ICRAAM 2020

International Conference on Recent Advances in Applied Mathematics 2020

4 - 6 February 2020 | Kuala Lumpur | MALAYSIA

PROGRAMME & ABSTRACT BOOK

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Jointly Organised by:

Institute for Mathematical Research (INSPEM), Universiti Putra Malaysia

Department of Mathematics, Faculty of Science, Universiti Putra Malaysia

COMSATS University Islamabad, Pakistan

http://einspem.upm.edu.my/icraam2020

ICRAAM 2020

International Conference on Recent Advances in Applied Mathematics 2020

Jointly Organised by:

UPM

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4 - 6 February 2020 | Kuala Lumpur | MALAYSIA

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MESSAGE FROM THE CHAIRMAN OF BOARD OF DIRECTORS, UPM

Assalamualaikum W.B.T. and Greetings

First and foremost, it is a great privilege and pleasure for me to welcome the Keynote Speaker, Plenary Speakers and all participants of the International Conference on Recent Advances in Applied Mathematics 2020 (ICRAAM2020). I congratulate the organisers, Institute for Mathematical Research (INSPEM) with the Department of Mathematics, Faculty of Science, Universiti Putra Malaysia and COMSATS University, Islamabad, Pakistan for their great first collaborative effort in putting together this event and further promoting the relevance of applied mathematics in the current era of digitisation.

Universiti Putra Malaysia (UPM) being the premier institution of higher education in the country and as a Research University, will continue to work together with other world leading universities, agencies and industries to give meaningful impact towards wealth creation, nation building and universal human advancement, through exploration and dissemination of knowledge, involving experts and researchers within the country and abroad. In this respect, ICRAAM2020 will provide a platform for the expansion of the exploration and research in the field of applied mathematical sciences.

I hope this conference will provide an avenue for the participants to discuss new ways and innovative approaches in the compilation and usage of applied mathematics to produce dynamic inference, analysis and decision-making. I believe that fruitful discussions will be achieved during these three days, and I am sure that this conference will strengthen collaborative research and networking among the participants. Finally, have a wonderful and meaningful conference!

Thank you and best wishes.

"WITH KNOWLEDGE WE SERVE"

Tan Sri Dr. Ghauth Jasmon
Chairman
Board of Directors
Universiti Putra Malaysia

MESSAGE FROM THE VICE CHANCELLOR OF UPM

Assalamualaikum w.b.t. and Greetings!

On behalf of Universiti Putra Malaysia (UPM), it gives me great pleasure to welcome all of you to the International Conference on Recent Advances in Applied Mathematics 2020 (ICRAAM2020). Selamat Datang!

The Institute for Mathematical Research (INSPEM) is one of the research institutes in UPM that has been undertaking the responsibility of spearheading high-end research in mathematical sciences. Mathematical sciences are important disciplines which carry out advanced analytical approaches to help solve related problems and make better decisions.

In this respect, I would like to congratulate INSPEM, Department of Mathematics, Faculty of Science, UPM and COMSATS University Islamabad, for taking the initiative in jointly organizing the ICRAAM2020. It is hoped that the hosting of this conference would serve as a platform for sharing ideas and research findings as well as to strengthen research collaboration among the participants of ICRAAM2020. This conference provides room to the participants to discuss the challenges and applications in Applied Mathematics including Cosmology, Fluid Dynamics, Geometric Numerical Integration, Numerical Computation, Difference Equations, Numerical Analysis, Statistics, Operational Research and many more.

To the distinguished keynote and plenary speakers, I would like to express my appreciation for sharing their research experiences with the participants. To all participants, I would like to urge that you actively participate and engage throughout the conference by contributing your ideas and insight. I would like to congratulate the committee members of ICRAAM2020 for organising this conference. I sincerely hope that all of you will also have an enjoyable stay in Kuala Lumpur and get to experience the warmth Malaysian hospitality.

Thank you.

“WITH KNOWLEDGE WE SERVE”

Prof. Datin Paduka Setia Dato' Dr. Aini Ideris
Vice Chancellor
Universiti Putra Malaysia

MESSAGE FROM THE CHAIRMAN OF ICRAAM2020

Assalamualaikum W.B.T.

Firstly, I would like to welcome the delegates to the International Conference on Recent Advances in Applied Mathematics 2020 (ICRAAM2020).

The Institute for Mathematical Research (INSPEM) and Department of Mathematics, Faculty of Science, Universiti Putra Malaysia with the COMSATS University, Islamabad, Pakistan are delighted to co-organise ICRAAM2020. This is the first conference which we co-organise together. The focus and objectives of ICRAAM2020 is striving to uplift mathematical sciences to higher levels of knowledge and research in various field of mathematics.

We are working towards a fruitful conference where fertile exchange of information on the latest findings in the ever-changing field of Applied Mathematics will take place. This conference aims to provide a platform for academicians, researchers and students to present latest advances and new ideas in Applied Mathematics field. We hope that all participants will take this opportunity to immerse and participate actively in the exchange between themselves and distinguished speakers and researchers. This knowledge sharing presents opportunities for potential research collaborations among local and international participants. I would like to express our gratitude to the sponsors for all the support generously given by them. We also wish to express our thanks to all committee members for their immense efforts in making this conference a success.

Thank you.

"WITH KNOWLEDGE WE SERVE"

Prof. Dr. Adem Kilicman
Chairman
International Conference on Recent Advances in Applied Mathematics (ICRAAM2020)

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GENERAL INFORMATION

Climate

Protected by the Titiwangsa Range in the east and Indonesia's Sumatra Island in the west, Kuala Lumpur is safe from strong winds and has a tropical rainforest climate (Köppen climate classification Af), which is warm and sunny, along with abundant rainfall. Temperatures tend to remain constant. Maximums hover between 32 and 35 °C (90 and 95 °F), while minimums hover between 23.4 and 24.6 °C (74.1 and 76.3 °F). Comfortable clothing of natural fibre is best worn in our climate.

Time Difference GMT +8:00

Language

Even though *Bahasa Malaysia* is the national language, English are also widely spoken throughout the country. In the local market in Kuala Lumpur, local Malay and other ethnic languages are being used daily. Meanwhile, Mandarin is the medium of instruction in Chinese medium schools, the Chinese also speaks several dialects such as *Hokkein, Hakka, Foochow, Teochew,* and *Cantonese*.

Electricity

The voltage used in Malaysia is 230/240 volts -50hz. If your electrical appliance uses 110/120 volts, you need to use a transformer/converter to step down the 230/240 volts Malaysian voltage to your 110/120 volt appliance. Failing to do so will damage your electrical appliances. Malaysia uses the British Standard BS1363 domestic AC power plugs and sockets.

Currency

Ringgit Malaysia or MYR is the official currency of Malaysia with note available in RM100, RM50, RM20, RM10, RM5 and RM1 while 50sen, 20sen, 10sen, and 5sen are available in coins. Banks, 24-hour ATMs and money changers are found in main airports and urban centers. Major credit card (VISA and MasterCard) are widely accepted, but cash is preferred for small amounts. International Banks like HSBC, Citi Bank, Standard Chartered and OCBC can be found in larger cities.

Religion

Islam is the official religion of Malaysia. Even though the residents of Kuala Lumpur are of different races and belief, they are able to live in peace and harmony. As a multi-religious society, it is common to see mosques, churches and temples built close to each other. Some of the major religious structures in Kuala Lumpur are the National Mosque of Malaysia in Jalan Perdana, the St Mary and St Joseph's Cathedrals in the city centre and the Thean Hou Temple in Seputeh. There are also several Hindu, Sikh, Buddhist and Taoist temples in and around the city.

Working Hours Which All Malaysians Follow

Most business premises are open Mondays to Fridays from 9am to 5pm. Shopping centers and arcades are usually open from 10am to 10pm on a daily basis.

GUIDELINES FOR SESSION CHAIRS

The role of the Chair is to coordinate and ensure the smooth running of the session. The Chair shall:

- Contact the presenter before the session, to verify who will present and to preempt any technical problems.
- Begin and end each session on time.
- Introduce the presenter and the title of each presentation.
- Ensure that presentations are made in the order shown in the program, to allow participants to jump between sessions. If a presenter cancels or does not attend, schedules should be respected rather than pushing every talk forward.
- Complete the session attendance form (there will be forms in the room).
- When appropriate, produce visual warnings to presenters as to the number of minutes (e.g., 5, 2) left by using simple gestures or prepared cards.
- Ask for questions and thank the presenters.

IMPORTANT NOTE:

We ask Session Chairs to notify us about last minute changes or cancellations; these changes will be posted outside the session rooms.

Language	Lunches	Refreshments
Official language is English. No simultaneous translation will be provided.	Lunches will be served at the Makan Kitchen Restaurant. You are kindly required to wear your badge and bring along your meal coupon. Vegetarian food is available.	Coffee, tea and bottled waters will be available during the conference. Refreshments will be served twice daily.

GUIDELINES FOR PRESENTERS

Audio - Visual Services

All session rooms will be equipped with LCD video projectors and laptops. You may use your own laptop to ensure that you will make your presentation with the right version of the software and fonts installed, so that it looks like what you have planned and designed.

Please follow these guidelines to ensure a successful presentation:

- Bring your laptop along with power supply cord to your session.
- You may need an adapter to connect your computer to the local voltage and wall plug type.
- If your laptop is a MAC, bring the required adapter for the external video output.
- Arrive at your session at least 10 minutes before it begins. All presenters in a session should set up and test the connection to the projector before the session begins.
- We encourage presenters to put their presentations on a USB pen drive as a backup.

Presenter Information

The location of your session is shown in the Parallel Session Schedule section of this book. Please be on time for your session, check-in with the session chair, and test the AV equipment.

Time your presentation to fit the allotted time, including time for questions and audience participation. Presentations should be limited to key issues along with a brief summary. Feel free to bring along copies of your paper to distribute or to provide a handout with related information.

For assistance during your session

One or more session assistants will be available at each room. If you have any problems in your session room related to AV needs or if you have any other requests, addresses a session assistant in the area to ask for assistance.

MASTER

PROGRAMME

MASTER PROGRAMME

3 FEBRUARY 2020 (MONDAY)

Time		Venue
20:00 — 22:00	Pre-Conference Registration	Ballroom Foyer

4 FEBRUARY 2020 (TUESDAY)

Time		Venue
08:00 — 09:00	Morning Tea and Registration	Ballroom Foyer
09:00 — 10:40	Parallel Session 1A Parallel Session 1B Parallel Session 1C	Ballroom B Rafflesia Peony
10:40 — 11:00	Refreshment	Ballroom Foyer
11:00 — 12:00	**Keynote Address** : **Prof. Dr. Mohammad Mursaleen** Aligarh Muslim University, INDIA **ON SOME APPLICATIONS OF MEASURES OF NONCOMPACTNESS** *Chairperson: Prof. Dr. Fudziah Ismail*	Ballroom B
12:00 — 12:45	**Opening Ceremony**	Ballroom B
12:45 — 14:30	Lunch	Makan Kitchen
14:30 — 16:50	Parallel Session 2A Parallel Session 2B Parallel Session 2C	Ballroom B Rafflesia Peony
16:50	Refreshment	Ballroom Foyer

MASTER PROGRAMME

5 FEBRUARY 2020 (WEDNESDAY)

Time		Venue
08:30 — 09:00	Morning Tea	Ballroom Foyer
09:00 — 10:20	Parallel Session 3A Parallel Session 3B Parallel Session 3C	Ballroom B Rafflesia Peony
10:20 — 10:40	Refreshment	Ballroom Foyer
10:40 — 11:20	**Plenary Session 1** : **Prof. Dr. Arjun Kumar Rathie** Rajasthan Technical University, INDIA **GENERALIZATION OF CLASSICAL SUMMATION THEOREMS FOR THE HYPERGEOMETRIC SERIES 2F1 WITH APPLICATIONS** *Chairperson: Prof. Dr. Adem Kilicman*	Ballroom B
11:25 — 12:45	Parallel Session 4A Parallel Session 4B Parallel Session 4C	Ballroom B Rafflesia Peony
12:45 — 14:30	Lunch	Makan Kitchen
14:30 — 15:10	**Plenary Session 2** : **Prof. Dr. Abderrahmane Nitaj** University of Caen Basse Normandie, FRANCE **MATHEMATICS OF POST QUANTUM CRYPTOGRAPHY** *Chairperson: Assoc. Prof. Dr. Muhammad Rezal Kamel Ariffin*	Ballroom B
15:15 — 17:15	Parallel Session 5A Parallel Session 5B Parallel Session 5C	Ballroom B Rafflesia Peony
17:15	Refreshment	Ballroom Foyer

MASTER PROGRAMME

6 FEBRUARY 2020 (THURSDAY)

Time		Venue
08:30 — 09:00	Morning Tea	Ballroom Foyer
09:00 — 10:20	Parallel Session 6A Parallel Session 6B Parallel Session 6C	Ballroom B Rafflesia Peony
10:20 — 10:40	Refreshment	Ballroom Foyer
10:40 — 12:40	Parallel Session 7A Parallel Session 7B Parallel Session 7C	Ballroom B Rafflesia Peony
12:40 — 14:30	Lunch	Makan Kitchen
14:30 — 15:50	Parallel Session 8A Parallel Session 8B Parallel Session 8C	Ballroom B Rafflesia Peony
15:55 — 16:35	**Plenary Session 3** : **Assoc. Prof. Dr. Sarfraz Ahmad** COMSATS University Islamabad, PAKISTAN **ON SOME ALGEBRAIC AND COMBINATORIAL PROPERTIES OF POSETS** *Chairperson: Prof. Dr. Noor Akma Ibrahim*	Ballroom B
16:40 — 17:00	**Closing Ceremony**	Ballroom B
17:00	Refreshment	Ballroom Foyer

OPENING CEREMONY 4 FEBRUARY 2020 (TUESDAY) BALLROOM B	
Time	
12:00 — 12:10	Arrival of VIP and Guests
12:10 — 12:15	National Anthem of Malaysia "NEGARAKU" and The UPM Anthem "Putra Gemilang"
12:15 — 12:20	Doa Recitation
12:20 — 12:25	**Welcoming Address by YBhg. Prof. Dr. Adem Kilicman** Chairman of ICRAAM2020
12:25 — 12:35	**Officiating Address by YBhg. Tan Sri Dr. Ghauth Jasmon** Chairman of Board of Directors, UPM
12:35 — 12:45	Photography Session

CLOSING CEREMONY 6 FEBRUARY 2020 (THURSDAY) BALLROOM B	
Time	
16:40 — 16:45	Arrival of VIP and Guests
16:45 — 16:50	**Closing Remark by Assoc. Prof. Dr. Norazak Senu** Deputy Chairman of ICRAAM2020
16:50 — 16:55	"Passing of Baton" to COMSATS University Islamabad for ICRAAM2021
16:55 — 17:00	Photography Session

KEYNOTE AND PLENARY SPEAKERS

KEYNOTE SPEAKER

Prof. Dr. Mohammad Mursaleen
Aligarh Muslim University

INDIA

Mohammad Mursaleen is a Principal Investigator at SERB Core Research Grant, Department of Mathematics, Aligarh Muslim University, Aligarh, India. He received his Ph.D in Mathematics from Aligarh Muslim University, Aligarh. His research interests include Sequence Spaces, Summability Theory, Functional Equations, Approximation Theory, Measures of Noncompactness, Fixed Point Theory, Differential and Integral Equations. He has authored over 300 publications which includes articles, books and chapters in books. He is a reviewer for many international scientific journals. He has an excellent citation track record and received the Web of Science Award 2019 for the category of Highly Cited Researcher. Additionally, he is also a member of the Editorial Board of 30 international peer reviewed journals, the International Council of Scientists "Global World Communicator Education and Science" and the American Mathematical Society, Indian Mathematical Society, Calcutta Mathematical Society.

ON SOME APPLICATIONS OF MEASURES OF NONCOMPACTNES

The most effective way in the characterization of compact operators between the Banach spaces is applying the Hausdorff measure of noncompactness. In this talk, we present some identities or estimates for the operator norms and the Hausdorff measures of noncompactness of certain operators given by infinite matrices that map an arbitrary BK-space into the sequence spaces c_0,c,ell_{∞} and ℓ_1, and into the matrix domains of triangles in these spaces. Many linear compact operators may be represented as matrix operators in sequence spaces or integral operators in function spaces. In this talk, we present some applications of measures of noncompactness to the theory of infinite system of differential equations in some sequence spaces. We also present some new results on applications to integral equations.

PLENARY SPEAKER 1

Prof. Dr. Arjun Kumar Rathie

Rajasthan Technical University
INDIA

Arjun Kumar Rathie is currently working as Director (Academics), Professor and Head for Department of Mathematics, Vedant College of Engineering & Technology in Rajasthan Technical University, Bundi, Rajasthan State, India. He received M.Sc. and Ph.D. degrees (Title: A study of H-function with applications in Statistics) from University of Rajasthan, Jaipur, India. Guided successfully 14 Ph.D. students. Visited several countries including Canada, Brazil, South Korea, Japan, Oman Turkey and Malaysia on various academic assignments. He is member of Research Board of Advisors, U.S.A. Published more than 270 research articles in National and International journals of high repute. Delivered invited talk in several international conferences and in various Universities/Institutions. Working as a referee for many international journals. His main research interests are: hypergeometric functions, Ramanujan's work on hypergeometric function, finite integrals, geometric probability theory and statistical distributions.

GENERALIZATION OF CLASSICAL SUMMATION THEOREMS FOR THE HYPERGEOMETRIC SERIES 2F1 WITH APPLICATIONS

In the theory of hypergeometric series, classical summation theorems such as those of Gauss, Gauss second, Kummer and Bailey play a key role. Applications of these theorems are well known. During 1992-2018, the above mentioned classical summation theorems were generalized and extended by Lavoie et al., Rakha & Rathie , Kim, et al. and others. Very recently, Masjed-Jamei & Koepf further generalized these summation theorems. The main objective of the invited talk is to provide generalization of the above summation theorems in the most general form. Applications of these summation formulas will also be discussed.

PLENARY SPEAKER 2

Prof. Dr. Abderrahmane Nitaj

University of Caen Basse Normandie
FRANCE

Abderrahmane Nitaj is a Professor of Mathematics and a Researcher at the Laboratory of Mathematics Nicolas Oresme at the University of Caen Normandy, France. He obtained a Ph.D. thesis in mathematics and a Habilitation to direct Research in cryptography. He is involved in the organization of several international workshops and conferences such as Africacrypt, C2SI and Cryptology. He served as Program Chair of several conferences with proceedings published by Springer. He has established a network of research in cryptography in several countries, mainly in Australia, Egypt, China, Malaysia, Morocco and Senegal. He is involved in the dissemination of cryptography in Africa and has organized and served as lecturer in several CIMPA Schools. His main research areas are cryptography and algorithmic number theory. He is the author and co-author of more than 40 international publications in journals and proceedings of conferences with committees. He is the co-editor of 9 Springer proceedings of international conferences.

MATHEMATICS OF POST QUANTUM CRYPTOGRAPHY

Cryptography is essential for various sensitive applications such as SSL/TLS, Secure Shell (SSH), Virtual Private Network (VPN), Wireless Communication (Wi-Fi), cyber-security and homomorphic encryption. Asymmetric cryptography relies on the difficulty of solving certain mathematical problems such as factorization and discrete logarithm problem. In 1994 Peter Shor presented a technique, based on quantum computation and quantum computers to solve each of these problems in polynomial time. In a more or less near future, large quantum computers may be available for breaking various currently used encryption algorithms with Shor's algorithm. As a consequence, it is crucial to develop new type of systems that are resistant to quantum computers. Such cryptosystems are called post quantum cryptosystems and many cryptographers are designing new algorithms to resist quantum computing. In this talk, we will present the mathematical concepts and the latest developments underlying the security of post-quantum cryptographic schemes, based on coding theory, multivariate quadratic equations, and lattices.

PLENARY SPEAKER 3

Assoc. Prof. Dr. Sarfraz Ahmad

COMSATS University Islamabad
PAKISTAN

Sarfraz Ahmad is Head of Mathematics Department at COMSATS University Islamabad, Lahore Campus, Pakistan. He did his PhD from Abdus Salam School of Mathematical Sciences in Pakistan under the supervision of Prof. Dorin Popescu (Romania) and Prof Juergen Herzog (Germany). He did his Post Doctorate with Prof. Volkmar Welker at Phillips Universitat Marburg Germany and at United Arab Emirates University U. A. E.. He has 30 impact factor publications in the field of Combinatorial Commutative Algebra. He has supervised 3 PhD and 20 Master students.

ON SOME ALGEBRAIC AND COMBINATORIAL PROPERTIES OF POSETS

For a poset P we say that a subset A is a chain blocker if it is an inclusion wise minimal subset of P that contains at least one element from every maximal chain. We give new interpretation of Catalan and convoluted Catalan numbers in terms of trees and chain blockers. In the end we discuss some Algebraic properties associated with posets.

PARALLEL SESSIONS

SCHEDULE

PARALLEL SESSION 1
4 FEBRUARY 2020
09:00 - 10:40

Time	Parallel Session 1A Ballroom B Chairperson : Dr. Ali Ahmadian	Parallel Session 1B Rafflesia Chairperson : Dr. Hafizah Bahaludin	Parallel Session 1C Peony Chairperson : Assoc. Prof. Dr. Sharifah Kartini Said Husain
09:00 to 09:20	**COMPUTING THE M-POLYNOMIALS AND DEGREE-BASED TOPOLOGICAL INDICES OF DIFFERENT INTERCONNECTION NETWORKS** Ibragimov Gafurjan Adnan Khalil Faisal, N. Muhammad A.	**MODIFIED HARMONY SEARCH FOR LOCATION-INVENTORY-ROUTING PROBLEM WITH PRODUCT RETURNS** Farahanim Misni Lai Soon Lee	**SOLVING THE TWO-DIMENSIONAL RIEMANN PROBLEMS FOR EULER EQUATIONS USING DIMENSIONAL SPLITTING** Ahmed Osama Mohamed Elhassan Mahgoub
09:20 to 09:40	**A NEW DIRECT SOLVER FOR THIRD ORDER ORDINARY DIFFERENTIAL EQUATIONS** Asma Izzati Asnor Siti Ainor Mohd Yatim Zarina Bibi Ibrahim	**TWO WAREHOUSE INVENTORY MODEL UNDER LIFO AND FIFO POLICY** Nurnadiah Nurhasril Siti Suzlin Supadi Mohd Omar	**MHD STAGNATION POINT FLOW AND HEAT TRANSFER OVER A NONLINEARLY STRETCHING/SHRINKING SHEET WITH INDUCED MAGNETIC FIELD** Mohamad Mustaqim Junoh Fadzilah Md Ali Norihan Md Arifin Norfifah Bachok
09:40 to 10:00	**A SIMPLE ITERATIVE METHOD FOR FINITE DIFFERENCE EQUATIONS OF APPLIED PROBLEMS** Abduvali Abdusamadovich Khaldjigitov Umidjon Z. Djumayozov A. A. Alisherov	**A MULTI DEPOT DYNAMIC VEHICLE ROUTING PROBLEM WITH STOCHASTIC ROAD CAPACITY** Wadi Khalid Anuar Lai Soon Lee Stefan Pickl	**ANALYTICAL STUDY OF UNSTEADY SQUEEZED FLOW OF WATER BASE CARBON NANOTUBES NANOFLUID IN THE PRESENCE OF MAGNETIC FIELD AND VARIABLE THERMAL CONDUCTIVITY OVER A STRETCHING SURFACE** Ali Rehman Zabidin Salleh Taza Gul
10:00 to 10:20	**SPECIAL TWO DERIVATIVE RUNGE-KUTTA TYPE METHODS FOR SOLVING $u''' = f(x, u(x))$** Khai Chien Lee Norazak Senu Ali Ahmadian Siti Nur Iqmal Ibrahim	**THE EFFECT OF MALAYSIA GENERAL ELECTION ON FINANCIAL NETWORK: AN EVIDENCE FROM SHARIAH-COMPLIANT STOCKS ON BURSA MALAYSIA** Hafizah Bahaludin Muhammad Hasanuddin Amran	**EFFECT OF SUCTION IN HYBRID NANOFLUID OVER A MOVING PLATE** Nur Adilah Liyana Aladdin Norfifah Bachok
10:20 to 10:40	**MODIFIED SHIFTED JACOBI TAU METHOD FOR SOLVING LINEAR MULTI-ORDER FRACTIONAL PARTIAL DIFFERENTIAL EQUATIONS** Wong Kian Yung Azmin Sham Rambely Ali Ahmadian	**CENTRALITY MEASURES FOR SHARIAH-COMPLIANT STOCKS NETWORK DURING GLOBAL FINANCIAL CRISIS: A CASE OF BURSA MALAYSIA** Hafizah Bahaludin Fatin Nur Amirah Mahamood Mimi Hafizah Abdullah	**INVARIANT AND CONTRACTIONS OF LEIBNIZ ALGEBRAS** Sharifah Kartini Said Husain Adamu Abdulkadir Witriany Basri

PARALLEL SESSION 2
4 FEBRUARY 2020
14:30-16:50

Time	Parallel Session 2A Ballroom B Chairperson : Dr. Faisal Mumtaz	Parallel Session 2B Rafflesia Chairperson : Assoc. Prof. Dr. Idham Arif Alias	Parallel Session 2C Peony Chairperson : Dr. Md. Yushalify Misro
14:30 to 14:50	**A COMPARATIVE STUDY OF STANDARD AND HYBRID METHODS FOR SOLVING 2D TIME FRACTIONAL DIFFUSION EQUATION** Fouad Mohammad Salama Norhashidah Hj. Mohd Ali	**WAITING TIME ANALYSIS OF AN EMERGENCY DEPARTMENT USING DISCRETE EVENT SIMULATION** Irdayu Ibrahim Noraida Abdul Ghani Norazura Ahmad Ruzelan Khalid	**HYBRID NANOFLUID FLOW PAST A MOVING WEDGE WITH CONVECTIVE BOUNDARY CONDITION: STABILITY ANALYSIS** Nur Syazana Anuar Norfifah Bachok Norihan Md Arifin Haliza Rosali
14:50 to 15:10	**EXISTENCE AND UNIQUENESS OF SOLUTIONS TO IMPLICIT FRACTIONAL PANTOGRAPH DIFFERENTIAL EQUATIONS VIA Ψ-HILFER FRACTIONAL DERIVATIVES** Idris Ahmed Poom Kumam	**DIFFERENTIAL GAME OF MANY PURSUERS AND MANY EVADERS WITH INTEGRAL CONSTRAINTS ON A CYLINDER** Piriatharisini Karapanan Gafurjan Ibragimov Risman Mat Hashim Idham Arif Alias	**TWO-DIMENSIONAL FLOW OF A NANOFLUID ON THIN NEEDLE UNDER THE INFLUENCE OF SORET AND DUFOUR EFFECTS: A STABILITY ANALYSIS** Siti Nur Alwani Salleh Norfifah Bachok Norihan Md Arifin Fadzilah Md Ali
15:10 to 15:30	**BLOW-UP SOLUTIONS FOR A SINGULAR NONLINEAR HADAMARD FRACTIONAL BOUNDARY VALUE PROBLEMS** Imed Bachar Said Mesloub	**SHAPE FUNCTION BY OPTIMIZATION** Akeremale Olusola Collins Olaiju Olusegun A. Yeak Su Hoe	**FLOW AND THERMAL BEHAVIORS IN NATURAL CONVECTIVE MAGNETOHYDRODYNAMICS FLOW OF CARBON NANOTUBES OLDROYD-B NANOFLUIDS WITH RAMPED WALL CONDITIONS** Talha Anwar Poom Kumam
15:30 to 15:50	**AUTOMOBILE INSURANCE FRAUD DETECTION USING MACHINE LEARNING ALGORITHMS WITH IMBALANCED DATA PREPROCESSING USING A HYBRID METHOD** Zuherman Rustam Hamidah	**EVASION DIFFERENTIAL GAME FROM MANY PURSUERS WITH SIMPLE MOTION IN CRITICAL CASE** Askar Rakhmanov Gafurjan Ibragimov Idham Arif Alias	**NUMERICAL STUDY OF NATURAL CONVECTION BETWEEN A COLD SQUARE ENCLOSURE AND A HOT CORRUGATED CYLINDER** Abeer Alhashash
15:50 to 16:10	**PANCREATIC CANCER EARLY DETECTION USING TWIN SUPPORT VECTOR MACHINE BASED ON KERNEL** Hamidah Alifah Roudhoh Chusmarsyah Zuherman Rustam	**STABILITY ANALYSIS OF A DOUBLE-WELL BOSE-EINSTEIN CONDENSATE-RESERVOIRS SYSTEM** Kalai Kumar Rajagopal Gafurjan Ibragimov	**EFFECTS OF ROTATING CIRCULAR CYLINDER AND TWO-PHASE NANOFLUID MODEL ON MIXED CONVECTION IN A CAVITY WITH HEATED WAVY BOTTOM WALL** Ammar Alsabery Ishak Hashim
16:10 to 16:30	**ASSESSING THE QUALITY OF MAPPED SINE SERIES FOR ATOMISITIC CALCULATIONS** Faisal Mumtaz Sergey Rashkeev Fahhad Alharbi	**GENERALIZATIONS OF SOME FRACTIONAL INTEGRAL INEQUALITIES** Ohud Almutairi Adem Kilicman	**CURVATURE ANALYSIS IN DYNAMIC DESIGN OF PATH PLANNING** Noor Ameera Anas Renie Md. Yushalify Misro Ahmad Ramli
16:30 to 16:50	-	**A PURSUIT DIFFERENTIAL GAME OF MANY PURSUERS VERSUS ONE EVADER IN A CONVEX COMPACT SET** Idham Arif Alias Khairunnisa Jaman Gafurjan Ibragimov	

PARALLEL SESSION 3
5 FEBRUARY 2020
09:00-10:20

Time	Parallel Session 3A Ballroom B Chairperson : Assoc. Prof. Dr. Gafurjan Ibragimov	Parallel Session 3B Rafflesia Chairperson : Assoc. Prof. Dr. Lee Lai Soon	Parallel Session 3C Peony Chairperson : Dr. Ahmad Lutfi Amri Ramli
09:00 to 09:20	**FIXED POINT THEOREM BASED SOLVABILITY OF 2-DIMENSION DISSIPATIVE CUBIC NONLINEAR KLEIN-GORDON EQUATION** Md. Asaduzzaman Adem Kilicman Md. Zulfikar Ali	**EDGE COVER OF GRAPHS RESULTING FROM SOME UNARY OPERATIONS** Rosalio G. Artes, Jr.	**ON THE DEVELOPMENT OF MOMENTUM AND THERMAL BOUNDARY LAYER FLOWS OF HYBRID NANOFLUID OVER ROTATING DISK** Mohsan Hassan
09:20 to 09:40	**A STUDY ON A MIXED CONVECTION FLOW AND HEAT TRANSFER OF THE NON-NEWTONIAN WILLIAMSON FLUID OVER A PERMEABLE AND EXPONENTIALLY STRETCHING/SHRINKING SURFACE WITH THERMAL RADIATION AND CONVECTIVE BOUNDARY CONDITION** Muhammad Norsyawalludin Idris Mohd Ezad Hafidz Hafidzuddin Norihan Md Arifin	**TWO ADAPTIVE CONJUGATE RESIDUAL PROJECTION ALGORITHMS FOR CONSTRAINED NONLINEAR MONOTONE EQUATIONS WITH APPLICATIONS IN COMPRESSIVE SENSING** Auwal Bala Abubakar Poom Kumam	**ROTATIONAL COINCIDENCE IN A THREE DIMENSIONAL LATTICE** Al-Jayson U. Abubakar Rosalio G. Artes, Jr Ibrahim Musa Abdulkasi
09:40 to 10:00	**THIRD DERIVATIVES EXPONENTIAL FITTING FOR NUMERICAL SOLUTION OF STIFF ORDINARY DIFFERENTIAL EQUATIONS** Cletus E. Abhulimen C. I. Uzoka G. R. Omokhagbor	**AN IMPROVED DIFFERENTIAL EVOLUTION ALGORITHM BY USING MIXED MUTATION AND CROSSOVER STRATEGIES** Watcharida Nararuk Jeerayut Wetweerapong Pikul Puphasuk	**TRAVEL TIME ESTIMATION BY GEOMETRIC PROPERTIES OF ROAD** Owen Tamin Badrul Ikram Asri Ahmad Lutfi Amri Ramli
10:00 to 10:20	**ON A FOUR-DIMENSIONAL DYNAMICAL SYSTEM WITH A CLOSED TRAJECTORY** Odiljon S. Akhmedov Gafurjan Ibragimov	**AN ADAPTIVE DIFFERENTIAL EVOLUTION ALGORITHM USING PROBABILITY-BASED CONTROL PARAMETERS WITH THE ALTERNATING OF LEARNING AND UTILIZING PERIODS** Wittaya Phaengthaisong Jeerayut Wetweerapong Pikul Puphasuk	**SMOOTHNESS-DISTANCE TRADE-OFF FOR PATH PLANNING ON PROBABILISTIC ROAD MAP USING CUBIC BEZIER CURVE** Wan Zafira Ezza Wan Zakaria Ahmad Lutfi Amri Ramli Md Yushalify Misro Mohd Nadhir Ab Wahab

PARALLEL SESSION 4
5 FEBRUARY 2020
11:25-12:45

Time	Parallel Session 4A Ballroom B Chairperson : Dr. Nor Azizah M. Yacob	Parallel Session 4B Rafflesia Chairperson : Assoc. Prof. Dr. Siti Hasana Sapar	Parallel Session 4C Peony Chairperson : Assoc. Prof. Dr. Zabidin Salleh
11:25 to 11:45	**DYNAMIC SIMULATION FOR ANALYZING THE EFFECTS OF THE INTERVENTION OF VITAMINS ON DELAYING THE GROWTH OF TUMOR CELLS** Sana Abdulkream Alharbi Azmin Shamb Rambely	**AN IMPROVED IN EVALUATING THE SUCCESS OF INTERNATIONALIZATION OF COMPANIES WITH RANDOM FORESTS** Zuherman Rustam Glori Stephani Saragih	**A NEW LSB ATTACK ON SPECIAL-STRUCTURED RSA PRIMES** Amir Hamzah Abd Ghafar Muhammad Rezal Kamel Ariffin Muhammad Asyraf Asbullah Mohamat Aidil Mohamat Johari
11:45 to 12:05	**GREEN'S FUNCTION TECHNIQUE FOR GENERATING PERFECT FLUID SPHERE** Tritos Ngampitipan Petarpa Boonserm	**CLASSIFICATION OF THALASSEMIA DISEASE USING NAÏVE BAYES, KNN AND LOGISTIC REGRESSION METHOD** Alifah Roudhoh Chusmarsyah Hamidah Zuherman J. Pandelaki	**AN ATTACK ON $N = p^2q$ AS A RESULT OF THE MULTIPLE OF THE PRIME FACTORS SHARING LEAST SIGNIFICANT BITS** Muhammad Rezal Kamel Ariffin Nurul Nur Hanisah Adenan Mohamat Aidil Mohamat Johari
12:05 to 12:25	**EMERGENCE OF PERSISTENT ACTIVITY STATE IN TWO-POPULATION NEURAL FIELD MODEL FOR GAUSSIAN EXTERNAL INPUT** Muhammad Yousaf Bhatti Sana Javed Naima Amin Tariq Javed	**CLASSIFICATION OF HEPATOCELLULAR CARCINOMA CANCER (HCC) USING SVM METHOD WITH SIGMOID, RBF AND POLYNOMIAL KERNEL** Alifah Roudhoh Chusmarsyah Hamidah Zuherman Rustam	**ELLIPTIC NET SCALAR MULTIPLICATION UPON KOBLITZ CURVES** Norliana Muslim Mohamad Rushdan Md. Said Faridah Yunos
12:25 to 12:45	**STABILITY SOLUTION OF UNSTEADY STAGNATION-POINT FLOW AND HEAT TRANSFER OVER A STRETCHING/SHRINKING SHEET IN NANOFLUID WITH SLIP VELOCITY EFFECT** Nor Fadhilah Dzulkifli Norfifah Bachok Ioan Pop Nor Azizah M. Yacob Norihan Md Arifin Haliza Rosali	**SCHIZOPHRENIA DATA CLASSIFICATION USING STOCHASTIC SUPPORT VECTOR MACHINE** Zuherman Rustam Durrabida Zahras	**ON A HARMONIC UNIVALENT SUBCLASS OF FUNCTIONS INVOLVING A GENERALIZED LINEAR DIFFERENTIAL OPERATOR** Abdeljabbar Talal Abdeljabbar Yousef Zabidin Salleh

PARALLEL SESSION 5
5 FEBRUARY 2020
15:15-17:15

Time	Parallel Session 5A Ballroom B Chairperson : Prof. Dr. Rakhmatillo Aloev	Parallel Session 5B Rafflesia Chairperson : Dr. Nurul Najihah Mohamad	Parallel Session 5C Peony Chairperson : Dr. Azadeh Zahedi Khameneh
15:15 to 15:35	**SOLVING DIFFERENTIAL ALGEBRAIC EQUATIONS USING IMPLICIT HYBRID METHOD** Zanariah Abdul Majid Khoo Kai Wen	**DKN-FUZZY SIMPLEX: AN APPLICATION PROGRAM TO SOLVE TRAPEZOIDAL FUZZY NUMBER LINEAR PROGRAMMING** Karyati Karyati Dhoriva Urwatul Wutsqa Nikenasih Binatari	**A BERNSTEIN-SZEGÖ INEQUALITY ON HARDY SPACE** Rosalio G. Artes, Jr. Ma. Theresa S. Alin
15:35 to 15:55	**A MATHEMATICAL MODEL FOR SUPERINFECTION IN MALARIA TRANSMISSION** Dipo Aldila	**SUPPLIER SELECTION DECISION BASED ON FUZZY DELPHI METHOD WITH Z-NUMBER VALUATION** Zamali Tarmudi Nurulzulaiha Sa'udah @ Suhadak Nur Syahidah Nordin Masyfu'ah Mokhtar	**(p,q)-HARDY TYPE INEQUALITY FOR POST-QUANTUM INTEGRAL** Suriyakamol Thongjob Kamsing Nonlaopon
15:55 to 16:15	**REFLECTION AND TRANSMISSION PROBABILITIES AND QUASI-NORMAL FREQUENCIES FROM THE SUPERPOSITION OF VARIOUS POTENTIALS** Petarpa Boonserm Tritos Ngampitipan C. Yindetet	**ISCHEMIC STROKE CLASSIFICATION USING LOCAL BINARY PATTERN AND SUPPORT VECTOR MACHINES** Nurlia Angie Darmawan Zuherman Rustam Reyhan Eddy Yunus	**ON EXISTENCE OF COUNTABLY MANY DISJOINT SHIFTED OCTANTS IN THE HILBERT SPACE L_2** Gafurjan Ibragimov Idham Arif Alias Abdulla Azamov
16:15 to 16:35	**ON A FRACTIONAL NON-LOCAL INITIAL BOUNDARY VALUE PROBLEM** Said Mesloub	**ISCHEMIC STROKE CLASSIFICATION USING GRAY LEVEL CO-OCCURRENCE MATRIX AND K-NEAREST NEIGHBOR** Nurlia Angie Darmawan Zuherman Rustam Reyhan Eddy Yunus	**GENERALIZED MIURA TRANSFORM IN ABSTRACT BANACH SPACES** Yoritaka Iwata
16:35 to 16:55	**EMBEDDED EXPONENTIALLY-FITTED EXPLICIT RUNGE-KUTTA-NYSTRÖM METHOD FOR SOLVING PERIODIC PROBLEMS** Musa Ahmed Demba Poom Kumam Wiboonsak Watthayu Idris Ahmed Abdulkarim Hassan Ibrahim Pawicha Phairatchatniyom Nuttapol Pakkaranang	**DISTANCE-PRESERVING INVERSE BEST APPROXIMATION IN EUCLIDEAN SPACES** Phoebe Jean J. Domen Rosalio G. Artes, Jr. Amina M. Nasirin Melisa A. Umlanis	**AN ALGORITHM FOR A CLASS OF PSEUDOMONOTONE EQUILIBRIUM PROBLEMS IN HILBERT SPACES** Habib ur Rehman Poom Kumam
16:55 to 17:15	**THE DIFFERENCE SPLITTING SCHEME FOR MULTIDIMENSIONAL HYPERBOLIC SYSTEMS** Rakhmatillo D. Aloev Zainiddin K. Eshkuvatov Khudoyberganov M. U. Nematova D. E.	**A NEW ESTIMATION APPROACH FOR NEGATIVE BINOMIAL GARCH MODEL: QUADRATIC ESTIMATING FUNCTIONS METHOD** - Nurul Najihah Mohamad Ibrahim Mohamed Hafizah Bahaludin	**SOME CONSTRUCTION METHODS OF AGGREGATION OPERATORS** Azadeh Zahedi Khameneh Adem Kilicman

PARALLEL SESSION 6
6 FEBRUARY 2020
09:00 – 10:20

Time	Parallel Session 6A Ballroom B Chairperson : Assoc. Prof. Dr. Zainiddin Eshkuvatov	Parallel Session 6B Rafflesia Chairperson : Dr. Seuk Yen Phoong	Parallel Session 6C Peony Chairperson : Assoc. Prof. Dr. Muhammad Hussain
09:00 to 09:20	**NUMERICAL SOLUTION OF PERIODICAL IVPS USING FOURTH ORDER PHASE-FITTED AND AMPLIFICATION-FITTED DIAGONALLY IMPLICIT TWO DERIVATIVE RUNGE-KUTTA METHOD** Nur Amirah Ahmad Norazak Senu Zarina Bibi Ibrahim Mohamed Othman	**IMPLEMENTATION OF RANDOM FOREST FOR THE CLASSIFICATION OF CHRONIC AND ACUTE SINUSITIS** Zuherman Rustam Glori Stephani Saragih Jacub Pandelaki	**SOLVING NON-LINEAR INTEGRAL OPERATOR OF FREDHOLM EQUATION BY MAJORANT FUNCTION PRINCIPLE** Hameed Husam Hameed Iraq T. Abbas Kasim Abbas Hussian
09:20 to 09:40	**DYNAMICAL ANALYSIS OF FRACTIONAL– ORDER CHEMOSTAT MODEL FOR CELL MASS PRODUCTION** Nor Afiqah Mohd Aris Suhana Jamaian	**CONVEX ACCESSIBILITY POLYNOMIAL OF NETWORKS RESULTING FROM MULTILAYER NETWORK CHAIN INTERACTIONS** Amina M. Nasirin Rosalio G. Artes, Jr. Phoebe Jean J. Domen Melisa A. Umlanis	**VALIDATED NUMERICAL COMPUTATION OF EIGENPAIRS IN THE GENERALIZED EIGENVALUE PROBLEM FOR NONSQUARE MATRIX PENCIL** Shinya Miyajima
09:40 to 10:00	**A DETERMINISTIC FRACTIONAL ORDER DENGUE MODEL WITH CONTROL MEASURES** Nur 'Izzati Hamdan Adem Kilicman	**THE EFFECTS OF INTERFERENCE ON THE POWER OF A/B TESTING** Sani Aji Poom Kumam	**VALIDATED NUMERICAL COMPUTATION FOR THE PERRON PAIR OF AN IRREDUCIBLE NON NEGATIVE MATRIX** Shinya Miyajima
10:00 to 10:20	**MODIFIED HAM FOR SOLVING LINEAR SYSTEM OF FREDHOLM-VOLTERRA INTEGRAL EQUATIONS** Zainiddin Eshkuvatov Shahrina Ismail Rakhmatillo D. Aloev H. X. Mamatova	**FINITE MIXTURE MODEL: PREDICTION OF TIME SERIES DATA USING BAYESIAN METHOD** Seuk Yen Phoong Seuk Wai Phoong Kok Hau Phoong	**STUDIES ON EDGE-MAGIC TOTAL GRAPHS** Muhammad Hussain

PARALLEL SESSION 7
6 FEBRUARY 2020
10:40 - 12:40

Time	Parallel Session 7A Ballroom B Chairperson : Dr. Mohd Ezad Hafidz Hafidzuddin	Parallel Session 7B Rafflesia Chairperson : Dr. Rossita Mohamad Yunus	Parallel Session 7C Peony Chairperson : Dr. Shahrina Ismail
10:40 to 11:00	**GRAVITY GRADIENT AND AERODYNAMIC DRAG COUPLED SATELLITE STABILIZATION REGIMES** Muhammad Azeem Renuganth Varatharajoo Sarfraz Ahmad	**CLASSIFICATION OF HEPATOCELLULAR CARCINOMA USING AN EXTENDED THREE-WAY C-MEANS BASED ON KERNEL** Zuherman Rustam Sri Hartini	**SLANT HELICES AND THEIR APPLICATIONS** Yusuf Yaylı
11:00 to 11:20	**FOCUSING ENERGY-CRITICAL INHOMOGENEOUS NLS** Yonggeun Cho Seokchang Hong Kiyeon Lee	**AN IMPROVED KC-MEANS CLUSTERING BASED ON KERNEL FOR HEPATITIS CLASSIFICATION** Sri Hartini Zuherman Rustam	**FEEG IMAGE SEGMENTATION USING K-MEANS AND FUZZY C-MEANS CLUSTERING** Suzelawati Zenian Muh Abdy
11:20 to 11:40	**STABILITY AND BIFURCATION ANALYSIS OF AN SEIRE MODEL OF DYNAMICS OF TUBERCULOSIS INFECTION** Sulayman Fatima Farah Aini Abdullah Mohd Hafiz Mohd	**GENERALIZED AUTOMORPHISMS OF ASSOCIATIVE DIALGEBRAS** Sharifah Kartini Said Husain Adamu Abdulkadir Witriany Basri	**THE CONVERGENCE OF THE HARD SAMPLING OPERATOR WITH RAPIDLY DECREASING WAVELET FUNCTIONS** Raghad Sahib Shamsah Anvarjon A. Ahmedov Adem Kilicman Hishamuddin Zainuddin
11:40 to 12:00	**TRIGONOMETRICALLY-FITTED FOUR-STEP PREDICTOR-CORRECTOR METHOD FOR SOLVING ORDINARY DIFFERENTIAL EQUATIONS WITH OSCILLATORY SOLUTIONS** Mohammed Mahmood Salih Fudziah Ismail	**SENSITIVITY ANALYSIS OF THE REPRODUCTIVE NUMBER OF INFLUENZA H1N1 MODEL** Wirawan Chinviriyasit Natthanon Monrat Sarita Kareevate Supreeya Suttikul Settapat Chinviriyasit	**GRAVITATIONAL WAVE SCATTERING BY POROUS WALL IN TWO-LAYER OCEAN OF NON-UNIFORM DEPTH** Nagmani Prasad
12:00 to 12:20	**COMPARISON OF PRESSURE DISTRIBUTION IN EXPONENTIAL AND PARABOLIC ROUGH SLIDER BEARINGS LUBRICATED WITH NON-NEWTONIAN RABINOWITSCH FLUID** Amit Kumar Rahul Pentyala Srinivasa Rao	**NETWORK ANALYSIS AND BUILDING CONSTRUCTION: IMPACT OF TIMING AND COSTING OF STAGES IN BUILDING PROCESS: A CASE STUDY** Auwalu Hamisu Usman	**ON CERTAIN 3-ALGEBRAS GENERATED BY BINARY ALGEBRAS** Houida Ahmed Sharifah Kartini Said Husain Witriany Basri
12:20 to 12:40	**EFFECTS OF SLIPS ON MICROPOLAR HYBRID NANOFLUID AND HEAT TRANSFER OVER A SHRINKING SHEET WITH THERMAL RADIATION, NON-UNIFORM HEAT SOURCE/SINK AND MAGNETOHYDRODYAMIC (MHD)** Nur Faizzati Ahmad Faizal Norihan Md Arifin Mohd Ezad Hafidz Hafidzuddin Nadihah Wahi	**A SLIDING WINDOW METHOD FOR OFFICIAL STATISTIC PREDICTION** Rossita Mohamad Yunus	**ON THE SOLUTIONS OF THE DIOPHANTINE EQUATI $x^4 + y^4 = p^k z^2$ IN GAUSSIAN INTEGERS** Shahrina Ismail Kamel Ariffin Mohd Atan Zainiddin Eshkuvatov

PARALLEL SESSION 8
6 FEBRUARY 2020
14:30 - 15:50

Time	Parallel Session 8A Ballroom B Chairperson : Dr. Seuk Wai Phoong	Parallel Session 8B Rafflesia Chairperson : Dr. Risman Mat Hasim	Parallel Session 8C Peony Chairperson : Assoc. Prof. Dr. Sun Mi Jung
14:30 to 14:50	**THE GENERALIZED EXPONENTIAL DISTRIBUTIONS WITH FIXED COVARIATE** Nada Mohammed Saeed Alharbi Jayanthi Arasan	**COMPACT HIGH-ORDER IMPLICIT ITERATIVE SCHEME FOR THE TWO-DIMENSIONAL TIME FRACTIONAL SUB-DIFFUSION EQUATION** Muhammad Asim Khan Norhashidah Hj. Mohd Ali	**EVALUATION OF HALF-LIFE OF ^{137}Cs NUCLIDE USING STATISTICAL THEORY** Hamman Tukur Gabdo Bello Yusuf Idi Ishiyaku Abubakar Mbela
14:50 to 15:10	**PREDICTION OF HOURLY WATER LEVEL TIME SERIES DATA IN FLOODPLAIN AREA USING LOCAL LINEAR APPROXIMATION METHOD** Adib Mashuri Nur Hamiza Adenan	**COMMUNITY STRUCTURE IN GRAPHS - CASE STUDY OF UPM CO-AUTHORSHIP NETWORK FROM 2007-2010** Zurita Ismail Hishamuddin Zainuddin Chan Kar Tim	**GENERATION OF ALL PYTHAGOREAN TRIPLES** Raymond Calvin Ochieng Chikunji John Chiteng'a Vitalis Onyango-Otieno
15:10 to 15:30	**AUGMENTED APPROACH TO DESIRABILITY FUNCTION BASED ON PRINCIPAL COMPONENT ANALYSIS** Yuvarani Thorisingam Mohd Shafie Mustafa	**A PENALTY METHOD TO PRICE AMERICAN-STYLE ASIAN OPTION UNDER JUMP-DIFFUSION PROCESS** Mohamed Faris Laham Siti Nur Iqmal Ibrahim Adem Kilicman	**AN APPROXIMATE ANALYTIC SOLUTION OF SIR EPIDEMIC MODEL BY ADOMIAN DECOMPOSITION METHOD** Natawat Klamsakul Wirawan Chinviriyasit
15:30 to 15:50	**DETECTION AND ANALYSIS VOLATILITY ON CRUDE OIL PRICE USING BREAKPOINT TEST AND MARKOV SWITCHING MODEL** Seuk Wai Phoong Seuk Yen Phoong Kok Hau Phoong	**IMPROVING THE ESTIMATE FOR THE PURSUER'S DISTANCE FROM THE ORIGIN** Gafurjan Ibragimov Risman Mat Hasim Idham Arif Alias Sayitali Akbarov Miraziz Makhmudov	**A NOTE ON GAUSS MAP ON RULED SUBMANIFOLDS IN MINKOWSKI SPACE** Young Ho Kim Sun Mi Jung

ABSTRACTS OF PARALLEL SESSIONS 1A, 1B AND 1C

4 February 2020 Tuesday 09:00 – 10:40

SESSION 1A

Computing the M-polynomials and Degree-Based Topological Indices of Different Interconnection Networks

Ibragimov, G.[1], Adnan, K.[1a)], Faisal, N[2]. and Muhammad A[3].

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Abstract: Topological indices can be classified into three types, such as distance-based, degree-based and spectrum-based. In this paper, we computed different types of degree-based topological indices of k-swapped network of t-regular graph, eye network, and n-dimensional twisted cube. Topological indices are the measures used for study of abstract structural features of networks. We also compute the M-polynomials of all above networks. The structure of an interconnection network can be represented by a graph. In the network, vertices represent the processor nodes and edges represent the links between the processor nodes. From the topology of the graph, we can easily find the diameter and degree of the nodes. Graph invariants play a vital feature in graph theory and distinguish the structural properties of graphs and networks. Graph invariants also describe the World Wide Web, social and computer networks**.**

Keywords: M-polynomials, topological indices, interconnection networks, eye network.

A New Direct Solver for Third Order Ordinary Differential Equations

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Abstract. A new direct method, variable step variable order higher order block backward differentiation formula (VSVO-HOBBDF) method is developed in this paper to find the approximate solutions of third order stiff ODEs. The computational work of VSVO-HOBBDF is carried out using a strategy of varying the step size and order. This strategy is intended to enhance the efficiency of the proposed method to approximate the solutions. Then, the numerical experiment is conducted to investigate the efficiency between the proposed method, VSVO-HOBBDF and MATLAB's ODE solvers. From the investigation, the numerical analysis has successfully proved that the applied of the proposed method to this particular problem is more efficient than the comparable methods. Thus, VSVO-HOBBDF is also reliable as another direct solver for solving the third order stiff ODEs directly.

Keywords: Block backward differentiation formula, stiff ordinary differential equations, third order ordinary differential equations, variable step, variable step variable order.

A Simple Iterative method for Finite Difference Equations of Applied Problems

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Abstract. In this article a numerical method for solving boundary value problems for ordinary differential equations and partial differential equations is proposed. The essence of which is the construction of finite-difference equations resolved with respect to the searching quantities and using the iterative process. For example, in the case of the elasticity problems, three finite-difference equations should be solved with respect to u_{ijk} ,v_{ijk} ,w_{ijk} and to organize iteration process taking into account the boundary conditions and trivial initial values. It should be noted that the described methodology to some extent corresponds to the integration of differential equations and to the determination of unknown constants using the boundary conditions. As an example, an ordinary second-order differential equation and also elastic and plastic boundary-value problems with different boundary conditions are solved. Coincidence of the results received by various methods and comparison with the exact solution, show the validity of the numerical method.

Keywords: boundary value problem, numerical method, finite-difference equations, iterative method, boundary conditions.

Special Two Derivative Runge-Kutta Type Methods for Solving $u''' = f(x, u(x))$

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Abstract. Special class of explicit Runge-Kutta type methods with the involvement offourth derivative, denoted as SCRKT methods are proposed and investigated for solving third order ordinary differential equations in the form $u''' = f(x, u(x))$. In this paper, two stages with algebraic order four and three stages with algebraic order five are presented. The derivation of SCRKT methods involves single third derivative and multiple evaluations of fourth derivative for every step. Stability property of the methods is analysed. Accuracy and efficiency of the new methods are exhibited through numerical experiments.

Keywords: Runge-Kutta type methods, Third-order ordinary differential equations, Algebraic order, Stability property, Accuracy.

Modified Shifted Jacobi Tau Method for Solving Linear Multi-order Fractional Partial Differential Equations

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Abstract: Shifted Jacobi tau method has been used for solving linear multi-order fractional differential equations.The main property behind this approach is to simplify such problems into a system of algebraic equations, which greatly simplifies the problem. In this paper, we propose a modified shifted Jacobi tau method for solving linear multi-order fractional differential equations (FPDEs) by using the properties of Kronecker product. The fractional derivative is described in the sense of Caputo because the Caputo fractional derivatives allow initial conditions and boundary conditions to be included in the linear multi-order FPDEs system. Three numerical illustrations are given to show the pertinent features of technique. The application example shows a good agreement between the numerical results and the exact solution.

Keywords: Fractional partial differential equations, operational matrix, shifted Jacobi tau method, Caputo derivative, Kronecker product.

SESSION 1B

Modified Harmony Search for Location-Inventory-Routing Problem with Product Returns

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Abstract. This paper study the integration of location-routing problem and inventory planning by considering the return products of an economic production quantity (EPQ) model. This model assumes that the return products can be refurbished and re-entered into the market to be resold. The objective of the problem is to minimize the total cost of establishing the depots, cost of setup the production and inventory holding, and the cost of delivery traveled by the vehicles. This problem is solved by a proposed Modified Harmony Search (MHS) algorithm on the parameter setting and local search techniques. Computational experiments on benchmark instances show that the proposed MHS outperformed a standard HS for all cases.

Keywords: location-routing, inventory planning, harmony search, reverse logistics, supply chain.

Two Warehouse Inventory Model under LIFO and FIFO Policy

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Abstract. Most classical inventory models consider the assumption where the available storage facility has an unlimited capacity. Conversely, in reality an additional storage space commonly known as a rented warehouse (RW) is needed to store excessive inventory. In this paper, we proposed a two-warehouse inventory model which considered the Last-In-First-Out (LIFO) and the First-In-First Out (FIFO) policies with the assumption that the holding cost is higher in the rented warehouse as compared to the owned warehouse. The objective of the proposed model is to determine the optimum values of the time period in a cycle of stage that will minimise the total relevant cost, TRC of a production cycle. This paper is divided into several sections, where we will discuss the mathematical formulation of the model followed by numerical example and a sensitivity analysis to illustrate the derived results.

Keywords: Inventory modeling, Two-warehouse, LIFO, FIFO.

A Multi Depot Dynamic Vehicle Routing Problem with Stochastic Road Capacity

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Abstract. In chaotic environment in the event of disasters, delivering medical supply as part of the Humanitarian Logistics operation proved to be difficult. A decision support system could help to solve for an efficient routing in this case. This paper proposed a machine learning solution approach as part of the decision support system to enable intelligent routing dynamically while accounting for the stochastic nature of the road capacity during disaster event. The proposed model is based on the Markov Decision Processes modelling framework while the solution is based on the approximate dynamic programming via the look ahead approach followed by a base heuristic enabling cooperative delivery among vehicles. Furthermore additional mechanism is added to curb the curse of dimensionality, inherent to the machine learning solution approach. The proposed work is an alternative approach to typical stochastic and dynamic vehicle routing problem that often introduces clustering to deal with the curse of dimensionality.

Keywords: Operations research, Machine Learning, Approximate Dynamic Programming, MDP, Stochastic.

The Effect of Malaysia General Election on Financial Network: An Evidence from Shariah-Compliant Stocks on Bursa Malaysia

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Abstract. Instead of focusing the volatility of the market, the market participants should consider on how the general election affects the correlation between the stocks during 14th general election Malaysia. The 14th general election of Malaysia was held on 9th May 2018. This event has a great impact towards the stocks listed on Bursa Malaysia. Thus, this study investigates the effect of 14th general election Malaysia towards the correlation between stock in Bursa Malaysia specifically the shariah-compliant stock. In addition, this paper examines the changes in terms of network topology for the duration, sixth months before and after the general election. The minimum spanning tree was used to visualize the correlation between the stocks. Also, the centrality measure, namely degree, closeness and betweenness were computed to identify if any changes of stocks that plays a crucial role in the network for the duration of before and after 14th general election Malaysia.

Keywords: Bursa Malaysia, Shariah-compliant stock, general election, minimum spanning tree.

Centrality Measures for Shariah-Compliant Stocks Network during Global Financial Crisis: A Case of Bursa Malaysia

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Abstract. The correlation of stocks can be classified as a complex system in which have difficulties to visualize as a whole. In addition, the main challenge is to identify which stock plays a crucial stock in the financial market. Thus, the objective of this study is to construct a financial network of 121 shariah-compliant securities traded in Bursa Malaysia from the year 2008 to the year 2009, by focusing on the global financial crisis. This paper used the minimum spanning tree (MST) approach to construct the network. Further, this study employed various centrality measures such as degree, betweenness, closeness, eigenvector, and eccentricity centrality in order to identify the most influential stock in the network. Then, the principal component analysis (PCA) is used to summarise the performance of centrality measure to select the central node of the network. This finding helps investors by providing an overview of the relationship of each stock as a whole and identifies the key stock in the market during a turbulent period.

Keywords: Financial network, minimum spanning tree, centrality, Bursa Malaysia.

SESSION 1C

Solving the Two-Dimensional Riemann Problems for Euler Equations using Dimensional Splitting

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Abstract. In this paper, an in-house FORTRAN 90 code for the 1D Euler equations has been extended to solve the 2D Euler equations via a dimensional splitting algorithm. The numerical stability of the explicit time integration is ensured by using the CFL condition to calculate the maximum time step allowed in the explicit time integration along each of the two spatial directions. The computed results show that the algorithm is robust enough to solve accurately the 2D Riemann problem when compared with results found in literature. Various numerical fluxes have been tested and, as easily anticipated, the numerical fluxes of Roe linearization or Lax-Wendroff scheme perform poorly compared to high-resolution flux. The effect of changing the grid size on the quality of the solution was studied. The effect of using different flux limiters has also been examined, and the Minmod limiter is found to provide the most accurate solutions.

Keywords: CFD, Dimensional splitting, Riemann Problem, Euler Equations, High-resolution flux.

MHD Stagnation Point Flow and Heat Transfer over a Nonlinearly Stretching/Shrinking Sheet with Induced Magnetic Field

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Abstract. In this paper, the problem of the steady two dimensional magnetohydrodynamics (MHD) stagnation point flow of an incompressible, viscous and electrically conducting fluid over a nonlinearly stretching/shrinking plate in the presence of induced magnetic field is considered. The nonlinear partial differential equations are transformed into nonlinear ordinary differential equations via similarity transformations. The transformed governing equations are solved numerically using the boundary value problem solver (bvp4c) in MATLAB software. Numerical solutions for the physical quantities as well as the velocity and temperature profiles are obtained. The effect of magnetic parameter will decrease the surface shear stress and local heat transfer at the surface. Dual solutions exist for both the stretching and shrinking rate parameter. Therefore, a stability analysis is performed to determine which solution is stable. Result shows that the first solution (upper branch) is linearly stable and is physically valid.

Keywords: stagnation-point flow, induced magnetic field, MHD, nonlinear, stability analysis.

Analytical Study of Unsteady Squeezed Flow of Water Base Carbon Nanotubes Nanofluid in the Presence of Magnetic Field and Variable Thermal Conductivity over a Stretching Surface

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Abstract. This research paper explains the analytical solution of unsteady squeezing flow of water base carbon nanotubes for both multi wall carbon nanotube and single wall carbon nanotube in the presence of magnetic field and variable thermal conductivity. The given partial differential equation is converted to nonlinear ordinary differential equation by using the similarity transformation and solve by analytical method namely optimal homotopy asymptotic method (OHAM) to obtain analytical solution of the nonlinear problem which analyze the problem. The result of important parameter for both velocity and temperature profile are plotted and discussed. The BVPh 2.0 package is used to obtain the convergence of the problem up to 25 iteration. The skin friction coefficient and Nusselt number is explained in table form.

Keywords: Water base carbon nanotubes nanofluid, optimal homotopy asymptotic method (OHAM), squeezing flow, magnetohydrodynamic (MHD), stretching surface.

Effect of Suction In Hybrid Nanofluid Over a Moving Plate

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Abstract. Hybrid nanofluid has been classified as a new class of nanofluid and further be used to enhance the rate of heat transfer. This paper explores the effect of suction in hybrid nanofluid which contain water (base fluid) and two different nanoparticles over a moving plate. The plate is assumed to move in the same or opposite direction to the free steam. Governing equation is transformed into a set of ordinary differential equations (ODEs) by using similarity transformation. Then, the ODEs are solved using bvp4c in MATLAB software. The mathematical hybrid nanofluid and boundary conditions in which the effect of nanoparticles and suctions are taken into account. Numerical findings on skin friction coefficient and local Nusselt number as well as the velocity and temperature profiles are graphically presented. Results found that duality exists when the plate and the free stream move in opposite direction. Moreover, the skin friction coefficient and local Nusselt number increase with the increment of the suction parameter. A stability analysis is performed. The first solution is stable and realizable compared to the second solution.

Keywords: Hybrid Nanofluid, Moving Plate, Suction, Duality, Stability Analysis.

Invariant and Contractions of Leibniz Algebras

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Abstract. In this paper we study some invariants of Leibniz algebras. The invariants are derived from a given concept of generalized derivations of Leibniz algebras. The values of the invariants are considered, and an invariant function is used, together with some criteria in finding continuous contractions of Leibniz algebras in low dimensional cases.

Keywords: Invariants, Contractions, Leibniz Algebra.

ABSTRACTS OF PARALLEL SESSIONS 2A, 2B AND 2C

4 February 2020 Tuesday 14:30 – 16:50

SESSION 2A

A Comparative Study of Standard and Hybrid Methods for Solving 2D Time Fractional Diffusion Equation

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Abstract. The numerical solution of time fractional partial differential equations is time-memory consuming, as it requires $O(N^2)$ computational cost and $O(MN)$ memory complexity with finite difference methods, where, N and M are the total number of time levels and spatial grid points, respectively. To overcome this issue, we present an efficient hybrid method with $O(N)$ computational cost and $O(M)$ memory complexity in solving two-dimensional time fractional diffusion equation. The presented method is based on the Laplace transform method and a finite difference scheme. A comparative study drawn from numerical experiments shows that the hybrid method is accurate and reduces the CPU computational time effectively compared to a standard finite difference scheme.

Keywords: Caputo's fractional derivative, Fractional diffusion equation, Laplace transform, Finite difference scheme.

Existence and Uniqueness of Solutions to Implicit Fractional Pantograph Differential Equations via ψ-Hilfer Fractional Derivatives

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Abstract. In this paper, firstly we study the existence and uniqueness of solutions for implicit fractional pantograph differential equations involving ψ-Hilfer fractional derivatives with nonlocal Reimann-Liouville fractional integral condition. The result is established using Schaefer's fixed point theory and Banach contraction principle. Secondly we investigate the Ulam-Hyers and Ulam-Hyers-Rassias stability on a compact interval. Finally some numerical examples are given to illustrate the established results.

Keywords: Hilfer fractional derivatives, pantograph differential equations, Ulam stability, Reimann-Liouville fractional integral, fixed point.

Blow-up Solutions for a Singular Nonlinear Hadamard Fractional Boundary Value Problems

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Abstract. The aim of this paper is to prove the existence and global behavior of positive continuous solutions for the following problem

$$\begin{cases} {}^{\mathcal{H}}D^{\alpha}u(t) = \lambda f(t,u(t)),\ t \in (1,e), \\ u > 0,\ \text{in } (1,e), \\ \lim\limits_{t\to 1^{+}} (\ln(t))^{2-\alpha}u(t) = a > 0,\ u(e) = b > 0, \end{cases}$$

where λ is a small nonnegative parameter, ${}^{\mathcal{H}}D^{\alpha}$ is the left-sided Hadamard fractional derivative order $\alpha \in (1,2]$ and $f:(1,e)\times\mathbb{R}^{+}\to\mathbb{R}^{+}$ is a continuous functions allowed to be singular with respect to the time variable . By means of properties of the Green's function and Schauder fixed point theorem, we prove our main results. Some examples are presented to illustrate our results.

Keywords: Hadamard fractional derivatives, Positive solution, Blow-up, Green's function, Schauder fixed point theorem.

Automobile Insurance Fraud Detection using Machine Learning Algorithms with Imbalanced Data Preprocessing using a Hybrid Method

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Abstract. Automobile insurance fraud can be easily detected by machine learning algorithms, such as support vector machine (SVM) and multilayer perceptron neural network (MLPNN). SVM and MLPNN are machine learning algorithms that can produce good performance on several benchmark datasets. However, unbalanced data conditions can affect the performance of these algorithms. The methods that can handle the problem of imbalanced data are the Synthetic Minority Over-Sampling Technique (SMOTE) method and the Edited Nearest Neighbors (ENN) method. This study uses a hybrid method of SMOTE and ENN, namely SMOTEENN to handle imbalances in automobile insurance claim data and using SVM and MLPNN to detect automobile insurance fraud. The hybrid method produces the best performance for each classifiers rather than not using the hybrid method for the problem of data imbalance where the classifier that produces the best performance is the MLPNN classifier, which results in an accuracy of 99.7%.

Keywords: Fraud Detection, Imbalanced Data, a Hybrid Method, Support Vector Machine (SVM), Multilayer Perceptron Neural Network (MLPNN).

Pancreatic Cancer Early Detection Using Twin Support Vector Machine Based on Kernel

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Abstract. Pancreatic cancer is the seventh leading cause of cancer deaths in the world and ranks the 14th most common cancer. In this paper, a machine learning method is proposed to detect pancreatic cancer early based on laboratory tests, such as cancer antigens, hemoglobin, leukocytes, hematocrit, and platelets. The machine learning method proposed is the Twin Support Vector Machine Based on Kernel. Twin Support Vector Machine is a modification of Support Vector Machine by setting two non-parallel fields for two class of data. On several benchmark data sets, Twin SVM is not only fast, but shows good generalization. Twin Support Vector Machine uses the kernel function to operate in a feature space, by only counting products in between all data pairs in the feature space. Using sample data from Al-Islam Hospital Bandung, Indonesia, the best kernel used to detect pancreatic cancer using the Twin Support Vector Machine is the Radial Basis Function (RBF) kernel which yields an accuracy of 98% and sensitivity of 97% with the running time about 1.3408 seconds.

Keywords: Pancreatic Cancer, Twin Support Vector Machine, RBF Kernel, Linear Kernel, Polynomial Kernel.

Assessing the Quality of Mapped Sine Series for Atomisitic Calculations

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Abstract. The basis sets are the core of atomistic calculations. In such calculations, the choice of a basis set is motivated by the expected geometrical structure of the problem in hand. The most commonly used basis sets for localized systems are based on Slater Type Orbitals (STOs), Gaussian Type Orbitals (GTOs) or their derivatives, which were incorporated intuitively. However, these basis sets have some major drawbacks from mathematical perspective, one of which is incompleteness. This means that they cannot guarantee convergence. In this work, we present a complete basis set, based on mapped sine series (MSS) and we assess its quality by using the fundamental definition of the eigenvalue problem. We also compare our results with standard basis sets (STOs and GTOs). The developed MSS is also compared to the reference electronic structure calculations in 1-dimension. The results confirm that the MSS can be a suitable candidate for the atomistic calculations.

Keywords: Mapped basis set, mapped sine series, hydrogenic systems, 1-D electronic structure calculations.

SESSION 2B

Waiting Time Analysis of an Emergency Department using Discrete Event Simulation

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Abstract. Waiting time in an Emergency Department (ED) is a key indicator in measuring the quality of hospital services and has a significant impact on patient satisfaction. Crowdedness in the ED will result in a longer waiting time of patients to be served. Thus, it is very crucial to find the possible ways to reduce the waiting time in order to meet patient satisfaction and increase the survival rate. This study was conducted in the ED of a government hospital. The ED operation involves four zones - Red Zone, Yellow Zone, Green Zone and Blue Zone. This study focuses on finding the average waiting time of patients to be attended to for each zone in the ED by simulating the current process using a discrete event simulation (DES). The result shows that the average waiting time for the Green and Blue Zones do not meet the key performance indicator (KPI) as set by the Ministry of Health (MoH). Root causes of the bottlenecks in the system are due to the use of mobile doctors and insufficient number of doctors assigned to each zone. A *What-if* analysis is performed to identify the possible doctor assignments that meet the KPI. The result shows that the ED could meet the waiting time target by increasing the number of doctors with the highest percentage of reduction in the waiting time is the Blue Zone (48.16%) followed by the Green Zone (42.5%).

Keywords: Discrete Event Simulation (DES), emergency department, patients waiting time, What-if Analysis.

Differential Game of Many Pursuers and Many Evaders with Integral Constraints on a Cylinder

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Abstract. We consider a simple motion pursuit differential game of m pursuers and k evaders on a cylinder in $\mathbb{R}^3$. We reduce the differential game to a differential game of m groups of countably many pursuers and k groups of countably many evaders in $\mathbb{R}^2$ where all the players from each group are controlled by one control parameter subjected to integral constraint. We prove that if the total resource of the pursuers is greater than the total resource of the evaders, then pursuit can be completed. We find a sufficient condition of completion of pursuit and construct strategies for the pursuers.

Keywords: Evader, integral constraint, pursuer, strategy, sufficient condition.

Shape Function by Optimization

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Abstract. In boundary value problems, the solution region is always discretized into finite elements. The polynomial chosen to interpolate the field variables over the element are called shape functions. The shape functions establish the relationship between the displacement at any point in the element with the modal displacement of the element. This paper offers an insight into the derivation of shape function using minimization theory. This is necessary because in the case of irregular elements, such as transition elements, it is difficult to derive the shape function through the traditional method as the inverse of the generated matrices is not feasible. This new approach captures the peculiarities of the so-called transition elements and their shape functions are validated according to the interpolation properties.

Keywords: Shape function, Optimization, Finite element, Polynomial, Interpolation.

Evasion Differential Game from Many Pursuers with Simple Motion in Critical Case

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Abstract. A simple motion evasion differential game of one evader from many pursuers with simple motion is studied in "critical case". The control functions of players are subjected to geometric constraints. Two cases are studied: (i) the maximum speed of the first coordinate of evader greater than that of all pursuers; (ii) the maximum speed of the first coordinate of evader is equal to that of all pursuers. In both cases, a theorem about evasion from many pursuers is proved. In the first case, the evasion strategy is constructed based on information about initial states and current states of pursuers. In the second case, the evasion strategy is constructed based on information about initial states, the states and values of controls of pursuers at current time.

Keywords: Differential game, many pursuers, evasion, strategy, control.

Stability Analysis of a Double-Well Bose-Einstein Condensate-Reservoirs System

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Abstract. The dynamics of Bose-Einstein condensates (BEC) confined within a symmetric double-well trap out-coupled to reservoirs is studied. The dynamical equations in the form of Quantum Langevin equations are derived using the Heisenberg equation of motion. Dissipation in our system is induced by the interaction of condensate bosons with the reservoir atoms within the non-Markovian operational regime. We study the fixed point stability analysis on the population imbalance and relative phases between the two trapped condensates controlled by the on-site interaction and dissipation strengths. We found besides the standard phases like Quantum Tunnelling and Macroscopic Quantum Self trapping within their appropriate on-site interactions regimes being destroyed, dissipation also led the system into more complicated dynamics.

Keywords: Bose-Einstein Condensate, double-well trap, dissipation, non-Markovian.

Generalizations of Some Fractional Integral Inequalities

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Abstract. In this paper, some new integral inequalities for generalized s-convexity on fractal sets are established. We also prove certain inequalities involving Riemann-Liouville integrals of a function f provided that the absolute value of the first or second order derivative of f possesses an appropriate fractal s-convexity property.

Keywords: Convex function; s-convex function; Riemann-Liouville integrals; fractal space.

A Pursuit Differential Game of Many Pursuers versus One Evader in a Convex Compact Set

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Abstract. We consider a pursuit differential game of many pursuers and one evader. The game occurs in a nonempty closed bounded convex subset S of R^n. Each player must stay and move within the set S at all time. Players move with speed not exceeding 1. The problem is to find an improved guaranteed pursuit time. We use the solution of pursuit problem in an n-dimensional cube N. We propose new strategies for pursuers in the game in cube N, which improve the existing guaranteed pursuit time.

Keywords: Pursuit, geometric constraint, strategy, convex set, guaranteed pursuit time.

SESSION 2C

Hybrid Nanofluid Flow Past a Moving Wedge with Convective Boundary Condition: Stability Analysis

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Abstract. This paper investigates the steady laminar boundary layer flow and heat transfer over a moving wedge in hybrid nanofluid (Cu-Al_2O_3/water) with convective boundary condition. The governing PDEs of momentum and energy are converted into nonlinear ODEs via similarity variables and then solved numerically using bvp4c solver in Matlab. The present numerical results are validated by favorable comparisons with previously published work. The effects of nanoparticle volume fraction, wedge parameter, Biot number parameter, moving parameter and suction parameter are investigated and presented graphically. The numerical evidences exhibit the existence of non-unique solution only when the wedge and free stream moving in the opposite direction. It is found that the range of similarity solution to exist is larger for hybrid nanofluid compared to nanofluid. Also, increasing values of wedge parameter and nanoparticle volume fraction can delay the boundary layer separation. To determine which solution is stable and realizable, we performed the stability analysis. The results indicate that the first solution is stable.

Keywords: Hybrid nanofluid, moving wedge, dual solution, convective boundary condition, stability analysis.

Two-dimensional Flow of a Nanofluid on Thin Needle Under The Influence of Soret and Dufour effects: A Stability Analysis

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Abstract. This paper concerns the study of the boundary layer flow**,** heat and mass transfer near a moving thin needle using the Buongiorno nanofluid model.Soret and Dufour effects are considered to analyze the thermo-diffusion and diffusion-thermo effects on the flow. The governing boundary layer equations are written into a dimensionless form by adopting similarity transformations. The transformed coupled non-linear ordinary differential equations are computed numerically via bvp4c function in MATLAB software. The influences of various flow parameters on the velocity, temperature and concentration fields are depicted graphically and analyzed in detail. Skin friction coefficient, local Nusselt and Sherwood numbers are illustrated through graphs.The dual solutions are noticed to exist in certain ranges of several parameters. Stability of solutions has been performed to identify which of the solution is linearly stable. The results indicate that the upper branch solution is stable, while the lower branch solution is unstable.
Keywords: Dual solutions, Stability analysis, Soret and Dufour, Nanofluid, Thin needle.

Flow and Thermal behaviors in Natural Convective Magnetohydrodynamics flow of Carbon Nanotubes Oldroyd-B Nanofluids with Ramped Wall Conditions

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Abstract. This article investigates the flow and heat profiles of magnetohydrodynamics (MHD) convective flow of carbon nanotubes (CNTs) Oldroyd-B model nanofluids subjected to ramped wall velocity and temperature conditions in presence of thermal radiation. Single wall carbon nanotubes (SWCNTs) and multiple wall carbon nanotubes (SWCNTs) are suspended in base fluids. A parametric study to analyze the influence of various pertinent parameters is conducted. It is noticed, that increase in values of Grashof number (Gr), Radiation parameter (Nr), Porosity parameter (K) and retardation time (λ_2) accelerates the flow. On the other hand increase in relaxation time (λ_1) and magnetic parameter (M^2) leads to decrease in velocity. It can be concluded that increase in volume fraction 'φ' of CNTs in nanofluids elevates the thermal conductivity which enhances the fluid temperature.

Keywords: Oldroyd-B fluid, Laplace transforms, thermal radiation, carbon nanotubes, magnetohydrodynamics (MHD).

Numerical Study of Natural Convection Between a Cold Square Enclosure and a Hot Corrugated Cylinder

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Abstract. Natural convection between a porous square enclosure and a sinusoidal cylinder is studied numerically in the present article. The flow in the porous layer is modeled utilizing the Darcy equations. The Galerkin weighted residual finite element method has been used to solve the governing non-dimensional partial differential equations. In numerical simulations, the amplitude and the number of corrugated surfaces is considered. It is found that the heat transfer of the corrugated cylinder might be slightly better than the heat transfer of the smooth cylinder under specific circumstances, but in general the heat transfer is reduced by applying the corrugated surface. The critical amplitude of corrugated exists, below which increasing the amplitude increases the heat transfer rate and above which increasing the amplitude decreases the heat transfer rate

Keywords: Darcy's law, Natural convection, corrugated surface, FEM.

Effects of Rotating Circular Cylinder and Two-Phase Nanofluid Model on Mixed Convection in a Cavity with Heated Wavy Bottom Wall

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Abstract. The current work investigated the effects of rotating circular cylinder and two-phase nanofluid model on mixed convection in a square cavity with heated wavy bottom wall using the finite element method. A wavy isothermal heater is placed on the bottom surface of the cavity while the left and right vertical surfaces are maintained at fixed cold temperatures. The horizontal top wall is kept adiabatic. The wavy cavity is filled with water-based nanofluids with alumina nanoparticles. The chosen governing parameters of the present study are Richardson number, nanoparticle volume fraction and number of undulations on the stream function, temperature and concentrations of nanoparticles, as well as the local and average Nusselt numbers have been described. It has been found that the wavy shape of the bottom heater, the characteristics of internal rotating cylinder and the properties of nanofluid are very good control parameters for heat transfer rate and fluid flow.

Keywords: Mixed convection, Two-phase nanofluid model, Thermophoresis and Brownian, Solid rotating cylinder, Wavy bottom wall.

Curvature Analysis in Dynamic Design of Path Planning

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Abstract. Path planning is a process of developing the desired movement from an initial position into discrete motions that satisfy given constraints before reaching the final destination. Normally, the initial position and the final destination can be connected using Bézier curves, but the ordinary Bézier curve lacks flexibility. Flexibility is important to ensure the curvature continuity at all joints, which makes quintic trigonometric Bézier curve a better choice. This newly basis function composed of shape parameters enables the curve to fit dynamically. Fittings of the curve through way-points of path planning using parametric and geometric continuity will be compared and analyzed. Finally, arc length approximation of path planning will be provided using Gaussian Quadrature Method.

Keywords: Curvature, Dynamic Design, Path Planning, Trigonometric Bézier Curve.

ABSTRACTS OF PARALLEL SESSIONS 3A, 3B AND 3C

5 February 2020 Wednesday 09:00 – 10:20

SESSION 3A

Fixed Point Theorem Based Solvability of 2-Dimension Dissipative Cubic Nonlinear Klein-Gordon Equation

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Abstract. The aim of this article is to establish the solvability of time-periodic solution to the2-Dimension dissipative cubic nonlinear Klein-Gordon (2DDCNLKG for short) equation via periodic boundary value conditions (PBVCs for short). The analysis of this study is founded on Galerkin's method (GLK method for short) and Leray-Schauder's fixed point theorem (LS fixed point theorem for short). Using GLK method, some uniform priori estimates of approximate solution to the corresponding equation of 2DDCNLKG has been constructed. Furthermore, the efficient and straightforward existence and uniqueness criteria of time periodic solution to the 2DDCNLKG with periodic boundary value conditions have been obtained.

Keywords: 2-Dimension dissipative cubic nonlinear Klein-Gordon equation, periodic solution, GLK method, LS fixed point theorem.

A Study on a Mixed Convection Flow and Heat Transfer of the non-Newtonian Williamson Fluid over a Permeable and Exponentially Stretching/Shrinking Surface with Thermal Radiation and Convective Boundary Condition

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Abstract. This research intends to discuss the problem of non-Newtonian Williamson fluid flow over a permeable and exponentially stretching/shrinking surface with the influence of suction. The effects of thermal radiation and convective boundary condition were studied and both cases of assisting and opposing flows were considered. The governing non-linear partial differential equations are transformed to a system of non-linear ordinary differential equations by similarity transformation and the resulting non-linear ordinary differential equations are solved numerically using the bvp4c solver in MATLAB for various values of the physical governing parameters; namely suction, stretching/shrinking, Prandtl number, dimensionless Williamson fluid, mixed convection, convective and radiation. We expect to obtain multiple (dual) solutions for a certain range of suction and stretching/shrinking parameters in the case of opposing flow, where the incorporated suction delays the boundary layer separation.

Keywords: mixed convection; Williamson fluid; exponentially stretching/shrinking surface; convective boundary condition; bvp4c.

Third Derivatives Exponential Fitting for Numerical Solution of Stiff Ordinary Differential Equations

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Abstract. In this paper, we develop a class of four and six-steps third derivatives exponentially fitted methods of order eight respectively, for the numerical solution of stiff ordinary differential equations. The newly constructed methods contain two free parameters which allow it to be fitted automatically to exponential functions. The stability analysis of the new methods was examined and found to be A-stable. Finally, the numerical results of the implementation of the new methods show that they competed favourably with the existing methods in the literature. They are superior for stiff systems for whose solutions can be expressed in exponential functions.

Keywords: Four and six-steps, third derivatives, exponential fitting methods stiff odes, A-stable.

On a Four-Dimensional Dynamical System with a Closed Trajectory

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Abstract. One of the important problems of the qualitative theory of dynamical systems is to prove an existence of closed trajectories. Despite of various methods devoted to this problem, even to prove whether a particular nonlinear system has a closed trajectory remains difficult. In the report using the DN-tracking method it will be demonstrated to construct the Poincaré map in order to prove an existence of closed trajectory of the modified 4-demensional brusselator model. Such kind of modification was made due to the fact that the classical brusselator model in the 4-dimensional case does not have a closed trajectory, which contradicts well-known property: a mathematical model of cyclic chemical reactions.

Keywords: closed trajectory, brusselator model, cyclic reaction, DN-tracking method, Poincaré map.

SESSION 3B

Edge Cover of Graphs Resulting from Some Unary Operations

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Abstract. Let G be a nontrivial connected graph. An edge in G is said to cover the vertices with which it is incident. A subset U of $E(G)$ is an edge cover of G if for each vertex $v \in V(G)$, there is an edge in U which covers v. The edge covering number of G is the minimum cardinality of the edge covers of G. Monotonicity property of this graph invariant for induced subgraphs holds while it is not true for spanning subgraphs. In this paper, we established results on the edge covers and edge covering number of graphs resulting from some unary operations such as power and closure of graphs, contraction and subdivision of edges, deletion of a vertex and deletion of an edge, and the complement of graphs.

Keywords: Edge cover, edge covering number, power of graphs, closure of graphs.

Two Adaptive Conjugate Residual Projection Algorithms for Constrained Nonlinear Monotone Equations with Applications in Compressive Sensing

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Abstract. We propose two adaptive positive parameters based on the choice of Birgin and Martinez (2001) conjugate residual direction. Using the two classical choices of the Barzilai-Borwein (1988) parameters, two positive adaptive parameters were derived by minimizing the distance between the relative matrix corresponding to the propose search direction and the scaled memoryless BFGS matrix in the Frobenius norm. Moreover, the resulting search direction satisfies the sufficient descent condition independent of any line search. Under appropriate assumptions, we establish the global convergence of the algorithm as well as it's rate of convergence. In addition, two sets of numerical experiment was carried out; one for solving nonlinear monotone equations with convex constraints and the other for solving sparse signal and image recovery problems arising in compressive sensing.

Keywords: Nonlinear equations, Conjugate residual method, Projection method, Convex constraints, Compressive sensing.

An Improved Differential Evolution Algorithm by Using Mixed Mutation and Crossover Strategies

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Abstract. In this research, an improved differential evolution algorithm by using mixed mutation and crossover strategies (IDEMIX) is proposed for solving continuous optimization problems. The differential proportions of two mutations strategies are varied and the mixing of two crossover rates are used to find the suitable mixed strategies. The IDEMIX algorithm is tested on several benchmark functions and compared the performance with those of some well-known population-based methods. The experimental results show that the proposed method can solve well all test functions. It also outperforms the basic DE and the compared methods.

Keywords: Differential evolution algorithm, mixed mutation strategies, mixed crossover rates, population-based method, continuous optimization problems.

An Adaptive Differential Evolution Algorithm Using Probability-Based Control Parameters with The Alternating of Learning and Utilizing Periods

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Abstract. In this research, we propose an adaptive differential evolution algorithm using probability-based control parameters with the alternating of learning and utilizing periods (ADEPC) for solving continuous optimization problems. The proposed method uses 3 values of scaling factor and 3 values of crossover rate with the adaptive and competitive probabilities based on the success of trial vectors in selection process. The probabilities are also controlled by the alternating of learning and utilizing periods. The ADEPC with the suitable learning and utilizing periods is tested and compared with some well-known adaptive differential evolution algorithms on several benchmark functions of different types and difficulties. The experimental results show that the ADEPC is effective and overall outperforms the compared methods.

Keywords: Adaptive differential evolution algorithm, continuous optimization problems, probability-based control parameters, learning period, utilization period.

SESSION 3C

On the Development of Momentum and Thermal Boundary Layer Flows of Hybrid Nanofluid over Rotating Disk

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Abstract. The purpose of current study is to explore the characteristic and development of momentum and thermal boundary layers of fluid near to surface of the rotating disk in the presence of hybrid nano-material. Based on the great potential in various applications of Cu and Ag nanoparticles due to their properties, Cu-Ag hybrid nano-material contained fluid is chosen for investigation. The physical problem is constructed with the help of the basic equations of thermo-hydrodynamic. For effective physical properties of hybrid nanofluid, co-relation models of a mixture are used. The results in form of boundary layers as well as velocity and temperature profiles at different positions in radial direction are calculated and displayed graphically. For engineering point of view, the results of wall shear stresses and coefficient of heat transfer are deliberated through tables and a comparison of hybrid with single nano-material contained fluids is also made.

Keywords: Hybrid nanofluid, Cu-Ag nanoparticles, Boundary layers development.

Rotational Coincidence in a Three Dimensional Lattice

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Abstract. Lattices play a very important role in the study of X-ray crystallography. One of the most common lattice being considered is the lattice generated by vectors of the form $(u, 0)$ and $(0, u)$, where $u \in \mathbb{R}$. If $u = 1$, then it is the lattice of all integer points, denoted by $\mathbb{Z}^2$. In this paper, we consider the three dimensional lattice $\mathbb{Z}^3$ and examine the coincidence site lattices (CSL). A CSL is generated by superimposing a rotated copy of a lattice to the original lattice. We consider the rotation along the lines passing through (0,0,0) and a point in the first octant within the sphere centered at (0,0,0) and containing the point (2,2,2) on the surface. The existence of points of coincidence for every angle of rotation along the specified axis is established using the density of $\mathbb{Q}$ in $\mathbb{R}$. Moreover, we generated results on superimposing multilattices.

Keywords: lattice, rotational coincidence, coincidence site lattice.

Travel Time Estimation by Geometric Properties of Road

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Abstract. Using curvature value of a road, travel time is estimated. In each section of the road, Hermite interpolation curve is fitted to obtain its curvature value. Design speed is estimated from the curvature value and an algorithm is developed for travel time estimation incorporating initial driving information. A comparison of the accuracy of the proposed method and of the existing method was based on the real-life driving test. This comparison showed that the proposed method approximates more accurately and more flexible in estimating travel time compared to the existing mobile application.

Keywords: Travel time estimation, design speed, Hermite interpolation.

Smoothness-distance Trade-off for Path Planning on Probabilistic Road Map using Cubic Bezier Curve

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Abstract. In this paper we present path planning algorithms constructed by Bezier curves for mobile robot with obstacles constraints. Bezier curves have useful properties for the path generation problem. The paper use cubic Bezier curve with the endpoint constraints, which are location and direction. As the algorithm for probabilistic road map may produce several nodes configurations, several paths can be generated. There is a trade-off between path length (distance) and smoothness. As the density of nodes may not be uniform, Bezier curve generated may produce a further route when preserving its continuity. To minimize this issue, a threshold in curvature mean value is set to improve the route. The algorithm is tested on few nodes configurations on a path with obstacle.

Keywords: Path planning, cubic Bezier curves, smoothness, probabilistic road map, mobile robot.

ABSTRACTS OF PARALLEL SESSIONS 4A, 4B AND 4C

5 February 2020 Wednesday 11:25 – 12:45

SESSION 4A

Dynamic Simulation for Analyzing the Effects of the Intervention of Vitamins on Delaying the Growth of Tumor Cells

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Abstract. The natural sources of the vitamins, which come from a balanced diet (as recommended by the World Cancer Research Fund and the American Institute for Cancer Research), contribute to protecting the body from advancing progressive of cancer stages. We developed a mathematical model, called tumor–normal–vitamins model (TNVM), which is governed by a system of ordinary differential equations and refers to two main populations normal cells and tumor cells. The models are discussed analytically and numerically by utilizing the Runge–Kutta method to simulate them. The results of the analysis and simulation of free model illustrate that the model will be stable if the tumor cells succeed in eliminating normal cells in the tissue. Whereas, the analysis and simulation of the TNVM showed a case of coexistence between normal cells and tumor cells occur if an individual consumes a regular rate of vitamins that have been simulated to be 87% per day from a natural food source. This study contributes to the increasing awareness regarding a healthy diet to reduce the risk of some deadly diseases, especially cancer.

Keywords: Dynamic system, numerical simulation, tumor-normal model, healthy diet.

Green's Function Technique for Generating Perfect Fluid Sphere

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Abstract. According to general relativity, gravity can be accurately described in terms of the curvature of spacetime. This curvature is caused by the present of matter and energy. How matter and energy curve spacetime can be explained by the Einstein field equation. Mathematically, the Einstein field equation is nonlinear second order partial differential equations coupled together. Unless there are some assumptions reducing its complexity, the Einstein equation cannot be solved exactly. One of these assumptions is a perfect fluid sphere. In this paper, the Einstein field equation is solved by the Green's function technique subject to a perfect fluid sphere condition.

Keywords: curvature, Einstein field equation, Green's function technique, perfect fluid sphere, spacetime.

Emergence of Persistent Activity state in Two-Population Neural Field Model for Gaussian External Input

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Abstract. In computational neuroscience the Wilson Cowan type two-population neural field model describes the dynamics of interactions between populations of excitatory and inhibitory model neurons. The bump solutions serve as Stimulus-specific persistent neural activity is the neural process underlying active (working) memory. In this work, we have explored effect of Gaussian spatio-temporal external input on the emergence of bumps in two-population neural field model. For detailed study the external input is divided into three parts amplitude, spatial and the temporal part. The effect all these parts of the external input are investigated with focus on temporal part. Different properties of the model investigated for the present choice of external input. The Gaussian temporal function in the external input is closer to natural phenomenon as observed in experimental studies. Results also show that the present choice of spatio-external input is better one as compare earlier studies.

Keywords: Integro-differential equitations, Bumps, RK4 method.

Stability Solution of Unsteady Stagnation-Point Flow and Heat Transfer over a Stretching/Shrinking Sheet in Nanofluid with Slip Velocity Effect

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Abstract. This study investigates the unsteady stagnation-point flow and heat transfer over a stretching/shrinking sheet immersed in nanofluid with the presence of slip velocity by using Tiwari and Das model. The governing equation is transformed to the system of ordinary differential equations using dimensionless similarity variables. The equations are solved for some parameters which are slip velocity, nanoparticle volume fraction, as well as the different type of nanoparticles namely Copper, Alumina and Titania in water as the base fluid with unsteadiness parameter using Matlab program in order to obtain the numerical solutions. The solutions are presented graphically in terms of skin friction coefficient, local Nusselt number and the profiles of velocity, as well as temperature where the profiles are depicted to show that the far-field boundary condition is fulfilled asymptotically and supported the duality of the findings. The stability analysis is performed using bvp4c program to identify which solution is stable and physically realizable since there are more than one solution obtained.

Keywords: Stability analysis, stagnation–point flow, unsteady boundary layer, slip velocity, nanofluid.

SESSION 4B

An Improved in Evaluating the Success of Internationalization of Companies with Random Forests

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Abstract. This paper proposes an improved accuracy and effectiveness in evaluating the success of internationalization of companies using random forest. The main contribution of this work is the simplification of current number of features, in which only 14 features are required—compared to 121 in the previous research. Evaluating the company's internationalization had previously been conducted by Rustam and Yaurita, using SVM, resulting in accuracy 81.36%. Therefore, this research is a novelty by using random forest to predict and also measure the feature importance. From the simulation work, it was found that random forest by using all features can evaluate the success of internationalization of companies with accuracy 91.62%, then with only 14 features, resulting in accuracy 93.29%. The result confirms that the method is superior to the previous research, namely obtaining better accuracy by reducing the number of features, which certainly helps the company to focus on several data points.

Keywords: internationalization, machine learning, random forest.

Classification of Thalassemia Disease using Naïve Bayes, kNN and Logistic Regression Method

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Abstract. In Indonesia, The Ministry of Health has recorded that every year 2500 babies are born with thalassemia. Thalassemia is an inherited disorder, where the body is unable to produce enough amount of protein in red blood cell called hemoglobin. When the amount of hemoglobin is abnormal, then red blood cell can't function properly. This leads to less amount of healthy red blood cells in the bloodstream. Thalassemia is a disorder that can't be cured, but the complications caused by thalassemia can be prevented. Some treatments for thalassemia are blood transfusion, bone marrow transplant and supplements. Quick and accurate diagnose of thalassemia will be very helpful for the patient to prevent further complications or death. Several researches on thalassemia has been done, one of them is Comparision of Fuzzy C-Means, Fuzzy Kernel C-Means, and Fuzzy Kernel Robust C-Means to Classify Thalassemia Data. In this research, the authors will analyse classification performance of Naïve Bayes, kNN and logisic regression method on thalassemia data. The data was taken from Harapan Kita Children and Women's hospital, Jakarta. The data consist of 82 thalassemia samples and 68 non-thalassemia samples with 11 features. The result shows accuracy of 99% for Naïve Bayes, 87% for kNN and 96% for logistic regression, using k-fold cross validation with k = 5.
Keywords: Machine Learning, Thalassemia, Naïve Bayes, kNN, Logistic Regression.

Classification of Hepatocellular Carcinoma Cancer (HCC) using SVM method with Sigmoid, RBF and Polynomial Kernel

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Abstract. Worldwide, hepatocellular carcinoma cancer or known as HCC is the third leading cause of cancer death. HCC is the most prevalent type of liver cancer. According to WHO (World Health Organization) fact sheet in 2017, 30-50% of cancer, including HCC can be prevented. One of HCC surveillance is to do (CT) scan or magnetic resonance imaging (MRI) every 6-12 months. But, not every patient have the access to CT scan, or MRI due to high cost and limited recources. In this research, the authors will analyse classification performance of SVM with sigmoid, RBF and oplynomial kernel on HCC data. The data was taken from Rumah Sakit Ibu dan Anak Bandung, West Java, Indonesia, consist of 203 instances. The result is accuracy of 73,1% for SVM with sigmoid kernel, 75,6% for SVM with polynomial kernel and 65,8% for SVM with RBF kernel using 80% data training and 20% data testing.

Keywords: Machine Learning, Hepatocellular Carcinoma Cancer, HCC, SVM, Kernel.

Schizophrenia Data Classification using Stochastic Support Vector Machine

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Abstract. Schizophrenia is a chronic, frequently disabling mental disorder that affects about one per cent of the world's population based on data on World Health Organization. Like most other mental disorders, the cause of schizophrenia is still not clearly presented. Most people imagine a schizophrenic person as someone who is vulnerable to violence or uncontrolled attitudes. In this paper, one machine learning methods were employed to classify Schizophrenia data. The methods are Stochastic Support Vector Machine. Stochastic Support Vector Machine is one of the supervised methods machine learning which has been used extensively to analyze and identify patterns that works on classifying data into some classes. The data that will be used contains of 392 observations and 65 variables. There are 171 data with the label "Schizophrenics" and 221 with "non Schizophrenics". The result is quite encouraging; we can see that the accuracy, precision, recall, and f-score using Stochastic Support Vector Machine reach more than 86%. Each data were classified into its rightful classes that are explaining its result.

Keywords: Schizophrenia, Machine Learning, Stochastic Support Vector Machine.

SESSION 4C

A New LSB Attack on Special-Structured RSA Primes

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Abstract. RSA cryptosystem is highly regarded as one of the most deployed public-key cryptosystem today. Previous attacks on the cryptosystem focus on the effort to weaken the hardness of integer factorization problem, embedded in the RSA modulus, $N = pq$. The attack used several assumptions to enable the attacks. For examples, p and q which satisfy Pollard's weak primes structures or partial knowledge of least significant bits (LSBs) of p and q can cause N to be factored in polynomial time. In this paper, we assume that q and r satisfy specific structures where $p = a^m + r_p$ and $q = b^m + r_q$ for a, b are integers and m is the power of 2, given that the bits of r_p and r_q are the known LSBs of p and q respectively. We also count the number of primes that are affected by our attack. From our result, it may pose a great danger to the users of RSA if no countermeasure being developed to resist our attack.

Keywords: RSA cryptosystem, RSA cryptanalysis, partial key exposure attack, integer factorization problem, cryptanalysis.

An Attack On $N = p^2q$ as a Result of The Multiple Of The Prime Factors Sharing Least Significant Bits

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Abstract. This paper presents an attack on the modulus $N = p^2q$ where p and q are two large primes with the same bit size. Let $e < N^{\gamma}$ be the public exponent while $d < N^{\delta}$ be its private exponent satisfying the equation $ed - k(N - (ap)^2 - apbq + ap) = 1$ where $\frac{a}{b}$ is an unknown approximation of $\frac{q}{p}$. Our attack is applicable when some amount of Least Significant Bits (LSBs) of ap and bq are known. We use the extended strategy of Jochemsz May as our main method to find the small roots of our polynomial and show that the modulus N can be factored in time polynomial if $\delta < \frac{3}{4} + \frac{3}{4}\beta - \frac{3}{4}\alpha - \frac{3}{4}\gamma$.

Keywords: Factorization; Jochemsz May Strategy; Least Significant Bits.

Elliptic Net Scalar Multiplication upon Koblitz Curves

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Abstract. Elliptic net scalar multiplication (ENSM) is a recent trend in cryptography. However, computational efficiency is a common issue in ENSM. The first ENSM is constructed using Weierstrass's division polynomials.Due to the limitation of the method in ENSM, the double and double-add methods were commonly used in cryptographic applications. Despite those advantages, such methods involve a big number of arithmetic operations on Weierstrass curve. Hence, this study proposes scalar multiplication via elliptic net upon Koblitz curves. The objectives outlined in this study are to investigate the relationships between division polynomials, elliptic divisibility sequences, and two types of Koblitz curve. Additionally, this study looked into the new relationship established between elliptic net and its scalar multiplication. The explicit formulae for ENSM were proposed and its computational costs of arithmetic operations were discussed.

Keywords: curve, divisible, Koblitz, polynomial, sequence.

On a Harmonic Univalent Subclass of Functions Involving a Generalized Linear Differential Operator

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Abstract. In this paper we use a function which is comprised into two parts. One is the analytic part and the other is the co-analytic part. Then, we rely on this function, which was used in some other differential operators, to build up our generalized linear differential operator which generalizes some interesting previous differential operators. We also embed our generalized linear differential operator with a harmonic univalent subclass of functions to yield some interesting results such as coefficient bound, compactness, and extreme points.

Keywords: Differential operator, harmonic functions, univalent functions, convex functions, starlike function of order α.

ABSTRACTS OF PARALLEL SESSIONS 5A, 5B AND 5C

5 February 2020 Wednesday 15:15 – 17:15

SESSION 5A

Solving Differential Algebraic Equations Using Implicit Hybrid Method

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Abstract. This paper will present an implicit hybrid one-step method to solve differential algebraic equations of type semi-explicit index 1. The method is similar as the one-step method and it is self - starting but the implementation is based on the predictor and corrector formulae. The order of the method and stability region will be discussed. This method will compute the solutions of stiff and algebraic differential equations using constant step size. The numerical results are presented to illustrate the applicability of the method. The results shown that the proposed method can produce comparable and better results compared to the existing method.

Keywords: Implicit method, differential algebraic equations, constant step size, stiff problems, predictor corrector formulae.

A Mathematical Model For Superinfection In Malaria Transmission

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Abstract. Malaria is one of many kinds of vector-borne disease which threat many developing countries all around the world every year. This disease caused by more than one type of plasmodium, which allows a superinfection between two kinds of plasmodium in the human body. Here in this talk, a mathematical model which describe the superinfection between two types of plasmodium. The model developed as a system of a nonlinear ordinary differential equation, which accommodate several essential factors, such as birth and death rate, infection process, superinfection phenomenon, recovery rate, etc. Mathematical analysis regarding the existence and stability of fixed points discuss and followed with the construction of the respected basic reproduction number. Some numerical experiments conducted to give a visual interpretation of the analytical results.

Keywords: Malaria, superinfection, basic reproduction number.

Reflection and Transmission Probabilities and Quasi-Normal Frequencies from the Superposition of Various Potentials

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Abstract. In the microscopic scale, matter can have the wave behavior more explicitly than in the macroscopic scale. This wave behavior of matter can be described by the Schrödinger equation. In a stationary state where a potential is independent of time, the Schrödinger equation can be separable into the product of term that depends only on time and term that depends only on position, which is called the time independent Schrödinger equation. The wave behavior can be described in terms of the reflection and transmission probabilities and the closely related quantity called the quasi-normal frequency. In this paper, these probabilities and the quasi-normal frequencies for the superposition of various potentials are calculated.

Keywords: Quasi-normal frequency,Reflection probability, Superposition, Transmission probability, Various potentials.

On a Fractional Non-Local Initial Boundary Value Problem

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Abstract. On the basis of some a priori bounds and on some density arguments, we prove the solvability of a singular time fractional initial boundary value problem with a memory term. The time fractional order derivative is taken the Caputo sense. The fractional order hyperbolic differential equation is associated with a local and non-local condition.

Keywords: Time fractional equation, non-local condition, a priori estimate, existence and uniqueness.

Embedded Exponentially-Fitted Explicit Runge-Kutta-Nyström Method For Solving Periodic Problems

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Abstract. In this work, a pair of embedded explicit exponentially-fitted Runge-Kutta-Nyström method is formulated for solving special second order ordinary differential equations (ODEs) with periodic solutions. A variable step size technique is used for the derivation of the 5(3) embedded pair; which provide a cheap local error estimation. The numerical results obtained signify that the new 5(3) embedded pair obtained is more efficient and accurate than the other existing methods in the literature.

Keywords: Exponentially-fitted, Runge-Kutta-Nystrom, Embedded Pair, Periodic Problems, Initial Value Problems.

The Difference Splitting Scheme for Multidimensional Hyperbolic Systems

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Abstract. In the note, the difference splitting scheme for a mixed problem posed for n-dimensional symmetric t-hyperbolic systems is proposed and it is used for the numerical calculation of stable solutions of the system. To build a difference scheme, a multidimensional problem is reduced (splitted) into one-dimensional ones then (and) solved it for each direction. The difference scheme for one-dimensional problem is based on the Godunov scheme. A discrete analogue of the Lyapunov's function is constructed for the numerical verification of stability of solutions for the considered problems. A priori estimate is obtained for the discrete analogue of the Lyapunov's function. This estimate allows us to assert the exponential stability of the numerical solution. A theorem on the exponential stability of the solution of the boundary value problem for linear hyperbolic system was proved. This stability theorem gives us the opportunity to prove the convergence of the numerical solution.

Keywords: difference scheme, Lyapunov function, mixed problem, stability, hyperbolic system.

SESSION 5B

DKN-*Fuzzy Simplex*: An Application Program to Solve Trapezoidal Fuzzy Number Linear Programming

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Abstract. The problem of fuzzy linear programming has been widely studied by several researchers. There are many methods used to solve this fuzzy linear programming problem. One of them is fuzzy simplex method, which utilizes the Maleki's ranking function. The authors never found computer application program has been developed to solve the problem of linear fuzzy programs, especially fuzzy trapezium numbers. This program is important to solve PLF with many variables easier than manual method. In this paper, presented the results of application programs that have been developed using the MATLAB programming language.This application program is available to solve fuzzy linear programming problems up to more than 20 variables. Some weakness of this program that the program only available to solve the maximum standard case and the program's appearance is very simple. This program package is called DKN-Fuzzy Simplex, with DKN is Dhoriva-Karyati-Niken, the authors of this paper.

Keywords: fuzzy linear programming, DKN-fuzzy simplex, trapezoidal fuzzy number, fuzzy simplex, ranking function.

Supplier Selection Decision Based on Fuzzy Delphi Method with Z-Number Valuation

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Abstract. Supplier selection problem is interesting many researchers. For years, the problem has drawn contentious debates among the practitioners and decision makers (DMs) mostly due to the uncertainty of input data involved and incomplete information. The study proposes Fuzzy Delphi Method (FDM) to minimize the problem. It focuses on the ways FDM can deal efficiently with incomplete information and uncertain data related to the supplier selection using Z-number valuation. A synthesis process was carried out to construct the decision matrix and derive the fuzzy average before applying the defuzzification process. A related illustrative example was employed to justify the beneficial and reliability of FDM. Based on the result of the calculation, it was found that by using Z-number in FDM, it had provided clear advantage in terms of evaluation approach due to its structure having the so-called restriction (constraint) and reliability (certainty) for component A and B, respectively. While component A described the real situation by linguistic measures with efficiency, component B provided the certainty of A consistently throughout the evaluation process.

Keywords: decision making, fuzzy delphi method, supplier selection, triangular fuzzy number, Z-number.

Ischemic Stroke Classification Using Local Binary Pattern and Support Vector Machines

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Abstract. Nowadays, it gets more types of diseases in the medical sector. For this reason, the role of technology is very important in assisting medical staff to overcome the problem. This research discusses about Ischemic Stroke. Ischemic Stroke happens when clots clog a blood vessel and cut off the blood flow to brain cells. In this research, the classification to diagnose Ischemic Stroke is using Support Vector Machines (SVM) with Local Binary Pattern (LBP) for its texture analysis. By seeing accuracy and computational time of the method, we will know the best rate of the classification from CT Scan Dataset that we have from CiptoMangunkusumo Hospital, Indonesia. The result is given that the accuracy shows 67.19% with 30% of data training.

Keywords: Classification, CT Scan, Ischemic Stroke, Local Binary Pattern, Support Vector Machines.

Ischemic Stroke Classification Using Gray Level Co-Occurrence Matrix and K-Nearest Neighbor

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Abstract. The medical sector is currently in need of a method to aid in the classification of diseases, which contemporarily progresses into varying types. Therefore, the role of technology is highly relevant in the process of overcoming this challenge. This research discusses about Ischemic Stroke, which is one of the types of stroke that occurs when a clot or a mass clogs a blood vessel cutting off the blood flow to brain cells. Furthermore, the Gray Level Co-Occurrence Matrix (GLCM) and K-Nearest Neighbor (KNN) are used as a texture analysis and classification method to diagnose the patients of Ischemic Stroke. Therefore, this research aims to compare how it works, using Euclidean and Mahalanobis Distance. Data of CT Scan from CiptoMangunkusumo Hospital, Indonesia was used to evaluate Ischemic Stroke, in terms of Accuracy and Computational Time. Thus, the final results indicate a better performance for Mahalonobis Distance in K-parameter equal to 10 with 71.43% as its Accuracy and 0.16 as its Computational Time.

Keywords: Euclidean Distance, Gray Level Co-Occurrence Matrix, Ischemic Stroke, K-Nearest Neighbor, Mahalanobis Distance.

Distance-Preserving Inverse Best Approximation inEuclidean Spaces

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Abstract. Let$\langle U_i\rangle_{i=1}^{k}$ be a sequence of closed convex subsets in a Euclidean space$\mathbf{E}^n$ and $\langle d_i\rangle_{i=1}^{k}$be a sequence of real numbers. Consider the system of equations: $||x - P_{U_i}(x)||_n = d_i$ for $i \in \{1,2,\dots,k\}$. We have shown that there are sequences of closed convex subsets with corresponding sequence of real numbers that gives uncountable solution to the system of equations. Also, there are cases that no solution exists. In the case that no point $x \in \mathbf{E}^n$satisfies the system of equations, we determine the approximate solution of the system of equations. That is, we find $x \in \mathbf{E}^n$ such that $\sum_{i=1}^{k}||d_i - ||x - P_{U_i}(x)||_n||_n$ is a minimum. This gives the best solution to the given system of equations. In particular, for $k = 3$ and if $d_1 = d_2 = d_3$, then there exists a point $x \in \mathbf{E}^n$ such that$x$ is the center of the circle for which the three closed convex sets are tangent to this circle.

Keywords: closed convex sets, Euclidean space, best approximation.

A New Estimation Approach for Negative Binomial Garch Model: Quadratic Estimating Functions Method

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Abstract. Time series of counts has been widely used in many real-world applications. In this paper, we derive the quadratic estimating functions for negative binomial GARCH, known as NBINGARCH (p,q) model. Specifically, we derive the optimal function of NBINGARCH(1,1) and obtain the estimated parameters of interest via simulation. We show that the performance of the quadratic estimating functions method is superior compared to estimating functions and maximum likelihood methods. For illustration, we fit the NBINGARCH(1,1) on the poliomyelitis cases in the United State from 1970 to 1983.

Keyword: Integer-valued time series, quadratic estimating functions, moment properties.

SESSION 5C

A Bernstein-Szegö Inequality on Hardy Space

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Abstract. The classical Bernstein-Szegö inequality asserts that $T'(x)^2 + n^2T(x)^2 \leq n^2\max_{y\in\mathbb{R}}|T(y)|^2$ for each real number x and for each real trigonometric polynomial T of degree at most n. In this paper, we establish a Bernstein-Szegö inequality on the Hardy space$H^2(D)$, a vector space of analytic functions on the unit disk D, by taking bounded linear operators S and T from some reproducing kernel Hilbert space of functions on D into the Hardy space $H^2(D)$ and obtain a sharp estimate using Bessel's inequality. The Hardy space is a reproducing kernel Hilbert spaces (RKHS) of functions on D. One of the interesting properties of a reproducing kernel Hilbert space $H^2(D)$ of functions on $D$is that, for each $x \in D$ and$f \in H^2(D)$, there exists $k_x \in H^2(D)$ satisfying $f(x) = \langle f, k_x\rangle_{H^2(D)}$.

Keywords: Hardy space, Bessel's inequality, linear functional, Bernstein-Szegö inequality.

(p, q)-Hardy Type Inequality for Post-Quantum Integral

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Abstract. A large number of authors have been studied Hardy type inequalities and have motivated some important lines of study which are currently active. There are a lot of papers that have been appeared in the literature which deals with the simple proofs, the discrete analogue of Hardy's inequality and its generalizations.Recently,q-calculusand some of the generalization forms of quantum type inequalities have been studied by many researchers,the generalization of q-calculus is (p, q)-calculus and it has been appliedin many branches of mathematics.In this talk, we investigategeneralized (p, q)-Minkowski type inequality,(p, q)-Hardy type inequality, generalized (p, q)-Hardy type inequality and (p, q)-Hardy type inequality with many functions for (p, q)-integral on post-quantum calculus.By taking $q \to 1^-$ and $p \to 1$, our result gave classical results on Hardy inequalities and generalized Minkowski inequality.

Keywords: Hardy inequality,Minkowski inequality, Quantum, Post-Quantum, (p, q)-integrable.

On Existence of Countably Many Disjoint Shifted Octants in the Hilbert Space l_2

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Abstract. We are given two sequences of points *{x_i}* and *{y_i}* with the terms in the Hilbert space l_2, that is, *x_i, y_i* are in *l_2*. We take any point *a* in *l_2* and pass straight lines parallel to coordinate axes through the point *a*. The octants formed by these straight lines are obtained from the octants formed by the coordinate axes by shifting them to the vector *a*. We call these octants shifted octants with the vertex at the point *a*. Problem is to determine the existence of a set of disjoint shifted octants in *l_2* with vertices at *y_i*, which do not contain all the points *x_j* and *y_j* for any positive integers *i* and *j*. In the present paper, we prove that there is such a set of shifted octants. Moreover, we construct these octants.

Keywords: Hilbert space, shifted octant, disjoints octants, uncountable set of octants.

Generalized Miura Transform in Abstract Banach Spaces

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Abstract. Miura transform is known as the transformation between KdV and modified KdV (mKdV) equations. Its formal similarity to the Cole-Hopf transform has been known. This fact sheds light on the logarithmic type transformations as an origin of certain kind of nonlinearity in the soliton equations. In this paper, based on the logarithmic representation of operators in infinite-dimensional abstract Banach spaces, a structure common to both Miura and Cole-Hopf transforms is extracted. In conclusion, by means of generalized Miura transform in Banach spaces, an integrable class of nonlinear semi group theory is established in the theory of abstract evolution equations.

Keywords: Miura transform, KdV equation, nonlinear semi group, soliton, logarithm.

An Algorithm For A Class Of Pseudomonotone Equilibrium Problems In Hilbert Spaces

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Abstract. In this paper, we proposed a subgradient extragradient method for dealing with pseudomonotone equilibrium problems with Lipschitz-type condition on a bifunction in Hilbert spaces. The weak convergence theorem for this method is precisely provided based on the standard presumptions on the cost bifunction. We also prove a strong convergence theorem for the second algorithm without knowing the strongly pseudomonotone constant and the Lipschitz-type constants of a cost bifunction. For a numerical observation, we consider and provide the solution of well-known Nash-Cournot oligopolistic equilibrium models and others examples to support our well-established convergence result.

Keywords: Equilibrium problem, Lipchitz-type conditions, Variational inequality, Nash-Cournot oligopolistic equilibrium model.

Some Construction Methods of Aggregation Operators

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Abstract. Aggregating data is the main line of any discipline dealing with fusion of information, from the knowledge-based systems to the decision-making. The purpose of aggregation methods is to convert a list of objects all belonging to a given set into a single representative object of the same set by an *n*-ary function. This paper reviews some methods to construct new aggregation functions on the basis of existing operators, where the construction methods are based on duality, transformation, composition and weighted rule.

Keywords: aggregation operators, composite aggregation operators, weighted aggregation operators, duality, transformation.

ABSTRACTS OF PARALLEL SESSIONS 6A, 6B AND 6C

6 February 2020 Thursday 09:00 – 10:20

SESSION 6A

Numerical Solution of Periodical IVPs Using Fourth Order Phase-Fitted and Amplification-Fitted Diagonally Implicit Two Derivative Runge-Kutta Method

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Abstract. A Phase-fitted and Amplification-fitted Diagonally Implicit Two Derivative Runge-Kutta method (PFAFDITDRK) of fourth algebraic order for the numerical integration of first order Initial Value Problems (IVPs) which possesses oscillatory solutions are constructed. Using the Phase-fitted and Amplification-fitted property, a fourth order two stage Diagonally Implicit Two Derivative Runge-Kutta (DITDRK) method is designed. The numerical experiments are carried out with the comparison with other existing Runge-Kutta(RK) methods of the same property to show the accuracy and efficiency of the derived method.

Keywords: Diagonally Implicit Two Derivative Runge-Kutta method, Initial Value Problems, Ordinary Differential Equations, Phase-fitted and Amplification-fitted.

Dynamical Analysis of Fractional – order Chemostat Model for Cell Mass Production

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Abstract. This study investigates the dynamical analysis of fractional chemostat model with variable yield coefficient where the growth rate is given by Monod expression. The stability and bifurcation analyses of the fractional – order chemostat model are conducted based on the stability and bifurcation theory of fractional – order system and are stimulated by Adams – type predictor – corrector method. The analyses identify the parameters condition that can change the stability of the system. The results show there are two steady – state solutions which are washout and no washout steady – state. The order of the fractional chemostat system should remain at $\alpha < 0.9$ to improve the cell mass growth for unstable steady – state. The decreasing value of α has the effect of increasing the growth rate of cell mass. Thus, the convergence speed of nearby trajectories is increases when the value of α decreases. This important to improve cell mass production in the chemostat.

Keywords: Fractional – order, Chemostat, Stability, Bifurcation, Adam – type predictor – corrector.

A Deterministic Fractional Order Dengue Model with Control Measures

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Abstract. This paper deals with a new deterministic mathematical model for control of the dengue fever outbreak based on a system of fractional differential equations. In this study, we consider control strategies relevant to the current situation in Malaysia, including the use of adulticides, larvicides, destruction of the breeding sites, and individual protection. Global stability of the disease-free and endemic equilibrium points is derived using the Lyapunov function theory. The relations between the order of the operator and the control parameters are investigated. Numerical simulations are performed to verify the theoretical results and to analyze the significance of each control method in reducing the spread of the dengue virus in the community.

Keywords: Dengue model, fractional derivative, dengue control, uniform stability, Lyapunov function.

Modified HAM for solving linear system of Fredholm-Volterra Integral Equations

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Abstract. In this note, system of linear Fredholm-Volterra integral equations (FVIEs) is considered and modified homotopy analysis method (MHAM) together with Gauss-Legendre quadrature formula (GLQF) are used to find approximate solutions. Standard HAM, modified HAM and optimal homotopy asymptotic method (OHAM) are compared for the same number of iteration.It is noted from chosen examples that modified HAM with GLQF dominated over standard HAM and OHAM. In all cases modified HAM with GLQF approaches to either exact solutions or residual converges to zero drastically when number of iteration and quadrature nodes are increased.

Keywords: Modified HAM, Gauss-Legendre QF, Approximate solution, Convergent.

SESSION 6B

Implementation of Random Forest for the Classificationof Chronic and Acute Sinusitis

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Abstract. This paper implements new method for the classification of sinusitis, which is random forest. Sinusitis is the inflammation of paranasal sinuses lining, sinusitis can cause severe infections and other complications, and therefore, accurate method is needed to classify the sinusitis. There are several methods have been used in previous studies, namely Kernel-Based Fuzzy C-Means, Kernel Spherical K-Means and Support Vector Machine, accuracy of these methods respectively 100%, 97%, and 90%. The main contribution of this research is to use smaller percentage of training data to classify sinusitis using random forest. It was found that proposed method is superior to previous research, random forest with entropy and 50 trees can classify the sinusitis 100% with percentage of training data only 30%, when previous method with kernel-based fuzzy c-means required 90% training data, this is very important for medical sector research, because some diseases are difficult to get observations, especially for rare diseases.

Keywords: sinusitis, machine learning, random forest.

Convex Accessibility Polynomial of Networks Resulting from Multilayer Network Chain Interactions

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Abstract. Let N be a finite network. A subset S of the node-set of N is said to be convex if for every pair of nodes $(u, v) \in S \times S$, any $u - v$ path lies entirely in S. A convex set with cardinality i is said to be i-convex. A set S is$i$-convex k-accessible in N if S is i-convex and the maximum of the distances between a node in $S$and a node not in S is equal to k. The convex accessibility polynomial of N is the polynomial given by $A(N; x, y) = \sum_{k\geq 0} \sum_{i=1}^{\Gamma(N)} a_{ik}(N) x^i y^k$ where $a_{ik}(N)$ is the number of i-convex k-accessible subsets of N and $\Gamma(N)$ is the cardinality of a maximum convex subset of the node-set of N. In this paper, we characterized the$i$-convex$k$-accessible subsets of some special networks and networks resulting from the multilayer network chain interactions and established their convex accessibility polynomials.

Keywords: convex sets, convex accessibility polynomial, network chain interaction.

The Effects of Interference on the Power of A/B Testing

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Abstract. Many industrial practitioners rely on A/B testing for making decisions in situations where interference cannot be controlled. In this work, an important question on how to assess the power of A/B testing in the presence of interference is addressed. It is proved that interference has a measurable effect on the power of A/B test, and, a measurement of the power of the test as a function of number of exposed individuals is presented. In addition, a central limit theorem for the number of observed individuals under a simple Bernoulli switching mechanism is derived. A method for estimating the power of A/B test is given based on the above results, and this method is applied in Facebook friendship network and Twitter follower network. This result provides a way of understanding how to design an A/B testing analysis to figure out confidently how the test is affected when conducted under interference in social networks. As a future work, we plan to analyse measurements under a different parametric distribution other than Bernoulli.

Keywords: Experimental Design, Causal Inference, Network Interference, Social Networks Analysis.

Finite Mixture Model: Prediction of Time Series Data using Bayesian Method

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Abstract. This paper measures the number of components that exhibit from the variables' series and formulate a predictive distribution of the exchange rate and international tourism expenditure in Malaysia. The number of components may be affected by the time series components including trend, seasonal adjustment and irregular changes. It is essential to weight the probability density function for time series data and thereafter used for prediction. Bayesian method is then used to fit with the finite mixture model due to its consistency characteristic to formulate a predictive distribution. The Bayesian parameter estimates are closed to the predictive distributions because it will integrate the prior distribution with likelihood function to produce posterior distribution. The results show that there is a two-component normal mixture model exists for the time series data. In addition, a Bayesian predictive distribution is obtained to make predictions about the exchange rate and international tourism expenditure in Malaysia.

Keywords: Finite Mixture Model, Bayesian Method, Prior Distribution, Likelihood Function, Predictive Distribution.

SESSION 6C

Solving Non-linear Integral Operator of Fredholm Equation by Majorant Function Principle

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Abstract. This paper focuses on the approximate non-linear solution of Fredholm integral operator. Where the concept of majorant function works with the modified Newton method (MNM) to linearizes the non-linear operator, at that point the Gaussian-Legendre quadrature formula is utilized to determine the approximate solution. The uniquely existence approximate solution has been proven. Furthermore, the Rate of convergence is determined in the Banach area. Finally, an example is given to confirm the exactness of the showed strategy.

Keywords: The majorant function, modified Newton method, non-linear integral operator, Fredholm integral equation, quadrature formula.

Validated Numerical Computation of Eigenpairs in the Generalized Eigenvalue Problem for Nonsquare Matrix Pencil

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Abstract. Consider an optimization problem arising from the generalized eigenvalue problem $Ax = \lambda Bx$, where $A, B \in \mathbb{C}^{m\times n}$ and $m > n$. Ito et al. showed that the optimization problem can be solved by utilizing right singular vectors of $C := [B, A]$. In this talk, we focus on computing intervals containing the solution. When some singular values of C are multiple or nearly multiple, we can enclose bases of corresponding invariant subspaces of $C^H C$, where C^H denotes the conjugate transpose of C, but cannot enclose the corresponding right singular vectors. The purpose of this talk is to prove that the solution can be obtained even when we utilize the bases instead of the right singular vectors. Based on the proved result, we propose an algorithm for computing the intervals. Numerical results show property of the algorithm.

Keywords: generalized eigenvalue problem, nonsquare pencil, invariant subspace, validated numerical computation.

Validated Numerical Computation for the Perron Pair of an Irreducible Nonnegative Matrix

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Abstract. Fast algorithms are proposed for calculating error bounds for a numerically computed Perron root and vector of an irreducible nonnegative matrix. Particular emphasis is put on the computational efficiency of these algorithms which has only square complexity under an assumption. The error bounds for the root and vector are based on the Collatz-Wielandt theorem and estimating a solution of a linear system whose coefficient matrix is an M-matrix, respectively. We introduce a technique for obtaining smaller error bounds. Numerical results show efficiency of the algorithms.

Keywords: Perron pair, irreducible nonnegative matrix, validated numerical computation.

Studies on Edge-Magic Total Graphs

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Abstract. A bijection $\lambda: V(G) \cup E(G) \to \{1,2,\dots,|V(G)| + |E(G)|\}$ is called an edge-magic total labeling of graph $G(V,E)$ if there exists a constant k such that $\lambda(x) + \lambda(y) + \lambda(xy) = k$ for any edge $xy \in E(G)$. An edge-magic total labeling λ is called super edge-magic total if $\lambda\big(V(G)\big) = \{1,2,\dots,|V|\}$. A graph admits edge magic total labelling is called edge magic total graph. However, Enomoto et al.[2] conjectured that every tree admits a super edge-magic total labeling. In the effort of attacking this conjecture, many authors have considered super edge-magic total labeling for some particular classes of trees. In this talk, I will explain our contribution towards this conjecture.

ABSTRACTS OF PARALLEL SESSIONS 7A, 7B AND 7C

6 February 2020 Thursday 10:40 – 12:40

SESSION 7A

Gravity Gradient and Aerodynamic Drag Coupled Satellite Stabilization Regimes

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Abstract. Low earth-orbit satellites with nadir-pointing requirements typically require three-axis attitude stabilization. At altitudes below 500 km, satellites experience primarily aerodynamic drag. The drag force will induce disturbance torques to act about the satellite's enter of mass. Gravity gradient is a common passive stabilization method to save the satellite fuel. Instead, aerodynamic torques can be exploited together to stabilize the satellite attitude. This paper attempts to combine the gravity gradient and aerodynamic torques to stabilize the satellite roll, pitch, and yaw attitudes. The idea of exploiting the aerodynamic torques requires installing the flaps on the satellite's body and keeping the flaps tilted at certain angles to generate desired control torques. This combined approach is analysed via numerical simulations corresponding to their deduced governing equations. The numerical results demonstrate the effectiveness of the proposed coupled gravity gradient and aerodynamic available satellite attitude stabilization regimes.

Keywords: Satellite Stabilization, Aerodynamic Drag, Gravity Gradient.

Focusing Energy-Critical Inhomogeneous NLS

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Abstract. We consider the focusing energy-critical inhomogeneous nonlinear Schrödinger equation $\mathrm{iu}_t + \Delta \mathrm{u} + \mathrm{g}|u|^{p-1}\mathrm{u}, \mathrm{u}(0) = \varphi \in H^1$, where $0 \leq g_i \leq |x|^b g \leq g_s, 0 < b < \frac{4}{3}$, and $\mathrm{p} = 5 - 2\mathrm{b}$. On the road map of Kenig-Merle we show the global well-posedness and scattering of radial solutions under energy condition together with scaling condition and variational condition, and rigidity condition. We also provide sharp finite time blowup results for non-radial and radial solutions. For this we utilize the localized virial identity.

Keywords: inhomogeneous NLS, focusing energy-citicalnonlinearity, GWP, Kenig-Merle argument

Stability and Bifurcation Analysis of an SEIRE Model of Dynamics of Tuberculosis Infection.

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Abstract. Tuberculosis is a disastrous infection disease worldwide. In this text, we designed and analysed a nonlinear compartmental model for an SEIRE model of dynamics of tuberculosis in an opened population. The basic reproduction number BRN (R_0) which account for the transmission of the disease is computed by using next generation operator (NGO). Locally and globally asymptotic stability conditions for the tuberculosis free and endemic equilibrium are both examined. Center manifold theory was used to proved the bifurcation analysis reveled that our system exhibits a transcritical (forward) bifurcation. Numerical simulation is carried out to confirmed theoretical analysis.

Keywords: Tuberculosis model, Basic reproduction number, Stability analysis, Bifurcation analysis, Numerical simulation.

Trigonometrically-Fitted Four-Step Predictor-Corrector Method for Solving Ordinary Differential Equations with Oscillatory Solutions

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Abstract. In this paper, a proposed trigonometrically-fitted four-step predictor-corrector method is developed. Based on the current four-step Adams-Bash forth method (as predictor) and on three-step Adams-Moulton method (as corrector) to solve ordinary differential equations with oscillatory solutions. This method is constructed which exactly integrate initial value problems whose solutions can be expressed as the linear combinations of the set functions$\{\sin(\omega x), \cos(\omega x)\}$ with $\omega \in R$, where ω represents an approximation of the frequency of the problem. The frequency of the problem will be used to raise the accuracy of the method. Stability of the suggested method is examined and corresponding region of stability is depicted. The new four-step trigonometrically-fitted predictor-corrector method is applied for solving the initial value problems whose solutions involve trigonometric functions. The numerical results are described to prove that the prospective method is more efficient than the widely used methods for the numerical solution of ordinary differential equations with oscillating solutions.

Keywords: trigonometrically-fitted, four-step Predictor-Corrector method, Adams-Bashforth-Moulton method, ODEs, oscillatory solutions.

Comparison of Pressure Distributionin Exponential and Parabolic Rough Slider Bearings Lubricated with Non-Newtonian Rabinowitsch Fluid

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Abstract. Based on the Rabinowitsch fluid model and the Christensen's stochastic theory, the comparison of pressure distribution in exponential and parabolic rough slider bearings have been investigated. We have established the Reynolds-type equation in lubrication theory by variational principal. By employing a small perturbation technique to the nonlinear non-Newtonian Reynolds equation, analytical solutions of the film pressure distribution are derived. The results are illustrated analytically and graphically by using the range of Rabinowitsch fluid, roughness and bearing parameters.

Keywords: slider bearing, third grade fluids, perturbation analysis.

Effects of Slips on Micropolar Hybrid Nanofluid and Heat Transfer Over a Shrinking Sheet with Thermal Radiation, Non-Uniform Heat Source/Sink and Magnetohydrodyamic (MHD)

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Abstract. In the presence of slips, non-uniform heat source/sink, thermal radiation and magnetohydrodynamic (MHD), micropolar hybrid nanofluid and heat transfer over a shrinking sheet has been studied. The problem is modeled as a mathematical formulation that involves a system of the partial differential equation. The similarity approach is adopted, and self-similar ordinary differential equations are obtained and then those are solved numerically using the shooting method. The flow field is affected by the presence of physical parameter, such as micropolar parameter, magnetic field parameter, suction parameter and slip parameter whereas the temperature field is affected by thermal radiation parameter, space-dependent parameter, temperature-dependent internal heat generation/absorption parameter, Prantl number and Biotnumber. The skin friction, couple stress and heat transfer coefficient are tabulated and analyzed. The effects of the governing parameters on the velocity, angular velocity and temperature profiles are illustrated graphically. The solution of velocity, angular velocity and temperature are obtained for several values of each parameters involved.

Keywords: Hybrid nanofluids, Micropolar fluid, Thermal radiation, Suction, Magnetohydrodynamic (MHD).

SESSION 7B

Classification of Hepatocellular Carcinoma using an Extended Three-Way C-Means Based on Kernel

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Abstract. Three-way c-means based on the kernel function of classifying Hepatocellular Carcinoma (HCC) data was proposed in this paper. As the improvement version of the rough k-means, it will be integrated with the polynomial kernel function. One of the important benefits of the proposed method is its ability to handle the data that cannot be separated linearly. The method was evaluated using *k*-fold cross-validation with *k*=3,5,7,10. Its sensitivity, precision, and F1-Score were compared to the three-way c-means in classifying the HCC dataset from Al Islam Bandung Hospital Indonesia, which consists of 130 HCC and 73 health samples. The result confirms that the proposed method makes the increment up to 10 percent to the three-way c-means in sensitivity, precision, and F1-Score. Therefore, the method proposed in this paper can be used to provide a proper diagnosis because it has high sensitivity in the classification.

Keywords: Classification, hepatocellular carcinoma, polynomial kernel function, rough k-means, three-way c-means.

An Improved KC-Means Clustering Based on Kernel for Hepatitis Classification

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Abstract. This paper proposed an improved KC-Means clustering algorithm based on Gaussian Radial Basis Function (RBF) and polynomial kernel function for classifying hepatitis data. This algorithm integrates Kernel K-Means and Fuzzy Kernel C-Means clustering algorithm. The main contribution of this work is the enhancement of accuracy due to the use of kernel function. The proposed methods were applied to the hepatitis dataset, which was obtained from Tangerang and Mitra Keluarga Kelapa Gading Hospital in Indonesia, consisting of 89 hepatitis B and 31 hepatitis C samples. The performance of the proposed methods was evaluated using the confusion matrix to calculate the accuracy. From the experiments, it was found that KC-Means based on Gaussian RBF kernel gives 80.28% accuracy, which is better compared to KC-Means based on the polynomial kernel and without kernel that provides 78.89% and 72.59% accuracy, respectively. Therefore, it is envisaged that this work will provide an accurate diagnosis in hepatitis classification.

Keywords: Classification, fast fuzzy, Gaussian RBF kernel, KC-Means, polynomial kernel.

Generalized Automorphisms of Associative Dialgebras

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Abstract. This paper focuses on a generalized automorphisms of associative dialgebras. It begins with automorphism groups of associative dialgebras *Aut(D)*. It then related the concept of generalized automorphisms of associative dialgebras with the concept of their generalized derivations.

Keywords: Associative Dialgebra, Lie Algebra, Algebraic Group.

Sensitivity Analysis of the Reproductive Number of Influenza H1N1 Model

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Abstract. Influenza is the important diseases in emerging infectious diseases and recurrent infections because there are many times of outbreaks worldwide including Thailand. It is reported that a major cause of illness and death in Thailand is caused by the influenza virus, especially, the most patients are found in Bangkok. Therefore, this paper aims to construct the mathematical model and suggest measure to prevent influenza. Mathematical analysis reveals that the threshold value of the model is called the reproductive number and denoted by R_0. It is found that if R_0 is less than unity, the disease dies out. The proposed model is applied for predicting the number of infectious individuals and comparing with the real cases in Bangkok during the years 2016-2017. The results give the appropriate values of model parameters which are used to investigate the sensitivity analysis of the reproductive number. The study results are suggested the factors influencing to influenza transmission which lead to the effective measures to prevent influenza.

Keywords: Influenza H1N1, Mathematical model, Reproductive number, Sensitivity analysis.

Network Analysis and Building Construction: Impact of Timing and Costing of Stages in Building Process: A Case Study

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Abstract. The network analysis results have been played a crucial role for application tasks solution in project management. This work intended to study the cost and minimum expected time that will be required to complete the project. The data on the cost and duration of activities were collected from H&M, Nigeria Ltd., a construction and building company in Kano. Critical path method (CPM) and project evaluation and review technique (PERT) were used to do the analysis. Further analysis revealed that the shortest possible time for the completion of the analyzed building project is 48.42 weeks instead of the expected duration of 87.56 weeks. This means that through proper scheduling of activities, the expected completion time was reduced by 39.14 weeks. The additional cost associated with the reduction in timing is ₦15,525,749 which increases the initial expected cost required to complete the project from ₦42,492,662 to ₦58,018,412.

Keywords: Network analysis, Building construction, Project management, Critical path method and Project evaluation and review technique.

A Sliding Window Method for Official Statistic Prediction

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Abstract. In this study, a methodology for the prediction of a one-step-ahead statistic is introduced to account the problems of cleaning official statistics data. The aim is to detect anomalies in official statistics data and correcting it for better forecasting of a one step-ahead official statistic. To achieve the aim, a sliding window method is used. A window is specified by a time series segment, and for each window, a sample statistic is obtained from the data in a time segment as an input to forecast or interpolate a one-step-ahead data. For the detection of the outliers, a method based on prediction confidence interval is used. In order to demonstrate the useful implementation of the method for improving data quality and decision making quality, the method is applied on several real official statistics datasets.

Keywords: Sliding Window, Official Statistic, Outliers, Prediction, Robust.

SESSION 7C

Slant Helices and Their Applications

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Abstract. Slant helices are used to determine curves such as closed curves, magnetic curves, and isophoto curves on surfaces. This work reviews slant helices and give their applications in terms of persistent frame motions.

Keywords: Slant helix, Closed curve, Magnetic curve, Isophoto curve, Persistent rigid-body motion.

FEEG Image Segmentation using K-means and Fuzzy C-means Clustering

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Abstract. Clustering which is an unsupervised learning problem is a type of segmentation that classified different patterns or structures in an image. It can be done by two different strategies which are hard clustering and soft clustering. In this paper, the image form of Electroencephalography (EEG) signal known as Flat Electroencephalography image (FEEG) is classified by using k-means and fuzzy c-means (FCM), which are hard and soft clustering techniques respectively.

Keywords: Clustering, k-means, fuzzy c-means, flat electroencephalography.

The Convergence of the Hard Sampling Operator with Rapidly Decreasing Wavelet Functions

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Abstract. In this work, the two-dimensional wavelet expansion of $L^p(R^2)$ function for $1 < p < \infty$ converges pointwise, almost everywhere under new kind of wavelet projection operator called hard sampling operator. The convergence is established by assuming some minimal regularity in which to define the rapidly decreasing property for two dimensional wavelet function ψ_{j_1,j_2,k_1,k_2} and by proving the bound (limit) of this wavelet function. Also, the two-dimension wavelet expansions under Hard Sampling Operator are controlled in a magnitude by the maximal function operator. All these conditions can be utilized to achieve the convergence almost everywhere.

Keywords: Almost everywhere convergence, two-dimensional wavelet expansion, hard sampling operator, rapidly decreasing, bound maximal function.

Gravitational Wave Scattering by Flexible Porous Wall in Two-Layer Ocean of Non-Uniform Depth

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Abstract. A problem of oblique wave scattering by bottom and top mounted porous and flexible vertical wall extended up to free surface in two layer fluid of varying water depth is considered. The bottom bed profile is made up of an uneven geometry within a bounded domain and constant water depths of unbounded domain. Within the convention of linear wave theory, method of matched Eigen function and modified mild-slope equation (MSE) is applied for the solution. The continuity conditions of the fluid pressure at the point of bottom slop discontinuities and mass flux at the interface is utilized which will finally enable us to convert the BVP into a system of equations. The findings are likely to assess the flexible porous wall as a breakwater in mitigating the wave energy in stratified fluids.

Keywords: Flexible, Porous, Step bottom, Surface wave, Interfacial wave.

On Certain 3-Algebras Generated by Binary Algebras

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Abstract. The central theme of this paper is to prove the existence of an *n*-algebra whose multiplication cannot be expressed employing any binary operation. Furthermore, to prove if two algebras are not isomorphic this does not hold for 3-algebras corresponds to these two algebras. The proof drives applying some results gotten early applying a new approach for the classification algebras problem introduced recently which showed great success in solving many problems of the classification algebras.

Keywords: Multilinear operator, n-algebras, associative, isomorphism.

On the Solutions of the Diophantine Equation $x^4 + y^4 = p^k z^3$ in Gaussian Integers

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Abstract. This paper is concerned with the existence, types and the cardinality of the integral solutions for Diophantine equation $x^4 + y^4 = p^k z^3$ where x, $y$and $z$are complex numbers. The aim of this paper is to develop methods to be used in finding all solutions to this equation. Results of the study show the existence of infinitely many solutions to this type of Diophantine equation in the field of complex numbers for both cases when$x = y$ and $x \neq y$. The main result obtained is a formulation of a generalized method to find all the solutions for this type of Diophantine equations.

Keywords: Integral solutions, Diophantine equation, hyperbolic equation, prime power decomposition, coprime integers.

ABSTRACTS OF PARALLEL SESSIONS 8A, 8B AND 8C

6 February 2020 Thursday 14:30 – 15:50

SESSION 8A

The Generalized Exponential Distributions with Fixed Covariate

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Abstract. The purpose of this paper is to extend the generalized exponential model (GE) to include covariates in the presence of right-censored data. We obtained the maximum likelihood estimator (MLE) for the parameters of this model. Following that a thorough simulation study was carried out to evaluate the performance of the estimator based on the values of bias, standard error (SE) and root mean square error (RMSE). The results indicated that the SE and RMSE decrease with the increase in sample size and decrease in censoring proportion. Finally, we illustrate the performance of the Wald confidence interval estimation technique for the GE model right-censored data and fixed covariate by obtaining the coverage probability study at several censoring proportions and different sample sizes.

Keywords: Generalized exponential distribution, maximum likelihood estimator, right-censoring, converge probability, fixed covariate.

Prediction of Hourly Water Level Time Series Data in Floodplain Area using Local Linear Approximation Method

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Abstract. Water level in the floodplain area is unpredictable and uncertain due to ongoing phenomena. The time series data for the water level in floodplain area has been analysed to identify the presence of chaotic behaviour in order to develop prediction model based on chaos approach. Kelantan River in Kelantan is the location for this study whereby there are three main water level stations being selected. In order to develop prediction method based on chaos approach, the analysis of chaotic dynamics need to be done first using two methods which are (1) Cao method and (2) phase space plot. The basic for both methods is phase space reconstruction as well as the development of prediction method. In order to reconstruct the phase space, two parameters are needed which included (1) delay of time, τ and (2) embedding of dimension, d that are obtained through the calculation of average mutual information (AMI) and Cao method. This research shows the presence of chaotic behaviour towards the time series data for water level. Hence, the time series data for water level has been estimated using local linear approximation method where the correlation coefficients in all stations show excellent results of prediction.

Keywords: Hourly Water Level Time Series Data, Local Linear Prediction Method, Floodplain, Chaotic Water Level, Chaos Approach.

Augmented Approach to Desirability Function Based On Principal Component Analysis

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Abstract. The desirability function approach is commonly used in industry to tackle multiple response optimization problems. The shortcoming of this approach is that the variability and correlated in each predicted response are ignored. It is now evident that the actual response may fall outside the acceptable region even though the predicted response at the optimal solution has a high overall desirability score. An augmented approach to the desirability function (AADF) and the Principal Component Analysis (PCA)is put forward to rectify this problem. This paper will discuss how the two methodologies have been used together where the goal is to determine the final optimal factor/level combination when several responses are to be optimized. Additionally, in this work optimization of multiple correlated responses was studied and AADF model was proposed based on Principal Component Analysis (PCA) to optimize correlated multiple response problems. The proposed method is also demonstrated by numerical examples from the literature to confirm the efficiencies.

Keywords: Response Surface Designs, Optimal Design, Multivariate Analysis, Principal Component Analysis.

Detection and Analysis Volatility on Crude Oil Price using Breakpoint Test and Markov Switching Model

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Abstract. Price movements of commodities are determined by changes in expectation about future economic variables. Crude oil price is non-stationary, high volatile and unstructured in nature which makes them very difficult to predict over short to medium time horizons. Some accredited the difficulty in forecasting to the fact that economic models could not consistently show evidence of a strong connection between commodities and economic fundamentals as a result, regarded the idea that economic fundamentals help predict price values as random luck. Past studies have also shown that the inconsistency may lie in the intrinsic limitations of the economic models themselves or a model's misspecifications. This study aims to overcome the limitations of the economic models through detect the structural changes on the data series using breakpoint test and Markov switching regression model is used to address the price patterns that led to different market state.
Keywords: Markov switching, breakpoint test, volatility, crude oil price, structural change.

SESSION 8B

Compact High-Order Implicit Iterative Scheme for the Two-Dimensional Time Fractional Sub Diffusion Equation

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Abstract. In this paper, a compact high-order implicit scheme is presented for the solution of the two-dimensional time fractional sub-diffusion equation. The Caputo fractional derivative operator and fourth-order compact implicit scheme are used for the time and space derivatives respectively to produce a compact high-order implicit scheme. The Order of convergence for the proposed scheme will be shown to be of $O(\tau^{2-\alpha}+h^4)$, where τ, α and h are representing time step, fractional order and space step respectively. Finally, some numerical examples are provided which shows the accuracy of the proposed scheme.

Keywords: Two-dimensional fractional sub-diffusion equation, High-order compact Implicit scheme, Finite difference, Caputo fractional derivative.

Community Structure in Graphs-Case Study of UPM Co-authorship Network from 2007-2010

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Abstract. Community structure is a typical structure found in social networks. By a community structure of such a graph, we mean a partition of the set of nodes into a number of groups, called communities. Note that one may consider partitions, which are not necessarily strict, i.e., one may allow the case of overlapping communities, when there exist graph nodes belonging to more than one groups (communities) of the partition. For instance, a typical property defining such a structure in a given graph is that communities should be relatively tight-knit, in the sense that nodes inside a community should be relatively densely connected to each other, while nodes among different communities should be relatively sparse. Using the first four years period UPM Research University dataset from 2007-2010 in journal publications, we constructed a co-authorship network representing collaborations between authors and coauthors with different community detection techniques.

Keywords: Graph Theory, Complex Networks, Social Networks, Co-authorship Networks, Community.

A Penalty Method to Price American-Style Asian Option under Jump-Diffusion Process

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Abstract. Asian option is a financial contract which payoff depends on the average price of the underlying asset over the life of the option. Pricing Asian option involves estimating a mathematical expectation for which no analytical solution is available. While pricing their American-style counterparts that provide early exercise feature becomes the additional difficulty of solving a dynamic optimization problem in order to determine the optimal exercise strategy. In this study, we develop a numerical procedure for solving a nonlinear partial integral differential equation (PIDE) complementarity problem to evaluate American-style Asian option when the underlying asset follows a jump-diffusion process. We approximate the complementarity problem using a penalty method. Then, the jump-diffusion integral term is computed using a Newton's iterative method coupled with a Fast Fourier Transform. Finally, we present numerical results to illustrate the convergence.

Keywords: Option pricing, Asian option, American option, Jump-diffusion process.

Improving the Estimate for the Pursuer's Distance From the Origin

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Abstract. We study a simple motion pursuit differential game problem of one pursuer and one evader in R^n. Maximum speeds of players is equal to 1. Players must move in a given bounded closed convex subset of R^n. If the distance between pursuer and evader less than or equal to a given positive number 1, then pursuit is considered to be completed. This game relates to lion and man games. In the past, various solutions of the game problem have been given by many researchers. In this paper, the estimates obtained by previous researchers for the distance of pursuer from the origin have been improved.

Keywords: Differential game, pursuer, evader, state constraint, strategy, control.

SESSION 8C

Evaluation of Half-Life of ^{137}Cs Nuclide Using Statistical Theory

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Abstract. Cesium (^{137}Cs) is use as a standard source for radio-analytical techniques such as, sample analysis using gamma spectroscopy. Since half-life of a standard source influence errors of measurements, a precise value of its half-life becomes important. For ^{137}Cs the half-life value is not precise. Detailed statistical theory in evaluating precise half-life value, arising from various laboratory measurements for the determination of the half-life of ^{137}Cs Nuclide was applied. The statistical methods Applied includes; the Un-weighted mean Method, weighted mean Method and Rajeval technique. The mean result obtained from the methods is 10972±15 in days which is the adopted half-life value of ^{137}Cs.

Keywords: Statistical Method, Un-weighted mean Method, weighted mean Method and Rajeval technique.

Generation of All Pythagorean Triples

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Abstract. There exist several techniques used to generate Pythagorean triples. The most effective formula for generating Pythagorean triples is the Euclid's formula. Whereas the Euclid's formula generates infinitely many Pythagorean triples, it does not generate all of them. For instance, the Euclid's formula generates the triple (3, 4, 5) but does not generate (4, 3, 5); in which case a transposition is needed. In addition, the triple (9, 12, 15) cannot be generated directly from the Euclid's formula but rather a multiplier to the triple (3, 4, 5) does so. In this article, we use the difference between the hypotenuse and the lengths of the legs of a right triangle to derive a formula that easily generates all Pythagorean triples without need for either multipliers or transpositions or both.

Keywords: Primitive Pythagorean Triples, Non-Primitive Triples, Co-Triples, Multipliers, Transposition.

An Approximate Analytic Solution of Sir Epidemic Model by Adomian Decomposition Method

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Abstract. An SIR epidemic model is used widely to understand the transmission dynamics of infectious diseases. This model is in the form of system of nonlinear differential equations which is well known that its solutions are obtained by using numerical methods. To ensure that a numerical method chosen to solve the model equations does not predict chaos when chaos is not a feature of the theoretical solution of the associated model equations, the aim of this paper is to calculate the approximate analytic solutions of the SIR epidemic model by using Adomian decomposition method. The results obtained are compared with the numerical solution produced by an unconditionally convergent finite-difference scheme to test its convergence and effectiveness.

Keywords: Adomian decomposition, Approximate analytic solution, Nonstandard finite difference scheme, SIR epidemic model.

A Note on Gauss Map on Ruled Sub Manifolds in Minkowski Space

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Abstract. In this paper, we study ruled sub manifolds in Minkowski space with the Gauss map having an interesting property regarding the Laplacian. As a generalization of usual cylinders, cones and null-scrolls in 3-dimensional Minkowski space, a cylinder over a space curve, a product manifold of a right cone and a k-plane, a product manifold of a hyperbolic cone and a *k*-plane, and the generalized B-scroll kind in Minkowski space are characterized with the partial differential equation regarding the Gauss map, where *k* is a positive integer.

Keywords: finite-type immersion, point wise 1-type Gauss map of the second kind, generalized-scroll kind.

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NOTES

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