity. Depending on the levels of heterogeneity, the flow is leading to a channelling regime and dispersive behaviour. Further, the channelling regime can be disruptive depending on the combination of spatial correlation scales. The augmentation of permeability variance yields a discernible improvement in the efficacy of breakthrough sweep, leading to a more uniform concentration front.

Keywords: Heterogenous porous medium, Viscous fingering.

ICRTAMC-23-027

THE EFFECT OF DEPTH GRADIENT ON THE MISCIBLE FLOW IN THREE-DIMENSIONAL POROUS MEDIUM

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Abstract: Interfacial instability during miscible displacements in porous medium has been seen in a wide range of applications, such as processing polymers, recovering oil, and separating substances using chromatography. Due to the lower viscosity of the injected solvent, the presence of viscous instabilities has a negative impact on the sweep efficiency process. The utilisation of the standard quasi-two-dimensional Hele-Shaw configuration offers a valuable framework for the examination of interfacial instabilities within confined channels. In the current work, we study a variation of the viscous fingering instability by incorporating a converging (diverging) three-dimensional Hele-Shaw cell, motivated by the need to manage interfacial instabilities and to replicate a degree of heterogeneity in a realistic system. The phenomenon is governed by Darcy's law, the equation of continuity, and the convection-diffusion equation. The finite element method is used for the numerical simulations. It is observed that the stability of the interface is dictated by two key factors: the contrast in viscosity between the fluids involved and the gradient in depth of the Hele-Shaw cell. Furthermore, the sweep efficiency would be considerably improved if the channel were tapered.

Keywords: Tapered Hele-Shaw cell, Viscous fingering.

ICRTAMC-23-028

FEASIBILITY AND FEASIBILITY STUDY OF A DATA CENTER IN TROPICAL CLIMATE ZONE: SIMULATION OF COOLING EFFECT WITH ANSYS ICEPACK

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Abstract: The increasing demand for internet and cloud services has led to a rapid growth of data centers globally. However, the associated environmental concerns, specifically regarding high energy consumption and cooling requirements, necessitate strategic solutions. This study investigates the feasibility of implementing an air raised flow cooling system in a data center situated in the tropical climate of the Republic of Congo, Central Africa, following the standards set by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). By utilizing ANSYS ICEPAK for Computational Fluid Dynamics (CFD) simulations, we conduct a comprehensive analysis of the thermal environment of a large-scale data center employing air raised flow cooling. Various factors, including climate conditions, solar exposure, airflow characteristics, temperature profiles, hotspots, flow rate of fan and energy consumption, are carefully examined. The study aims to enhance the data center's efficiency by proposing strategies to reduce both energy consumption and operational costs. This research not only delves into technical aspects but also emphasizes the broader context of environmental sustainability in data center operations. Through presenting a thorough analysis and simulation, this study provides valuable insights into developing energy-efficient data centers in tropical climates.

Keywords: Data center, cooling effect, air raised flow, simulation

ICRTAMC-23-029

THE EFFECTS OF THE EXPANSION FAN ON THE SEPARATION BUBBLE OF A 2D COMPRESSION RAMP

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Abstract: In supersonic aerodynamics, shock waves induced by compression ramps can lead to airflow separation at a sufficient ramp angle and Reynolds number. This study investigates the influence of an expansion fan on separation bubble characteristics in a 2D compression ramp configuration under supersonic laminar inflow conditions. A finite volume-based, unstructured solver has been developed and validated for both inviscid and viscous flows. The viscous solver shows excellent agreement with Bibin et al. [1]. The expansion fan generated at the end of the ramp significantly alters the flow patterns and behavior. Bibin et al. [1] varied the Mach number and ramp angle, while we focused on adding an expansion fan at the end of the ramp for various lengths. Numerical simulations are conducted to investigate the impact of varying ramp lengths (0.015, 0.03, 0.04, and 0.07) at an angle of 15°. Our findings elucidate the variation in the separation bubble in viscous flow with changing ramp length. Incorporating an expansion fan with a ramp length of 0.015 at (x, y) coordinates of (0.05, 0.001) reduces pressure to 16.868% and separation length to 64.594%, demonstrating the expansion fan influence on pressure distribution and separation characteristics. Detailed analysis will be presented in the final paper.

Keywords: Computational Fluid Dynamics, 2D compression ramp, Supersonic laminar flow.

ICRTAMC-23-030

A WEAK FORM OF PRE Q-ROUGH ALGEBRA

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Abstract: This paper is the continuation of the work in D. Umadevi, On the Completion of Rough Sets System Determined by Arbitrary Binary Relations, Fundamental Informaticae 137 (2015). It is proved that the algebraic structure on the completion of the rough sets system defined by a reflexive relation, $\mathfrak{R}_C{}^*$ is a Tarski interior lattice in the above article. In this paper, it is noted that $\mathfrak{R}_C{}^*$ satisfy the axioms of pre Q-rough algebra (every pre Q-rough algebra is a Tarski interior lattice) except a few. For that, an example of a rough set system defined by a reflexive relation is given. So, the algebraic structure of $\mathfrak{R}_C{}^*$ is considered to be a weak form of Pre Q-rough algebra. A new class of algebra is defined with the axioms satisfied by $\mathfrak{R}_C{}^*$ and a representation theorem for the new class of algebra is given.

Keywords: Rough Sets system, Dedekind-MacNeille completion, Kleene complementation, pre Q-rough algebra.

ICRTAMC-23-031

DETECTION OF TUMOR PROGRESSION IN THE BRAIN BY IMAGE SEGMENTATION OF MRI IMAGES USING DEEP NEURAL NETWORK

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Abstract: Accurate identification and delineation of tumors in the brain from MRI images which is multimodal is crucial for tracking disease progression, particularly in the case of gliomas, which are both malignant and highly diverse. To achieve precise segmentation of these tumors into their intra-tumoral subtypes, modern approaches favor deep learning algorithms over conventional methods. Among these, CNNs have emerged as a powerful tool in the field of biomedical and significantly advancing the accuracy of medical image segmentation.

This study proposes a novel ensemble method that combines two distinct segmentation networks: like a 3D CNN and a U-Net. This combination, while conceptually straightforward, yields superior and more precise segmentation results. These two models were individually trained using the BraTS-19 challenge dataset, resulting in segmentation maps that exhibited notable differences in terms of the identified tumor sub-regions. By skillfully assembling these diverse outputs, we achieved a final prediction that greatly improved the accuracy of the segmented image.

Keywords: CNN, U-Net, Deep learning, brain tumor

ICRTAMC-23-032

A PARTIAL BACKLOGGED INVENTORY MODEL WITH EXPONENTIAL TIME VARY DEMAND AND TIME DEPENDENT HOLDING COST UNDER INFLATION

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Abstract: The paper presented with any inventory system is the fluctuation of demand with time and price. Numerous studies detail circumstances where demand changes independently with time and price. The combined effect of time, price and demand on optimal solutions has been studied by a few researchers. As a result, an appropriate inventory policy is always looking for. In this study, a model of inventories with selling prices and time-varying demand, variable holding cost. This model makes the assumption that shortages are partially backlogged. The overall inventory cost after taking inflation into account. An algorithm suggested for solving the model, and it is shown using the numerical values of the system parameters. The final step is sensitivity analysis carried out for various parameter values for the system.

Keywords: Demand that depends on time and price; holding cost; partial backlogging; inflation.

ICRTAMC-23-033

AN IMPROVED CRITIC-MULTIMOORA APPROACH FOR KIDNEY TRANSPLANT UNDER PYTHAGOREAN NEUTROSOPHIC

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Abstract: This paper discusses a CRITIC- MULTIMOORA approach in a Pythagorean Neutrosophic environment. A novel score function and distance measure are proposed for a Pythagorean neutrosophic. Using the criteria importance through the inter-criteria correlation (CRITIC) method to determine the Weightage of the objectives. Then the Multi-Objective Optimization on the basis of a Ratio Analysis plus the full Multiplicative form (MULTIMOORA) method is applied to creating a waiting list for kidney recipients. Finally, a numerical example is provided to check the feasibility of the proposed method.

Keywords: Pythagorean neutrosophic fuzzy set, score function, distance measure, multi objective decision making.

ICRTAMC-23-034

MULTI OBJECTIVE - EMERGENCY TRANSPORTATION PROBLEM (MOETP) FOR NEUTROSOPHIC FUZZY USING RUSELL'S APPROXIMATION METHOD (RAM)

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Abstract: In this paper, RAM method is applied to solve a real life MOTP problem. The goal of this paper is to create an optimal solution for a transportation problem with multiple objectives in an emergency situation. The main objective of this problem is to choose the best route for transportation that involves the least amount of money and time, while also maximizing manpower to the affected area with the help of neutrosophic fuzzy environment. Also a case study is provided that utilizes a comparison study with other methods to confirm the effectiveness of this proposed method.

Keywords: Neutrosophic fuzzy set, Multi objective transportation problem, and Rusell's Approximation Method (RAM)

ICRTAMC-23-035

A NEW APPROACH ON FISH FARM AGRICULTURE FIELD UNDER NEUTROSOPHIC ENVIRONMENT

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Abstract: This paper presents a new approach in the modification of the Criteria Importance Through Inter-criteria Correlation (CRITIC) method - Preference Selection Index Method using by the linguistic variables are converted to Neutrosophic set, which is an effective decision making model in a real life environment. The comparative study reveals that the results of the proposed method are more feasible and practical than the existing techniques.

Keywords: Multi-criteria Decision Making, Critic, Preference selection index (PIS) method, Neutrosophic set.

ICRTAMC-23-036

ON SOLVING A MULTI-CRITERIA DECISION-MAKING PROBLEM USING NEUTROSOPHIC SOFT SET AND ITS APPLICATION

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Abstract: In this paper, a new approach for solving a multi-criteria decision-making problem that uses neutrosophic soft matrix is introduced. A solving procedure has been developed by constructing choice matrix, max-min product and comparison matrix. Furthermore, a numerical example is provided to illustrate the feasibility of the proposed method.

Keywords: Neutrosophic soft set, Neutrosophic soft matrix, Max-min product, Choice matrix, Comparison matrix.

ICRTAMC-23-037

AN INTUITIONISTIC FUZZY AND CONTRAST LIMITED ADAPTIVE HISTOGRAM EQUALIZATION BASED LOW-LIGHT COLOR IMAGE ENHANCEMENT TECHNIQUE

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Abstract This paper proposes a new intuitionistic fuzzy-based algorithm for color image enhancement. A unique aspect of the proposed method is determining the degree of hesitation using Yager's intuitionistic fuzzy generator technique. Here a boosting parameter α is used to stimulus the intuitionistic fuzzy image for enhancement technique. In this proposed method, first normal fuzzification transforms the given image into a fuzzy image. Then it is again transferred to an intuitionistic fuzzy image. Finally, one can get the proposed enhanced image after applying contrast limited adaptive histogram equalization. The proposed method is compared with other existing methods like brightness preserving dynamic fuzzy histogram equalization, histogram equalization, contrast limited adaptive histogram equalization, histogram specification approach, dehazing algorithm, intuitionistic fuzzy algorithm, and interval-valued intuitionistic fuzzy algorithm. We got better results through performance analysis like entropy, structural similarity index, absolute mean brightness error, and contrast improvement index. The outcomes uncovered that the proposed technique beats other existing strategies on generally speaking execution measurements and visual quality.

Keywords: Histogram Equalization, Image Enhancement, Intuitionistic Fuzzy Sets.

ICRTAMC-23-038

ANALYSIS OF SHOCK SENSORS TO CAPTURE SUPERSONIC TURBULENCE IN FVM FRAMEWORK

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Abstract: Shock-turbulence interaction is of importance in transonic, supersonic, and hypersonic flows. There exist many methods to simulate discontinuities, the popular being the AUSM scheme[1], which is widely used in commercial tools like ANSYS and research codes. To improve the accuracy of the solution, the traditional way is to incorporate limiters that improve the accuracy of convective terms in the smooth region. However, these limiters are computationally expensive. Improving the accuracy of the solution using shock sensors is widely used in the FD frameworks. This involves detecting the shocks. The shock detector will blend the central difference formulation in smooth regions and shock capturing schemes near discontinuities, generally referred to as hybrid schemes. In this work, the accuracy of the methods to capture supersonic turbulence at Mach number 1.25 will be presented for the classic Taylor-Green vortex problem at a Reynolds number of 1600. Three methods, (a) stand-alone AUSM scheme, (b) AUSM scheme using limiters, and (c) Hybrid scheme, which blends Ducros sensor [2] and AUSM scheme, will be used to compare against the reference solution. These methods are implemented in the in-house automatic source code generation framework OpenSBLIFVM[3], capable of running on CPUs and GPUs. The final paper will detail the Enstrophy and kinetic energy evolution as well as the runtime comparison of the methods using an NVIDIA A100 GPU.

Keywords: Shock sensors, FVM, Hybrid scheme, GPGPU

ICRTAMC-23-039

EFFICIENT PATHFINDING: EXAMINING DIJKSTRA'S AND FLOYD-WARSHALL ALGORITHMS FOR OPTIMAL NAVIGATION IN GOOGLE MAPS

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Abstract: Effective navigation in systems like Google Maps relies on efficient path planning. Two widely employed shortest path algorithms, Dijkstra's and Floyd-Warshall, play vital roles in various domains, including Google Maps. This paper offers a comprehensive comparison of these algorithms, shedding light on their strengths and limitations within the context of Google Maps. Our implementation in Python includes GUI applications, showcasing the versatility of these algorithms. Dijkstra's algorithm excels in finding the shortest path between a user's current location and a destination, while the Floyd-Warshall algorithm precomputes all-pairs shortest paths for quick responses to user queries regarding routes between arbitrary locations in Google Maps.

ICRTAMC-23-040

IMPLEMENTATION OF GENETIC ALGORITHM WITH DISCRETE TESTSUITE IN FUNCTIONAL TESTING

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Abstract: Software testing is crucial for ensuring the quality of a product, but it can be time-consuming and expensive. The more thorough the testing, the better the product will be. However, testing can also be costly because it requires people to work diligently to find and execute the test suite. It's impossible to guarantee that any software is completely free of bugs, and it's difficult to determine if the testing that has been done is sufficient. Optimizing the test suite is important to make testing more cost-effective. Heuristic algorithms can help with this optimization, and genetic algorithms can play a significant role in achieving a sound weight on the optimization of the test suite.

Keywords: Genetic Algorithm, crossover, mutation, selection, stratified sampling.

ICRTAMC-23-041

FACE DETECTION USING PROBABILISTIC NEURAL NETWORK

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Abstract: Detecting the presence of faces in images is the first step of any face-processing system. However, face detection is a challenging task in image processing due to the variations in scale, location, orientation, pose, facial expression, occlusion, and lighting conditions. To address this issue, a novel approach based on a Probabilistic Neural Network (PNN) has been developed. This method uses YCbCr color space for segmentation, as it provides better reliability in complex backgrounds than HSV color components and is less affected by changes in lighting conditions than RGB components. The PNN is trained with 546 skin color images of the face and non-face areas at a resolution of 15x15 in the training database. The class 'face' includes properly chosen frontal and some side face areas, while the class 'non-face' includes all other regions.

Keywords: Image processing, Face detection, Probabilistic Neural Network, RGB color space

ICRTAMC-23-042

DETECTING MENTAL HEALTH OF THE PEOPLE USING SOCIAL MEDIA DATA POSTING

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Abstract: Many people worldwide experience one or more mental disorders that affect how they think and behave. Detecting these problems early is challenging but crucial, as it can help individuals get treatment before their condition worsens. One approach is to observe how people communicate, including their writing style and the emotions they express on social media. This study examines two computational methods designed to understand and track the emotions conveyed by users on social media platforms. We analyzed two recent public datasets related to two major mental disorders: depression and anorexia. The results show that these methods effectively capture emotions and their variations, enabling the identification of important insights about social media users dealing with depression or anorexia. Additionally, combining both methods improves accuracy, reaching a performance level similar to the best-known approach for depression and falling just 1% short of the leading method for anorexia. Moreover, these methods enhance the interpretability of the findings.

Keywords: Δ−BoSE, Stochastic Neighbor Embedding, post-traumatic stress disorder (PTSD), seasonal affective disorder (SAD).

ICRTAMC-23-043

[1,2]-COMPLEMENTARY INDEPENDENT DOMINATION NUMBER FOR SPECIAL GRAPHS

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Abstract: A set $\mathbf{S \subseteq V(G)}$ in a graph G is said to be [1, 2]- complementary independent dominating set, if for every vertex $\mathbf{v \in V - S}$, $\mathbf{1 \leq |N(v) \cap S| \leq 2}$ and $\mathbf{< V - S >}$ has no edge. The minimum cardinality of [1, 2]-complementary independent dominating set ([1, 2]ci-set) is called [1, 2]-complementary in-dependent domination number and is denoted by $i_{[1,2]c}(G)$. In this article, we discussed about [1, 2]-complementary independent domination number of some special types of graphs.

Keywords: Independent domination, [1,2]-sets, [1,2]-domination, [1,2]-complementary independent domination.

ICRTAMC-23-044

CONTROLLABILITY AND OBSERVABILITY OF ADJOINT SYLVESTER MATRIX DYNAMIC IMPULSIVE SYSTEMS ON TIME SCALES

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Abstract: In this paper, the solution for controllability and observability of the time-varying adjoint matrix Sylvester dynamic impulsive systems on time scales are studied. A vectorization operator is employed to transform the system into an equivalent Kronecker product dynamic impulsive system. The necessary and sufficient condition for adjoint matrix of controllability and observability of impulsive dynamic system on time scales with Gramian matrix results are presented.

Keywords: Controllability, observability, Kronecker product, Time scales.

ICRTAMC-23-045

CONTROLLABILITY WITH CONSTRAINED SYLVESTER MATRIX DYNAMIC SYSTEM ON TIME SCALES

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Abstract: The current paper is about the investigation of Controllability for linear control time-varying system is analysed in the context of convex target sets on time scales. A vectorization operator is employed to transform the system into an equivalent Kronecker product dynamic system. Local controllability with constrained controllers for sufficient conditions and Necessary conditions of dynamic Lyapunov system on time scales. We use the separation theorem used to obtain the main results.

Keywords and phrases: controllability with constrained control; separation theorem; time-varying control system; time scale.

ICRTAMC-23-046

THE FLOW OF A VISCOUS LIQUID AROUND A PROLATE SPHEROID IN A BRINKMAN FLOW REGIME WITH UNIFORM FAR-FIELD STREAMING

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Abstract: In this paper, we explore the flow of a viscous liquid past a prolate spheroid submerged in a porous medium. We assume that the prolate spheroid is immersed within a porous medium, where the viscous flow is governed by the Brinkmann equation. Our objective is to derive expressions for the velocity and pressure fields, as well as determine the drag experienced by the spheroid in this context. The flow field variables are expressed in terms of Legendre functions, Associated Legendre functions, and Prolate angular and radial spheroidal wave functions. To ensure physical realism, we enforce the no-slip condition on the spheroid's surface and impose the condition of regularity on the flow field. We approach this problem analytically, solving it rigorously, and then proceed to analyze the numerical variations in drag. Our findings are presented graphically to provide a visual representation of these variations."

Keywords: viscus, prolate, spheroid, Legendre functions, drag

ICRTAMC-23-047

MATRIX TRANSFORMATION ON ALMOST INCREASING SEQUENCE

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Abstract: In this paper, a main theorem dealing with absolute weighted arithmetic mean summability factors of infinite series and Fourier series to the $|\boldsymbol{A}, \boldsymbol{p_n}; \boldsymbol{\delta}|_{\boldsymbol{k}}$ summability method by a using almost increasing sequence.

Keywords: Summability factors; Absolute matrix summability; Fourier series; Infinite series; H*ö*lder inequality; Minikowski inequality.

ICRTAMC-23-048

A NEW METHODOLOGY TO SOLVE FUZZY UNCONSTRAINED OPTIMIZATION PROBLEMS BY QUASI NEWTON'S DAVIDON-FLETCHER-POWELL METHOD

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Abstract: Fuzzy set theory is not a philosopher's stone, which solves all the problems that confront us today. But it has considerable potential for practical and for mathematical applications. As basic building stone of this research, the primary focus is on finding new algorithm on fuzzy numbers to apply them in the fuzzy number involved unconstrained Optimization problems in real – life applications It is also briefly overviewed its background, main problems, methodologies, and recent developments. The secondary focus is on the application of fuzzy numbers in various unconstrained optimization problems. A new methodology is proposed for solving unconstrained optimization problems by Quasi Newton's DFP method with Triangular, Trapezoidal, intuitionistic triangle and Intuitionistic trapezoidal Fuzzy number coefficients. The modified interval arithmetic operations are utilized to solve the reduced fuzzy interval number coefficients at different levels of $\boldsymbol{\alpha}$ −cuts and $\boldsymbol{\beta}$ −cuts. A real life example is provided to demonstrate the effectiveness of the proposed algorithm and MATLAB programs are also developed to check the validity of the proposed method with outputs.

Keywords: Fuzzy numbers, Intuitionistic fuzzy set(IFS), Quasi Newton's method(QN), DFP method, Unconstrained Optimization(UO), Modified Interval Arithmetic operation(MIAO).

ICRTAMC-23-049

APPLICATIONS OF SECOND-ORDER DIFFERENTIAL SUBORDINATION FOR A CLASS OF ANALYTIC FUNCTIONS

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Abstract: In this paper, we introduce a new class of analytic functions by using the Mittag-Leffler Poisson distribution series and obtain some applications of second-order differential subordination results of those analytic functions**.**

Keywords: Analytic, Convex, Subordination, Poisson distribution series.

ICRTAMC-23-050

A METHODOLOGY TO PROPOSE NEUTROSOPHIC BASIC PROBABILITY ASSIGNMENT IN NEUTROSOPHIC EVIDENCE SET

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Abstract: Many data fusion application systems make use of the $\mathcal{DS}$ –theory. In evidence theory, determining Basic Probability Assignment is still a work in progress. A method for locating Neutrosophic Basic Probability Assignment in a Neutrosophic set is proposed in this study. Finally, a numerical example demonstrates the cogency of the planned strategy.

Keywords: Dempster Shafer Theory, Neutrosophic evidence sets, Combination rule, Basic Probability Assignment.

ICRTAMC-23-051

FUZZY TRANSPORTATION PROBLEM USING TRAPEZOIDAL FUZZY NUMBERS WITH ERROR BY USING NEWTON'S DIVIDED DIFFERENCE INTERPOLATION

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Abstract: In the transformation of a well-defined transportation problem into a fuzzy counterpart, a symmetric trapezoidal fuzzy number denoted as (x - 2d, x-d, x + d, x+2d) is employed. In this context, x signifies the precise transportation cost, while d represents the level of fuzziness or uncertainty inherent in the transportation cost. The variation of d yields a spectrum of fuzzy transportation costs. To assess the accuracy of the crisp transportation problem, we calculate and validate the error using a general interpolation formula.

Keywords: Fuzzy, Transportation, Ranking, Trapezoidal, Interpolation

ICRTAMC-23-052

CTATD NUMBER FOR POWER GRAPH OF STANDARD GRAPHS

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Abstract: Recently the concept of *CTAT D*(*G*) introduced by G Mahadevan et al [2]. A set $S \subseteq V$ is called an complementary triple connected at most twin dominating set (*CTAT D*(*G*)), if every vertex $v \in V - S$, $1 \leq |N(v) \cap S| \leq 2$ and $< V - S >$ is triple connected. The minimum cardinality taken over all the complementary triple connected at most twin domination number of G and is denoted by *CTAT D*(*G*). The authors obtained this number for many peculiar types of Graphs and discussed some nice results. In this article We examine this parameter for the power graph of standard graphs.

Keywords: triple connected, [1,2] dominating set, triple connected domination number.

ICRTAMC-23-053

ON SOLVING NEUTROSOPHIC LINEAR AND NONLINEAR AS A NEUTROSOPHIC FUZZY LINEAR COMPLEMENTARITY PROBLE

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Abstract: In this paper, a new approach for solving the neutrosophic quadratic programming problem (NQPP) is suggested. Here, all the fuzzy coefficients in the objective functions and constraints are replaced by single-valued triangular neutrosphic numbers. We formulate other existing programming problems, such as the linear programming problems and the quadratic programming problems, into the linear complementarity programming problems and, hence, solve them using a solution algorithm for the LCP. Real-life applications taken from linear programming problems (LPP) and quadratic programming problems (QPP) are then used to demonstrate the elegance, precision, and utility of these Complementarity programming problems (LCP).

Keywords: Fuzzy Quadratic programming problem, Fuzzy Linear Complementarity problem, Single valued Triangular Neutrosophic Number, Lemke's method

ICRTAMC-23-054

ALGORITHMS TO CONVERT A COMPLETE GRAPH INTO AN ID-GRAPH

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Abstract: A red-white colouring of a connected graph G of diameter d is obtained by assigning the colours red and white to the vertices of the graph such that there should be at least one red-coloured vertex. Then, every vertex $v \in V(G)$ is assigned a vector of length d called code of the vertex v, in which the value of ith coordinate is equal to the number of red-coloured vertices at distance i from the vertex v in the graph G. This is denoted as $\overrightarrow{dv}$. A red-white colouring of G in which $\overrightarrow{dv}$ is different for every $v \in V(G)$, then such a red-white colouring is called an ID-colouring. A graph which has an ID-colouring is called an ID-graph. The minimum number of red-coloured vertices required to get an ID-colouring is called the ID-number. In this paper, we explore the ID-Colouring for subdivided star graphs (star-like trees) where there are $2k-1$ paths of length $k>1$ and 2 paths of length 1. Extending from the philosophy used for this, we generate algorithms to convert a complete graph $Kn$to ID-graph by bridging paths to $n-2$ vertices. Four different algorithms are explained in this paper.

Keywords: Distance, Colouring, Vertex Identification, Algorithms

ICRTAMC-23-055

GENERATION OF FRACTALS IN NEUTROSOPHIC METRIC SPACES

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Abstract: This paper introduces a novel deterministic fractal, the neutrosophic fuzzy fractal, utilizing the Iterated Function System (IFS) and the Hutchinson-Barnsley theory. By employing a finite set of neutrosophic contractive mappings over a neutrosophic metric space, we demonstrate the existence of these fractals using the neutrosophic Banach and Edelstein contraction theorems. This research provides a mathematical foundation for the presence of fractal structures in neutrosophic metric spaces, opening avenues for applications in diverse scientific fields.

Keywords: Fractals; Iterated Function System; Contraction; Fuzzy Metric Space; Neutrosophic Metric Space; Precompact.

ICRTAMC-23-056

SURFACE ROUGHNESS EFFECT ON POROUS PIVOTED SLIDER BEARINGS WITH SQUEEZE FILM FORMED BY COUPLE STRESS FLUID

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Abstract: The study intends to investigate the problem of surface roughness effects on porous pivoted slider bearings with squeeze film formed by couple stress fluid. On the basis of the microcontinuum theory, the modified Reynolds' type equation of porous slider bearing is obtained by considering rough surface and squeezing action. The closed-form expressions for the mean pressure, load carrying capacity, frictional force and centre of pressure are obtained. Capacity for load bearing and point where pressure is centred are evaluated in form of various parameters that are couple stress, permeability and surface roughness. It is conclude that capacity for load bearing increases with roughness and decreases with increase in permeability parameters. Normal behaviour of exists for surface roughness parameters with pressure and pressure with permeability parameters. Computed values of load capacity, frictional force and coefficient of friction are displayed in graphical form.

Keywords: Porous, Squeeze film, Couple stress, Slider bearing.

ICRTAMC-23-057

FUZZY MULTIVARIATE POLYNOMIAL FIT: AN EFFECTIVE FABRICATION OF PECTIN DEGRADING FE3-O4-SIO2 NANOBIOCATALYST ACTIVITY

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Abstract: This study focus to derive linear and higher order polynomials using mathematical methods such as Fuzzy Multivariate Lagrange's Interpolating Polynomial (FMLIP) and Method of Fuzzy Multivariate Least Square (FMLS). Firstly, the practical data have been converted into a set of Triangular Fuzzy Numbers (TFN). TFN is the set of inputs to the polynomials derived by these methods. This proposed study is applied to an "effective fabrication of Pectin degrading Fe_3-O_4-SiO_2 Nanobiocatalyst activity (IU/mg)" in chemical engineering application. An objective of these polynomials with respect to an ordered pair of three independent variables namely pH value, pectinase loading (pL), temperature (temp) and the nonobiocatalyst activity is the dependent variable. These derived multivariate polynomials are statistically validated by testing of hypothesis. Fuzzy polynomials provides a maximum optimal solution and it is compared to an experimental study. Finally, the maximum activity calculated by FMLIP method for deriving linear polynomial is 58.64 with immobilization parameters are pH=4, pL=250 and temp=4^0C; whereas in FMLS method the maximum activity 58.64 with pH=4, pL=250 and temp=4^0C. These results are compared to canonical method with maximum activity is 58.64 with pH=4, pL=250 and temp=4^0C. Statistical validation of this study provides a good precision of results within the acceptable range. Comparisons of both mathematical methods concludes that the FMLIP method is better than FMLS method.

Keywords: Triangular Fuzzy Numbers, alpha-Cuts, Multivariate Lagrange's Interpolation Polynomial, Method of Multivariate Least Square, Testing of Hypothesis, Normal Curve Fit.

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ASSESSMENT OF NONLINEARITY FOR UNDERWATER TARGET TRACKING APPLICATION USING DATA FUSION TECHNIQUES

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Abstract: The magnitude of the nonlinearity, for the bearings – only tracking in sonar's passive mode of operation, is found using measure of nonlinearity (MoN) that has been presented recently. Based on the filter's covariance matrix, the MoN is formulated. In this research, the MoN allowed is computed through the capability of filter performance, along with the parameters of the target motion estimation with superior precision. Furthermore, the values of MoN with various techniques adopted for filtering undergone estimation against bearings – only tracking. Monte Carlo simulation results are presented for evaluation of the process.

Keywords: Measure of Non-linearity, Measurement fusion, Target tracking, Estimation theory, Nonlinear systems

ICRTAMC-23-059

AN ANALYSIS OF DISPARATE OPTIMIZERS IN PERSPECTIVE OF DENSENET

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Abstract - The agricultural industry is widely regarded as the most crucial sector for human civilization as it effectively fulfills all essential prerequisites for human development. Plants, which provide sustenance, medicinal properties, and other fundamental necessities, are widely recognized as a fundamental contributor to human well-being. The occurrence of diseases resulting from the interaction between plants and various pathogens, such as viruses and bacteria, can lead to a decrease in crop yield. Consequently, it is imperative to implement preventive measures and undertake appropriate actions to mitigate the impact of these diseases. Precisely identifying and diagnosing these potentially fatal infections constitutes a crucial initial measure for both the agricultural sector and farmers. In the domain of image recognition and classification, there has been significant progress in the advancement of Convolutional Neural Network (CNN) and deep learning techniques as a whole. The performance of a CNN model can be influenced by various factors, such as the dataset's size, the number of classes, the model's weights, hyperparameters, and optimizers, among other considerations. The popularity of transfer learning and fine-tuning a pre-trained model has been steadily increasing due to the numerous benefits they offer. Various model optimization methods have been extensively examined in the existing literature. The Adam, Stochastic Gradient Descent (SGD), Mini Batch Gradient Descent, and Adagrad optimizers are commonly utilized for optimizing CNN models. This study examines the impact of the four aforementioned optimizers on the performance of the CNN model, specifically Densenet. The fine-tuned CNN models are trained over 15 epochs using the aforementioned optimizers on a plant village dataset that was constructed by manually selecting hundreds of images. The experiment employed a learning rate of 0.001, and the training and validation loss were computed using categorical cross entropy. Comparatively comparing optimisers can be facilitated by plotting the training accuracy and training loss against the number of epochs.

Keywords*:* Densenet, Deep Learning Optimizers, Image classification, Plant disease detection, Convolutional Neural Networks

ICRTAMC-23-060

MULTIPLIERS OF GE-ALGEBRAS

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Abstract: The concept of multipliers is introduced in GE-algebras. Some fundamental properties to GE-algebras are studied. The notion of a generalized multiplier is introduced in GE-algebras and consider the properties of generalized multipliers. Also, we introduced the notion of a normal filter in GE-algebras. Moreover, we proved that if F is a generalized multiplier of a GE-algebra, then $KerF$ is a normal filter.

Keywords: GE-algebra, filter, normal filter, multiplier, generalized multiplier, and isotone.

ICRTAMC-23-061

ANALYTICAL STUDY OF GROUND DEFORMATION DUE TO A SUDDEN MOVEMENT OF AN INTERACTING DIP-SLIP FAULT SITUATED IN VISCOELASTIC HALF-SPACE OF STANDARD LINEAR SOLID (SLS)

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Abstract: In seismically active regions, faults rarely occur individually but as sets or networks, with the arrangement of these faults producing a variety of different fault interactions. However, in general, the movement of the earthquake faults are both in strike and down-dip directions. In this study, the ground deformation due to sudden interaction between finite and infinite dipslip fault situated in a visco-elastic half-space of Standard linear solid (SLS) has been established. Based on integral transform and Green's function technique, the displacement and stress-strain components are obtained. The significant effects of various effecting parameters viz. inclinations of the faults, velocity of fault movements and depth of the fauts from the free surface has been illustrate graphically. Computational outcomes reveal that fault movement and fault geometry have a significant effect on the stress, strain and displacement components in the localized area of the fault plane.

ICRTAMC-23-062

HY TRANSFORM FOR THE SOLUTION OF ABEL'S INTEGRAL EQUATION

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Abstract: In last few days, integral transforms play important role in solving differential equations, integral equations. Lot of integral transforms are introduced by various researchers. HY transform is recently developed integral transform. Many researchers used various methods for obtaining the solution of Abel's integral equation. In this paper we solve Abel's integral equations by using HY Integral transform.

Keywords: Integral Transforms, Integral Equations, HY transform, and Abel's Integral Equations.

ICRTAMC-23-063

ENHANCING VEHICLE IOT SECURITY THROUGH MATRIX POWER FUNCTIONS IN SUPERTROPICAL SEMIRING

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Abstract: The growing ecosystem of Internet of Things (IoT) devices in the automotive industry demands innovative solutions for secure communication and data exchange. In this context, we present a novel lightweight symmetric key exchange protocol based on matrix power functions, employing the supertropical semiring as a platform. This protocol offers a unique and robust approach to ensuring the confidentiality and integrity of data transmission in Vehicle IoT (VIoT) devices. In this paper, we detail the theoretical foundations of our protocol, explaining the mathematics behind supertropical semirings. We also describe the algorithm of key exchange process, highlighting its efficiency and security features. Furthermore, we demonstrate the feasibility and performance of our protocol through extensive simulations and experimentation analysis.

Keywords: Key exchange, Semirings, Symmetric cryptography, Vehicle IoT.

ICRTAMC-23-064

A TROPICAL UPPER TRIANGULAR KEY EXCHANGE PROTOCOL FOR INTERNET OF MEDICAL THINGS

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Abstract: As the Internet of Medical Things (IoMT) continues to evolve, ensuring the security and privacy of sensitive health data becomes very crucial. This paper introduces a novel cryptographic key exchange protocol specifically designed for IoMT environments based on tropical upper triangular matrices. Tropical algebra is a mathematical structure that provides a unique perspective on algebraic operations, emphasizing the concept of idempotent semirings and their applications. In particular, tropical upper triangular matrices hold a special place within this context, offering intriguing properties that set them apart from their classical counterparts. The tropical upper triangular structure ensures that the exchanged keys remain resistant to common cryptographic attacks while optimizing computational resources. The experimental By combining the strengths of tropical algebra with cryptographic principles, this protocol offers a robust and scalable approach to key exchange, contributing to the ongoing efforts to enhance the security infrastructure of IoMT systems.

Keywords: Cryptography, Internet of Medical Things, Key exchange protocol.

ICRTAMC-23-065

ENERGY OF K-UNIFORM HYPERSTAR

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Abstract: This paper is focussed on the derivation of energy of special type of hypergraph known as k uniform hyperstar. As energy is related to stability and is the sum of absolute of the eigen values, its adjacency matrix is examimed closely. It is interesting to see that -1 is an eigen value of all k-uniform hyperstar. Here we also specially find other eigen values too. All these results are strengthened through examples.

Keywords: k-uniform hyperstar, eigen values, determinant, block matrix.

ICRTAMC-23-066

INDEPENDENCE POLYNOMIAL AND INDEPENDENCE DENSITY OF HYPERSTAR

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Abstract: In this paper the recurrence relation of independence polynomial of hypergraph using some hypergraph operations on vertices and hyperedges are explained in detail. The binary tree representation using the recurrence relation is described and showed how to derive the independence polynomial of hypergraph through it. Further the recurrence relation of independence density of hypergraph on vertex operation is established along with its binary tree representation method. Finally, these representation helps to derive the independence polynomial and independence density of k-uniform hyperstar and hyperstar.

Keywords: hypergraph, k-uniform hyperstar, independence polynomial, hyperstar, independence density.

ICRTAMC-23-067

OBSERVATIONS ON TERNARY QUADRATIC DIOPHANTINE EQUATION $y^2 + 5x^2 = 14z^2$

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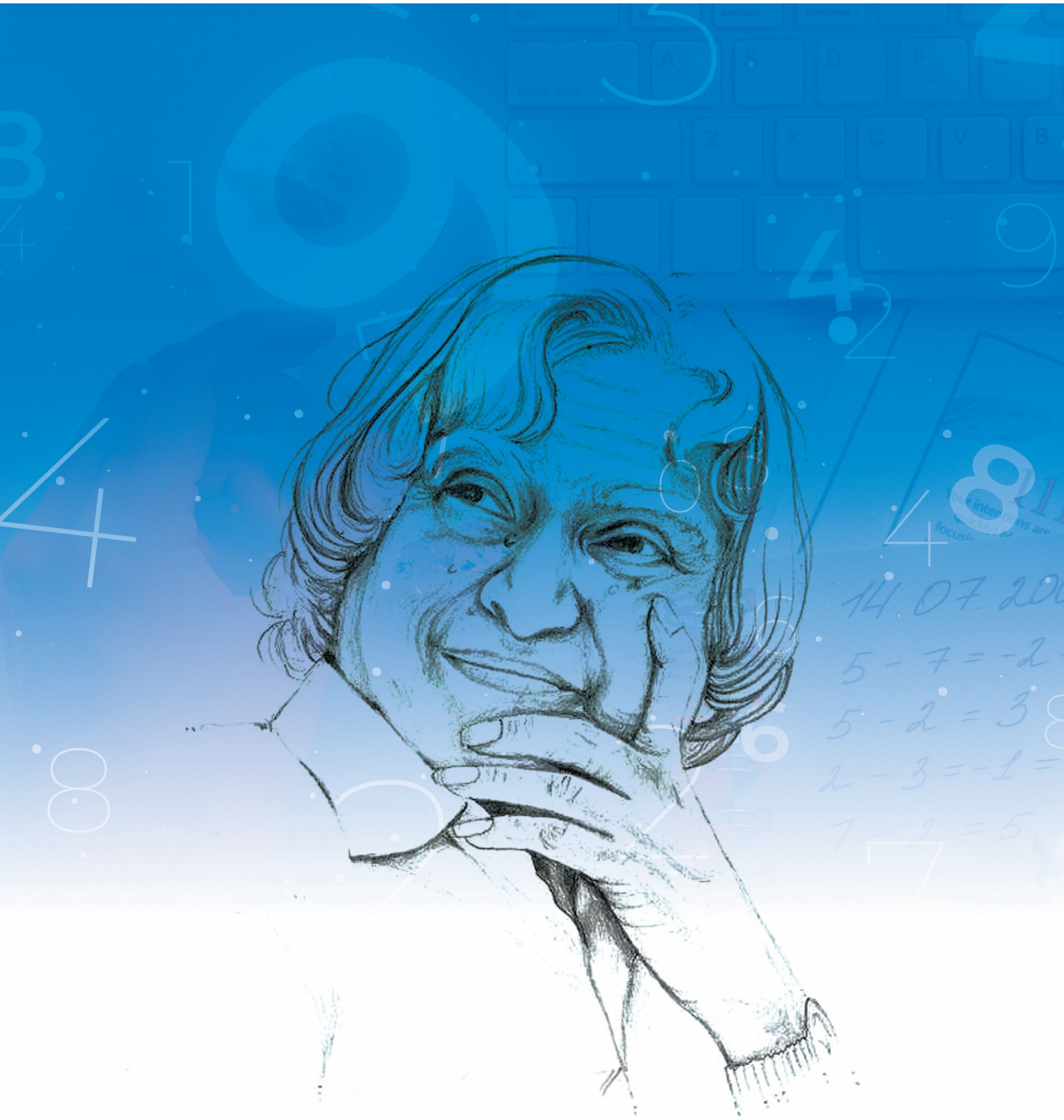
Abstract: This paper aims at determining non-zero distinct integer solutions to the homogeneous cone represented by the ternary quadratic Diophantine equation $y^2 + 5x^2 = 14z^2$. Different sets of integer solutions are obtained by applying the method of factorization and also, through employing the linear transformations. Given an integer solution, formulae for getting sequence of solutions based on the given solution are illustrated.

Keywords: Ternary quadratic, Homogeneous quadratic, Integer solutions



Teaching is a very noble profession that shapes the character, caliber, and future of an individual. If the people remember me as a good teacher, that will be the biggest honour for me

-A P J Abdul Kalam