University of Kashan

Abstracts Booklet

of the 51st Annual Iranian Mathematics Conference

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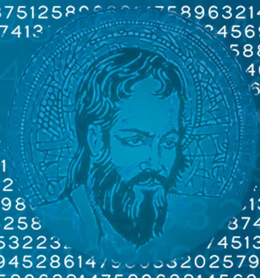
February 15-20, 2021

University of Kashan, I. R. Iran



51st Annual Iranian Mathematics Conference

51^{st} **Annual Iranian Mathematics Conference**

15–20 February 2021, University of Kashan

Abstracts Booklet of the 51^{st} Annual Iranian Mathematics Conference

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Message from the Mayor of Kashan

Once again the world's top mathematicians, professors, scholars, and students of mathematics have gathered in a scientific circle in the historical city of Kashan. The Faculty of Mathematics of the University of Kashan has been honored to host the 51st Annual Iranian Mathematics Conference. Undoubtedly, the philosophy of science would be incomplete in the absence of objective examples of phenomena. Mathematics serves as the basic science for understanding the principles of existence and the basis of the order of the universe. As our grasp on mathematic theory tightens, we are humbled by the greatness of this world's creator.

It is not a secret that Kashan has long been a cradle for flourishing men and women like Ghiythal-DnJamshdKashanis who have advanced the boundaries of science.

We were also pleased to have with us an acclaimed mathematician from our city, Dr. Javad Mashreghi; president of the Canadian Mathematical Society.

As the Mayor of Kashan, I wish to welcome all scholars and mathematics enthusiasts to this conference and to thank the esteemed keynote speakers, guests, and participants. I pray that this message finds you in health and ever-increasing prosperity. I wish for a world free of pandemics and a return to normal with physical conferences.

Mayor of Kashan
Saeed Abrishami-Rad

Foreword

The 51st Annual Iranian Mathematics Conference was held at University of Kashan in cooperation with the Iranian Mathematical Society from February 15 to February 20, 2021. We were eager to host the presence of the mathematical community of Iran at University of Kashan, and by providing an intimate and academic atmosphere for opportunities for exchange and scientific participation for all in the field of mathematical sciences and their applications. University of Kashan was founded at first as an institution of higher education in 1973. It began its activities in October, 1974 by 200 students of mathematics and physics.

Being in a suitable geographical position, the cultural atmosphere of the region and the long history in science and art have provided the basis for great success for this university and now, for example, University of Kashan has been introduced as the seventh comprehensive university in Iran by ISC National University Ranking.

The Faculty of Mathematical Sciences of University of Kashan is active with nearly forty full-time faculty members in three levels of bachelor's, master's and doctoral degrees and has made a significant contribution to the development and achievements of University of Kashan.

Holding successful conferences, student competitions of the Iranian Mathematical Society and various specialized seminars have been among the activities of this faculty. The editor in chief of the "Bulletin of the Iranian Mathematical Society" and the "Journal of Mathematical Culture and Thought" by the faculty members of this faculty at various times, are some of the effective collaborations with the Iranian Mathematical Society.

Due to the outbreak of the Corona virus, the 51st Iranian Mathematical Conference is being held virtually in University of Kashan for the first time.Besides the limitations created by holding the conference virtually, new opportunities have emerged. We had the great opportunity by using the facilities of cyberspace to invite prominent national and international professors from 22 different countries.

You are all aware that due to various reasons and problems in the educational, economic and social dimensions, the number of mathematics students has decreased significantly in recent years.

The elites of the country, have emphasized on strengthening the basic sciences, especially mathematics, and have introduced them as a treasure for the development of the country. It is up to the Iranian Mathematical Society to use the opportunity and the support the authorities, to plan for the promotion and expansion of mathematics.

As a step towards taking responsibility for this, we added a new section to the conference this year called "Mathematical Promotion". This idea was welcomed by the esteemed officials of the Iranian Mathematical Society and it is hoped that it will be followed as part of the conference in the coming years. In this regard, with the help of the education department of the region, a call was made and so far we have received more than 400 articles, from interested students in different levels of elementary and high school from all over the country.

It was decided to hold the first meeting for the promotion and popularization of mathematics as part of the mathematics conference in the near future and to present the selected works.

I consider it necessary to thank the Ministry of Science, Research and Technology, esteemed officials of University of Kashan, dear colleagues in the Faculty of Mathematical Sciences of the University of Kashan, faculty members of universities and research centers across the country who helped and guided us in particular those who contributed to the accurate judging of the received papers.

I would like to thank all the participants who added value by sending valuable papers and participating in the conference. Holding a conference like Iranian Mathematics Conference virtually was a new experience for us. I hope we have been able to do this great event well and in a desirable and worthy way. Moreover, this will be an experience for the expansion of virtual activities in the future. I apologize in advance for all the shortcomings, which were mainly due to our lack of experience in holding such conferences and virtual activities.

Hoping to see you at the future conferences.

Conference Chair of AIMC51
Hassan Daghigh

Welcome to AIMC51

The Annual Iranian Mathematics Conference (AIMC) is the country's most important and oldest mathematical gathering where researchers, students, and professors at home and abroad present their latest scientific findings. The first mathematics conference of the country was held by the University of Shiraz in April 1970, the most important of which was the proposal to establish the Iranian Mathematical Society, which coincided with the second mathematical conference of the country at the Sharif University of Technology in April 1971. Since then, the conference has welcomed a large number of scholars at home and abroad each year.

The Iranian Mathematics Conference has been held for the last fifty years despite all the difficulties. The Faculty of Mathematical Sciences of the University of Kashan is now honored to hold the fifty-first gathering of this important mathematics event of the country from February 15 to February 20, 2021 in the cradle of Iranian civilization and traditional culture, the city of Kashan with seven thousand years history.

We originally planned to hold the conference in person from 7 September to 10 September 2020, but due to the corona pandemic and the laws announced to the universities by the government, we changed the time to February 2021.

AIMC 51 has 31 keynote and 7 invited speakers from 20 different countries, all of whom are among the best and most famous mathematicians in the world in their field. The scope of the conference covered various topics in mathematics, statistics and computer science. The conference was attended by more than 500 researchers from Argentina, Belarus, Brazil, Canada, Check Republic, China, Croatia, India, Iran, Iraq, Italy, Kuwait, Netherland, Nigeria, Oman, Pakistan, Romania, Russia, Saudi Arabia, Serbia, South Africa, South Korea, Thailand, Turkey and USA who held 20, 40 and 60 minutes lectures.

We have fifteen keynote speakers in pure mathematics, seven keynote speakers in applied mathematics, four keynotes in statistics and five keynotes in computer science. There are also seven young invited speakers who are famous mathematicians in their topics.

Our Keynote Speakers in Pure Mathematics are professors: Alireza Abdollahi (University of Isfahan, I. R. Iran), Javad Asadollahi (University of Isfahan, I. R. Iran), Mohammad Bagheri (Historian), Maurizio Brunetti (Universit di Napoli Federico II, Italy), Henri Darmon (McGill University, Canada), Omid Ali Shehni Karamzadeh (Shahid Chamran University of Ahvaz, I. R. Iran), Javad Mashreghi (Laval university, Canada), Mohammad Sal Moslehian (Ferdowsi University of Mashhad, I. R. Iran), Thekiso Seretlo (University of Limpopo, South Africa), Mohammad Shahryari (Sultan Qaboos University, Muscat, Oman), Andrea Solotar (University of Buenos Aires, Argentina), Teerapong Suksumran (Chiang Mai University, Thailand), Mukut Mani Tripathi (Banaras Hindu University, India), Andrei Yu. Vesnin (Russian Academy of Sciences, Russia) and Changchang Xi (Capital Normal University, China).

The AIMC51 Keynote Speakers in Applied Mathematics are professors: Tomislav Doslic (University of Zagreb, Croatia), Roberto Garrappa (University of Bari, Italy), Nezameddin Mahdavi-Amiri (Sharif University of Technology, I. R. Iran), Davoud Mirzaei (University of Isfahan, I. R. Iran), Kees Roos (Delft University of

Technology, Netherland), Majid Soleimani Damaneh (University of Tehran, I. R. Iran) and Zahra Gooya (Shahid Beheshti University, I. R. Iran).

Other main topics of AIMC 51 are Statistics and Computer Science, and the keynote speakers of these topics are professors: Masoud Asgharian (McGill university, Canada), Khalil Shafie (University of Northern Colorado, USA), Ahmad Reza Soltani (Kuwait University, Kuwait), Bijan Zohuri-Zangeneh (Sharif University of Technology, I. R. Iran), Khodakhast Bibak (Miami University, USA), Alain Bretto (University of Caen, France), Luca De Feo (University of Versailles - Saint-Quentin, France), Predrag S. Stanimirovic (University of Nis, Serbia) and Constantine Tsinakis (Vanderbilt University, USA).

Our Invited Speakers are Akbar Ali (University of Ha'il, Saudi Arabia), Mohsen Ghasemi (Urmia University, I. R. Iran), Gülistan Kaya Gök (Hakkari University. Hakkari-Turkey), Mohsen Kian (University of Bojnord, I. R. Iran), Ali Shukur (Belarusian State University, Belarus) and Ebrahim Reyhani (Shahid Rajaee Teacher Training University, I. R. Iran). The annual meeting of the Women's Committee of the Iranian Mathematical Society (WCIMS) will be started by the speech of professor Ashraf Daneshkhah, secretary of WCIMS. This meeting has professor Carolina Araujo as honorary guest. She is the Award Wiener of Ramanujan 2020, Brazil and vice president of the IMU committee for women. Professor Araujo will be presented an invited talk for AIMC 51 participants.

I am very thankful to all of my colleagues in Organizing and Scientific Committee and to all of participants. My special gratitude is going to the Keynote and Invited Speakers. I would also like to thank all the referees for the time they allocated and their help.

Chair of the Scientific Committee of AIMC51
Ali Reza Ashrafi

Conference Chair: Hassan Daghigh

Chair of Scientific Committee: Ali Reza Ashrafi

Chair of Organizing Committee: Mojtaba Bahramian

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- Abdolrahman Razani — Imam Khomeini International University, I. R. Iran
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- Mehdi Shams — University of Kashan, I. R. Iran
- Seyyed Mansour Vaezpour — Amirkabir University of Technology, I. R. Iran

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- Ali Asghar Rezaei

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- Marzieh Pourbabaee
- Mahdi Sabzevari
- Zeinab Saeedian Tarei
- Zeinab Soltani
- Fatemeh Zabihi

Other people who helped organizing the conference:

Ladies: Maryam Azizi, Narges Barzegran, Leila Goodarzi, Elham Hajirezaei, Shirin Heidari, Marzieh Sadat Hosseini, Zeinab Jafari Tadi, Nazila Jahangir, Sheyda Maddah, Elahe Mahabadian, Nasrin Malek-Mohammadi Faradonbeh, Faezeh Mohammadi, Maryam Nasr-Esfahani, Mohadeseh Nasr-Esfahani, Mahsa Rafiee, Maryam Rezaei Kashi, Mina Shafouri, Maryam Taheri-Sedeh, Ghazal Tavakoli, Armina Zare, Samaneh Zareian

Gentlemen: Jalal Abbassi, Mahdi Abedi, Ali Ghalavand, Mohammad Izadi, Bardia Jahangiri, Mostafa Karbalaei Reza, Ali Reza Khalilian, Kourosh Mavaddat-Nezhad, Sajad Raahati, Mohsen Yaghoubi

Keynote Speakers

	Name	Family	Affiliation
1	Alireza	Abdollahi	University of Isfahan, I. R. Iran
2	Javad	Asadollahi	University of Isfahan, I. R. Iran
3	Masoud	Asgharian	McGill Univesity, Canada
4	Mohammad	Bagheri	Editor in chief of the Journal of the History of Science, I. R. Iran
5	Khodakhast	Bibak	Miami University, USA
6	Alain	Bretto	Normandie University, France
7	Maurizio	Brunetti	Universita Federico II, Italy
8	Henri	Darmon	McGill University, Canada
9	Luca	De Feo	University of Versailles, Switzerland
10	Tomislav	Došlić	University of Zagreb, Croatia
11	Roberto	Garrappa	Polytechnic University of Bari, Italy
12	Zahra	Gouya	Shahid Beheshti University, I. R. Iran
13	Nezam	Mahdavi-Amiri	Sharif University of Technology, I. R. Iran
14	Javad	Mashreghi	University of Laval, Canada
15	Davoud	Mirzaei	University of Isfahan, I. R. Iran
16	Kees	Roos	Technical University Delf, Netherland
17	Mohammad	Sal Moslehian	Ferdowsi University of Mashhad, I. R. Iran
18	Thekiso Trevor	Seretlo	University of Limpopo, South Africa
19	Khalil	Shafie	University of Northern Colorado, USA
20	Omid Ali	Shehni-Karamzadeh	Shahid Chamran University of Ahvaz, I. R. Iran
21	Mohammad	Shahryari	Sultan Qaboos University, Muscat, Oman
22	Majid	Soleimani-Damaneh	University of Tehran, I. R. Iran
23	Andrea	Solotar	Universidad de Buenos Aires, Argentina
24	Ahmad Reza	Soltani	Kuwait University, Kuwait
25	Predrag	Stanimirović	University of Nis, Serbia
26	Teerapong	Suksumran	Chiang Mai University, Thailand
27	Mukut Mani	Tripathi	Banaras Hindu University, India
28	Constantine	Tsinakis	Vanderbilt University, USA
29	Andrei	Vesnin	Tomsk State University, Russia
30	Changchang	Xi	Capital Normal University, China
31	Bijan	Zohuri-Zangeneh	Sharif University of Technology, I. R. Iran

Invited Speakers

	Name	**Family**	**Affiliation**
1	Akbar	Ali	University of Hail, Saudi Arabia
2	Mohsen	Ghasemi	Urmia University, I. R. Iran
3	Gülistan	Kaya Gök	Hakkari University, Turkey
4	Mohsen	Kian	University of Bojnord, I. R. Iran
5	Ebrahim	Reihani	Shahid Rajaee Teacher Training University, I. R. Iran
6	Ali	Shukur	Belarusian State University, Belarus; The Islamic University, Iraq

Conference Participants

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2	Mostafa	Abbaszadeh	Amirkabir University of Technology
3	Fakhralsadat	Abdenean	Yazd University
4	Me'raj	Abdi	Bam University
5	Nasim	Abdi Kourani	Khajeh Nasir Toosi University of Technology
6	Atefeh	Abdolah Abyaneh	Kharazmi University
7	Alireza	Abdollahi	University of Isfahan
8	Farshid	Abdollahi	Shiraz University
9	Fahimeh	Abdollahi	Khajeh Nasir Toosi University of Technology
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15	Fatemeh	Ahangari	Al-Zahra University
16	Alireza	Ahmadi	Yazd University
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18	Ghasem	Ahmadi	Payame Noor University
19	Razieh	Ahmadian	IPM Institute For Research In Fundamental Sciences
20	Mohammad Ali	Ahmadpoor	University of Guilan
21	Zohreh	Akbari	University of Mazandaran
22	Najmeh	Akbari	Isfahan University of Technology
23	Fahime	Akhavan Ghassabzade	University of Gonabad
24	Narges	Akhlaghinia	Shahid Beheshti University
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26	Akbar	Ali	University of Hail, Saudi Arabia
27	Mahdi	Aliakbari	Torbat Heydarieh University
28	Ghazale	Aliasghari	Shahid Rajaee Teacher Training University
29	Saeid	Alikhani	Yazd University
30	Hajar	Alimorad	Jahrom University
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39	Hanieh	Amjadian	Amirkabir University of Technology
40	Mahdi	Anbarloei	Imam Khomeini International University
41	Hajar	Ansari	Amirkabir University of Technology
42	Ali	Ansari Ardali	University of Shahrekord
43	Fereshteh	Arad	Shahid Bahonar University of Kerman
44	Mahdi	Asadi	University of Kashan

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47	Meysam	Asadipour	Yasouj University
48	Javad	Asadollahi	University of Isfahan
49	Saeed	Asaeedi	University of Kashan
50	Masoud	Asgharian	McGill Univesity, Canada
51	Ali Reza	Ashrafi	University of Kashan
52	Jalal	Askari Farsangi	University of Kashan
53	Hamed	Aslani	University of Guilan
54	Parvane	Atashpeykar	University of Bonab
55	Ahmad Reza	Attari Polsangi	Shiraz University
56	Mehrasa	Ayatollahi	Payame Noor University
57	Saeid	Azam	University of Isfahan
58	Mahdieh	Azari	Islamic Azad University
59	Fariborz	Azarpanah	Shahid Chamran University of Ahvaz
60	Seyed Morteza	Babamir	University of Kashan
61	Mohammad	Bagheri	Editor in chief of the Journal of the History of Science
62	Neda	Bagheri	University of Mazandaran
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64	Shima	Baharlouei	Isfahan University of Technology
65	Erfan	Bahmani	University of Zanjan
66	Faezeh	Bahmani	University of Kashan
67	Mojtaba	Bahramian	University of Kashan
68	Fariba	Bakrani	Shahid Beheshti University
69	Seddigheh	Banihashemi	University of Mazandaran
70	Narjes Sadat	Banitaba	Yazd University
71	Ali	Barani	Lorestan University
72	Ali	Barati	Razi University
73	Hasan	Barsam	University of Jiroft
74	Ali	Barzanouni	Hakim Sabzevari University
75	Esmaeil	Bashkar	Velayat university
76	Mostafa	Bayat	Amirkabir University of Technology
77	Behnam	Bazigaran	University of Kashan
78	Fatemeh	Bazikar	University of Guilan
79	Fereshteh	Behboudi	Imam Khomeini International University
80	Reza	Beyranvand	Lorestan University
81	Khodakhast	Bibak	Miami University, USA
82	Morteza	Bisheh-niasar	University of Kashan
83	Rajab Ali	Borzooei	Shahid Beheshti University
84	Ali	Bozorgmehr	Iran University of Medical Sciences
85	Alain	Bretto	Normandie University, France
86	Maurizio	Brunetti	Universita Federico II, Italy
87	Kinkar	Chandra Das	Sungkyunkwan University, South Korea
88	Mehran	Chehlabi	Islamic Azad University
89	Abbas	Cheraghi	University of Isfahan
90	Fatemeh	Choopani	Ferdowsi University of Mashhad
91	Mohammadehsan	Dadkani	University of Sistan and Baluchestan

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94	Henri	Darmon	McGill University, Canada
95	Razie	Darvazeban Zade	Payame Noor University
96	Mahshid	Dashti	Malayer University
97	Zahra	Davari Shalamzari	Yazd University
98	Mostafa	Davtalab Olyaie	University of Kashan
99	Bijan	Davvaz	Yazd University
100	Luca	De Feo	University of Versailles, Switzerland
101	Mohammad Ali	Dehghan	Vali-e-Asr University of Rafsanjan
102	Sakineh	Dehghan	Shahid Beheshti University
103	Mahdi	Dehghani	University of Kashan
104	Fatemeh	Dehghani	Yazd University
105	Najmeh	Dehghani	Persian Gulf University
106	Zahra	Dehvari	Yazd University
107	Atefeh	Deris	Arak University
108	Zahra	Donyari	Shahid Chamran University of Ahvaz
109	Reza	Doostaki	Shahid Bahonar University of Kerman
110	Saeed	Doostali	University of Kashan
111	Fateme	Dorri	Ferdowsi University of Mashhad
112	Tomislav	Došlić	University of Zagreb, Croatia
113	Ghodrat	Ebadi	Tabriz University
114	Javad	Ebadpour Golanbar	Payame Noor University
115	Neda	Ebrahimi	Shahid Bahonar University of Kerman
116	Ali	Ebrahimijahan	Amirkabir University of Technology
117	Asiyeh	Ebrahimzadeh	Farhangian University
118	Sohrab	Effati	Ferdowsi University of Mashhad
119	Ali	Eftekhari	University of Kashan
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121	Mohammad	Eghbali	University of Kashan
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123	Hossein	Eshraghi	University of Kashan
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125	Morteza	Essmaili	Kharazmi University
126	Masoumeh	Etebar	Shahid Chamran University of Ahvaz
127	Amin	Faghih	Sahand University of Technology
128	Farhad	Fakhar-Izadi	Amirkabir University of Technology
129	Farahnaz	Fakhraddin Arani	Nongovermental Collage Nonprofit Refah
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131	Farzaneh	Farhang Baftani	Islamic Azad University
132	Mohammad Reza	Farmani	Kharazmi University
133	Javad	Farokhi-Ostad	Birjand University of Technology
134	Fariba	Fayazi	University of Qom
135	Fateme	Fasihi	Bu-Ali Sina University of Hamedan
136	Gholam Hossien	Fathtabar Firouzjae	University of Kashan
137	Reza	Fayazi	Ferdowsi University of Mashhad
138	Mohamad Javad	Fazeli	University of Birjand
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146	Ali	Ghafarpanah	Salman Farsi University of Kazerun
147	Ali	Ghalavand	University of Kashan
148	Fatemeh	Ghanadian	Damghan University
149	Fatemeh	Ghandi	University of Kashan
150	Mohammad Reza	Ghanei	University of Khansar
151	Hadi	Ghasemi	Hakim Sabzevari University
152	Mohsen	Ghasemi	Urmia University
153	Mohammad Hesam	Ghasemi	Shahid Beheshti University
154	Peyman	Ghiasvand	Payame Noor University
155	Hamid	Ghorbani	University of Kashan
156	Ali Reza	Ghorchizadeh	University of Birjand
157	Azin	Golbaharan	Kharazmi University
158	Faranak	Goodarzi	University of Kashan
159	Leila	Goodarzi	University of Kashan
160	Zahra	Gooya	Shahid Beheshti University
161	Farzaneh	Gorjizadeh	University of Shahrekord
162	Punam	Gupta	Dr. Harisingh Gour University, India
163	Mahnaz	Habibi	Islamic Azad University
164	Ali	Habibi Moakher	Payame Noor University of Tehran
165	Ali	Habibirad	Shiraz University of Technology
166	Masoud	Hadian Dehkordi	Iran University of Science and Technology
167	Amir Hosein	Hadian Rasanan	Shahid Beheshti University
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169	Somayeh	Hadjirezaei	Vali-e-Asr University of Rafsanjan
170	Donya	Haghighi	Imam Khomeini International University
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175	Elham	Hajirezaei	University of Kashan
176	Hamid Reza	Hajisharifi	University of Khansar
177	Nooshin	Hakamipour	Buein Zahra Technical University
178	Mardjan	Hakimi-Nezhaad	Shahid Rajaee Teacher Training University
179	Shahad	Hasan	University of Kufa, Iraq
180	Farzane	Hashemi	University of Kashan
181	Ebrahim	Hashemi	Shahrood University of Technology
182	Mehdi	Hassani	University of Zanjan
183	Mostafa	Hassanlou	Urmia University
184	Marziyeh	Hatamkhani	University of Arak
185	Sina	Hedayatian	Shahid Chamran University of Ahvaz
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192	Esmail	Hesameddini	Shiraz University of Technology
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201	Ali	Iranmanesh	Tarbiat Modares University
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203	Mehdi	Izadi	Shahid Rajaee Teacher Training University
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205	Mohammad Mahdi	Izadkhah	Birjand University of Technology
206	Kiyana	Izadyar	Shahid Chamran University of Ahvaz
207	Mehsin	Jabel Atteya	University of Al-Mustansiriyah, Iraq
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210	Mohammad	Jafari	Islamic Azad University
211	Hosna	Jafarmanesh	Hakim Sabzevari University
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213	Mehdi	Jahangiri	University of Maragheh
214	Reza	Jahani-Nezhad	University of Kashan
215	Ruhollah	Jahanipur	University of Kashan
216	Marziye	Jamali	University of Kashan
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225	Azam	Kaheni	University of Birjand
226	Reza	Kahkeshani	University of Kashan
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238	Kianoush	Kazemi	University of Birjand
239	Ramin	Kazemi	Imam Khomeini International University
240	Rasool	Kazemi Najafabadi	University of Kashan
241	Seyed Mehdi	Kazemi Torbaghan	University of Bojnord
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244	Zahra	Keshtkar	Shahid Chamran University of Ahvaz
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254	Seyed Mohammad Amin	Khatami	Birjand University of Technology
255	Abolfazl	Khedmati	University of Kashan
256	Ekhtiar	Khodadadi	Islamic Azad University
257	Hamid	Khodaei	Malayer University
258	Davod	Khojasteh Salkuyeh	University of Guilan
259	Hassan	Khosravi	Gonbad Kavous University
260	Eisa	Khosravi Dehdezi	Persian Gulf University
261	Mohsen	Kian	University of Bojnord
262	Stefan	Kohl	University of St Andrews, Scotland
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264	Majid	Kowkabi	University of Gonabad
265	Zeinab	Kowsari	Kharazmi University
266	Behnaz	Lajmiri	Amirkabir University of Technology
267	Sanaz	Lamei	University of Guilan
268	Seyed Jalal	Langari	Farhangian University
269	Samira	Latifi	University of Mohaghegh Ardabili
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276	Ali	Mahdipoor	University of Kashan
277	Zahra	Mahmoodi	Islamic Azad University
278	Mojgan	Mahmoudi	Shahid Beheshti University
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293	Kurosh	Mavaddat Nezhaad	University of Kashan
294	Majid	Mazrooei	University of Kashan
295	Alireza	Medghalchi	Kharazmi University
296	Hussain	Mehdi	University of Kufa, Iraq
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298	Samira	Mehrangiz	Shiraz University
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300	Sadegh	Merati	Shiraz University
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303	Davoud	Mirzaei	University of Isfahan
304	Fatemeh	Mirzaei	Payame Noor University
305	Fatemeh	Mirzaei Gaskarei	Islamic Azad University
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309	Amir Abbas	Mofidian Naeini	Isfahan University of Technology
310	Hoda	Mohammadi	Payame Noor University
311	Maryam	Mohammadi	Isfahan University of Technology
312	Shahnaz	Mohammadi	Tabriz University
313	Reza	Mohammadiarani	Amirkabir University of Technology
314	Seyyed Ali	Mohammadiyeh	University of Kashan
315	Zahra	Mohammadzadeh	University of Birjand
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319	Zahra	Mohtasham	Shahid Beheshti University
320	Reza	Mokhtari	Isfahan University of Technology
321	Tahereh	Molaee	Al-Zahra University
322	Mahdieh	Molaeiderakhtenjani	University of Birjand
323	Ehsan	Momtahan	Yasouj University
324	Morteza	Moniri	Shahid Beheshti University
325	Mansooreh	Moosapoor	Farhangian University, Bentolhoda Sadr
326	Rasoul	Moradi	Persian Gulf University
327	Sirous	Moradi	Lorestan University
328	Ali	Moradzadeh-Dehkordi	Shahreza Higher Education Center
329	Seyed Adel	Moravveji	Laval University, Canada
330	Maysam	Mosadeq	Islamic Azad University
331	Seyfollah	Mosazadeh	University of Kashan
332	Zohreh	Mostaghim	Iran University of Science and Technology
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335	Fatemeh Sadat	Mousavinejad	Yazd University
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338	Mohammad Javad	Nadjafi-Arani	Mahallat Institute of Higher Education
339	Razieh	Naghibi	Yazd University
340	Mohammadali	Naghipoor	Jahrom University
341	Reza	Naghipour	Kharazmi University
342	Mehran	Naghizadeh Qomi	University of Mazandaran
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345	Mehran	Namjoo	Vali-e-Asr University of Rafsanjan
346	Seyed Mojtaba	Naser Sheykholislami	Semnan University
347	Nasim	Nasrabadi	University of Birjand
348	Zohreh	Nazari	Vali-e-Asr University of Rafsanjan
349	Ali Mohammad	Nazari	University of Arak
350	Tahere	Nazari	Payame Noor University
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366	Mehdi	Parsinia	Shahid Chamran University of Ahvaz
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368	Leila	Pedram	Imam Khomeini International University
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371	Shima	Pirmohammadi	University of Isfahan
372	Mina	Pirzadeh	University of Guilan
373	Marzieh	Pourbabaee	University of Kashan
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409	Mohsen	Rostamian Delavar	University of Bojnord
410	Arta	Rouhi	Semnan University
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415	Samaneh	Saberali	Urmia University
416	Sedigheh	Sabermahani	Al-Zahra University
417	Mehdi	Sabzevari	University of Kashan
418	Somayeh	Sadeghi	University of Isfahan
419	Behruz	Sadeqi	Payame Noor University
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423	Zeinab	Saeidian	University of Kashan
424	Jamshid	Saeidian	Kharazmi University
425	Ali	Safaie	University of Maragheh
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437	Hamid	Salimi	University of Tehran
438	Mahdi	Salmanpour	University of Kashan
439	Nasrin	Samadyar	Al-Zahra University
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441	Karim	Samei	Bu-Ali Sina University
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443	Samaneh	Saneifar	Yazd University
444	Behnaz	Savizi	Islamic Azad University
445	Yamin	Sayyari	Sirjan University of Technology
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463	Mehdi	Shams	University of Kashan
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467	Javad	Sharafi	University of Kashan
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469	Kamran	Sharifi	Shahroud University of Technology
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471	Omid Ali	Shehni-Karamzadeh	Shahid Chamran University of Ahvaz
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504	Meysam	Taheri-Dehkordi	University of Kashan
505	Maryam	Taheri Sedeh	University of Kashan
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507	Haleh	Tajadodi	University of Sistan and Baluchestan
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509	Ebrahim	Tamimi	Semnan University
510	Somayyeh	Tari	Azarbaijan Shahid Madani University
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512	Mohammadreza	Tavakkoli Moghaddam	Shahid Beheshti University
513	Reza	Tayebi Khorami	Islamic Azad University
514	Atieh	Teymourzadeh	University of Mazandaran
515	Faezeh	Tiba	University of Sistan and Baluchestan
516	Abdolsaleh	Toghdori	Yazd University
517	Fateme	Torabi	Damghan University
518	Soraya	Torkaman	Yazd University
519	Vali	Torkashvand	Islamic Azad University
520	Thekiso	Trevor Seretlo	University of Limpopo, South Africa
521	Constantine	Tsinakis	Vanderbilt University, USA
522	Seyed Mansour	Vaezpour	Amirkabir University of Technology
523	Farzaneh	Vahdanipour	University of Mohaghegh Ardabili
524	Seryas	Vakili	University of Tabriz
525	Amir	Veisi	Yasouj University
526	Andrei	Vesnin	Tomsk State University, Russia
527	Changchang	Xi	Capital Normal University, China
528	Marjan	Yaghmaei	Kharazmi University
529	Mohamad	Yar Ahmadi	Shahid Chamran University of Ahvaz
530	Zahra	Yarahmadi	Islamic Azad University
531	Mohammad Reza	Yasamian	Payame Noor University
532	Azam	Yazdani	Amirkabir University of Technology
533	Mohsen	Yousefnezhad	Shiraz University
534	Omid	Zabeti	University of Sistan and Baluchestan
535	Sayyed Mahmood	Zabetzadeh	Payame Noor University
536	Fatemeh	Zabihi	University of Kashan
537	Amirhesam	Zaeim	Payame Noor University

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539	Elham	Zangiabadi	Vali-e-Asr University of Rafsanjan
540	Hossein	Zare	Tarbiat Modares University
541	Rohollah	Zarei	Yasouj University
542	Behnam	Zarpak	Shahed University
543	Maryam	Zeinali	Shahid Chamran University of Ahvaz
544	Ali	Zeydi Abdian	Lorestan University
545	Elham	Zeynal	Islamic Azad University
546	Mosayeb	Zohrehvand	Malayer University
547	Bijan	Zohuri-Zangeneh	Sharif University of Technology

List of Presented Papers

Keynote Speakers

Profinite Groups with Many Elements Satisfying a Law

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and Institute for Research in Fundamental Sciences, School of Mathematics, Tehran, Iran

Abstract. Lévai and Pyber proposed the following as a conjecture: Let G be a profinite group such that the set of solutions of the equation $x^n = 1$ has positive Haar measure. Then G has an open subgroup H and an element t such that all elements of the coset tH have order dividing n (see Problem 14.53 of [The Kourovka Notebook, No. 19, 2019]). The validity of the conjecture has been proved in [Arch. Math. (Basel) 75 (2000) 1-7] for $n = 2$. In this talk we confirm the conjecture for $n = 3$. We also consider a similar question of Lévai and Pyber for group laws.

Keywords: Profinite groups, Elements of bounded order, Subsets with positive Haar measures, Large subsets, Groups laws.

AMS Mathematical Subject Classification [2010]: 20E18, 20P05.

1. Introduction and Results

Let G be a Hausdorff compact group. Then G has a unique normalized Haar measure denoted by $\mathbf{m}_G$. In general, the question of weather the interior of every non-empty measurable subset of G with positive Haar measure is non-empty has negative answer even if G is profinite (See e.g. [1]). However the same question for subsets defined by words is still open. In [1] the following conjecture is proposed.

(Conjecture 3 of [1], Problem 14.53 of [4]) Let G be a profinite group such that the set $X_n(G)$ of solutions of the equation $x^n = 1$ in G has positive Haar measure. Then G has an open subgroup H and an element t such that all elements of the coset tH have order dividing n.

The validity of Conjecture 1 has been proved in [1] for $n = 2$. In [3] it is shown that the conjecture is valid for $n = 2$ even if G is Hausdorff compact. It is also proved in [3] that if $X_3(G)$ has positive Haar measure in a compact group G, then G contains an open normal subgroup which is 2-Engel. Here we confirm Conjecture 1 for $n = 3$. To do so, we first show that Conjecture 1 is equivalent to the following one. We need the following notation in the statement of the conjecture. For an arbitrary group K and an automorphism ϕ of K of order

*Speaker

dividing a positive integer n, define

$$X_{n,\phi}(K) := \left\{x \in K \mid x x^{\phi} x^{\phi^2} \cdots x^{\phi^{n-1}} = 1\right\}.$$

The automorphism group of K will be denoted by $\mathrm{Aut}(K)$.

$$\sup\left(\left\{\frac{|X_{n,\phi}(H)|}{|H|} : H \text{ is a finite group and } \ \phi \in \mathrm{Aut}(H),\ \phi^n = \mathrm{id}\right\} \setminus \{1\}\right) < 1.$$

It is known that Conjecture 1 is valid for $n = 2$ and the supremum is $\frac{3}{4}$ (See [2]).

If time permits we will talk on a similar problems as Conjectures 1 and 1 by replacing the law $x^n = 1$ by an arbitrary group law.

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Higher Dimensional Ideal Approximation Theory

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Abstract. Ideal approximation theory is a gentle generalization of the classical approximation theory and deals with morphisms and ideals instead of objects and subcategories. Our aim in this presentation is to study ideal approximation theory over n-exact categories. In particular, the higher version of the notions such as ideal cotorsion pairs, phantom ideals, Salce's Lemma and Wakamatsu's Lemma for ideals will be introduced and studied. The main source of n-exact categories are n-cluster tilting subcategories of exact categories.

Keywords: n-Exact categories, n-Cluster tilting subcategories, Phantom morphisms.

AMS Mathematical Subject Classification [2010]: 18E05, 18G25, 18G15.

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*Speaker

Prevalent Cohort Studies: Length-Biased Sampling with Right Censoring

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Abstract. Logistic or other constraints often preclude the possibility of conducting incident cohort studies. A feasible alternative in such cases is to conduct a cross-sectional prevalent cohort study for which we recruit prevalent cases, that is, subjects who have already experienced the initiating event, say the onset of a disease. When the interest lies in estimating the lifespan between the initiating event and a terminating event, say death for instance, such subjects may be followed prospectively until the terminating event or loss to follow-up, whichever happens first. It is well known that prevalent cases have, on average, longer lifespans. As such, they do not form a representative random sample from the target population; they comprise a biased sample. If the initiating events are generated from a stationary Poisson process, the so-called stationarity assumption, this bias is called length bias. I present the basics of nonparametric inference using length-biased right censored failure time data. I will then discuss some recent progress and current challenges. Our study is mainly motivated by challenges and questions raised in analyzing survival data collected on patients with dementia as part of a nationwide study in Canada, called the Canadian Study of Health and Aging (CSHA). I will use these data throughout the talk to discuss and motivate our methodology and its applications. If time permits, I will also talk about another data set and some other challenges in the other data set, not shared by CSHA.

Keywords: Prevalent Cohort, Length-Biased Sampling, Right Censoring, Weak Convergence.

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*Speaker

Congruences in Cryptography, QIS, Coding, NLP, and More

Khodakhast Bibak*

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Abstract. Congruences are ubiquitous in computer science, mathematics, and related areas. In this talk, we first determine the number of solutions of restricted linear congruences in their most general case. This completes the story of this problem which was first studied about 90 years ago. The problem is very well-motivated and has found intriguing applications in several areas of computer science, mathematics, and physics. Then we discuss applications in cryptography (e.g., constructing authentication code with secrecy schemes), universal hashing, quantum key distribution, AI, etc. We even go further and give an explicit and practical formula for the number of surface-kernel epimorphisms from a co-compact Fuchsian group to a cyclic group. This problem has important applications in combinatorics, geometry, string theory, and quantum field theory (QFT). As a consequence, we obtain an equivalent form of Harvey's famous theorem on the cyclic groups of automorphisms of compact Riemann surfaces. We also consider the case of linear congruences with distinct coordinates (which has interesting connections to coding theory and combinatorics), and using a graph theoretic method, generalize a result of Schönemann from 1839. We also connect these problems to the deletion/insertion correcting codes by determining the weight enumerators of several important classes of these codes including the Levenshtein code and also most of the codes which have been recently used in studying DNA-based data storage systems.

Keywords: Restricted congruence, Deletion correcting codes, Universal hashing, Authenticated encryption, Quantum key distribution.

AMS Mathematical Subject Classification [2010]: 11D79, 68P30, 94A60.

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*Speaker

G-Graphs and Cayley Graphs

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Abstract. In this presentation we will link G-graphs with Cayley graphs and we will study the relations between these two types of graphs. Such a connection opens up a possible pathway between these two theories and thus investigating certain problems from one of these areas might be easier to tackle when dealt with them as problems in the other. We will see that the link could have been thanks to the theory of hypergraphs and that these structures can form a bridge between these two types of graphs. Applications will be developed in particular in the computation of the spectra of an infinite family of Cayley graphs of non-abelian groups which is a task, in most cases very difficult.

Keywords: G-graphs, Cayley graphs, Computational group theory.

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*Speaker

Hoffmann Program between Past and Future: A Tale of Many Matrices

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Abstract. Let G be a simple graph, and let $M(G)$ be any complex-valued matrix associated to G in a prescribed way. The M-spectral radius $\rho_M(G)$ of G is the largest norm of its M-eigenvalues. A real number $\gamma(M)$ is said to be an *M-limit point* if there exists a sequence of graphs $\{G_k \mid k \in \mathbb{N}\}$ such that

$$\rho_M(G_i) \neq \rho_M(G_j) \quad \text{whenever } i \neq j, \quad \text{and} \quad \lim_{k\to\infty} \rho_M(G_k) = \gamma(M).$$

After the seminal work carried out in the early 1970s by Alan J. Hoffman on the smallest limit points for the adjacency matrix, it is now known as *the Hoffman program with respect to M* the following double-sided problem: i) determining all the possible values for the M-limit points; ii) characterizing all connected graphs whose spectral radius does not exceed a fixed M-limit point.

In this talk, we summarize what is known on this topic with respect to the adjacency, Laplacian, signless Laplacian, Hermitian adjacency and skew-adjacency matrices of graphs as well as the tensors of hypergraphs. Moreover, we present some new results concerning the A_α-matrices of graphs. This is a joint work with Jianfeng Wang and Jing Wang.

Keywords: Hoffman program, Graphs matrices, Limit point, Spectral radius.

AMS Mathematical Subject Classification [2010]: 05C50.

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*Speaker

Elliptic Curves, Modular Forms, and Explicit Class Field Theory

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Abstract. A celebrated theorem of Kronecker and Weber asserts that all the abelian extensions of the rationals can be obtained by adjoining roots of unity, i.e., values of the transcendental function $e^{2\pi iz}$ at rational arguments. The theory of complex multiplication shows that the modular function $j(z)$ plays a similar role for generating abelian extensions of imaginary quadratic fields. For other ground fields, the explicit class field theory is less firmly established, and developpingit is the theme of Hilberts celebrated twelfth problem. I will discuss some progress that has been achieved in recent years on this question, with special reference to the case of real quadratic fields.

Keywords: Elliptic curves, Modular forms, Explicit class field theory.

AMS Mathematical Subject Classification [2010]: 11G05, 11R23.

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*Speaker

Isogeny Based Cryptography, the New Frontier of Number Theoretic Cryptography

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Abstract. Since the discovery of RSA and of the DiffieHellman key exchange in the 70s, number theory has been at the heart of cryptography. Contemporary cryptography heavily relies on elliptic curves, and has been instrumental in the development of algorithmic techniques for number theory, such as factoring and point counting algorithms.

Isogenies are morphisms of abelian varieties. Graphs of abelian varieties with isogenies between them exhibit rich combinatorial structures, that have been studied for some decades. Isogeny based cryptography was born out of elliptic curve cryptography in the late 90s. Rather than focusing on a single elliptic curve and the algorithmic theory of its group of points, it looks at finite isogeny graphs of elliptic curves and the algorithmic theory of pseudorandom walks.

The advent of quantum computers poses an existential threat to elliptic curves and RSA. Isogeny based cryptography has recently gained in popularity as an interesting candidate to replace the current quantum-weak systems, thanks to its very compact representations and acceptable performance.

In this talk I will survey the main ideas, techniques and open problems in isogeny based cryptography.

Keywords: Isogeny based cryptography, Number theoretic cryptography.

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*Speaker

Packing Stars (and other Structures) into Fullerenes (and into other Polyhedra)

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ABSTRACT. A perfect star packing in a graph G is a spanning subgraph of G whose every component is isomorphic to the star graph $K_{1,3}$. We investigate which fullerene graphs allow such packings. We also consider generalized fullerene graphs and packings of other graphs into classical and generalized fullerenes. Several open problems are listed.
A Joint work with Gh. H. Fath-Tabar and M. Taheri-Dehkordi of Kashan, IRAN.

Keywords: Fullerene graph, Generalized fullerene, Perfect packing, Perfect pseudomatching.

AMS Mathematical Subject Classification [2010]: 05C90.

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*Speaker

On the Use of Matrix Mittag-Leffler Functions in Fractional Calculus: From Theory to Applications

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and Marina Popolizio
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ABSTRACT. The Mittag-Leffler function plays a fundamental role in fractional calculus. Its evaluation with matrix arguments has several important applications in control theory, solution of multi-term differential equations, systems of fractional differential equations and so on. After introducing the Mittag-Leffler function, its matrix extension and some of its major applications, we present here some practical methods for the computation of matrix ML functions based on the efficient numerical inversion of the Laplace transform.

Keywords: Mittag-Leffler function, Fractional derivative, Matrix function, Numerical computation.

AMS Mathematical Subject Classification [2010]: 33E12, 26A33, 65F60.

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*Speaker

A Competitive Exact Penalty Approach with Secant Structured Projected Hessian Updates for Constrained Nonlinear Least Squares

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Abstract. An adaptive exact penalty approach for solving constrained nonlinear least squares problems using a secant structured projected Hessian update scheme is proposed. The approach makes use of iterative projected quadratic programming approximations with special considerations for secant approximates of the projected Hessians. A special combined line search-trust region strategy is used taking advantage of the special structure of the objective function. Both global convergence and a local two-step superlinear rate of convergence are established. An implementation of the proposed method is tested on various test problems including some specially featured randomly generated problems as well as a variety of available small and large residual problems in the literature. Comparative comparisons of our obtained results with the ones due to three competitive general nonlinear programming codes affirm our established theoretical results and show outperformance of our special considerations for nonlinear least squares.

Keywords: Constrained nonlinear programming, Exact penalty method, Nonlinear least squares, Structured projected Hessian update.

AMS Mathematical Subject Classification [2010]: 49M37, 90C53, 49J52.

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*Speaker

Approximation Techniques in Function Theory

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Abstract. Taylor (analytic) polynomials are not the most natural objects in approximation theory. However, in most cases Cesaro means help and the resulting sequence of Fejer polynomials are a good remedy. We study some function spaces on the open unit disc. In the context of Local Dirichlet Spaces, we show that the sequence of Taylor polynomials may (badly) diverge. However, and surprisingly enough, if we properly modify just the last harmonic, the new sequence becomes convergent. In the general setting of super-harmonically weighted Dirichlet spaces, we show that Fejer polynomials and de la Vallee Poussin polynomials are the proper objects for approximation. We also discuss polynomial approximation in de Branges-Rovnyak spaces.

Keywords: Function Theory, Sequence of Taylor polynomial, Fejer polynomial, De la Vallee Poussin polynomial, Polynomial approximation.
AMS Mathematical Subject Classification [2010]: 30J05, 30H10, 46E22.

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*Speaker

A Recent Progress in Localized RBF Techniques

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Abstract. In this talk, the new direct RBF partition of unity (D-RBF-PU) method is presented for numerical solution of boundary value problems. The D-RBF-PU method is a new localized RBF-based technique which avoids all derivatives of PU weight functions as well as all lower derivatives of local approximants. It is faster and simpler than the standard RBF-PU method, and allows the use of some discontinuous PU weight functions to develop the method in a more efficient and less expensive way. Alternatively, the new method is an RBF-generated finite difference (RBF-FD) method in a PU setting which is much faster and in some situations more accurate than the original RBF-FD. To show the generality of the idea, we will go beyond the RBFs and use other finite dimensional approximation spaces to construct the local approximants on PU cells. At the end, we will extend the method for solving surface PDEs on embedded and smooth submanifolds of the Euclidean spaces.

Keywords: Radial basis function (RBF), Partition of unity (PU) Methods, RBF-FD, RBF-PU, Partial differential equations (PDEs).

AMS Mathematical Subject Classification [2010]: 65Nxx, 41Axx.

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*Speaker

Real and Complex Banach Spaces: Analogies and Differences

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Abstract. In this talk we focus on some differences and analogies between complex Banach spaces and real Banach spaces and their corresponding linear operators. We review some complexification of real Banach spaces and give several examples showing how different can be the behaviour of real Banach spaces versus complex Banach spaces.

Keywords: Complex Banach spaces, Real Banach spaces.

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*Speaker

The Use of Nemirovski's Mirror-Prox Method for Efficiently Solving Homogeneous Feasibility Problems

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Abstract. We introduce a new variant of Chubanov's method for solving homogeneous linear systems with positive variables. In the Basic Procedure we use a recently introduced cut in combination with Nemirovski's Mirror-Prox method. We show that generating the new cut requires at most $O(n^3)$ time, just as Chubanov's cut; despite this the new cut is always at least as sharp as the one of Chubanov, as we also show. Our Modified Main Algorithm is in essence the same as Chubanov's Main Algorithm, except that it uses the new Basic Procedure as a subroutine. The new method has $O(n^{4.5}L)$ time complexity. As we show, a simplified version of the new Basic Procedure competes well with the Smooth Perceptron Scheme of Peña and Soheili and, when combined with Rescaling, also with two commercial codes for linear optimization, namely Gurobi and Mosek.

Keywords: Linear system, Homogeneous, Algorithm, Mirror-prox method.

AMS Mathematical Subject Classification [2010]: 90C05, 90C46, 90C47.

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*Speaker

Clifford-Fischer Theory

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Abstract. This talk is on Clifford-Fischer theory which is a technique that was develped by Bernd Fischer(1934-2020). This technique is for calculating character tables in aparticular method. Most character tables, except finitely many like subgroups of the monster F_1 and the baby moster B can be calculated using MAGMA or GAP. One cannot use any of GAP or MAGMA with the Clifford-Fischer theory. I take a brief survey at these the split and non split extensions and mostly the special and extra special groups. This paper is dedicated to Bernd Fischer and J. Moori who introduced Clifford Fisckher theory in South Africa. A speicial word of gratitude to A. Basheer with whom I have done a lot of reesearch with and who allowed me to use his papers.

Keywords: Clifford-Fischer theory, Character table.

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*Speaker

Statistical Inference on Some Abstract Spaces

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Abstract. Modern sensor technologies have, in recent years produced very detailed and informative images, many extremely complex. A few of these advanced technologies of collecting data are EEG, MRI, Calcium imaging, and satellite imaging methods. These techniques have changed the nature of observations and the parameter of interest in statistical inference from finite dimensional spaces of vectors and matrices to abstract infinite dimensional spaces of sets, multivariate functions, and algebraic structures. Following the pioneer work of Grenander (1981), the term "Abstract inference" is used when we deal with such an infinite dimensional spaces as the observation or the parameter space. In this work, I will have a review on some of my work on abstract inference from both classical and Bayesian perspectives.

Keywords: Statistical inference, Abstract spaces.

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*Speaker

On the Structure of Profinite Polyadic Groups

Mohammad Shahryari*
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Abstract. We introduce profinite polyadic groups as the n-ary generalizations of a the ordinary profinite groups. The structure of such profinite systems will be investigated and we will show that a topological polyadic group (G, f) is profinite, if and only if, it is compact, Hausdorff, totally disconnected. It is also shown that a topological polyadic group $\mathrm{der}_{\theta,b}(G, \bullet)$ is profinite, if and only if, the corresponding retract group $(G, \bullet)$ is profinite and the automorphism θ is continuous. Also, for a variety (formation) $\mathfrak{X}$ of finite polyadic groups, we show that a polyadic group (G, f) is pro-$\mathfrak{X}$, if and only if it is compact, Hausdorff, totally disconnected and for every open congruence R, the finite polyadic group $(G/R, f_R)$ belongs to $\mathfrak{X}$.

Keywords: Polyadic groups, n-Ary groups, Profinite groups and polyadic groups, Post's cover and retract of a polyadic group.

AMS Mathematical Subject Classification [2010]: 20N15.

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*Speaker

Properly Increasing Maps and Proper Efficiency in Multi-Objective Programming

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and Moslem Zamani
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Abstract. Multi-objective problems are concerned with mathematical programming involving more than one (in conflict) objective function to be maximized/minimized simultaneously. Such problems arise in decision making with more than one criterion. Several important theoretical and practical problems in engineering, management, economics, finance, etc. can be modeled as multi-objective programs.

Scalarization is one of the most popular approaches for generating (weakly, properly) efficient solutions in multi-objective programming. The single-objective programs derived from scalarization techniques are employed as subproblems in iterative and interactive algorithms as well. A scalarization method is defined by means of some parametric mapping, called Scalarization Mapping (SM). In this talk, we focus on the properly increasing scalarization maps, and provide technical connections between the properties of the considered SM and the quality of the optimal solutions of the corresponding single-objective problem. This leads to some sufficient conditions under which the optimal solutions of the dealt with scalarization problem are properly efficient. We show that some well-known scalarization techniques (SMs) satisfy the addressed sufficient conditions, and so several important results existing in the literature are direct consequences of the results of the present study. Furthermore, we concentrate on a parametric SM, and provide sufficient conditions under which the considered parametric scalarization problem is able to generate properly efficient solutions. The unboundedness of the considered general scalarization problem is investigated as well.

Keywords: Multi-objective programming, Proper efficiency, Scalarization.

AMS Mathematical Subject Classification [2010]: 90C29.

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*Speaker

Han's Conjecture for Bounded Extensions

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Abstract. The global dimension of an associative algebra A over a a field is a measure of the complexity of its representations. Han's conjecture relates the global dimension to the Hochschild homology of the algebra. Let $B \subseteq A$ be a bounded extension of finite dimensional algebras. I will use the Jacobi-Zariski long nearly exact sequence to show that B satisfies Han's conjecture if and only if A does, regardless if the extension splits or not. I will also give conditions ensuring that an extension by arrows and relations is bounded and comment examples of non split bounded extensions.

This talk contains joint work with Claude Cibils, Marcelo Lanzilotta and Eduardo Marcos.

Keywords: Hochschild, Homology, Relative, Han, Quiver.

AMS Mathematical Subject Classification [2010]: 18G25, 16E40, 16E30, 18G15.

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*Speaker

An Estimation Procedure: Search Detection Via Simulation

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Abstract. In this article, we establish a simulation search procedure to search for a simulated data which is as good as the observed data, in the sense of the Kolmogorov-Smirnov distance. Then, the source of the simulated data gives rise to our search detection estimations for the parameters of the underlying population distribution. Indeed, in contrast to the existing estimation procedures, in our search method, there is no need to construct statistics in explicit form for doing the parameter estimation. Also, there is no need to formulations for the population density, distribution or characteristic function, in closed form. Moreover, we prove that the search detection estimators, defined implicitly, satisfy a type of strong consistency. Numerical illustrations on effectiveness of our search detection procedure are given, using Wolfram Mathematica (2020).

Keywords: Parameter estimation, Simulation, Two sample Kolmogorov-Smirnov test, Goodness of fit, Implicit function theorem, Gnedenko-Cantelli theorem, Search detection.

AMS Mathematical Subject Classification [2010]: 62G10, 60F03, 60F15.

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*Speaker

Zeroing Neural Networks for Solving Time-Varying Problems in Linear Algebra

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Abstract

The problem of pseudoinverses computation leads to well-known Penrose equations

$$(1)\quad AXA = A \qquad (2)\quad XAX = X \qquad (3)\quad (AX)^* = AX \qquad (4)\quad (XA)^* = XA.$$

For any matrix A there exists a unique solution to the set of Penrose equations, called the Moore-Penrose inverse of A, which is denoted by $A^\dagger$. The Drazin inverse $X = A^{\mathrm{D}}$ of a square matrix $A \in \mathbb{C}^{n\times n}$ is the unique matrix $X \in \mathbb{C}^{n\times n}$ which satisfies

$$(2)\ \ XAX = X, \quad (1^k)\ \ A^{k+1}X = A^k,\ k = \mathrm{ind}(A), \quad (5)\ \ AX = XA.$$

For a subset $\mathcal{S} \subseteq \{(1),(2),(3),(4)\}$, the set of all matrices obeying equations contained in $\mathcal{S}$ is denoted by $A\{\mathcal{Q}\}$, such that $i \in \mathcal{Q}$ corresponds to the equation (i). Any matrix from $A\{\mathcal{S}\}$ is called an $\mathcal{S}$-inverse of A and it is denoted by $A^{(\mathcal{S})}$. Outer generalized inverse $A^{(2)}_{T,S}$ of $A \in \mathbb{C}^{m\times n}$ with prescribed range T and null space S is unique the matrix $X \in \mathbb{C}^{n\times m}$ which satisfies

$$(2)\ \ XAX = X, \quad \mathrm{R}(X) = T, \quad \mathrm{N}(X) = S.$$

The Moore-Penrose inverse $A^\dagger := A^{(2)}_{\mathrm{R}(A^*),\mathrm{N}(A^*)}$ and the weighted Moore-Penrose inverse $A^\dagger_{M,N} := A^{(2)}_{\mathrm{R}((MAN^{-1})^*),\mathrm{N}((MAN^{-1})^*)}$, the Drazin inverse $A^{\mathrm{D}} := A^{(2)}_{\mathrm{R}(A^k),\mathrm{N}(A^k)}$ and the group inverse $A^{\#} := A^{(2)}_{\mathrm{R}(A),\mathrm{N}(A)}$ can be derived by means of appropriate choices of T and S.

A new type of complex-valued Recurrent Neural Networks (RNNS), known as Zhang (or zeroing) neural network (ZNN), was proposed in 2001 and has been extensively exploited in solving various time-varying problems. ZNN dynamic is defined by the evolution law

$$\dot{E}(t) = \frac{\mathrm{d}E(t)}{\mathrm{d}t} = -\gamma\,\mathcal{H}\left(E(t)\right),$$

where $\dot{E}(t)$ is the time derivative of the error function $E(t)$ is a matrix, vector or scalar, γ is a positive scalar used to accelerate the convergence and $\mathcal{H}(\cdot)$ denotes element-wise application of an appropriate *activation-function*.

This lecture presents a survey of recent results about usage of ZNN dynamical systems in solving time-varying problems of numerical linear algebra, mainly in computing matrix inverse and generalized inverses, approximating time-varying QR decomposition $A(t) = Q(t)R(t)$ and solving time-varying linear matrix equations $A(t)X(t)B(t) = C(t)$.

*Speaker

Integration-enhanced noise-tolerant ZNN models (shortly IENTZNN) robust against various kinds of noise are investigated. The IENTZNN evolution design is of the general form

$$\dot{E}(t) = -\gamma\, E(t) - \zeta \int_0^t E(\tau)\mathrm{d}\tau + N(t),$$

where $\gamma > 0$ and $\zeta > 0$ are the scaling parameters and $N(t)$ is a noise in appropriate matrix-form. A varying-parameter ZNN (VPZNN) neural design is defined for approximating various generalized inverses and expressions involving generalized inverses of complex matrices. The general VPZNN pattern is defined by the varying-parameter gain parameter $\mu(t)$, as follows

$$\dot{E}(t) := \frac{\mathrm{d}E(t)}{\mathrm{d}t} = -\mu(t)\,\mathcal{H}(E(t)).$$

Several variants of finite-time VPZNN (FTVPZNN) dynamical systems are presented in the form

$$\dot{E}(t) = -\mu(t)\,\mathcal{H}\Big(k_1 E(t) + k_2 E^{\frac{q}{p}}(t)\Big), \quad \chi \geq \mathrm{e},$$

where $k_1, k_2 > 0$ are constants and p, q denote positive odd integers satisfying $p > q$. Main choices for $\mu(t)$ are $\mu(t) \equiv \gamma\,\mathrm{e}^{at}$, $a \in \mathbb{R}$, $\gamma > 0$ or $\mu(t) \equiv \gamma\,\chi^t$, $\chi \geq \mathrm{e}$, $\gamma > 0$. Convergence properties of the FTVPZNN evolution design are investigated.

Practical applications in robotic motion tracking and in the angle-of-arrival localization are described. An application of the VPFTZNN dynamics in solving the time-dependent division problem is presented as well as in overcoming the division by zero (DBZ) problem.

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Gyrogroups: Generalization of Groups

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Abstract. A gyrogroup is a non-associative algebraic structure, which is a natural generalization of a group, arising from the study of the parametrization of the Lorentz transformation group by Abraham A. Ungar. Gyrogroups share many properties with groups and, in fact, every group may be viewed as a gyrogroup with trivial gyroautomorphisms. In this talk, we indicate strong connections between gyrogroups and classical structures such as groups, linear spaces, topological spaces, and metric spaces from the algebraic point of view.

Keywords: Gyrogroup, Gyrogroup action, Representation of gyrogroup, Topological gyrogroup, Gyronorm.

AMS Mathematical Subject Classification [2010]: 20N05.

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*Speaker

Wintgen Inequality for Kulkarni Curvature Tensors and its Applications

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Abstract

For a surface M^2 in $\mathbb{R}^4$, in 1979, P. Wintgen [8] proved an inequality, namely

$$K \leq \|H\|^2 - \left|K^{\perp}\right|,$$

where K is the Gaussian curvature, $\|H\|^2$ is the squared mean curvature and $K^{\perp}$ the normal curvature of the surface. The equality case is true if and only if the ellipse of curvature of M^2 in E^4 is a circle. Later, in 1983, I. V. Guadalupe and L. Rodriguez extended the above result for a surface M^2 of codimension $m \geq 2$ in a real space form $\widetilde{M}^{2+m}(c)$, and proved that

$$K \leq \|H\|^2 - K^{\perp} + c.$$

In 1999, De Smet, Dillen, Verstraelen and Vrancken [2] conjectured the above Wintgen inequality for submanifolds in real space forms, now known as the DDVV conjecture. After many proofs for special cases, the DDVV conjecture was finally proved by Lu (2011) [5] and by Ge and Tang (2008) [3], independently. The Wintgen inequality has drawn interest of many scholars and they obtained Wintgen inequalities in different situations.

In this presentation, Wintgen inequality for a Kulkarni curvature tensor satisfying algebraic Gauss equation will be given as follows:

Theorem 1.1. Let (M, g) be an n-dimensional Riemannian manifold and (B, g_B) an m-dimensional Riemannian vector bundle over M with $n, m \geq 2$. Let ζ be a B-valued symmetric $(1,2)$-tensor field and T a Kulkarni curvature tensor [4] on M satisfying the algebraic Gauss equation [1, Chen, Dillen, and Verstraelen 2005]

$$T(X,Y,Z,W) = g_B(\zeta(X,W), \zeta(Y,Z)) - g_B(\zeta(X,Z), \zeta(Y,W)).$$

Then, normalized T-scalar curvature τ^T_{NOR} and normalized Wintgen curvature $\mho^{\zeta}_{\mathrm{NOR}}$ of ζ (defined by the author) satisfy the inequality

$$\tau^T_{\mathrm{NOR}} \leq \frac{1}{n^2}\|\operatorname{trace}\zeta\|^2 - \mho^{\zeta}_{\mathrm{NOR}}. \tag{1}$$

If $m = 2$, the equality case of (1) is satisfied identically if and only if with respect to a suitable orthonormal frame $\{e_1, \ldots, e_n\}$ on M and an orthonormal frame

*Speaker

$\{e_{n+1}, e_{n+2}\}$ of the Riemannian vector bundle (B, g_B), the matrices (ζ^r_{ij}) take the forms

$$(\zeta^{n+1}_{ij}) = \begin{pmatrix} a & b & 0 & \cdots & 0 \\ b & a & 0 & \cdots & 0 \\ 0 & 0 & a & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & a \end{pmatrix}, \quad (\zeta^{n+2}_{ij}) = \begin{pmatrix} b & 0 & 0 & \cdots & 0 \\ 0 & -b & 0 & \cdots & 0 \\ 0 & 0 & 0 & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & 0 \end{pmatrix},$$

where a, and b are local real functions on M. If $m > 2$, the equality case of (1) is satisfied identically if and only if, with respect to a suitable orthonormal frame $\{e_1, \ldots, e_n\}$ on M and an orthonormal frame $\{e_{n+1}, \ldots, e_{n+m}\}$ of the Riemannian vector bundle (B, g_B), the matrices (ζ^r_{ij}) take the forms

$$(\zeta^{n+1}_{ij}) = \begin{pmatrix} a_1 + b & 0 & 0 & \cdots & 0 \\ 0 & a_1 - b & 0 & \cdots & 0 \\ 0 & 0 & a_1 & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & a_1 \end{pmatrix}, \quad (\zeta^{n+2}_{ij}) = \begin{pmatrix} a_2 & b & 0 & \cdots & 0 \\ b & a_2 & 0 & \cdots & 0 \\ 0 & 0 & a_2 & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & a_2 \end{pmatrix},$$

$$(\zeta^{n+3}_{ij}) = a_3 I_n, \quad (\zeta^r_{ij}) = 0_n, \qquad r \in \{n+4, \ldots, n+m\},$$

where a_1, a_2, a_3 and b are real functions on M.

It will be explained that, applying this result a number of results can be obtained for submanifolds of Riemannian manifolds, real space forms, complex space forms, Sasakian space forms, quaternion space forms, Statistical real space form etc.

This presentation is based on the previous experiences of the author (See [6], [7]), where he presented improved Chen-Ricci inequality and basic inequalities for algebraic Casorati curvatures.

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Residuation in Algebra and Logic: A Short Introduction

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Abstract. This talk is in the general area of algebraic logic. Algebraic logic studies classes of algebras that are related to logical systems, as well as the process by which a class of algebras becomes the algebraic counterpart (semantics) of a logical system. This focal point of the talk is *residuated lattices*, the algebraic counterparts of (propositional) *substructural logics*.

Substructural logics are non-classical logics that are weaker than classical logic, in the sense that they may lack one or more of the structural rules of contraction, weakening and exchange in their Genzen-style axiomatization. They include many non-classical logics related to computer science (linear logic), linguistics (Lambek Calculus), philosophy (relevant logics), and many-valued reasoning.

Residuated lattices first appeared explicitly in the work of Krull, Ward and Dilworth as abstractions of lattices of ideals of rings in the early 1930s. Their study, however, goes even further back, for example Riesz's development of the theory of operators and their spaces. Thus, residuated structures have played an important role in mathematics independently of their connection with substructural logics.

Developments in the algebraic theory of residuated lattices during the past decade have produced powerful tools for the comparative study of substructural logics. Moreover, the bridge algebraic logic builds provides significant benefits to algebra as well via proof-theoretic techniques. My objective is to highlight some of these developments.

Keywords: Algebraic logic, Substructural logics, Residuated lattices.

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*Speaker

The Wiener Index and Hyperbolic Geometry of Fullerene Graphs

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Abstract. We observe that fullerene graphs are one-skeletons of polytopes which can be realized in a hyperbolic 3-dimensional space with all dihedral angles equal to $\pi/2$. We are referring volume of such polytope as a hyperbolic volume of a fullerene. We demonstrate that hyperbolic volumes of fullerenes correlate with few important topological indices and can serve as a chemical descriptor for fullerenes.

Keywords: Fullerene, Wiener index, Hyperbolic space, Right-angled polyhedron.

AMS Mathematical Subject Classification [2010]: 05C12, 51M10, 92E10.

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*Speaker

Exact Contexts and Recollements of Derived Module Categories

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Abstract. This talk surveys some of our recent joint works on constructions of recollements of derived categories of algebras. Generalising Milnor squares and usual tensor products over commutative rings, we introduce exact contexts and their noncommutative tensor products, respectively. We then construct universal localizations and characterize when they are homological in terms of the data of exact contexts. In this way we establish new methods to get recollements of derived categories of rings.

Keywords: Derived module category, Exact context, Noncommutative tensor product, Recollement, Rigid morphism.

AMS Mathematical Subject Classification [2010]: 16E35, 18G35, 13B30.

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*Speaker

53 Years of Evolutionary Process of a Passionate Mathematician!

Bijan Zohuri-Zangeneh*
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Abstract. The purpose of this talk, is to share my living experiences with an audience and in specific, young mathematicians. Experiences that I have attained over a 53 year period that has been a bumpy, difficult, yet enjoyable journey that has paved the way for me to become the mathematician that I am today! I will start with my BS and MS studies at Sharif(Arya Mehr) University of Technology in late the late 60s and early 70s. At that point in my mathematical life I truly enjoyed working on abstract mathematics such as Analysis and Algebra, while I despised any applied aspect of mathematics. Keeping up this interest, I started my doctoral program at MIT. At that time, I took a variety of courses in pure mathematics, and focused on Harmonic analysis on Lee Groups for my dissertation under the supervision of Professor Helgason. Soon after the 1979 revolution in Iran, I returned to the country (without obtaining my PhD degree) and started to work at Isfahan University of Technology. However, the Cultural Revolution started and all the universities in Iran were closed for three years. Throughout that time, I started the self-learning of Probability and DE with my colleagues, at Isfahan University of Technology. Soon after I continued my mathematical evolution by entering the École polytechnique fédérale de Lausanne (EPFL) in Switzerland I started a PhD and worked on Probability on Banach Spaces under the supervision of Professor Chaterjy. After a year into my PhD studies at EPFL, I enrolled in another PhD program at the University of British Columbia (UBC) in Vancouver, Canada. Again, I took a large number of courses in probability, stochastic processes, PDE and such, and became more and more interested in these areas and did my dissertation on Stochastic Evolution Equations under Professor Walshs supervision. After obtaining my PhD, I started as an assistant professor at Sharif University of Technology in 1992 and established probability as a novel field in this university. After supervising a number of doctoral students in this field, I gradually moved toward Stochastic Numerical Analysis and Mathematics of Finance and at the present, I am mostly focusing on Statistics. In this talk, I would like to say that there is a long way to go from obtaining a PhD degree in mathematics to becoming a mathematician! From hating applied mathematics and loving pure mathematics and ultimately combining and integrating both I have reached the point I am now in my mathematical career. This talk that I am sharing with you is the story of my mathematical journey.

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*Speaker

Invited Speakers

On the Extremal Problems for Some Degree-Based Graph Invariants

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Abstract. A degree-based graph invariant is the graph invariant that depend only on the degrees of the vertices of the considered graph. Among the graph invariants that have found some applications in chemistry, several are the degree-based ones. Problems of characterizing graphs from certain graph classes having the extremum values of specific degree-based graph invariants are well-studied in chemical graph theory. In this talk, solutions to some of such extremal problems will be dispensed.

Keywords: Chemical graph theory, Degree-based graph invariants, Extremal problem.

AMS Mathematical Subject Classification [2010]: 05C07, 05C09.

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*Speaker

Symmetries in Algebraic Geometry x Gender Asymmetries in Mathematics

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Abstract. In the first part of this talk, I will discuss different notions of symmetries in Algebraic Geometry and my research work in understanding them. Then I will discuss my experience as a member of the Committee for Women in Mathematics of the International Mathematical Union, and our efforts to promote women in mathematics worldwide.

Keywords: Symmetry, Asymmetry.

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*Speaker

On Tetravalent Non-Cayley Vertex-Transitive Graphs

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ABSTRACT. A graph is vertex-transitive if its automorphism group acts transitively on vertices of the graph. A vertex-transitive graph is a Cayley graph if its automorphism group contains a subgroup acting regularly on its vertices. It is well known that a vertex-transitive graph is a Cayley graph if and only if its automorphism group contains a subgroup acting regularly on its vertex set. There are vertex-transitive graphs which are not Cayley graphs and the smallest one is the well-known Petersen graph. Such a graph will be called a *vertex-transitive non-Cayley graph*, or a VNC-graph for short. In this talk, the tetravalent VNC-graphs of special orders are classified.

Keywords: Vertex-transitive graph, Automorphism group, Cayley graph.

AMS Mathematical Subject Classification [2010]: 20B25, 05C25.

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*Speaker

On the ABC Index of Graphs

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Abstract. Atom-bond-connectivity index used to model the stability of alkanes It is an index that makes a significant contribution to chemistry, pharmacology etc. In this paper, some results for the general ABC index which has chemical applications are found using different methods. These new results for ABC index are found in terms of its edges, its vertices and its degrees.

Keywords: ABC index, Graph.

AMS Mathematical Subject Classification [2010]: 05C05, 05C12, 05C75.

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*Speaker

Information Monotonicity From Operator Geometric Mean to Multivariate Deformed Means

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ABSTRACT. In the quantum information theory, it is known that every f-divergence has a monotonicity under any quantum operation. This monotonicity has important consequences like for example characterization of the joint convexity of f-divergences for a general continuous function f on $(0, \infty)$. These operations are interpreted by the positive linear maps Φ on operator algebras. The monotonicity property for operator means was first showed by T. Ando, when he showed that $\Phi(A \#_t B) \leq \Phi(A) \#_t \Phi(B)$ holds for all positive operators A and B. We review recent results on information monotonicity for multivariate operator means.

Keywords: Positive (multi)linear map, Positive operator, Operator mean, Operator equation.

AMS Mathematical Subject Classification [2010]: 47A63, 47A64.

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*Speaker

Investigation of the Quality of Prospective Secondary Mathematics Teachers Reasoning in Determining the Value of a Propositional Sentence

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Abstract. The ability of mathematics teachers to teach reasoning and proof to students naturally depends on their content knowledge and their pedagogical content knowledge.(PCK) A necessary condition for the usefulness of PCK is mastery in mathematical knowledge. This study aims to analyze the performance of prospective secondary mathematics teachers reasoning in determining the value of a propositional sentence. The research method is descriptive survey. In a case study, the responses of 42 students of mathematics teachers to a task involving a propositional sentence analyzed using SOLO taxonomy and the quality of the answers was categorized into 4 levels with this theory. The findings showed that most students are at the unistructural level and are not able to connect with different concepts and topics involved in the given task. The most common difficulties for students are the inability to understand the propositional sentence, to find the negation of a statement, to provide a counterexample, not to understand the effect of the order of the quantifiers and the inability to constructing a proof by contradiction. The findings also indicate that students do not pay proper attention to the completeness of their writing in presenting a formal proof.

Keywords: Reasoning and proof, Prospective secondary mathematics teachers, Proof by contradiction, Propositional sentence, SOLO taxonomy.

AMS Mathematical Subject Classification [2010]: 97E50.

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*Speaker

On the Behavior of Birkhoff Sums Generated by Irrational Rotation

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Abstract. In this talk, we will consider the Birkhoff sums $f(n, x, h)$, where f is a continuous function with zero average on the unit circle, generated by irrational rotation. We show that the unique boundary condition of growth rate of sequence $\max f(n, x, h)$ for $n \to \infty$, if the average of the Birkhoff sums, i.e. $\frac{1}{n} f(n, x, h)$ is approaching to zero.

Keywords: Birkhoff sums, Irrational rotation, Resolvent, Weighted shift operator.

AMS Mathematical Subject Classification [2010]: 47B37, 34C29.

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Workshops Speakeres

Continuous and Discontinuous Systems of Cancer

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Abstract. The system of differential equations is one of the best and most complete models in the study and research of models related to other sciences, including biology. We will first consider a two-dimensional model for infection HTLV-I in which the innate immune system is activated after the infection is detected before the infection spreads to the host cell. After examining the periodic answers, the presence or absence of chaos will be very important. Because chaos can show that the patient's body with such an immune structure can not remain in recovery condition and also, due to the inaccuracy of the patient's initial condition, chaos can examine the sensitivity of the model to the initial conditions. Then, due to the different immune system responses at different time differences and leading the immune response function as a step function, we propose a discontinuous immune response function for this model. Because the infection stays in the body for a long time without showing any symptoms of the disease, over time the cell cancer caused by this infection appears. So this situation leads to a four-dimensional model with healthy cells, cells with latent infection, cells with active infection, and cancer cells, which we will describe. In the following, we will explain the immunotherapy method for this type of cancer.

Keywords: Discontinuous systems, Chaos, Bifurcation.

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Delayed Differential Equations in Cancer Tumor Model

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Abstract. A tumor is a nonlinear dynamic system in which bad cells grow and spread and kill and destroy good cells in the body. Due to the time delay in the immune response, the model is introduced as a delayed differential equation and is examined from the point of view of stability and periodic responses. If the time lag is large, there is a possibility of chaotic absorbers being addressed. Note that limit and periodic responses play a key role in cancer differential equations, and in fact, it shows that the dynamic state of each tumor returns to its original state after a certain time. However, the response of tumor diseases to the treatment process depends on many factors, in this presentation, we examine the role of the immune system in the mechanism of growth of predator cells, considering the role of the immune system. We hypothesize that predator cells do not respond to tumor cell killing as soon as they receive a signal from stagnant cells, but are activated after a fixed time delay. The presence of periodic responses in cancer models suggests that tumor levels fluctuate around a fixed point even in the absence of any treatment.

Keywords: Delayed differential equations, Dynamic system.

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*Speaker

Inquiry-Based Teaching and Learning of Mathematics with a Particular Focus on Graph Theory

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Abstract. Lecturing is the main method of teaching mathematics in Iran and many countries across the world. In the past two decades, several attempts have been made to change this approach to more active student-centred approaches. In this workshop, we talk about the principles of inquiry-based teaching and learning and share some mathematical examples that can be used for teaching mathematics at the university level. The examples that will be discussed have been used for teaching vertex colouring in a graph theory course in an Iranian university. In this workshop, we also kindly ask participants to design some inquiry-based tasks.

Keywords: Inquiry-based teaching and learning, Vertex colouring.

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Workshop of Task Design and Evaluation Criteria for Mathematical Problem Posing

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Abstract. The role of mathematical tasks in learning mathematics has been emphasized by many studies. The ability task design is a necessity, especially for mathematical teachers. In the first part of the workshop, information about the nature of mathematical tasks, its structure, the role and importance of mathematical tasks in the process of teaching mathematics and types of mathematical Tasks are presented. Then, the principles and models of task design and analysis are examined, with emphasis on mathematical learning tasks. Attempts are made to make the material presented in this section exemplary by providing examples and concrete examples. In the last step, participants are asked to analyze and design rich mathematical tasks based on the models and frameworks presented in the workshop in an interactive process. The second part of the workshop is dedicated to the topic of mathematical problem posing and presentation ideas for its evaluation. Many researchers are researching and studying mathematical problem posing. One of the challenges for researchers after examining problem posing skills and examining students' thinking processes is how to evaluate the problems posed. In this workshop, after introducing a number of important frameworks of mathematical problem posing with examples, the criteria for evaluating the skills of mathematical problem posing from the perspective of researchers during the last 26 years (with the help of qualitative Meta-Analysis) will be discussed and then a framework including 11 criterion is suggested by the authors. The framework has been analyzed by experts in mathematics and mathematics education and teachers from different educational backgrounds. After reviewing, this framework has been tested in two stages and has been validated by the theory of generalizability with a reliability coefficient of 0.81.

Keywords: Task design, Problem posing, Problem solving, Meta-Analysis.

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Workshop on Data Science with Python

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Abstract. Nowadays, due to the production of a huge amount of data, human beings need to classify, analyze and understand them. Data scientist is a most attractive and money maker jobs in the world. We aim to teach and promote data science to encourage interested students to become data scientist. We hope them to have a more opportunity to join the labor market as a data analysts. During this intensive workshop, we expect that participants achieve a general knowledge in this field. In this workshop, we first teach some important Python packages including Numpy, Pandas, Matplotlib and NetworkX.

Keywords: Data Science, Python, Numpy, Pandas, Matplotlib and NetworkX.

1. Introduction

Every thing started years ago when the concept of data science attracted many scholars around the world. Since then, data analysis and data mining become popular research topic. Although, data mining was a part of applied statistics, but the increasing attention to it raised the question "Is data Science a new form of classic Statistics?" Many people still dose not know the difference between data science, data mining, data analysis and machine learning (ML).

Today, the rise of interest and attention to data science and artificial intelligence (AI) have made an involution in the science and technology. Developing AI and data science requires some tools for their implementation in the real world.

In this workshop, we will introduce the basics of the python programming environment, including fundamental python programming techniques such as lambdas, reading and manipulating csv files, and the numpy, pandas, matplotlib and networkX library. Series and Data Frame are as the central data structures for data analysis.

We introduce data manipulation and cleaning techniques using the popular python pandas data science library. Then we also give with tutorials on how to use functions such as merge, groupby and pivot tables effectively.

By the end of this workshop, we hope participants to be able to take tabular data, clean it, manipulate it, and run basic inferential statistical analyses and consequently, create an anticipation model if necessary.

*Speaker
*Speaker

The destination of this workshop inspired from [**1**, **2**, **3**, **4**].

Acknowledgement

We would like to thank Prof. Alireza Ashrafi for encouraging us to hold this workshop. We are also grateful to Hossein Haghbin and Mohammad Fozuni for their help and support.

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Integrated Analysis of the Genetic Basis of Risky Behaviors Based on a Graph Model

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Abstract. Although each genetic investigation appears to be valuable, no one study on its own can comprehensively explain the etiology of suicidal behavior. In this study, using a broad literature review, we found the suicide-associated gene co-expression interactions and reconstructed the interactive network. The reconstructed network consisted of 104 genes, including 91 previously known genes and 13 novel genes, and 354 interactions. Topological analysis showed that in total, CCK, INPP1, DDC, and NPY genes are the most fundamental hubs in the network. We found that suicide genes are. Further analysis showed that monoaminergic signal transduction, especially through GPCRs is the main deficient routes in suicide. Moreover, it turned out that genetically, suicidal behavior is more likely in patients with mood and affective disorders. In summary, multidisciplinary investigations are needed to uncover those issues that are not clearly understand in biological science.

Keywords: Interactive network, Genes, Graph model.

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Contributed Talks

Algebra

Relative Isosuperfluous Submodules

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Abstract. We introduce isosuperfluous R-submodules and then we examine some characteristics of these modules on max rings. Also, we introduce and study the notions of isoprojective cover modules and isosemiperfect rings by using the notion of isosuperfluous submodules. Finally, we investigate some properties of these modules on isoartinian rings.

Keywords: Isosuperfluous submodule, Isoprojective cover, Strongly superfluous submodule, Isoartinian modules.

AMS Mathematical Subject Classification [2010]: 16D10, 16D99, 13C13.

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*Speaker

A New Type of Filter in EQ-Algebras

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Abstract. In this paper, we introduce a new type of (pre)filter in EQ-algebra and investigate the relation between this filter and the other filters. Then with the congruence relation induced by this filter, we construct residuated EQ-algebra and also, a hoop algebra.

Keywords: EQ-Algebras, (Pre)filter, Residuated filter, Residuated lattices, Hoop-algebra.

AMS Mathematical Subject Classification [2010]: 06E15, 06F99.

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*Speaker

On the List Distinguishing Number of Graphs

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Abstract. A graph G is said to be k-distinguishable if every vertex of the graph can be colored from a set of k colors such that no non-trivial automorphism fixes every color class. The distinguishing number $D(G)$ is the least integer k for which G is k-distinguishable. A list assignment to G is an assignment $L = \{L(v)\}_{v\in V(G)}$ of lists of labels to the vertices of G. A distinguishing L-labeling of G is a distinguishing labeling of G where the label of each vertex v comes from $L(v)$. The list distinguishing number of G, $D_l(G)$ is the minimum k such that every list assignment to G in which $|L(v)| = k$ for all $v \in V(G)$ yields a distinguishing L-labeling of G. In this paper, we study and compute the list-distinguishing number of some families of graphs. We also study graphs with the distinguishing number equal the list distinguishing number.

Keywords: Distinguishing number, List-distinguishing labeling, List distinguishing chromatic number.

AMS Mathematical Subject Classification [2010]: 05C15, 05E18.

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*Speaker

On n-Absorbing Hyperideal

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Abstract. In this paper, we introduce the concept of n-absorbing hyperideal which is a generalization of prime hyperideal. Let R be a multiplicative hyperring. A proper hyperideal I of R is called an n-absorbing hyperideal of R if whenever $\alpha_1 \circ \ldots \circ \alpha_{n+1} \subseteq I$ for $\alpha_1, \ldots, \alpha_{n+1} \in R$, then there are n of the $\alpha_i^{,}$s whose product is in I.

Keywords: Prime hyperideal, n-Absorbing hyperideal, Primary hyperideal, Hyperring.

AMS Mathematical Subject Classification [2010]: 20N20.

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*Speaker

Semi-Symmetric Graphs of Certain Orders

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Abstract. A connected simple graph Γ is called semi-symmetric if $\mathbb{A}ut(\Gamma)$ acts transitively on the edge-set of Γ but intransitive on its vertices. If Γ is regular of degree 3, then it is called cubic. We classified all semi-symmetric cubic graphs of certain orders, which are presented here.

Keywords: Semi-symmetric graph, Edge-transitive graph, Cubic graph.

AMS Mathematical Subject Classification [2010]: 20B25, 20C10.

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*Speaker

A Generalization of the Faltings' Local-Global Principle Theorem

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Abstract. In this paper we introduce the local-global principle for the $CD_{<n}$ of local cohomology modules as a generalization of the Faltings' local-global principle for the annihilation and for the in dimension $< n$ of local cohomology modules.We show that local-global principle for the $CD_{<n}$ of local cohomology modules is valid at level 2 over any commutative Noetherian local ring R.

Keywords: $CD_{<n}$ R-modules, Local cohomology modules, Local-global principle.

AMS Mathematical Subject Classification [2010]: 13D45, 13C13, 13C99.

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*Speaker

On (Quasi-)Morphic Rings

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ABSTRACT. The main objective of this work is to study (quasi-)morphic property for skew polynomial rings. Let R be a ring and σ be a ring homomorphism on R. We show that if $R[x,\sigma]/(x^{n+1})$ $(n \geq 1)$ is quasi-morphic then so is R. It is also proved that R is a regular ring provided that $R[x;\sigma]/(x^{n+1})$ is morphic. Some applications of our results are provided.

Keywords: Annihilator, Morphic ring, Quasi-morphic ring, Regular, Unit-regular.

AMS Mathematical Subject Classification [2010]: 16E50, 16S70.

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*Speaker

On Injectivity of Certain Gorenstein Injective Modules

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Abstract. In this note, we will be concerned with injectivity of Gorenstein injective modules over certain rings. Specifically, we will show that if R is a complete local d-Gorenstein ring and M is a Gorenstein injective R-module possessing a syzygy K_n, $n \geq d$ such that ${}^{\perp}K_n \cap K_n^{\perp} = \mathrm{Add}\,(\mathrm{K_n}) \cup \mathrm{Inj(R)}$, then M is injective. This is particularly related to the dual notion of the famous Auslaner-Reiten Conjecture recently posed.

Keywords: Gorenstein injective module, Gorenstein ring, Ordinal number.

AMS Mathematical Subject Classification [2010]: 18G20, 18G25, 13H10, 03E10.

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*Speaker

$k-$Numerical Range of Quaternion Matrices with Respect to Nonstandard Involutions

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Abstract. Let ϕ be a nonstandard involution on the set of all quaternions and α be a quaternion such that $\phi(\alpha) = \alpha$. In this paper, the notion of $k-$numerical range of quaternion matrices with respect to ϕ is introduced. Some basic algebraic properties are investigated.

Keywords: Quaternion matrices, Nonstandard involution, $k-$Numerical range.

AMS Mathematical Subject Classification [2010]: 15A60, 15B33, 15A18.

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*Speaker

Depth of Factor Rings of $C(X)$ Modulo z-Ideals

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Abstract. In this article, it has been shown that the depth of factor rings of $C(X)$, the ring of all real continuous functions on a Tychonoff space X, modulo some important z-ideals is less than or equal to 1.

Keywords: Regular sequence, Depth, Factor ring, z-Ideal.

AMS Mathematical Subject Classification [2010]: 13A15, 54C40.

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*Speaker

Adaptive Simpler GMRES Based on Tensor Format for Sylvester Tensor Equation

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Abstract. The problem of Sylvester tensor equations is a crucial issue in several research applications. Krylov subspace methods are very effective approaches to solve this problems due to their merits in large and sparse problems. We present an adaptive simpler GMRES method for solving the Sylvester tensor equation and then obtain an upper bound for condition number of the basis matrix. Eventually, a numerical example is conducted to illustrate the effectiveness of the method.

Keywords: Tensor Krylov subspace, Adaptive simpler GMRES.

AMS Mathematical Subject Classification [2010]: 15A69, 65F10, 65F15.

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*Speaker

A Generalization of Weakly Prime Submodules

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Abstract. In this article we generalize the notion of classical weakly prime submodules to modules over arbitrary noncommutative rings. We define a proper submodule N of an R-module M to be classical weakly prime submodule if whenever $r, s \in R$ and $K \leq M$ with $0 \neq rRsK \subseteq N$, then $rK \subseteq N$ or $sK \subseteq N$. We investigate some properties of these submodules and their structure in different classes of modules. In particular, this yields characterizations of classical weakly prime submodules in multiplication modules and also modules over duo rings.

Keywords: Weakly prime ideal, Weakly prime submodule, Classical prime submodule,Weakly classical prime submodule, Duo ring.

AMS Mathematical Subject Classification [2010]: 16Dxx, 16D10, 16D80.

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*Speaker

Finding the Degrees of Freedom of Linear Systems over max-Plus Algebra through Normalization Method

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Fateme olia
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Abstract. In this paper, we introduce and analyze a normalization method for solving a system of linear equations over max-plus algebra. If solutions exist, the method can also determine the degrees of freedom of the system.

Keywords: max-Plus algebra, System of linear equations, Degree of freedom.

AMS Mathematical Subject Classification [2010]: 16Y60, 65F05, 15A03.

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*Speaker

Certain Functors for Some p-Groups of Class Two with Elementary Abelian Derived Subgroup of Order p^2

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Abstract. Let G be a finite d-generator p-group of class two such that G/G' is elementary abelian and $G' \cong \mathbb{Z}_p \oplus \mathbb{Z}_p$. The aim of this talk is to characterize the exact structure of some functors including the Schur multiplier, the non-abelian tensor square, and the non-abelian exterior square of G. We also give the corank of G.

Keywords: Schur multiplier, Non-abelian tensor square, Non-abelian exterior square, p-Groups.

AMS Mathematical Subject Classification [2010]: 20D15, 20C25.

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*Speaker

On Schur Multipliers of Special p-Groups of Rank 3

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Abstract. Let G be a special p-group of rank 3 and exponent p. In this talk, an explicit bound for the order of Schur multiplier of G will be given.

Keywords: p-Group, Schur multiplier.

AMS Mathematical Subject Classification [2010]: 20J99, 20D15.

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*Speaker

On Trivial Extensions of Morphic Rings

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Abstract. The aim of this work is to study (quasi-)morphic property for the trivial extension $R \propto M$ of a bimodule M over a ring R. For instance, we show that if R is a commutative domain and $\mathrm{ann}_R(x) = 0$ for some $x \in M$, then $R \propto M$ is (quasi-)morphic if and only if R is a field and $M \simeq R$. Moreover, examples which illustrate our results will be provided.

Keywords: Bimodule, Morphic ring, Quasi-morphic ring, Trivial extension.

AMS Mathematical Subject Classification [2010]: 16S70, 16D20, 16U10.

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*Speaker

Characterization of Finite Groups by the Number of Elements of Prime Order

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Abstract. Let S be a nonabelian simple group that is not isomorphic to $L_2(q)$, where q is a Mersenne prime and let p be the greatest prime divisor of $|S|$. In [1, Conjecture E] A. Moreto conjectured that if a finite group G is generated by elements of order p and G has the same number of elements of order p as S, then $G/Z(G) \cong S$. In this paper, we verify the conjecture for the sporadic simple groups.

Keywords: Element orders, Simple groups, Sylow subgroups.

AMS Mathematical Subject Classification [2010]: 20D99, 20D06.

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*Speaker

Finite Groups with the Kappe Property

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Abstract. Let m and n be positive integer numbers. In this note we study all finite groups that for every finite subsets M and N containing m and n elements, respectively, there exist $x \in M$ and $y \in N$ such that $\langle x, y\rangle$ is r-Kappe (call this condition $\mathcal{K}_r(m, n)$). In fact we fined some bounds for m and n such that $G \in \mathcal{K}_r(m, n)$ implies that G is Kappe and we find a bound for order of G when G is not Kappe group in $\mathcal{K}_r(m, n)$ and $r = 2, 3$. Also we study all finite groups such that every two subsets M and N of G, containing m and n elements, there exist $x \in M$ and $y \in N$, such that $\langle x\rangle$ is subnormal in $\langle x, y\rangle$, (call this condition $\mathfrak{S}(m, n)$), and we will fine some bounds for m and n such that all finite groups in this class are nilpotent. Also we find a bound for order of G when G is a non-nilpotent finite $\mathfrak{S}(m, n)$-group.

Keywords: Finite group, Fitting subgroup, Kappe group.

AMS Mathematical Subject Classification [2010]: 20B05, 20D15.

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*Speaker

Some Applications of Tridiagonal Matrices in P-Polynomial Table Algebras

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Abstract. Here, we study the characters of two classes of P-polynomial table algebras. To obtain the characters of these table algebras, we use some tridiagonal matrices and linear algebra methods.

Keywords: Character, P-polynomial table algebra, Tridiagonal matrix.

AMS Mathematical Subject Classification [2010]: 05C50, 15A18, 15A23.

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*Speaker

The Skjelbred-Sund Method to Classify Nilpotent Leibniz Algebras

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Abstract. Skjelbred and Sund presented (1977) their method of constructing all nilpotent Lie algebras of dimension n given those algebras of dimension $< n$, and their automorphism group. Leibniz algebras are certain generalization of Lie algebras. The concept of Leibniz algebra was first introduced by J. L. Loday (1993) and the subject has been studied since them. By minor but important adjustments, we apply the Skjelbred-Sund method to classify nilpotent Leibniz algebras in low dimensional cases.

Keywords: Leibniz algebras, Skjelbred-sund method.

AMS Mathematical Subject Classification [2010]: 17A32, 17A36, 17A60.

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*Speaker

Generalized 2-Absorbing Second Submodule

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Abstract. Let R be a commutative ring with identity. A proper submodule N of an R-module M is said to be a *2-absorbing submodule* of M if whenever $abm \in N$ for some $a, b \in R$ and $m \in M$, then $am \in N$ or $bm \in N$ or $ab \in (N :_R M)$. In [1], the authors introduced two dual notion of 2-absorbing submodules (that is, *2-absorbing and strongly 2-absorbing second submodules*) of M and investigated some properties of these classes of modules. In this paper, we will introduce the concepts of generalized 2-absorbing and strongly generalized 2-absorbing second submodules of modules over a commutative ring and obtain some related results.

Keywords: Second, Generalized 2-absorbing second, Strongly generalized 2-absorbing second.

AMS Mathematical Subject Classification [2010]: 13C13, 13C99.

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*Speaker

Group Rings which are Right Gr-Ring

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Abstract. A ring R is called a reversible ring, if $ab = 0$ implies that $ba = 0$, for every $a, b \in R$. Many studies have been conducted on reversible group rings in recent years. The aim of this paper is to generalize some of the previous results about reversible group rings to more general cases. For this purpose, we introduce a generalization of reversible rings as right gr-ring, where a right gr-ring is a ring in which $ab \in I$ implies $ba \in I$, for every right ideal I of R and $a, b \in R$. We will study conditions under which a group ring $R[G]$ becomes a right gr-ring. We show that the group ring $K[Q_8]$ of a group of quaternions Q_8 over field K is a right gr-ring if and only if char(K)=0 and the equation $x^2 + y^2 + 1 = 0$ has no solution in K.

Keywords: Reversible, Group ring, Right duo.

AMS Mathematical Subject Classification [2010]: 16P99, 16S34, 16D25 .

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*Speaker

On the Generalized Telephone Numbers of Some Groups of Nilpotency Class 2

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Abstract. In this paper, we study the generalized telephone numbers modulo m and define the generalized telephone numbers on a finite group. Also, by considering some special groups of nilpotency class 2, we examine the lengths of the period of the generalized telephone numbers.

Keywords: Period, The generalized telephone numbers.

AMS Mathematical Subject Classification [2010]: Primary: 20F05, Secondary:11B39, 20D60.

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*Speaker

Upper Bounds for the Index of the Second Center Subgroup of a Pair of Finite Groups

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Abstract. By a pair of groups, we mean a group G and a normal subgroup N. Let $Z_2(G, N)$ denote the second center subgroup of a pair (G, N) of groups. In this paper, we give an upper bounds for $|N/Z_2(G, N)|$, for any pair (G, N) of finite groups.

Keywords: Schur's theorem, Pair of groups, Upper bound.

AMS Mathematical Subject Classification [2010]: 20F14, 20E22, 20F05.

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*Speaker

Power Graphs Based on the Order of Their Groups

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Abstract. The power graph $P(G)$ of a group G is a graph with vertex set G, where two vertices u and v are adjacent if and only if $u \neq v$ and $u^m = v$ or $v^m = u$ for some positive integer m. The present paper aims to classify power graphs based on group orders, which can be a new look at the power graphs classification. We raise and study the following question: For which natural numbers n every two groups of order n with isomorphic power graphs are isomorphic? We denote the set of all such numbers by $\bar{S}$ and consider the elements of $\bar{S}$. Moreover, we show that if two finite groups have isomorphic power graphs and one of them is nilpotent or has a normal Hall subgroup, the same is true with the other one.

Keywords: Power graph, Conformal groups, Nilpotent group.

AMS Mathematical Subject Classification [2010]: 05C12, 91A43, 05C69.

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*Speaker

Hyperring-Based Graph

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Abstract. In this paper, we study a concept of graph based on hyperideals of a hyperring and investigate some graph property such connectedness, completeness and etc. In particular, we obtain some necessary and sufficient conditions such that mentioned graph is complete.

Keywords: Hyperring, Hyperideals, Intersection graph.

AMS Mathematical Subject Classification [2010]: 20N20.

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*Speaker

Rings over which Every Simple Module is FC-Pure Projective

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Abstract. We study rings over which every simple right module is FC-pure projective. It is shown that a normal right duo ring R is right Artinian ring if and only if R is left perfect and every simple right R-module is FC-pure projective if and only if R is left perfect and $(R/J)_R$ is FC-pure projective. As a consequence, we obtain that a duo ring R is Artinian if and only if R is one-sided perfect and $(R/J)_R$ (resp., $_R(R/J)$) is FC-pure projective if and only if R is one sided perfect and every simple right (resp., left) R-module is FC-pure projective. Finally, it is shown that a duo ring R is quasi-Frobenius if and only if R is one-sided perfect, $E((R/J)_R)$ and $E(_R(R/J))$ are FC-pure projective.

Keywords: FC-Pure projective module, Simple module, Artinian ring, Quasi-Frobenius ring.

AMS Mathematical Subject Classification [2010]: 16D50, 16D40, 16P70.

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*Speaker

Some Results on Divisibility Graph in Some Classes of Finite Groups

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Abstract. A finite group G is called an $F-$group, if for every $x, y \in G \setminus Z(G)$, $C_G(x) \leq C_G(y)$ implies that $C_G(x) = C_G(y)$. The graph $D(G)$ is called the divisibility graph of G if its vertex set is the non-central conjugacy class sizes of G and there is an edge between vertices a and b if and only if $a|b$ or $b|a$. We determine the number of connected components of the divisibility graph $D(G)$ where G is an $F-$group.

Keywords: Divisibility graph, F-group, Conjugacy class.

AMS Mathematical Subject Classification [2010]: 20E45, 05C25.

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*Speaker

$\mathcal{NAC}$-Groups

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Abstract. A finite non-Dedekind group G is called an $\mathcal{NAC}$-group if all non-normal abelian subgroups are cyclic. In this paper, we classify all finite $\mathcal{NAC}$-groups. We show that the center of such groups is cyclic. If G has a non-abelian non-normal Sylow subgroup of odd order, then other Sylow subgroups of G are cyclic or generalized Quaternion.

Keywords: $\mathcal{NAC}$-Group, Abelian non-normal, Non-nilpotent groups.

AMS Mathematical Subject Classification [2010]: 20D99, 20E45.

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*Speaker

Isomorphism Theorems of Hyper K-Algebras

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Abstract. In this paper, we state isomorphism theorems of hyper K-algebras and ask this question, under which condition, does the second isomorphism theorem hold?

Keywords: Hyper K-algebra, Isomorphism theorems, Second isomorphism theorem.

AMS Mathematical Subject Classification [2010]: 19K99, 20N99.

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*Speaker

Essentially Retractable Acts over Monoids

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Abstract. In this paper we introduce a class of right S-acts called essentially retractable S-acts which are right S-acts with homomorphisms into their essential subacts. We also give some classifications of monoids and acts by essentially retractable S-acts.

Keywords: Essential subact, Retractable act, S-act.

AMS Mathematical Subject Classification [2010]: 20M30.

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*Speaker

On the Linearly Equivalent Ideal Topologies over Noetherian Modules

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Abstract. Let R be a commutative Noetherian ring, and let N be a non-zero finitely generated R-module. In this note, the main result asserts that for any N-proper ideal $\mathfrak{a}$ of R, the $\mathfrak{a}$-symbolic topology on N is linearly equivalent to the $\mathfrak{a}$-adic topology on N if and only if, for every $\mathfrak{p} \in \operatorname{Supp}(N)$, $\operatorname{Ass}_{R_{\mathfrak{p}}} N_{\mathfrak{p}}$ consists of a single prime ideal and $\dim N \leq 1$.

Keywords: Adic topology, Symbolic power, Symbolic topology.

AMS Mathematical Subject Classification [2010]: 13B20, 13B21.

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*Speaker

On Prime and Completely Prime Modules

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Abstract. This talk is about some basic facts and new results on prime and completely prime modules over arbitrary rings which have been achieved over the past years. We review some generalizations of prime modules over arbitrary rings and their relations to each other. Several properties of completely prime modules are given. Moreover, some characterizations of completely prime submodules of a module are studied. Finally, some outlines about new researches of the subject under discussion are given.

Keywords: Prime, Completely prime, Symmetric.

AMS Mathematical Subject Classification [2010]: 16D10, 16D40, 16D60.

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*Speaker

Injectivity in the Category $\mathbf{Set_F}$

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ABSTRACT. In this research, we investigate the notion of injectivity in an arbitrary covariety and we show that the injectivity in the category of F-coalgebras, for every functor F, is well-behaved.

Keywords: F-coalgebra, Injectivity.

AMS Mathematical Subject Classification [2010]: 18B20, 46M10.

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*Speaker

Line Graphs with a Sequentially Cohen-Macaulay Clique Complex

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ABSTRACT. Let H be a simple undirected graph and $G = \mathrm{L}(H)$ be its line graph. Assume that $\Delta(G)$ denotes the clique complex of G. We show that $\Delta(G)$ is sequentially Cohen-Macaulay if and only if it is shellable if and only if it is vertex decomposable. Furthermore, we state a complete characterization of those H for which $\Delta(G)$ is sequentially Cohen-Macaulay.

Keywords: Line graph, Stanley-Reisner ideal, Sequentially Cohen-Macaulayness, Edge ideal, Squarefree monomial ideal.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05E45.

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*Speaker

A Note on Poisson Quasi-Nijenhuis Lie Groupoids

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Abstract. In this paper we introduce the notion of Poisson quasi-Nijenhuis Lie groupoids from the invariant point of view. Also their infinitesimal counterparts on the corresponding Lie algebroid AG are defined. The existence of a one-to-one correspondence between $P-qN$ structures on the Lie groupoids and corresponding Lie algebroid are proved.

Keywords: Poisson quasi-Nijenhuis Structure, Lie Groupoid, Lie Algebroid.

AMS Mathematical Subject Classification [2010]: 22A22, 58H05, 20N02.

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*Speaker

LU-Factorization Method for Solving Linear Systems over Max-Plus Algebra

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Abstract. In this paper, we introduce and analyze a new LU-factorization technique for square matrices over "max-plus" algebra. We first determine the conditions under which a square matrix has LU factors. Next, using this technique, we propose a method for solving square linear systems of equations whose system matrices are LU-factorizable. This work is an extension of similar techniques over fields.

Keywords: Semiring, Max-plus algebra, LU-factorization, Linear system of equations.

AMS Mathematical Subject Classification [2010]: 16Y60, 65F05, 15A06.

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*Speaker

Action of Automorphism Group on a Certain Subgroup

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Abstract. Let G be a group and $L(G)$ be the set of all elements of G fixed by all automorphisms of G. In this talk, we find $L(G)$ for all p-groups of maximal class of order less than p^6 and p-groups of maximal class for $p = 2, 3$.

Keywords: Automorphism group, p-Group of maximal class.

AMS Mathematical Subject Classification [2010]: 20D45, 20D15.

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*Speaker

Geometric Reflections and Cayley Graph-Reflections (Type A_1)

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ABSTRACT. In this work, we consider geometric reflections based on elements of a reflectable base of an extended affine root system R, and prove that in type A_1, any geometric reflection of a reflectable base is a Cayley graph-reflection if and only if the nullity of R is less than or equal one. Also we show that any extended affine root system R, is a union of extended affine root systems of type A_1 with the same nullities as the nullity of R.

Keywords: Cayley graph, Extended affine root systems, Geometric reflection, Normalized dart.

AMS Mathematical Subject Classification [2010]: 17B22, 20F55, 94C15.

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*Speaker

On the $t-$Nacci Sequences of Some Finite Groups of Nilpotency Class Two

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Abstract. We consider finite groups H_m and G_{mn} as follows:

$$H_m = \left\langle x, y | x^{m^2} = y^m = 1, y^{-1}xy = x^{1+m} \right\rangle, \ m \geq 2,$$
$$G_{mn} = \langle x, y | x^m = y^n = 1, [x, y]^x = [x, y], [x, y]^y = [x, y] \rangle, \ m, n \geq 2.$$

In this paper, we first study the groups H_m and G_{mn}. Then by using the properties of H_m, G_{mm} and $t-$nacci sequences in finite groups, we show that the period of $t-$nacci sequences in these groups are a multiple of Wall number $K(t, m)$.

Keywords: Finite group, Nilpotent groups, $t-$Nacci sequences, Wall number.

AMS Mathematical Subject Classification [2010]: 05C25, 20F05, 20D60.

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*Speaker

Hyperdiagrams Related To Switching Functions

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ABSTRACT. This paper, considers the notation of T.B.T, introduces a novel concept of hyperdiagramable Boolean switching and Boolean functionable hyperdiagram via T.B.T. This study proves that every T.B.T corresponds to a Minimum Boolean expression via unitors set and obtains a Minimum irreducible Boolean expression from switching functions.

Keywords: Hyperdiagram, Boolean function–based hyperdiagram, Hyperdiagramable Boolean functions, Unitor.

AMS Mathematical Subject Classification [2010]: 20N20.

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*Speaker

Some Properties of Generalized Groups

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Abstract. In this paper, we study some properties of generalized groups and generalized normal subgroups. Moreover, we recall the notion of relativization in resolvability and irresolvability of topological space and obtain an important results about them.

Keywords: Generalized groups, Normal generalized groups, Generalized normal subgroups, Resolvable relative to X.

AMS Mathematical Subject Classification [2010]: 22F05, 54xx.

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*Speaker

When Gelfand Rings are Clean

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Abstract. In this paper, we consider a special class of ideals of a commutative ring called “lifting ideals”and comaximal factorizations of ideals of a ring into this class of ideals. Then by using Pierce stalks we characterize the Gelfand rings whose ideals can be written as a product of comaximal lifting ideals. Finaly, we characterize completely regular topological spaces X such that $C(X)$ is a clean ring.

Keywords: Lifting idempotents, Gelfand rings, Clean rings.

AMS Mathematical Subject Classification [2010]: 13A15.

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*Speaker

Associated Primes of Formal Local Cohomology Modules

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Abstract. Let $\mathfrak{a}$ be an ideal of a commutative Noetherian ring R and M, a finitely generated R-module. In this paper, we proved that if $\mathrm{Supp}\mathfrak{F}^i_{\mathfrak{a}}(M)$ is finite for all $i < t$, then $\mathrm{Ass}(\mathfrak{F}^t_{\mathfrak{a}}(M))$ is finite.

Keywords: Formal local cohomology, Associated prime ideals, Cofinitness, Weakly laskerian modules.

AMS Mathematical Subject Classification [2010]: 13D45, 13E99.

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*Speaker

When is the Factor Rings of $C(X)$ Modulo a Closed Ideal a Classical Ring?

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Abstract. A commutative ring R is *classical* if its every non-unit element is zerodivisor. In this article, it has been shown that the factor rings of $C(X)$ modulo a closed ideal M^A, $A \subseteq X$, is classical if and only if A is an almost P-space completely separated from every disjiont zero-set. Using this, we conclude that $C(X)$ modulo the smallest z-ideal containing a member $f \in C(X)$ is classical if and only if the set of its zeros is almost P-space. We also prove that X is a P-space if and only if for every ideal $I \subseteq C(X)$, the factor ring $C(X)/I$ is classical.

Keywords: Classical ring, Factor ring, Closed ideal, Almost P-space.

AMS Mathematical Subject Classification [2010]: 13A15, 54C40.

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*Speaker

A Study of Cohomological Dimension via Linkage

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Abstract. Let R be a commutative Noetherian ring. Using the new concept of linkage of ideals over a module, we show that if $\mathfrak{a}$ is an ideal of R which is linked by the ideal I, then $\mathrm{cd}\,(\mathfrak{a}, R) \in \{\mathrm{grade}\;\mathfrak{a}, \mathrm{cd}\,(\mathfrak{a}, H_{\mathfrak{c}}^{\mathrm{grade}\;\mathfrak{a}}(R)) + \mathrm{grade}\;\mathfrak{a}\}$, where $\mathfrak{c} := \bigcap_{\mathfrak{p} \in \mathrm{Ass}\,\frac{R}{I} - V(\mathfrak{a})} \mathfrak{p}$. Also, it is shown that for every ideal $\mathfrak{b}$ which is geometrically linked with $\mathfrak{a}$, $\mathrm{cd}\,(\mathfrak{a}, H_{\mathfrak{b}}^{\mathrm{grade}\;\mathfrak{b}}(R))$ does not depend on $\mathfrak{b}$.

Keywords: Linkage of ideals, Local cohomology modules.

AMS Mathematical Subject Classification [2010]: 13C40, 13D45.

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*Speaker

On the Generalization of Mirbagheri-Ratliff's Theorem

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ABSTRACT. Let R be a commutative Noetherian ring, E a non-zero finitely generated R-module and I an ideal of R. The purpose of this paper is to show that the sequence $\mathrm{Ass}_R E/\widetilde{I^n_E}$, $n = 1, 2, \ldots$, of associated prime ideals is increasing and eventually stabilizes. In addition, a characterization concerning the set $\widetilde{A^*}(I, E) := \bigcup_{n\geq 1} \mathrm{Ass}_R E/\widetilde{I^n_E}$ is included.

Keywords: Noetherian module, Ratliff-Rush closure, Rees ring.

AMS Mathematical Subject Classification [2010]: 13A30, 13E05.

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*Speaker

On a Generalization of Schur's Theorem

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Abstract. In this note, we show that if $L/Z(L)$ is finite dimensional, abelian, nilpotent, solvable or supersolvable, then so is $[L, L]$.

Keywords: Non-abelian tensor product, Lie algebra.

AMS Mathematical Subject Classification [2010]: 17B30, 17B99.

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*Speaker

Methods for Constructing Shellable Simplicial Complexes

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Abstract. A clutter $\mathcal{C}$ with vertex set X is an antichain of 2^X such that $X = \cup\mathcal{C}$. For any clutter $\mathcal{C}$, we consider the independence complex of $\mathcal{C}$ whose faces are independent sets in $\mathcal{C}$. In this paper, we introduce some methods to obtain clutters $\mathcal{C}'$ containing a given clutter $\mathcal{C}$ as an induced subclutter such that the independence complex of $\mathcal{C}'$ is shellable. Consequently, for a given squarefree monomial ideal $I \subset S = \mathbb{K}[x_1, \dots, x_n]$, we obtain a squarefree monomial ideal $J \supseteq I$ in an extension ring S' of S such that the ring S'/J is Cohen-Macaulay.

Keywords: Hybrid clutter, Simplicial complex, Shellable clutter, Cohen-Macaulay complex.

AMS Mathematical Subject Classification [2010]: 05E40, 05E45.

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*Speaker

p-Hirano Invertible Matrices over Local Rings

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Abstract. An element a in a ring R has p-Hirano inverse if there exists $b \in R$ such that $bab = b, b \in comm^2(a), (a^2 - ab)^k \in J(R)$ for some $k \in \mathbb{N}$. Some results on p-Hirano inverse elements in rings and Banach algebras are investigated and it is completely determined when a 2×2 matrix over local rings has P-Hirano inverse.

Keywords: Pseudo Drazin inverse, Tripotent, Matrix, Cline's formula, Jacobson's lemma, Banach algebra, Local ring.

AMS Mathematical Subject Classification [2010]: 15A09, 32A65, 16E50.

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*Speaker

The Cyclic and Normal Graphs of the Group $D_{2n} \times C_p$, where p is an Odd Prime

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Abstract. Suppose G is a group. The cyclic graph $\Gamma_C G$ is a simple graph with vertex set G and the edge set $E(\Gamma_C(G)) = \{\{x, y\} \mid \langle x, y\rangle \leq_C G\}$, where $\langle x, y\rangle \leq_C G$ means that $\langle x, y\rangle$ is a cyclic subgroup of G. The normal graph $\Gamma_N G$ is anther graph with the same set of vertices and the edge set $E(\Gamma_N(G)) = \{\{x, y\} \mid \langle x, y\rangle \trianglelefteq G\}$. In this paper, we establish some properties of the cyclic and normal graphs defined on the group $D_{2n} \times C_p$, where p is an odd prime.

Keywords: Cyclic graph, Normal graph, Split graph.

AMS Mathematical Subject Classification [2010]: 50B10, 05C07, 05C50.

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*Speaker

On Parallel Krull Dimension

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Abstract. We introduce and study the concept of parallel Krull dimension of a module (briefly, p.Krull dimension) which is Krull-like dimension extension of the concept of DCC on parallel submodules. Using this concept, we extend some of the basic results for modules with this dimension which are almost similar to the basic properties of modules with Krull dimension. In this article, we show that if an R-module M has finite Goldie dimension, then M has homogeneous parallel Krull dimension if and only if it has Krull dimension and these two dimensions for M coincide.

Keywords: Parallel submodules, P.Krull dimension, Krull dimension.

AMS Mathematical Subject Classification [2010]: 16P60, 16P20, 16P40.

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*Speaker

Simple Associative Algebras and their Corresponding Finitary Special Linear Lie Algebras

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Abstract. Let $\mathbb{F}$ be a field of any characteristic. Given any associative algebra A over $\mathbb{F}$, one can render it into a Lie algebra by defining a new product, the Lie product, for any two elements a and b in A by means of $[a, b] = ab - ba$, where ab is the associative product in A. It is natural to except that the Lie algebra so obtained has a structure which is closely connected with the associative structure of A. In this paper, we study the relation between simple associative algebras and their related finitary Special Linear Lie algebras.

Keywords: Associated algebra, Lie algebra.

AMS Mathematical Subject Classification [2010]: 17B69, 17B99.

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*Speaker

Marginal Automorphisms of Finite p-Groups

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Abstract. Let $\mathcal{V}$ be a variety of groups defined by the set of laws $V \subseteq F$, where F be a free group. The automorphism α of a group G is said to be a marginal automorphism (with respect to V), if $x^{-1}x^{\alpha} \in V^{\star}(G)$ for all $x \in G$. In this paper, we give some results on marginal automorphisms of a given finite $\mathcal{V}$-nilpotent p-group.

Keywords: Automorphism group, Marginal automorphisms, Variety, Marginal subgroup, Finite p-groups.

AMS Mathematical Subject Classification [2010]: 20F28, 20E10, 20D25.

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*Speaker

Projective Dimension over Regular Local Rings

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Abstract. Let $(R, \mathfrak{m}, k)$ be a regular local ring and M be a finitely generated R-module. We prove some homological results using some basic properties of homomorphisms between injective modules. Assume that $n \geq 1$ is an integer such that $\mathrm{Tor}_n^R(M, k) \simeq k$. It is shown that $\mathrm{pd}_R\, M = n$.

Keywords: Complete local ring, Flat resolution, Free resolution, Noetherian ring, Injective resolution, Regular ring.

AMS Mathematical Subject Classification [2010]: 13E05, 13D05.

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*Speaker

The Quasi-Frobenius Elements of Simplicial Affine Semigroups

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Abstract. The quasi-Frobenius elements of simplicial affine semigroups are introduced as a generalization of pseudo-Frobenius numbers of numerical semigroups.

Keywords: Simplicial affine semigroup, Pseudo-Frobenius element, Apéry set.

AMS Mathematical Subject Classification [2010]: 20M14, 13D02.

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*Speaker

On n-Centralizer CA-Groups

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ABSTRACT. Let G be a finite non-abelian group and $m = \frac{|G|}{|Z(G)|}$. In this paper, we prove that if G is a finite non-abelian m-centralizer CA-group, then there exists an integer $r > 1$ such that $m = 2^r$. It is also prove that if $|G'| = 2$, then G is an m-centralizer group.

Keywords: m-Centralizer group, CA-Group.

AMS Mathematical Subject Classification [2010]: 20C15, 20D15.

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*Speaker

Contributed Talks

Analysis

Generalized Hermite-Hadamard Inequality for Geometrically $P-$Convex Functions on Co-ordinates

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Abstract. In this paper the concept of geometrically $P-$convex functions on co-ordinates is introduced. Hermite-Hadamard type integral inequality for functions defined on rectangles in the plane is investigated.

Keywords: Hermite-Hadamard inequality, Geometrically $P-$convex function, Power mean inequality.

AMS Mathematical Subject Classification [2010]: 26D15, 26A51.

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*Speaker

On the GG-Orthogonality in Normed Linear Spaces

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Abstract. The main aim of this paper is to study the relation between the gg-orthogonality and semi-inner product orthogonality in the real normed linear spaces. We also define the concept of gg-quasi inner product space and some results relative to this new notion are investigated.

Keywords: Inner product space, Semi-inner product space, Quasi-inner product space, gg-Orthogonality.

AMS Mathematical Subject Classification [2010]: 46B20, 47B99, 46C50, 46C99.

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*Speaker

Quasi-Uniform and Quasi-Strong Operator Topologies on QM(A)

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Abstract. In this paper we extend the notion of quasi-multipliers to the general topological algebra setting, not necessarily normed or locally convex. We discuss the quasi-uniform and quasi-strong operator topologies on the algebra $QM(A)$ of all bilinear and jointly continuous quasi-multipliers on topological algebra A and study their various properties.

Keywords: Quasi-multiplier, Multiplier, Topological algebra, Ultra-approximate identity, Strict topology.

AMS Mathematical Subject Classification [2010]: 46H05, 46A16, 47D30.

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*Speaker

A Note on the p-Operator Space Structure of the p-Analog of the Fourier-Stieltjes Algebra

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Abstract. In this paper one of the possible p-operator space structures of the p-analog of the Fourier-Stieltjes algebra will be introduced, and to some extend will be studied. This special sort of operator structure will be given from the predual of this Fourier type algebra, that is the algebra of universal p-pseudofunctions. Furthermore, some applicable and expected results will be proven.
Current paper can be considered as a new gate into the collection of problems around the p-analog of the Fourier-Stieltjes algebra, in the p-operator space structure point of view.

Keywords: p-Operator spaces, p-Analog of the Fourier-Stieltjes algebras, QSL_p-Spaces, Universal representation.

AMS Mathematical Subject Classification [2010]: 46L07, 43A30, 43A15.

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*Speaker

Some Results About Generalized Inverse for Modular Operators Based on its Components

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Abstract. In this paper, we investigate the generalized inverse of a modular operator, where it is considered as the sum or product of several other operators. Let T be a modular operator that is the sum or product of several other operators. We express its generalized inverse in terms of its components.

Keywords: Hilbert C^*-module, Generalized inverse, Moore-Penrose inverse.

AMS Mathematical Subject Classification [2010]: 47A05, 46L08, 15A09.

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*Speaker

A Characterization of Frame-Less Hilbert C^*-Modules

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Abstract. In this paper, we present the results on the frame existence problem in Hilbert C*-modules. We would also propose a conjecture on this problem based on the frame transform.

Keywords: Hilbert C^*-modules, C^*-algebras, Frames in Hilbert C^*-modules.

AMS Mathematical Subject Classification [2010]: Primary: 46L08; Secondary: 42C15, 46L05.

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*Speaker

On Hypercyclicity and Local Spectrum

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Abstract. Let X be a complex Banach space, and $L(X)$ be the space of bounded operators on X. Given $T \in L(X)$ and $x \in X$ denote by $\sigma_T(x)$ the local Spectrum of T at x. And the operator T is called hypercyclic, if $\overline{orb(T,x)} = X$. In this paper, we will introduce a relationship between the local spectrum and hypercyclicity.

Keywords: Spectrum, Local spectrum, Hypercyclicity.

AMS Mathematical Subject Classification [2010]: 47A10, 47A16.

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*Speaker

Integral Jensen Type Inequality for Preinvex Functions

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Abstract. In this paper some new properties of preinvex functions defined on invex subsets of real line are investigated. Then a version of integral Jensen type inequality for preinvex functions is introduced.

Keywords: Jensen's type inequality, Invex sets, Preinvex functions.

AMS Mathematical Subject Classification [2010]: 26D15, 26A51.

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*Speaker

Injectivity of a Certain Banach Right Module

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Abstract. Let $\mathcal{A}$ be a Banach algebra and let $\mathcal{M}$ be a unital Banach algebra. Let also $\mathcal{I}$ be a closed ideal of $\mathcal{A}$. For a homomorphism Φ from $\mathcal{A}$ into $\mathcal{M}$, we investigate the relation between the injectivity of $\mathcal{M}$ as a Banach right $\mathcal{A}$-module and Banach right $\mathcal{I}$-module.

Keywords: Banach algebra, Banach module, Homological property, Retraction.

AMS Mathematical Subject Classification [2010]: 43A07, 46H05, 46L10.

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*Speaker

The Stability of the Cauchy Functional Equation in Quasilinear Spaces

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Abstract. In this paper, we introduce quasilinear spaces and then by using fixed point Theorem prove the stability of the Cauchy functional equation in quasilinear spaces.

Keywords: Cauchy functional equation, Fixed point, Quasilinear space.

AMS Mathematical Subject Classification [2010]: 39A10, 39B72, 47H10.

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*Speaker

Existence of Solution to a Class of Nonlinear Elliptic Equation via Minimization on the Nehari Manifold

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Abstract. In this paper, we prove the existence of a non trivial solution for a nonlinear equation via minimization on the Nehari manifold.

Keywords: Existence, Nehari manifold, Minimization.

AMS Mathematical Subject Classification [2010]: 35J25.

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*Speaker

Coincident and Common Fixed Point of Mappings on Uniform Spaces Generated by a Family of b-Pseudometrics

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Abstract. In this paper, we give some coincidence and common fixed point results for two self mappings defined on a uniform space generated by a family of b-pseudometrics which is sequentially complete. Our result generalizes the related results proved by Acharya.

Keywords: Uniform space, b-Pseudometric, Coincident point, Fixed point.

AMS Mathematical Subject Classification [2010]: 47H10, 54H25.

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*Speaker

p-Woven g-Frames and p-Woven Fusion Frame in Tensor Product of Hilbert Spaces

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Abstract. In this article we develop a theory for p-woven frames in tensor product of Hilbert spaces.We introduce the p-woven fusion frames and we show that the equivalence of tensor product frames and bases with p-woven fusion frames.

Keywords: Frame, Woven frame, Fusion frame, Orthonormal bases.

AMS Mathematical Subject Classification [2010]: 41A58, 42C15, 42C40.

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*Speaker

G-Frames and Special Modular Operators

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Abstract. In this paper, a brief overview of some properties of g-frames on Hilbert C^*-modules are investigated. Also, we present that the g-frames was preserved with the Moore-Penrose operators on Hilbert C^*-modules.

Keywords: Hilbert C^*-module, Frame, G-Frame.

AMS Mathematical Subject Classification [2010]: 42C15, 47B38, 35S05.

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*Speaker

Module Lie Derivation of Triangular Banach Algebra to its Dual

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Abstract. In this paper, we introduce the concept of module Lie derivation on triangular Banach algebras $\mathcal{T} = \left[\begin{smallmatrix} A & M \\ & B \end{smallmatrix}\right]$ to its Dual. We examine the relationship between module Lie derivations $L_A : \mathcal{A} \to \mathcal{A}^*$ and $L_B : \mathcal{B} \to \mathcal{B}^*$ with module Lie derivation $L : \mathcal{T} \to \mathcal{T}^*$.

Keywords: Triangular Banach algebras, Lie module derivations.

AMS Mathematical Subject Classification [2010]: 46H20, 16E40.

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*Speaker

Surjective Linear Isometries on Little Zygmund Spaces

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Abstract. In this paper we characterize the general form of the surjective linear isometries on little Zygmund spaces.

Keywords: Linear isometry, Zygmund space.

AMS Mathematical Subject Classification [2010]: 46B04, 46E15.

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*Speaker

Some Preorder on Operators in Semi-Hilbertian Spaces

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ABSTRACT. Let A be a positive operator in $\mathcal{B}(\mathcal{H})$. Then for $x, y \in \mathcal{H}$, the semi-inner product $\langle x, y\rangle_A = \langle Ax, y\rangle$, and the seminorm $\|x\|_A = \|A^{\frac{1}{2}}x\|$ are defined on complex Hilbert space $(\mathcal{H}, \langle\cdot,\cdot\rangle)$. The aim of this work is to investigate a preorder on semi-Hilbertian space operators, it is called A-majorizarion. In some sense, the A-majorizarion is equivalent to Barnes's majorization. Some equivalent Theorems are obtained. The relations between A-majorization, range inclusion and A-numerical radius are studied.

Keywords: Majorization, Semi-Hilbertian space, Semi-inner product.

AMS Mathematical Subject Classification [2010]: 47A05, 46C05, 47B65.

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*Speaker

Boundednes of Generalized Weighted Composition Operators between Zygmund Type Spaces

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Abstract. In this paper some estimates for the boundedness of generalized weighted composition operators between Zygmund type spaces are presented.

Keywords: Generalized weighted composition operator, Weighted composition operator, Zygmund type space, Bloch type space.

AMS Mathematical Subject Classification [2010]: Primary: 47B38; Secondary: 47B33, 46E15.

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*Speaker

Weak Solutions for a System of Non-Homogeneous Problem

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Abstract. Using the variational method, the existence of weak solutions is proved.

Keywords: Infinitely many solutions, Variational method, Nonhomogeneous operator.

AMS Mathematical Subject Classification [2010]: 35J60, 35J50, 34B10.

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*Speaker

C-Norm Inequalities for Special Operator Matrices

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Abstract. C-norm of 2×2 operator matrices, in the form of $\begin{bmatrix} 0 & A \\ 0 & 0 \end{bmatrix}$ and $\begin{bmatrix} A & 0 \\ 0 & B \end{bmatrix}$ are studied and examples indicate equalities not hold.

Keywords: C-Norm, Inequality, Operator matrices.

AMS Mathematical Subject Classification [2010]: 15A18, 47A30, 15A60.

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*Speaker

n-Tuple Fixed Point Theorems via α-Series on Partially Ordered Cone Metric Spaces

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Abstract. In this research, we proving the results of n-tuple fixed point in partially ordered cone metric spaces. We will impose some conditions upon a self-mapping and a sequence of mappings via α-series. This series are wider than the convergent series. Also, at the end of this paper, an example is provided to illustrate the results.

Keywords: α-Series, Coupled fixed point, Coupled coincidence point, Cone metric space, Compatible, Reciprocally continuous.

AMS Mathematical Subject Classification [2010]: 47H10, 54H25.

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*Speaker

Some Inequalities for the Numerical Radius

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Abstract. In this paper, we prove numerical radius inequalities for products of Hilbert space operators. Our results can be looked at as refined and generalized earlier well-known results.

Keywords: Numerical radius, Operator norm, Inequality, Refine.

AMS Mathematical Subject Classification [2010]: Primary 47A63, Secondary 47A99.

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*Speaker

Mean Ergodicity of Multiplication Operators on Besov Spaces

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Abstract. In this paper, the power boundedness and mean ergodicity of multiplication operators are investigated on the Besov Space $\mathcal{B}_p$. Let $\mathbb{U}$ be the unit disk in the complex plane $\mathbb{C}$ and ψ be a function in the space of holomorphic functions $H(\mathbb{U})$, our goal is to find out when the multiplication operator M_ψ is power bounded, mean ergodic and uniformly mean ergodic on $\mathcal{B}_p$.

Keywords: Multiplication operator, Power bounded, Mean Ergodic operator, Besov spaces.

AMS Mathematical Subject Classification [2010]: 47B38, 46E15, 47A35.

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*Speaker

First Hachschild Cohomology Group of Triangular Banach Algebras on Induced Semigroup Algebras

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Abstract. Let S be a discrete semigroup with a left multiplier operator T on S. A new product on S defined by T related to S and T creates a new induced semigroup S_T. Suppose that T is bijective and

$$\mathcal{T}_1 = \begin{bmatrix} \ell^1(S) & \ell^1(S) \\ & \ell^1(S) \end{bmatrix} \quad \text{and} \quad \mathcal{T}_2 = \begin{bmatrix} \ell^1(S_T) & \ell^1(S_T) \\ & \ell^1(S_T) \end{bmatrix}.$$

In this paper, we show that the first cohomology groups $\mathcal{H}^1(\mathcal{T}_1, \mathcal{T}_1^*)$ and $\mathcal{H}^1(\mathcal{T}_2, \mathcal{T}_2^*)$ are equal. Therefore $\mathcal{T}_1$ is weakly amenable if and only if $\mathcal{T}_2$ is weakly amenable.

Keywords: Inducted semigroup, Triangular Banach algebra, Cohomology group, Weak ameanability.

AMS Mathematical Subject Classification [2010]: 46H25, 16E40.

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*Speaker

Schweitzer Integral Inequality for Fuzzy Integrals

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Abstract. Fuzzy integrals are well known aggregation operators. They can be used integrant variety of decision making applications. In this paper, we want to extend the Schweitzer integral inequality for fuzzy case. More precisely, we show that:

$$i)\ \int_{[0,a]}^{\oplus} f dx \oplus \int_{[0,b]}^{\oplus} f^{-1} dx \leq a+b,$$

$$ii)\ 0<m\leq f\leq M \Rightarrow ⨍_{a}^{b} f d\mu ⨍ \frac{1}{f} d\mu \leq \frac{(M+n)^2}{4Mm}(b-a)^2,$$

$$\int_{[a,b]}^{\oplus} f dx \odot \int_{[a,b]}^{\oplus} \frac{1}{f} dx \leq \frac{(M+m)^2}{4Mm}(b-a)^2.$$

Keywords: Fuzzy integral, Fuzzy measure, Fuzzy integral inequality, Pseudo integral, Pseudo integral inequality.

AMS Mathematical Subject Classification [2010]: 03E72, 26E50, 28E10.

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*Speaker

A Perturbation of n-Jordan Derivations on Banach Algebras

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Abstract. The first aim of this paper is to present a nontrivial example of n-Jordan derivations introduced by I. N. Herstein. The second aim is to investigate almost n-Jordan derivations on Banach algebras.

Keywords: Jordan derivation, Almost n-Jordan derivation, Banach algebra.

AMS Mathematical Subject Classification [2010]: 47B47, 47B48.

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*Speaker

Function Weighted Quasi-Metric Spaces and Some Fixed Point Results

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Abstract. In this paper, we prove some new fixed point results for both single-valued and multi-valued mappings in function weighted quasi-metric space, which is a generalization of function weighted metric space introduced by Karapinar, et al. [1]. We also present some examples for the validity of our results and present an application to the existence of a solution of the Volterra-type integral equation.

Keywords: Function weighted quasi-metric space, Common fixed point, Common coupled fixed point, Volterra integral equation.

AMS Mathematical Subject Classification [2010]: 54E50, 54A20, 47H10.

References

1. E. Karapinar, A. Pitea and W. Shatanawi, *Function weighted quasi-metric spaces and fixed point results*, IEEE Access **7** (2019) 89026 - 89032. DOI: 10.1109/ACCESS.2019.2926798

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*Speaker

An Equilibrium Problem in the Absence of Usual Convexity Conditions

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Abstract. In this paper, we investigate an equilibrium problem in topological spaces in the absence of usual convexity condition. Moreover, a minimax inequality is concluded in topological spaces. Here, the results are presented in uniform mapconvex spaces.

Keywords: Uniform mapconvex space, KKM, Equilibrium.

AMS Mathematical Subject Classification [2010]: 54C60, 49J53.

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*Speaker

Adjoint of Certain Weighted Composition Operators on Hilbert Spaces of Analytic Functions

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Abstract. Let ψ be an analytic functions on the unit disk $\mathbb{D}$, and φ be a holomorphic self-map of $\mathbb{D}$, the weighted composition operator with symbols φ and ψ is defined by $C_{\psi,\varphi}f = \psi f \circ \varphi$. In this article we characterize the adjoint of certain weighted composition operators on some Hilbert spaces of analytic functions.

Keywords: Dirichlet space, Weighed composition operator, Adjoint, Bergman space.

AMS Mathematical Subject Classification [2010]: 47B33, 47B38.

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*Speaker

Reverse Order Law for Moore-Penrose Inverses of Operators with Acting Involution

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Abstract. We study some relations on operators in Hilbert C^*-module setting. New condition are represented which allows to obtain many results for Moore-Penrose operators. Also, we show star can play the role of the Moore-Penrose inverse in the reverse order law.

Keywords: Closed range, Moore-Penrose inverse, Star partial ordering, Hilbert C^*-module.

AMS Mathematical Subject Classification [2010]: 47A62, 15A24, 46L08.

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*Speaker

Subspace-Mixing Operators and Subspace-Hypercyclicity Criterion

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Abstract. In this paper, we investigate subspace-mixing operators. We prove that if an operator is invariant under a subspace and it satisfies the conditions of subspace-hypercyclicity criterion with respect to a syndetic sequence, then it is subspace-mixing.

Keywords: Subspace-mixing operators, Subspace-hypercyclicity criterion, Mixing operators.

AMS Mathematical Subject Classification [2010]: 47A16, 47B37, 37B99.

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*Speaker

The Strong Convergence of New Proximal Point Algorithm and its Application

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ABSTRACT. Let T be a maximal monotone operator in a real Hilbert space H. By considering a new proximal point algorithm in this paper, we give a necessary and sufficient condition for the zero set of T to be nonempty, and we show that in this case, this algorithm converges strongly to the metric projection of u onto $T^{-1}(0)$. These results extend previous results by Boikanyo and Morosanu [1] and by Xu [2].

Keywords: Maximal monotone operator, Proximal point algorithm,Resolvent operator, Metric projection.

AMS Mathematical Subject Classification [2010]: 47J25, 47H05, 47H09.

References

1. O. A. Boikanyo and G. Morosanu, *A proximal point algorithm converging strongly for general errors*, Optim. Lett. **4** (2010) 635–641.
2. H. K. Xu, *A regularization method for the proximal point algorithm*, J. Global Optim. **36** (2006) 115–125.

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*Speaker

σ-Derivations of Operator Algebras and an Application

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Abstract. Let σ be a bijective bounded linear operator on a Banach algebra $\mathcal{A}$. In this talk, we closely examine the concept of σ-one parameter groups of bounded linear operators as a generalization of one parameter groups and analyze their basic properties. We also, describe a σ-C^*-dynamical system as a uniformly continuous σ-one parameter group of $*$-linear automorphisms on a C^*-algebra and associate with each so-called σ-C^*-dynamical system a σ-derivation, named as its infinitesimal generator. Finally, as an application, we characterize each σ-C^*-dynamical system on the concrete C^*-algebra $\mathcal{A} := \mathbf{B}(H)$, where H is a Hilbert space.

Keywords: C^*-Dynamical systems, (inner) σ-Derivation, One parameter group of operators, Operator algebra.

AMS Mathematical Subject Classification [2010]: 47D03, 46L55, 46L57.

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*Speaker

Self Testing Correcting Programs and Ulam Stability

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Abstract. In this paper, we investigate the subject of self-testing/correcting programs and its relation to the issue of Ulam's stability. Assume that the mission of program P is to compute the value of F. We want to make sure that P works properly. A self-testing/correcting pair allows us to: (1) approximate the probability that $P(x) \neq f(x)$ when x is randomly selected; (2) on all input x, calculate $f(x)$ correctly as long as P is not too faulty on average.

Keywords: Hyers-Ulam stability, Functional equation, Self-testing/correcting program.

AMS Mathematical Subject Classification [2010]: 39B82, 39B05, 65D15.

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*Speaker

Parseval Controlled g-Frames in Hilbert Spaces

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Abstract. We use two appropriate bounded invertible operators to define a controlled g-frame with optimal g-frame bounds. We characterize those operators that produces Parseval controlled g-frames. Also we state a way to construct nearly Parseval controlled g-frames.

Keywords: g-Frames, Parseval g-Frames, Controlled g-frames.

AMS Mathematical Subject Classification [2010]: 94A12, 42C15, 46C05.

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*Speaker

A Survey on Ternary Derivations

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Abstract. We survey some interesting topics on ternary derivations on Jordan triples which were in concern during the last decade.

Keywords: Jordan triple, n-Weak-Amenability, Local ternary derivation, Ternary derivation at a point.

AMS Mathematical Subject Classification [2010]: 17A36, 17C65, 46L57.

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*Speaker

A Note on Local Spectral Subspace Preservers of Jordan Product

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Abstract. Let $B(X)$ be the algebra of all bounded linear operators on Banach space X. For $T \in B(X)$ and $\lambda \in \mathbb{C}$, let $X_T(\{\lambda\})$ denotes the local spectral subspace of T associated with $\{\lambda\}$. We determine the forms of map (not necessarily linear) $\phi : B(X) \to B(X)$ that preserve the local spectral subspace of Jordan product of operators associated with a singleton. Also, we obtain some interesting results in direction.

Keywords: Jordan product, Local spectral subspace, Nonlinear preservers, Single-valued extension property.

AMS Mathematical Subject Classification [2010]: 47A11, 47A15, 47B48.

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*Speaker

Some New Fixed Point Theorems in Midconvex Subgroups of a Banach Group

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Abstract. In this paper, we introduce and prove some new fixed point theorems in normed and Banach groups. We present fixed points in midconvex and closed subsets of a Banach group.

Keywords: Banach group, Fixed point, Normed group, Midconvex subset.

AMS Mathematical Subject Classification [2010]: 47H10, 22A10.

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*Speaker

Construction of Controlled K-g-Fusion Frames in Hilbert Spaces

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Abstract. Considering the importance and application of dual of frames, especially fusion frames, which cannot be defined in the usual way, we try to investigate the concept of dual for controlled generalized K-fusion frames.

Keywords: K-g-fusion frame, Controlled g-fusion frame, Controlled K-g-fusion frame, Q-duality.

AMS Mathematical Subject Classification [2010]: 42C15, 94A12, 46C05.

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*Speaker

Estimating Coefficients for Certain Subclass of Meromorphic Bi-Univalent Functions

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Abstract. In this paper, we introduce and investigate an interesting subclass of meromorphic bi- univalent functions defined on

$$\Delta = \{z \in \mathbb{C} : \quad 1 < |z| < \infty\}.$$

For functions belonging to this class, estimates on the initial coefficients are obtained.

Keywords: Meromorphic functions, Meromorphic bi-univalent functions, Coefficient estimates, Vertical strip.

AMS Mathematical Subject Classification [2010]: 30C45.

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*Speaker

Controlled g-Dual Frames in Hilbert Spaces

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Abstract. In this paper, controlled g-dual of a frame in a separable Hilbert space $\mathcal{H}$ are introduced and characterized. We actually extend the concept of g-dual from frame to controlled frame and show some of their properties.

Keywords: Frames, Controlled frames, g-Dual frame.

AMS Mathematical Subject Classification [2010]: 42C15, 42C99.

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*Speaker

Construction of a Module Operator Virtual Diagonal on the Fourier Algebra of an Amenable Inverse Semigroup

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Abstract. For an amenable inverse semigroup S with the set of idempotents E and a minimal idempotent, we construct a module operator virtual diagonal on the Fourier algebra $A(S)$, as an operator module over $\ell^1(E)$. This generalizes a well known result of Ruan on operator amenability of the Fourier algebra of a (discrete) group.

Keywords: Completely contractive Banach algebras, Module operator amenability, Module operator virtual diagonal, Inverse semigroup, Fourier algebra.

AMS Mathematical Subject Classification [2010]: Primary: 46L07; Secondary: 46H25, 43A07.

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*Speaker

Trapezoid and Mid-point Type Inequalities in $\mathbb{R}^2$ and $\mathbb{R}^3$

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Abstract. Some trapezoid and mid-point type inequalities related to the Hermite-Hadamard's inequality on a closed disk $D(\mathcal{C}, R) \subseteq \mathbb{R}^2$ and on a closed ball $\mathcal{B}(\mathcal{C}, R) \subseteq \mathbb{R}^3$ are investigated. The polar and spherical coordinates are used to obtain some sharp inequalities.

Keywords: Trapezoid and mid-point inequality, Polar coordinates, Spherical coordinates.

AMS Mathematical Subject Classification [2010]: 26D15, 26A51, 26D07.

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*Speaker

On Nonsmooth Optimality Conditions and Duality in Robust Multiobjective Optimization

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Abstract. In this paper, we introduce a new concept of generalized convexity, and establish necessary/sufficient optimality conditions for (weakly) robust efficient solutions of the considered problem. These optimality conditions are presented in terms of limiting subdifferentials of the related functions. In addition, we address Mond-Weir-type robust dual problem to the primal one, and explore weak/strong duality relations between them under assumptions of pseudo convexity.

Keywords: Robust nonsmooth multiobjective optimization, Optimality conditions, Duality, Limiting subdifferential.

AMS Mathematical Subject Classification [2010]: 65K10, 90C29, 90C46.

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*Speaker

On Cyclic Strongly Quasi-Contraction Maps

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ABSTRACT. Let A and B be nonempty subsets of a metric space (X, d) and self mapping $T : A \cup B \to A \cup B$ be a cyclic map. In 2013 Amini-Harandi ['Best proximity point theorems for cyclic strongly quasi-contraction mappings', J. Global Optim. 56 (2013), 1667-1674] introduced the notion of maps called cyclic strongly quasi-contraction, with adding the condition

$$d(T^2x, T^2y) \le c\, d(x, y) + (1 - c)d(A, B),$$
$$\text{for all } x \in A \text{ and } y \in B \text{ where } c \in [0, 1), \tag{1}$$

to cyclic quasi-contraction maps and proved an existence result of best proximity point theorem. The author also posed the question that does this theorem remains true for cyclic quasi-contraction maps. In 2017, Dung and Hang gave negative answer to question of Amini-Harandi and decided to prove his theorem. But they had mistakes in proving theorem. In this paper, first we show that the condition (1) is so strong that theorem of Amini-Harandi (and so modified version of it) is correct by using it alone.

Keywords: Best proximity point, Fixed point, Cyclic and noncyclic contraction maps, Uniformly convex Banach space.

AMS Mathematical Subject Classification [2010]: 47H10, 54E05, 54H25.

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*Speaker

Tensor Products and BSE-Algebras

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Abstract. In this paper, we investigate the BSE property of tensor product $A\widehat{\otimes}_\alpha B$ of commutative Banach algebras $\mathcal{A}$ and $\mathcal{B}$. We show that if $A\widehat{\otimes}_\alpha B$ is a BSE-algebra, then $\mathcal{A}$ and $\mathcal{B}$ are BSE-algebras. In the special case, we investigate Banach algebras of vector-valued continuous functions on a compact Hausdorff space X, and also vector-valued polynomial Lipschitz algebras on a compact plane set X.

Keywords: BSE-algebra, Tensor product, Commutative Banach algebra, Lipschitz algebra.

AMS Mathematical Subject Classification [2010]: 46B28, 46J15, 46J10.

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*Speaker

On Increasing Plus-Concave-Along-Rays Functions

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Abstract. The theory of increasing and convex along rays (ICAR) functions, defined on a convex cone in a locally convex topological vector space X, is well developed. In this paper, we examine properties of increasing plus-concave-along-rays (IPCEAR) functions defined on a normed linear space X. We also study superdifferential set of these functions as a results of abstract concavity.

Keywords: Increasing plus-concave-along-rays function, Abstract concavity, Superdifferential.

AMS Mathematical Subject Classification [2010]: 26A48, 26B25, 46N10.

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*Speaker

On Approximate Notions of Banach Homological Algebras

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Abstract. In this paper, we study the notions of approximate biprojectivity, approximate biflatness and approximate Connes biprojectvity of some Banach algebras. We show that the Segal algebra $S(G)$ is approximately biprojective (approximate biflat) if and only if G is compact(amenable), respectively. Also we give a class of matrix algebras which is neither approximate biprojective nor is approximate biflat. We show that the measure algebra over a locally compact group G is approximately biprojective if and only if G is amenable.

Keywords: Approximate biprojectivity, Approximate biflatness, Approximate Connes biprojective, Banach algebras.

AMS Mathematical Subject Classification [2010]: 46M10, 43H05.

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*Speaker

On the Graph of Unbounded Regular Operators on Hilbert C*-Modules

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Abstract. Let E be a Hilbert C*-modules over an arbitrary C*-algebra A and let t be an unbounded regular operator on E with the domain $Dom(t)$. Then the graph of $HtG + T$ is orthogonally complemented where $T \in \mathcal{L}(E)$ and $G, H \in \mathcal{L}(E)$ are two invertible operators. If A is the C*-algebra of compact operators, a similar result is investigated for a densely defined closed operator t.

Keywords: Hilbert C*-module, Unbounded regular operators, Projections, Graph of operators.

AMS Mathematical Subject Classification [2010]: 46L08, 47A05, 46C05.

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*Speaker

A New Subclass of Univalent Functions Associated with the Limaçon Domain

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ABSTRACT. Let $\mathcal{A}$ denote the family of analytic and normalized functions $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$ in the unit disk $\mathbb{D} := \{z \colon |z| < 1\}$, such that $f(z) = u + iv$ lies in a domain bounded by a Limaçon

$$\left[(u-1)^2 + v^2 - s^2t^2\right]^2 = (t-s)^2 \left[(u-1-st)^2 + v^2\right],$$

where $-1 \le s < t \le 1$ and $0 < 2|st| \le t - s$. In this work, we introduce a family of analytic univalent functions in the open unit disc $\mathbb{D}$. For functions belonging to this class, we derive several properties such as bounded for real part and the order of starlikeness and convexity.

Keywords: Univalent functions, Subordination, Starlike and convex functions, Domain bounded by Limaçon.

AMS Mathematical Subject Classification [2010]: 30C45, 30C80.

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*Speaker

Projectivity of Some Banach Spaces Related to Locally Compact Groups

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ABSTRACT. For a locally compact group G we investigate some geometric properties of Banach spaces $L_0^\infty(G)$ and $L_0^\infty(G)^*$.

Keywords: Projective Banach space, Phillips property, Locally compact group.

AMS Mathematical Subject Classification [2010]: 22B20, 22D05, 22D15.

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*Speaker

Operator Characterizations of von Neumann-Schatten p-Bessel Sequences

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Abstract. Let X be a separable Banach space. If X is reflexive, we give characterizations of von Neumann-Schatten p-frames and von Neumann-Schatten p-Riesz bases in terms of operators. Using operator theory tools, we prove that the set of all von Neumann-Schatten p-Bessel sequences for X, is a Banach space. Finally, we give a necessary and sufficient condition for Banach spaces to have a von Neumann-Schatten p-frame or a von Neumann -Schatten p-Riesz basis.

Keywords: Von Neumann-Schatten operator, Bessel sequence, Norm space, Frame.

AMS Mathematical Subject Classification [2010]: 46C50, 42C99.

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*Speaker

φ-Connes Module Amenability of Dual Banach Algebras and φ-Splitting

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Abstract. In this talk, we define φ-Connes module amenability of a dual Banach algebra $\mathcal{A}$, where φ is a ω^*-continuous bounded module homomorphism from $\mathcal{A}$ onto itself. We obtain the relation between φ-Connes module amenability of $\mathcal{A}$ and φ-splitting of the certain short exact sequence. We show that if S is a weakly cancellative inverse semigroup with subsemigroup E_S of idempotents and $l^1(S)$ as a Banach module over $l^1(E_S)$ is χ-Connes module amenable, then the short exact sequence is χ-splitting that χ is a ω^*-continuous bounded module homomorphism from $l^1(S)$ onto itself.

Keywords: Dual Banach algebra, Connes module amenability, Short exact sequence, Semigroup algebra, φ-Splitting.

AMS Mathematical Subject Classification [2010]: 22D15, 43A10.

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*Speaker

Locally Solid Vector Lattices with the AM-Property

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Abstract. Suppose X is a locally solid vector lattice. We say that X possesses the AM-property provided that for every bounded set $B \subseteq X$, the set of all finite suprema of elements of B, denoted by $B^{\vee}$, is also bounded. This notion extends some properties regarding AM-spaces in Banach lattices to the category of all locally solid vector lattices. With the aid of this concept, we investigate some topological and ordered structures for the spaces of all bounded order bounded operators between locally solid vector lattices.

Keywords: Locally solid vector lattice, bounded operator, AM-property, Levi property, Lebesgue property.

AMS Mathematical Subject Classification [2010]: 46A40, 47B65, 46A32.

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*Speaker

Contributed Talks

Code and Cryptography

List Decoding of Unit Codes

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Abstract. In this paper, we propose a list decoding algorithm for the family of unit codes introduced by C. Maire and F. Oggier. Unit codes are constructed based on number fields and these codes are generalized version of number field codes for which a list decoding algorithm has already been proposed. We employ the list decoding algorithm of the number field codes presented by J. F. Biasse and G. Quintin.

Keywords: List decoding, Number field codes, Unit codes.

AMS Mathematical Subject Classification [2010]: 11T71, 68P30, 94A24.

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*Speaker

A New Approach for Decoding of Cyclic Codes over $F_2 + uF_2$

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Abstract. Udaya and Bonnecaze (1999) presented a decoding algorithm for cyclic codes of odd length over the ring $F_2 + uF_2$. In this study, a simpler approach for decoding cyclic codes with odd length over this ring is proposed.

Keywords: Decoding, Cyclic codes, Torsion codes, Lee distance.

AMS Mathematical Subject Classification [2010]: 94B15.

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*Speaker

Some Subgroup Perfect Codes in Cayley Graphs

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Abstract. A perfect code in a graph Γ with vertex set $V(\Gamma)$ is a subset $\mathcal{C}$ of $V(\Gamma)$ such that every vertex of Γ is at a distance no more than one, to exactly one vertex of $\mathcal{C}$. In other words, every vertex in $V(\Gamma)\backslash\mathcal{C}$ is adjacent to exactly one vertex in $\mathcal{C}$, and no two vertices in $\mathcal{C}$ are adjacent. An inverse-closed subset $\mathcal{S}$ of a given group G is called a Cayley transversal of a subgroup H in G if $\mathcal{S}$ contains exactly one element of each left (right) coset of H. A subgroup H of G is a subgroup perfect code of G, if there exists a Cayley transversal $\mathcal{S}$ of H in G containing the identity element, such that H is a perfect code in Cayley graph $Cay(G,\ \mathcal{S})$. In this paper, we obtain some interesting results for several subgroups of groups such as self normalizing subgroups, Sylow p-subgroups, cyclic and normal subgroups, and subgroup generated by the solutions of the equation of order n; $x^n = e$; of an abelian group, to be a subgroup perfect code of a finite group.

Keywords: Cayley graphs, Efficient dominating set, Perfect code, Subgroup perfect code, Tillings of finite groups.

AMS Mathematical Subject Classification [2010]: 05C25, 05C69, 94B25.

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*Speaker

The Weight Hierarchy of $(u, u+v)-$Construction of Codes

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Abstract. Let C_i be an $[n, k_i, d_i]$ linear code over F_q for $i = 1, 2$. Let $C = \{(u, u+v); u \in C_1, v \in C_2\}$. Motivated by finding the relationship between $d_r(C)$ and $d_r(C_1)$, $d_r(C_2)$, we investigated $d_r(C)$. Hence we found an upper bound for $d_r(C)$ according to $d_r(C_1)$ and $d_r(C_2)$. In addition, we proved that $d_2(C)$ equals to an upper bound in the binary case. Note that for a linear code D over a finite field, the r-th generalized Hamming weight (r-th GHW) is defined as the minimum of the support size of r-dimensional sub-codes of D and we denote it by $d_r(D)$.

Keywords: Generalized Hamming weight, Linear code, $(u, u+v)-$construction, Weight Hierarchy.

AMS Mathematical Subject Classification [2010]: 05C69.

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*Speaker

Quantum Codes From Quadratic Residue Codes over $\mathbb{F}_{q^r} + v\mathbb{F}_{q^r}$

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Abstract. In this paper, we present a method to construct quantum codes over $\mathbb{F}_{q^r}$ from the Gray images of quadratic residue codes over the ring $R = \mathbb{F}_{q^r} + v\mathbb{F}_{q^r}$, where $v^2 = v$ and q is an odd prime number. In particular, we obtain a few quantum maximum distance separable (MDS) codes over $\mathbb{F}_{q^r}$ from quadratic residue codes and their extended over R.

Keywords: Quantum codes, Quadratic residue codes, Extended quadratic residue codes.

AMS Mathematical Subject Classification [2010]: 94B05, 94B15, 81P70.

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*Speaker

Isogeny Problems in Cryptography

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Abstract. Many cryptosystems are based on the difficulty of the discrete logarithm problem in a cyclic group and the integer factorization problem. There are quantum polynomial attacks on these problems. Isogeny problems are believed to be quantum-resistant. Here we give a brief review of some problems involving isogenies on elliptic curves.

Keywords: Elliptic curve, Isogeny, Cryptography.

AMS Mathematical Subject Classification [2010]: 14H52, 94A60, 11T71.

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*Speaker

Contributed Talks

Computer Science

MLIPD: A Machine Learning Approach to Identify Party and Date Hub in PPI Network

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Abstract. It has been claimed that protein interaction networks are scale free that contain a few hubs with ability to bind multiple proteins. Hubs are classified as party and date hubs. Party hubs generally bind different proteins in specific module simultaneously, while date hubs interact with multiple proteins in different modules at different times and locations. Generally, they have been divided into two classes based on the average Pearson Correlation Coefficient (avPCC) of expression over all partners or their functions. In this study, we propose a more appropriate method to identify party and date hubs based on their topological properties of network. First, we calculate some topological properties for each vertex of network. Then, using support vector machine approach, we train a model on the entire training dataset to identify party and date hubs. Finally, we evaluate our method on reference hubs based on the avPCC on network. We show that the combination of topological properties can improve the performance of each topological property approach.

Keywords: Date hub, Party hub, PPI network, Support vector machine.

AMS Mathematical Subject Classification [2010]: 94C15.

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*Speaker

Face Recognition Using Ordinary and Higher-Order Singular Value Decomposition Classifier: A Comparison Study

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Abstract. The tensor based classifiers are used for classification of any data with multiple dimensions, such as images, videos, fMRI images and so on. The Higher-Order Singular Value Decomposition (HOSVD) is an essential tool for such a classifier. Although the HOSVD considers the factors of each dimension of the data separately, it needs more memory and has a higher complexity compared to the ordinary Singular Value Decomposition (SVD). In this paper, we consider the problem of face recognition and compare the performance of SVD and HOSVD classifiers in this field. It is observed that HOSVD classifier can not dominate the ordinary SVD classifier for face recognition problem.

Keywords: Multidimensional data, Sub-space classification, Tensor decomposition.

AMS Mathematical Subject Classification [2010]: 15-XX, 15A69.

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*Speaker

New Heuristics for Burning Graphs

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Abstract. Graph burning models the spread of contagion(fire) in a graph in discrete time steps. The burning number of a graph G, $bn(G)$ is the minimum time needed to burn a graph G. Determining the burning number of a graph is NP-complete. In this paper, we develop first heuristics to solve the problem in general (connected) graphs. In order to test the performance of our algorithms, we applied them on some graph classes with known burning number and known benchmarks for NP-hard problems in graph theory. We also improved the upper bound for burning number on general graphs in terms of their distance to cluster. Then we generated a data set of 2000 random graphs with known distance to cluster and tested our heuristics on them.

Keywords: Burning number, Heuristic, Distance to cluster, Theta graphs.

AMS Mathematical Subject Classification [2010]: 05C85, 05C85, 90C06.

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*Speaker

Contributed Talks

Differential Equations and Dynamical Systems

Emotional Rough Extreme Learning Machines for the Identification of Nonlinear Dynamic Systems

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Abstract. Rough extreme learning machine (RELM) is a rough-neural network with a single hidden layer where the weights of connections between the inputs and hidden neurons are randomly assigned and remain unchanged during the training process. In this work, on the basis of artificial emotional learning, a stable online learning algorithm for RELM is proposed. Emotional learning facilitate the error convergence in the training of neural models with increasing their memory depth. RELM with the proposed stable emotional learning algorithm that is called emotional RELM, is used to identify the discrete dynamic nonlinear systems. The efficiency of the proposed methodology are shown in simulation results.

Keywords: Discrete dynamic nonlinear system, System identification, Extreme learning machine, Emotional learning, Rough extreme learning machine.

AMS Mathematical Subject Classification [2010]: 93B30, 68T05.

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*Speaker

Stability and Dynamic of the HIV Model with Logistic Growth, Treatment, Cure Rate and Cell-to-Cell Transmission

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Abstract. In this work, we propose a five-dimensional Ordinary Differential Equation model with logistic growth, cell-to-cell and virus-to-cell transmission rates, cellular and humoral immune responses, rate of cure, and two treatments. Then we examine the dynamic behavior of the system to investigate therapeutic effects on disease control.

Keywords: Logistic growth, Treatment rate, Cure rate, Cell-to-cell transmission, Dynamic.

AMS Mathematical Subject Classification [2010]: 34D20, 34C11, 34M10.

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*Speaker

Global Existence, Asymptotic Stability and Blow-up for Nonlinear Kirchhoff Type Equation with Damping and Coriolis Term

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Abstract. In this paper, we study the initial-boundary value problem for a nonlinear Kirchhoff type equation with Coriolis force term and damping in a bounded domain with smooth boundary. For this problem, we show that the global existence and uniqueness of solution via potential well theory and Faedo-Galerkin method. Also, we consider the asymptotic behavior of solutions. Making use of integral inequalities, multiplier technique and Lyapanov function, we establish polynomial decay and exponential decay of solution, respectively. In two different methods, we show that the energy function grows-up as exponential function when $t \to +\infty$. The first method based on a method used in Vitillaro(Arch Ration Mech Anal 149:155-182, 1999). The second method based on some energy estimates. The result of the second method seems to be much more better than the result of first one. Moreover, the blow-up of solutions are established for arbitrary initial energy by using modified concavity method.

Keywords: Kirchhoff type wave equation, Blow-up, Exponential decay, Polynomial decay.

AMS Mathematical Subject Classification [2010]: 35J60, 35J47, 35J25.

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*Speaker

Proximality, Uniformly Recurrent, Almost Periodic Point of Topological Semiflow

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ABSTRACT. Let (T, X) be a semiflow. In this paper we study relation between the notions of uniformly recurrent point and almost periodic point for (T, X). We show that almost periodic point for a semiflow (T, X) is a discretely almost periodic point. Also we show that if X is a compact Hausdorff space then every point $x \in X$ is proximal with an uniformly recurrent point. Finally, we give an example to show that if (T, X) is a proximal semiflow then it may be happen that for every $t \in T$, $t : X \to X$ is not proximal.

Keywords: Semiflow, Proximality, Uniformly recurrent point, Almost periodic point.

AMS Mathematical Subject Classification [2010]: 37B05, 37B20.

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*Speaker

Conservation Laws by Scaling Method for the Fifth-Order Kudryashov and Sinelshchikov Equations

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Abstract. In this paper, by the scaling method, we obtain new conservation laws of the fifth-order Kudryashov and Sinelshchikov equation which is generalization of the famous Kawahara equation. Scaling method applies tools from variational calculus and linear algebra and based on scaling symmetry of the PDE. We use this method to construct conservation laws of rank 3 and 5 for the fifth-order Kudryashov and Sinelshchikov equations.

Keywords: Fifth-order Kudryashov and Sinelshchikov equation, Conservation law, Scaling symmetry.

AMS Mathematical Subject Classification [2010]: 76M60, 70S10, 35L65.

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*Speaker

Three Solutions for a Two-Point Boundary Value System

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Abstract. Applying a three critical points theorem by Averna and Bonanno, we will prove some multiplicity results for a class of two-point boundary value equations.

Keywords: Three solutions, Critical points, Two-point boundary value system.

AMS Mathematical Subject Classification [2010]: 34B15, 58E05.

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*Speaker

The Uniqueness Theorem for Discontinuous Differential Pencils

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Abstract. In this paper, we investigate the inverse problem for a differential pencil on the finite interval $(0, 1)$ with the non smooth solutions. We establish the properties of the spectral characteristics and prove the uniqueness theorem by the Weyl function.

Keywords: Inverse problem, Differential pencil, Discontinuity, Weyl function.

AMS Mathematical Subject Classification [2010]: 34B07, 34A55, 34A36.

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*Speaker

A Generalization of Katok Entropy Formula to Measure-Theoretic Pressure

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Abstract. Katok proved that for a continuous map defined on a compact metric space being invariant under an ergodic probability measure, the topological entropy defined on a subset with measure greater than or equal to $1-\delta$ is equal to its measure-theoretic entropy for any $0 < \delta < 1$. We generalized this entropy to pressure function when the map is measurable.

Keywords: Katok entropy formula, Measure-theoretic pressure.

AMS Mathematical Subject Classification [2010]: 58F11, 28D20.

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*Speaker

Chaos of Discontinuous Maps

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Abstract. This paper is devoted to the study of a family of one-dimensional piecewise smooth maps in which two below classic theorems are still permanent. One of them is Birkhoff transitivity theorem and the other one is, sensitivity provided by the properties of transitivity and density of periodic points exist which is known as Banks, Brooks, et al. theorem.

Keywords: Baire space, Chaos, Discontinuous maps, Transitivity.

AMS Mathematical Subject Classification [2010]: 37D45.

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*Speaker

Poincare Map on Degenerate Centers

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Abstract. We consider the differential homogeneous polynomial system of order five. We provide sufficient conditions such that the origin is a degenerate center and show that with a special perturbation, this degenerate center is a limit of a hyperbolic saddle and limit of a linear center (focus).

Keywords: Poincare map, Degenerate center.

AMS Mathematical Subject Classification [2010]: 34C07, 34C25.

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*Speaker

Stability of a Stochastic Model of the Burst Neurons

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Abstract. In this paper, we attempt to determine the stability of a model of the burst neurons, and resettable integrator. In order to obtain the stability of the model, we investigate, polar coordinates, Taylors expansion, and stochastic averaging method. A more comprehensive study, would include some theorems that give us some conditions which leads us to sufficient conditions on drift and diffusion coefficients for stochastic stability of the model. The most striking result to appear from the data is that the part of saccadic model in eye movements is stable under different noises.

Keywords: Noise, Saccadic model, Stability, Stochastic equation.

AMS Mathematical Subject Classification [2010]: 60H10, 34K50, 92C20.

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*Speaker

Laplace-Adomian Decomposition Method for Solving a Model of HIV Infection on CD4^{+} Cells

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ABSTRACT. The dynamic of HIV infection of CD4^{+} T cells is considered as a fractional order nonlinear ordinary differential equations system. In this paper using Laplace transform and Adomian decomposition method the fractional nonlinear system reduces to a linear algebraic system. By solving the algebraic system, the solutions are calculated. The numerical solution of illustrative case study shows that the purposed method is easy implement and accurate.

Keywords: Fractional model of HIV infection, Adomian decomposition method, Pade approximant.

AMS Mathematical Subject Classification [2010]: 34A34, 26A33.

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*Speaker

Invariant Bony Multi-Graphs

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Abstract. In this work, it is described the geometric structures of invariant graphs of a certain class of skew products. We construct an open set of skew products over an invertible base map having attracting invariant bony multi-graphs which support finitely many ergodic SRB measures.

Keywords: Invariant graph, Bony multi-graph, Skew product.

AMS Mathematical Subject Classification [2010]: 37C05, 37C40, 37H15.

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*Speaker

Control Bifurcations for a Family of Linearly Uncontrollable Nilpotent Planner Plants

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Abstract. This conference paper deals with control bifurcations of linear controllability for a generic family of planar differential plants with locally nilpotent linearly uncontrollable equilibrium. The results, of course, are readily applicable to higher dimensional systems via center manifold theory; *e.g.,* see [1]. We show how control bifurcations can help to design a compensator for controllers who start to fail their responsibilities. We illustrate the original idea from A. J. Krener, Kang, and Chang [2, 3] to show how one can move a linearly uncontrollable equilibrium to a linearly controllable equilibrium. Then, we apply input-state feedback linearization method for introducing a local compensator to tune its dynamics. We claim that our approach is a powerful and natural mathematical alternative method for many compensator design techniques in nonlinear control theory.

Keywords: Control bifurcations, Uncontrollable nilpotent system, Linear controllability.

AMS Mathematical Subject Classification [2010]: 58E25, 34H20, 37N35.

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*Speaker

Exitance of a Weak Solution of an Elliptic Equation

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Abstract. In this work we consider the elliptic problem $-\Delta_{\mathbb{H}^n} u + \lambda u = a(|\xi|_{\mathbb{H}^n})|u|^{r-2}u$, $\xi \in \Omega$, with Neumann boundary conditions on the Heisenberg group and prove the existence of at least one positive weak solution by applying a variational principle.

Keywords: Heisenberg group, Neumann problem, Variational principle.

AMS Mathematical Subject Classification [2010]: 35J20, 35R03, 46E35.

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*Speaker

A Frequency Domain Interpretation for the Gap Metric on the Non-Linear Operator Space: S-Gap Metric

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Abstract. A well-known method to compare the behavior of two dynamical system is the definition of the gap metric. However, in general, there exists no explicit solution for calculation of the gap metric in the cases dealing with non-linear dynamical systems. In this paper, with a new mapping definition between the constructed graph spaces (sub-spaces of the Hilbert space) by the non-linear operators, we present a new formulation to calculate the upper bound of the gap metric. The introduced metric, called as the s-gap metric, considers the weakest topology of the most far constructed tangent spaces. The results are fruitful in the robust control theory when encountering with the stability analysis of the non-linear feedback systems.

Keywords: Robustness analysis, Coprime factorization, The gap metric, Frequency domain uncertainty.

AMS Mathematical Subject Classification [2010]: 93C10, 93C41.

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*Speaker

Existence of Positive Solution for Systems of Fractional q–Differential Equations via Multi-Point Boundary Value Conditions

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Abstract. In this research, we consider the nonlinear theorems of r-concave, $(-r)$-convex and mixed monotone operators to establish the existence of positive solutions for fractional q-differential systems of operator equations on a normal cone in a real Banach space, with multipoint boundary conditions. The examples are given to confirm our results.

Keywords: Dual system, Multi-step methods, Multi-point, q-Differential equation.

AMS Mathematical Subject Classification [2010]: 34A08, 34B16, 39A13.

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*Speaker

On Weak Specification Property of Semigroup Actions

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Abstract. In this talk, we introduce the notion of weak specification property of semigroup actions on the compact metric spaces and investigate its relation with pseudo orbital specification and ergodic shadowing properties.

Keywords: Semigroup actions, Ergodic shadowing, Specification property.

AMS Mathematical Subject Classification [2010]: 37B05, 37C50.

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*Speaker

$\sigma_{2,p}$-Energy Functional and Polyconvexity

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Abstract. A class of maps reffered to as generalised twists is introduced and the system of Euler-Lagrange equations for the energy functional with polyconvex integrand over the n-dim- ensional annulus domain, based on them is presented. Further, the existence of the weak solu- tion of the Euler-Lagrange equations on the homotopy classes is investigated.

Keywords: Gnereralised twists, Euler-Lagrange equation, Polyconvex.

AMS Mathematical Subject Classification [2010]: 70S20, 58Exx.

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*Speaker

Contributed Talks

Geometry and Topology

Application of Frölicher-Nijenhuis Theory in Geometric Characterization of Metric Legendre Foliations on Contact Manifolds

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Abstract. In the context of geometry and mathematical physics, the theory of Lagrangian foliations on symplectic manifolds is of specific significance. More recent is the study of the theory of Legendre foliation on contact manifolds which geometrically can be regarded as the odd-dimensional counterpart of Lagrangian foliations. In this paper, a comprehensive analysis of the geometric structure of metric Legendre foliations on contact manifolds via the Frölicher - Nijenhuis formalism is presented. For this purpose, the global expression of Helmholtz metrizability conditions in terms of a semi-basic 1-form is applied in order to induce a metric structure which leads to construction of a Legendre foliation equipped with a bundle-like metric on an arbitrary contact manifold. Moreover, the local structure of metric Legendre foliations is exhaustively analyzed by applying two significant local invariants existing on the tangent bundle of a Legendre foliation of the contact manifold (M, η); One of them is a symmetric 2-form and the other one is a symmetric 3- form. Mainly, it is proved that under some particular circumstances the behaviour of the Legendre foliation on the contact manifold (M, η) is locally the same as the foliation defined by the complementary orthogonal distribution in TTM° whose leaves are the c-indicatrix bundle over M.

Keywords: Frölicher-Nijenhuis formalism, Legendre foliation, Semi-basic 1-form, Contact manifolds, c-Indicatrix bundle.

AMS Mathematical Subject Classification [2010]: 53D35, 53C12, 58E10.

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*Speaker

Smooth Quasifibrations

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ABSTRACT. As a homotopical extension of diffeological fiber bundles and fibrations, we study a version of quasifibrations, called smooth quasifibrations, in the context of diffeology based on smooth homotopy. Some characterizations of smooth quasifibrations are given and a few basic results are obtained.

Keywords: Diffeological spaces, Quasifibrations, Smooth homotopy.

AMS Mathematical Subject Classification [2010]: 55R99, 55P99, 57P99.

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*Speaker

The Problem of Toroidalization of Morphisms: A Step Forward

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Abstract. Toroidal varieties are algebraic varieties that are locally (formally) toric in structure, and toroidal morphisms are those morphisms of varieties which are locally determined by toric morphisms. The problem of toroidalization, proposed first in [1], is to construct a toroidal lifting of a dominant morphism $\varphi : X \to Y$ of algebraic varieties by blowing up non-singular subvarieties in the target and domain. This problem is evidently very difficult, and it has been solved only when Y is a curve, or when φ is dominant and X, Y are of dimension $\leqslant 3$ – see [3]. This article provides a comprehensive survey of the toroidalization problem. In addition, we discuss some recent results in toroidalization of locally toroidal morphisms [2], which is among patching type problems.

Keywords: Toroidalization, Resolution of morphisms, Principalization.

AMS Mathematical Subject Classification [2010]: 14M99, 14B25, 14B05.

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*Speaker

Characterization of the Killing and Homothetic Vector Fields on Lorentzian PP-Wave Four-Manifolds

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Abstract. We consider the Lorentzian pp-wave four-manifolds. We obtain a full classification of the Killing and homothetic vector fields of these spaces. We also provide an example of killing vector fields on these manifolds.

Keywords: PP-wave manifold, Killing vector field, Homothetic vector field, Lorentzian.

AMS Mathematical Subject Classification [2010]: 53C43, 53B30.

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*Speaker

Hom-Lie Algebroid Structures on Double Vector Bundles and Representation up to Homotopy

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Abstract. In this paper we show that, there exists a correspondence between the VB-hom algebroids, which is essentially defined as a hom-Lie algebroid object in the category of vector bundles and two term representations up to homotopy of hom-Lie algebroid.

Keywords: Hom-Lie algebroid, Representation up to homotopy, VB hom-Lie algebroid.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Characterization of Osculating and Rectifying Curves in Semi-Euclidean Space of Index 2

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Abstract. Osculating and rectifying curves in Euclidean space and Minkowski space were investigated in several articles. In this paper the concept of osculating and rectifying null and partially null curves are generalized in four dimensional semi-Euclidean space of index two and the coefficients of their position vector in each case by using of Frenet equations, are given. Partially null curves with constant second and third curvature are classified and it is shown that partially null curves with zero second curvature are planer. In addition, a characterization for rectifying null curves is given and it is shown that any null rectifying curve with constant second and third curvature is spherical.

Keywords: Ferenet equation, Semi-Euclidean space, Curve, Spherical curve.

AMS Mathematical Subject Classification [2010]: 53C40, 53C50.

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*Speaker

λ-Strongly Compact Spaces

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Abstract. λ-strongly compact spaces are introduced. Basic properties of λ-strongly compact spaces are studied. Relations between pre-irresolute functions and λ-strong compactness are investigated.

Keywords: Preopen, Preclosed, λ-Strongly compact.

AMS Mathematical Subject Classification [2010]: 54A25, 54D30, 54C08.

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*Speaker

On a Weighted Asymptotic Expansion Concerning Prime Counting Function and Applications to Landau's and Ramanujan's Inequalities

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ABSTRACT. Landau's inequality and Ramanujan's inequality concerning prime counting function assert that $\pi(2x) < 2\pi(x)$ and $\pi(x)^2 < \frac{\mathrm{e}\,x}{\log x}\,\pi(\frac{x}{\mathrm{e}})$, respectively, for sufficiently large x. In this paper we give an asymptotic expansion for $\pi(\alpha\,x)$ as the common key to study Landau's inequality and Ramanujan's inequality. Then, we give several refinements and generalizations of these inequalities.

Keywords: Prime counting function, Landau's inequality, Ramanujan's inequality, The Riemann hypothesis.

AMS Mathematical Subject Classification [2010]: 11A41, 11N05.

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*Speaker

Geometrical Properties of Shrinking Finsler Ricci Solitons

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Abstract. Here, we show that any forward complete gradient shrinking Finslerian Ricci soliton is homeomorphic to interior of the compact manifold with boundary, if the Ricci scalar is bounded above and the injectivity radius is bounded away from zero.

Keywords: Finsler geometry, Ricci soliton, Ricci flow.

AMS Mathematical Subject Classification [2010]: 53C60, 53C44.

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*Speaker

On Pseudo Slant Submanifolds of 3-Cosymplectic Manifolds

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Abstract. In this paper, we study pointwise pseudo 3-slant submanifolds of a 3-cosymplectic manifold. We give a necessary and sufficient condition for such submanifolds to be pointwise pseudo 3-slant and then construct an example of this type of submanifolds. Also, we prove integrability of some distributions of these submanifolds.

Keywords: Almost contact 3-structure, Pseudo slant, 3-Cosymplectic manifold.

AMS Mathematical Subject Classification [2010]: 53C25, 53C50.

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*Speaker

Stable Exponential Harmonic Maps with Potential

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Abstract. In this paper, the first and second variation formulas of the exponential energy functional for a smooth map from a Finsler manifold to a Riemannian manifold are obtained. As an application, it is proved that under certain condition there exists no non-constant stable exponential harmonic map from a Finsler manifold to the standard unit sphere $S^n (n > 2)$.

Keywords: Exponential harmonic maps, Stability, Riemannian manifolds, Calculus of variations.

AMS Mathematical Subject Classification [2010]: 53C43, 58E20.

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*Speaker

On (G, H)-(Semi)Covering Map

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Abstract. In this paper, by reviewing the concept of covering maps and semicovering maps, we define and motivate $(G, H)-$ (Semi)covering map. Also we investigate the properties of (G, H)-(Semi)covering map. For example, if $p : \tilde{X} \longrightarrow X$ is a (G, H)-(Semi)covering map and α is a path in $\tilde{X}$ with starting at $\tilde{x_0}$ and $\alpha(1) = x$, then p is an $(\alpha^{-1}G\alpha, (p \circ \alpha)^{-1}H(p \circ \alpha))$- (Semi) covering map.

Keywords: Fundamental group, Covering map, Semicovering map.

AMS Mathematical Subject Classification [2010]: 57M10, 57M12, 57M05.

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*Speaker

Projective Vector Field on Finsler Spaces

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Abstract. The collection of all projective vector fields on a Finsler space (M, F) is a finite-dimensional Lie algebra with respect to the usual Lie bracket, called projective algebra and is denoted by $p(M, F)$. It is the Lie algebra of the projective group $P(M, F)$. After a short review of the definitions of Randers metric and projective vector field. we show that for Randers space with isotropic S-curvature and β is not close, every affine vector field is invariant affine.

Keywords: Projective vector, Isotropic S-curvature, Finsler.

AMS Mathematical Subject Classification [2010]: 53B40, 53C60.

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*Speaker

Some Anti-de Sitter Space in Different Dimensions and Coordinates

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Abstract. We want to introduce sphere, hyperboloid, de-sitter and especially anti-de sitter and obtain the coordinates of the anit-de sitter space in different coordinates and we will describe its features according to each coordinate.

Keywords: Anti-de sitter space, Differential equations, Hyperboloid, Sausage coordinate, Stereographic coordinate.

AMS Mathematical Subject Classification [2010]: 97Gxx, 97G20, 11F23.

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*Speaker

The Corresponding Hom-Lie Algebroid Module of a Representation up to Homotopy

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Abstract. In this paper we introduce the concept of hom-Lie algebroid modules and $\mathcal{VB}$ hom-Lie algebroids. Then we show the correspondence between hom-Lie algebroid modules and representation up to homotopy of hom-Lie algebroids.

Keywords: Hom-Lie algebroid, Representation up to homotopy, VB hom-Lie algebroid.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

On Some Questions Concerning Rings of Continuous Ordered-Field Valued Functions

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Abstract. In this paper, we investigate answers to some questions in the context of rings of ordered field-valued continuous functions raised by Acharyya et al. in [*A Generic method to construct P-spaces through ordered fields,* Southeast Asian Bull. Math. **28** (2004) 783–790] and [*Structure spaces for intermediate rings of ordered field continuous functions,* Topology Proc. **47** (2015) 163–176].

Keywords: Zero-dimensional space, P-Space, P_F-Space, Almost P-space, Almost P_F-space.

AMS Mathematical Subject Classification [2010]: 54C30, 46E25.

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*Speaker

Building Different Types of Curves in a Specific Formula

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Abstract. In this paper, using two differential functions, we present a parametric formula for space curves so that the curvature and tursion of the curve can be expressed in terms of these two functions. We then obtain some conditions on the functions to characterize some families of curves, including planar curves, helices, and Bertrand curves.

Keywords: Space curve, Helix, Planar curves, Bertrand curves, Curvature.

AMS Mathematical Subject Classification [2010]: 53A04.

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*Speaker

$C_c(X)/P$ as a Valuation Domain

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Abstract. A prime ideal P of $C_c(X)$ is called valuation prime whenever $C_c(X)/P$ is a valuation domain. $C_c(X)$ is a valuation ring if and only if $C_c(X)$ is a valuation ring at every point of νX. For each space X, the minimal prime ideals space of $C_c(X)$ and $C_c(\beta_0 X)$ are homomorphism.

Keywords: Real closed ring, Real closed ideal, Valuation ring.

AMS Mathematical Subject Classification [2010]: 54C30, 54C40, 54C05.

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*Speaker

Some Ideals and Filters in Rings of Continuous Functions

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Abstract. In this note, we study and investigate e_c-filters on X and e_c-ideals in the functionally countable subalgebra of $C(X)$ consisting of bounded functions with countable image, denoted by $C_c^*(X)$. We observe that any maximal ideal in $C_c^*(X)$ and any arbitrary intersection of them is e_c-ideal. Also, If $\mathcal{F}$ is an e_c-filter on X, then $\mathcal{F}$ is e_c-ultrafilter if and only if $E_c^{-1}(\mathcal{F})$ is a maximal ideal in $C_c^*(X)$. We show that the maximal ideals of $C_c^*(X)$ are in one-to-one correspondence with the e_c-ultrafilters on X. It is also shown that the sets of maximal ideals of $C_c(X)$ and $C_c^*(X)$ have the same cardinality.

Keywords: c-Completely regular space, Closed ideal, Zero-dimensional space.

AMS Mathematical Subject Classification [2010]: 54C40, 13C11.

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*Speaker

Ricci Flow and Estimations for Derivatives of Cartan Curvature in Finsler Geometry

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Abstract. Here, we first derive evolution equation for the hh-curvature tensor of Cartan connection. Then we establish estimates for the covariant derivatives of the Cartan curvature tensor. It is proved the long time existence theorem for the Finsler Ricci flow as long as its hh-curvature remains bounded.

Keywords: Finsler geometry, Ricci flow, Cartan curvature.

AMS Mathematical Subject Classification [2010]: 53C60, 53C44.

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*Speaker

Generalized Ricci Solitons on Four-Dimensional Non-Reductive Homogeneous Spaces of Signature $(2, 2)$

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Abstract. We classify generalized Ricci solitons on four-dimensional non-reductive homogeneous spaces of neutral signature.

Keywords: Non-reductive homogeneous space, Pseudo-Riemannian metric, Neutral signature, Generalized Ricci soliton.

AMS Mathematical Subject Classification [2010]: 53C30, 53C44.

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*Speaker

Bundle-Like Metric on Foliated Manifold with Semi-Symmetric Metric Connection

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Abstract. Let $(M, g, \mathcal{F})$ be a semi-Riemannian foliated manifold with structural distribution $\mathcal{D}$ on $\mathcal{F}$. We define a semi-symmetric metric connection on $\mathcal{D}$ and $\mathcal{D}^{\perp}$, where $TM = \mathcal{D} \oplus \mathcal{D}^{\perp}$. In particular it is presented a characterization of bundle-like metric of $\mathcal{F}$ by means of semi-symmetric metric connection.

Keywords: Foliation, Bundle-like metric, Semi-symmetric metric connection.

AMS Mathematical Subject Classification [2010]: 53C12, 53B05.

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*Speaker

On the Compactness of Minimal Prime Spectrum of $C_c(X)$

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Abstract. The ring $C_c(X)$ as a subring of $C(X)$ consists of all functions with countable image. We show that $C_c(X)$ has countable annihilator condition and property(A). Let $Min(C_c(X))$ denote the minimal prime spectrum of $C_c(X)$. $Min(C_c(X))$ as a subspace of $Spec(C_c(X))$ is not generally compact. Also, in the class of basically disconnected spaces $Min(C_c(X))$ and $Min(C(X))$ are homeomorphic. We consider some relations between the topological properities of the spaces X and $Min(C_c(X))$, for which $Min(C_c(X))$ becomes a compact space. Finally, while introducing z_c°-ideals and $c-cc-$spaces, we study the compactness of $Min(C_c(X))$.

Keywords: Zero-dimensional space,Basically disconnected space, z_c°-ideals, Compact space, Minimal prime spectrum.

AMS Mathematical Subject Classification [2010]: 54C05, 54C30, 54C40.

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*Speaker

Projective Vector Fields on the Cotangent Bundle of a Manifold

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Abstract. Let ∇ be a symmetric connection on an n-dimensional manifold M_n and T^*M_n its cotangent bundle. In this paper, firstly, we determine the fiber-preserving projective vector fields on T^*M_n with respect to the Riemannian connection of the modified Riemannian extension $\tilde{g}_{\nabla,C}$, where C is a symmetric $(0,2)$- tensor field on M_n. Then we prove that, if $(T^*M_n, \tilde{g}_{\nabla,C})$ admits a non-affine fiber-preserving projective vector field, then M_n is locally flat, where ∇ is the Levi-Civita connection of a Riemannian metric g on M_n.

Keywords: Modified Riemannian extension, Fiber-preserving vector fields, Projective vector fields.

AMS Mathematical Subject Classification [2010]: 53C07, 53C22, 53B20.

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*Speaker

Contributed Talks

Graphs and Combinatorics

On Covering Set of Dominated Coloring in Some Graph Operations

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Abstract. The dominated coloring of a graph G is a proper coloring of G such that each color class is dominated by at least one vertex. The dominated chromatic number of a graph G is the smallest number of colors needed to color the vertices of G by this way, denoted by χ_{dom}.

In this paper, we define the covering set related to χ_{dom} as a new concept. For a minimum dominated coloring of G, a set of vertices S is called a covering set of dominated coloring if each color class is dominated by a vertex of S. We call the minimum cardinality of a covering set of dominated coloring of G, covering number and we denote by $\theta_{\chi_{dom}}$. We obtain some bounds on $\theta_{\chi_{dom}}$ and finally we study about covering number of subdivision, middle and total graph of paths and cycles.

Keywords: Dominated coloring, Dominated chromatic number, Covering set, Covering number.

AMS Mathematical Subject Classification [2010]: 05C69, 05C15.

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*Speaker

Total Domination Polynomial and $\mathcal{D}_t$-Equivalence Classes of Some Graphs

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Abstract. Let $G = (V, E)$ be a simple graph of order n. The total dominating set of G is a subset D of V that every vertex of V is adjacent to some vertices of D. The total domination number of G is equal to minimum cardinality of total dominating set in G and is denoted by $\gamma_t(G)$. The total domination polynomial of G is $D_t(G, x) = \sum_{i=\gamma_t(G)}^{n} d_t(G, i)x^i$, where $d_t(G, i)$ is the number of total dominating sets of G of size i. Two graphs G and H are said to be total dominating equivalent or simply $\mathcal{D}_t$-equivalent, if $D_t(G, x) = D_t(H, x)$. The equivalence class of G, denoted $[G]$, is the set of all graphs $\mathcal{D}_t$-equivalent to G. In this paper, we investigate the $\mathcal{D}_t$-equivalence classes of some graphs.

Keywords: Total domination number, Total domination polynomial, $\mathcal{D}_t$-Equivalent graphs, Equivalence class.

AMS Mathematical Subject Classification [2010]: 05C30, 05C31, 05C69.

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*Speaker

On Lower Bounds for the Metric Dimension of Graphs

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Abstract. For an ordered set $W = \{w_1, w_2, \ldots, w_k\}$ of vertices and a vertex v in a connected graph G, the ordered k-vector

$$r(v|W) = (d(v, w_1), d(v, w_2), \ldots, d(v, w_k)),$$

is called the (metric) representation of v with respect to W, where $d(x, y)$ is the distance between the vertices x and y. The set W is called a resolving set for G if distinct vertices of G have distinct representations with respect to W. The minimum cardinality of a resolving set for G is its metric dimension, and a resolving set of minimum cardinality is a basis of G. The only lower bound for metric dimension of graphs was found by Chartrand et al. in 2000. In this paper, all graphs with this lower bound are characterized and a new lower bound is obtained. This new bound is better than the previous one, for graphs with diameter more than 3.

Keywords: Resolving set, Metric dimension, Lower bound.

AMS Mathematical Subject Classification [2010]: 05C12.

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*Speaker

Maximum Fractional Forcing Number of the Products of Cycles

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Abstract. In this work, we find upper and lower bounds on the maximum fractional forcing number of the Cartesian product of even cycles of the same lengths. Our results can extend the result of [1] about the maximum forcing number of $C_{2n}\square C_{2n}$ to that of the product of an arbitrary number of even cycles of the same lengths.

Keywords: Fractional perfect matching, Forcing number, Fractional forcing number, Cartesian product of graphs, Perfect matching.

AMS Mathematical Subject Classification [2010]: 05C70, 05C72, 05C92.

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1. S. Kleinerman, *Bounds on the forcing numbers of bipartite graphs*, Discrete Math. **306** (1) (2006) 66–73.

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*Speaker

A Lower Bound on Graph Energy in Terms of Minimum and Maximum Degrees

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ABSTRACT. The energy of a graph G, denoted by $\mathcal{E}(G)$, is defined as the sum of absolute values of all eigenvalues of G. In (*MATCH Commun. Math. Comput. Chem.* **83** (2020) 631–633) it was conjectured that for every graph with maximum degree $\Delta(G)$ and minimum degree $\delta(G)$ whose adjacency matrix is non-singular, $\mathcal{E}(G) \geq \Delta(G) + \delta(G)$ and the equality holds if and only if G is a complete graph. Here, we prove the validity of this conjecture for regular graphs, triangle-free graphs and quadrangle-free graphs.

Keywords: Energy of a graph, Regular graph, Triangle-free graph, Quadrangle-free graph.

AMS Mathematical Subject Classification [2010]: 05C50.

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*Speaker

A New Approach on Roman Graphs

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Abstract. Let $G = (V, E)$ be a simple graph with vertex set $V = V(G)$ and edge set $E = E(G)$. A Roman dominating function (RDF) on a graph G is a function $f : V \to \{0, 1, 2\}$ satisfying the condition that every vertex u for which $f(u) = 0$ is adjacent to at least one vertex v such that $f(v) = 2$. The weight of f is $\omega(f) = \Sigma_{v\in V} f(v)$. The minimum weight of an RDF on G, $\gamma_R(G)$, is called the Roman domination number of G. It is a fact that $\gamma_R(G) \leq 2\gamma(G)$ where $\gamma(G)$ denotes the domination number of G. A graph G is called a Roman graph whenever $\gamma_R(G) = 2\gamma(G)$. On the other hand, the differential of X is defined as $\partial(X) = |B(X)| - |X|$ and the differential of a graph G, written $\partial(G)$, is equal to $max\{\partial(X) : X \subseteq V\}$. By using differential we provide a sufficient and necessary condition for the graphs to be Roman. We also modify the proof of a result on Roman trees. Finally we characterize the large family of trees T such that $\partial(T) = n - \gamma(T) - 2$.

Keywords: Roman domination, Roman graphs, Dominant differential graphs.

AMS Mathematical Subject Classification [2010]: 05C65.

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*Speaker

Partition and Colored Distances in Graphs

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Abstract. Studying partitions and colored distances has been crucial in metric graph theory, as the usefulness of those problems when defining/analyzing quantitative graph measures has been proved. Its motivation stems from the facility location network problem. Those concepts are usually defined on the whole vertex set of a graph. In this manuscript, we tackled the problem of inducing these definitions locally and consider subsets of vertices. Previous definitions for partitions and colored distances were not able to induced to subsets of vertices. In this way, we considered the canonical metric representation method and defined a two-dimensional weight for vertices of graphs with an operator. Then, we applied quotient graphs and cuts to calculate the induced partition and colored distances for some subsets of vertices.

Keywords: Average distance, Partition distance, Colored distance, Djoković–Winkler relation.

AMS Mathematical Subject Classification [2010]: 05C12, 92E10.

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*Speaker

On Distance-Eigenvalues of Complete Multipartite Graphs

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Abstract. The distance matrix of a connected graph is a square matrix whose entries are the distance between the vertices of the graph. By the distance spectral radius of G that is denoted by $\mu(G)$, we mean the largest eigenvalue of the distance matrix of G. We obtain some bounds for the distance spectral radius of complete multipartite graphs. In particular, we obtain that

$$\frac{n+a+b-4+\sqrt{(n+a+b)^2-4ab(t+1)}}{2} \leq \mu(K_{n_1,\ldots,n_t}) \leq \frac{2n-t-2+\sqrt{(2n-2t+1)^2+t^2-1}}{2},$$

where $t \geq 2$ and $n_1, \ldots, n_t$ be some positive integers, and $n = n_1 + \cdots + n_t$, $a = \lceil \frac{n}{t} \rceil$ and $b = \lfloor \frac{n}{t} \rfloor$.

Keywords: Distance spectral radius, Complete multipartite graphs.

AMS Mathematical Subject Classification [2010]: 05C31, 05C50, 15A18.

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*Speaker

Degree-Associated Reconstruction Number of Balanced Trees

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ABSTRACT. A card of a graph G is a subgraph formed by deleting one vertex. The reconstruction conjecture states that each graph with at least three vertices is determined by its multiset of cards. A dacard specifies the degree of the deleted vertex along with the card. The degree-associated reconstruction number $drn(G)$ is the minimum number of dacards that determine G. Barrus and West conjectured that $drn(G) \leq 2$ for all but finitely many trees. Each connected subtree formed by deleting of a vertex v in T is called the component of v. The components of vertex v are denoted by $comp_1(v), comp_2(v), ..., comp_{d(v)}(v)$. A vertex v of a tree T is called balanced, if for each i, $|comp_i(v)| \leq \frac{n-1}{2}$. A vertex v of T is called parent if it has at least one leaf in its neighborhood. In this paper, we prove that $drn(T) \leq 2$ for any tree T with a balanced parent vertex.

Keywords: Degree-associated reconstruction number, Balanced tree, Eq-balanced tree.

AMS Mathematical Subject Classification [2010]: 05C05, 05C99.

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*Speaker

Turán's Numbers of Berge Hypergraphs

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ABSTRACT. Let N, n, r be integers, where $N \geq n > r$ and $r \geq 2$. Also let $T_r(N, n-1)$ be the complete r-uniform $(n-1)$-partite hypergraph with N vertices and $n-1$ parts $V_1, V_2, \ldots, V_{n-1}$ whose partition sets differ in size by at most 1. Suppose that $t_r(N, n-1)$ denotes the number of edges of $T_r(N, n-1)$. Let $\mathcal{F}_n^{(r)}$ be the family of complete r-uniform Berge-hypergraphs of order n. We show that, for $N \geq 13$, $ex(N, \mathcal{F}_n^{(3)}) = t_3(N, n-1)$ and $T_3(N, n-1)$ is the unique extremal hypergraph for $\mathcal{F}_n^{(3)}$.

Keywords: Berge hypergraph, Turán number, Extremal hypergraph.

AMS Mathematical Subject Classification [2010]: 05C65, 05C35, 05D05.

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*Speaker

On the Structure of r-Partite N-Bounded Graphs

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Abstract. A simple graph is called N-bounded if for every two nonadjacent vertices x, y there exists a vertex z such that $N(x) \cup N(y) \subseteq N[z]$. In this paper, it is shown that any bipartite N-bounded graph is complete bipartite with at most two horns; The structure of N-bounded r-partite graphs is determined, too.

Keywords: Bipartite, N-Bounded graph, Neighborhood.

AMS Mathematical Subject Classification [2010]: 05C15, 05C30.

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*Speaker

Planarity of Perpendicular Graph of Modules

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ABSTRACT. Let R be a ring and M be an R-module. Two modules A and B are called orthogonal, written $A \perp B$, if they do not have non-zero isomorphic submodules. We consider an associated graph $\Gamma_\perp(M)$ to M with vertices $\mathcal{M}_\perp = \{(0) \neq A \lneq M \mid \exists (0) \neq B \lneq M \text{ such that } A \perp B\}$, and for distinct $A, B \in \mathcal{M}_\perp$, the vertices A and B are adjacent if and only if $A \perp B$. The main object of this article is to study the interplay of module-theoretic properties of M with graph-theoretic properties of $\Gamma_\perp(M)$. In this article, we investigate the planarity of perpendicular graph of R-module M.

Keywords: Perpendicular graph, Orthogonal submodules, Planar graph, Semi-artinian module.

AMS Mathematical Subject Classification [2010]: 05C25, 16P60, 16P40.

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*Speaker

On the Super Connectivity of Direct Product of Graphs

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Abstract. A vertex-cut S is called a *super vertex-cut* if $G - S$ is disconnected and it contains no isolated vertices. The *super-connectivity*, $\kappa^{'}$, is the minimum cardinality over all super vertex-cuts. This article provides bounds for the super connectivity of the direct product of an arbitrary graph and the complete graph K_n. Among other results, we show that if G is a non-complete graph with $\mathrm{girth}(G) = 3$ and $\kappa^{'}(G) = \infty$, then $\kappa^{'}(G \times K_n) \leq \min\{mn - 6, m(n-1) + 5, 5n + m - 8\}$, where $|V(G)| = m$.

Keywords: Direct product, Super connectivity, Vertex-cut.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Relationship between k-Matching and Coefficient of Characteristic Polynomial of Graphs

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Abstract. In this paper we establish a formula for the number of k-matching in graphs with girth of at least $k+2$, in terms of coefficient of characteristic polynomial.

Keywords: Characteristic polynomial, k-Matching.

AMS Mathematical Subject Classification [2010]: 05C31, 05C70.

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*Speaker

Total Double Roman Domination Number

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ABSTRACT. A double Roman dominating function on a graph G is a function $f : V \to \{0, 1, 2, 3\}$ such that the following conditions hold. If $f(v) = 0$, then vertex v must have at least two neighbors in V_2 or one neighbor in V_3 and if $f(v) = 1$, then vertex v must have at least one neighbor in $V_2 \cup V_3$. The weight of a double Roman dominating function is the sum $w_f = \sum_{v \in V(G)} f(v)$. A total double Roman dominating function ($TDRDF$) on a graph G with no isolated vertex is a $DRDF$ f on G with the additional property that the subgraph of G induced by the set $\{v \in V : f(v) \neq 0\}$ has no isolated vertices. The total double Roman domination number $\gamma_{tdR}(G)$ is the minimum weight of a $TDRDF$ on G. We initiate the improvement of the upper bounds of $\gamma_{dR}(G)$ and we show that $\gamma_{tdR}(G) \leq \dfrac{4n}{3}$, for any graph with $\delta(G) \geq 2$.

Keywords: Total double Roman domination, Upper bound.

AMS Mathematical Subject Classification [2010]: 05C65.

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*Speaker

Exatremal Polyomino Chains with Respect to Total Irregularity

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ABSTRACT. The total irregularity of a given simple graph G is calculated by the formula $irr_t(G) = \frac{1}{2}\sum_{\{u,v\}\subseteq V(G)} \mid deg_G u - deg_G v \mid$ in which $deg_G v$ is the degree of a vertex v in G. The aim of this paper is computing the total irregularity of polyomino chains. Upper and lower bounds for the total irregularity of polyomino chains together the fist and second extremal polyomino chain with respect to this graph invariant will be also presented.

Keywords: Total irregularity, Polyomino chain.

AMS Mathematical Subject Classification [2010]: 05C07, 05C35.

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*Speaker

On the Semitotal Dominating Sets of Graphs

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ABSTRACT. A set D of vertices in an isolate-free graph G is a semitotal dominating set of G if D is a dominating set of G and every vertex in D is within distance 2 from another vertex of D. The semitotal domination number of G is the minimum cardinality of a semitotal dominating set of G and is denoted by $\gamma_{t2}(G)$. In this paper after computation of semitotal domination number of specific graphs, we count the number of this kind of dominating sets of arbitrary size in some graphs.

Keywords: Dominating set, Semitotal domination number, Product.

AMS Mathematical Subject Classification [2010]: 05C15, 05C25.

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*Speaker

Contributed Talks

Interdisciplinary Mathematics

Recognizable of Finite Groups with Property of the Prime Graph

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Abstract. Let G be a finite group. In this paper, we investigate a cheracterization of some finite groups by property of the prime graph. In particular, it is shown that $G \cong \S p$ if and only if $|G| = |\S p|$, $S(G) = 2$, $\rho(p, G) = \{p, q_1, .., q_8, \frac{p-1}{2}\}$, where $\frac{p-1}{2} < q_i < p$ for $p > 47$, $\frac{p-1}{2}$ is a prime number and $p - 2$ is not a prime number. Also it is shown that $\S p$ recognizable by prime graph and as a consequence of the main result Shi conjecture is valid for the $\S p$, if $p > 2$ is a prime number.

Keywords: Characterization of groups, Shi conjecture, Symmetric groups, Prime graph.

AMS Mathematical Subject Classification [2010]: 20D05, 06F15.

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*Speaker

Approximate Solution of Tumor Growth Model with Cancer Stem Cells

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Abstract. In this paper, we investigate the reaction-diffusion system of integro-partial differential equations describing tumor growth with cancer stem cells(CSCs). We show the existence of the solution for this problem and numerical simulations confirm the evidence of tumor growth paradox, which indicates that, accelerated tumor growth with increased the death rate of cancer cells(CCs).

Keywords: Mathematical modeling of tumors, Integro-partial differential equations, Tumor growth paradox, Cancer stem cell.

AMS Mathematical Subject Classification [2010]: 93A30, 45Kxx.

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*Speaker

On a Variant of Eccentric Connectivity Index

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Abstract. The multiplicative eccentric connectivity index of a connected graph G is defined as the product of the terms $\varepsilon_G(u)+\varepsilon_G(v)$ over all edges uv of G, where $\varepsilon_G(u)$ denotes the eccentricity of the vertex u in G. In this paper, we present several sharp upper and lower bounds on this vertex-eccentricity-based graph invariant which reveals its connection to some existing graph invariants.

Keywords: Eccentricity of a vertex, Graph invariant, Bound.

AMS Mathematical Subject Classification [2010]: 05C12, 05C35.

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*Speaker

A Fractional-Order Model of CA3 Hippocampal Pyramidal Neurons

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Abstract. We study the mathematical modeling and dynamics of a two-compartment CA3 hippocampal pyramidal cell with Caputo fractional derivative. We investigate the solutions, bifurcation diagrams and chaotic behavior of the system. Chaotic regions are obtained for different values of the fractional derivative order and different injection currents. The obtained results can be considered as help to control relevant diseases caused by maximal injection currents abnormality.

Keywords: CA3 hippocampal pyramidal neurons, Caputo fractional derivative, Bifurcation analysis.

AMS Mathematical Subject Classification [2010]: 26A33, 34A08.

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*Speaker

Race Lévy Flights Model: A PDE Framework for Modeling Dynamic Decisions with Multiple Alternatives

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Abstract. Lévy Flights model has attracted much attention and it performs much better than the other sequential sampling models. But there are some drawbacks with the Lévy Flights model. The first one is that it could just model decisions with only two options. Secondly, there is no exact likelihood function for this model. In this work, a new paradigm is presented for modeling the decision making that can be applied for both 2-alternative and multi-alternatives. Moreover, a space fractional partial differential equation (fPDE) is proposed for approximating the probability distribution of the first passage time of the model.

Keywords: Lévy Flights, Fractional calculus, Decision making, Sequential sampling models.

AMS Mathematical Subject Classification [2010]: 91E10, 00A06, 35R11.

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*Speaker

Pricing Equity-Linked Insurance Products with Options under Jump Models

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ABSTRACT. In this paper, we study the pricing problem of equity-linked life insurance products such as guaranteed minimum death benefit (GMDB) using option price, in the case that remaining life time of a policyholder, denoted τ, approximated by exponential distribution and underling asset dynamic, denoted by X_t, is described by a jump-diffusion regime-switching model. To find the fair value of the products, we use the discounted density approach. For this purpose, we applied the Laplace transform to use option price in Markov-modulated economy to value equity-linked life insurance products. Finally, the performance of the proposed model are illustrated through some numerical examples.

Keywords: Life insurance, Equity-Linked death benefits, Jump diffusion regime switching model, Option pricing.

AMS Mathematical Subject Classification [2010]: 62P05, 97M30.

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*Speaker

Analysis of Predator-Prey System with Infection

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Abstract. Mathematical modeling of diseases enables one to predict when the disease occurs, and therefore, leading to the successful control to the diseases before it gets epidemic. This paper constructs a biological model in the mathematical aspect. Solutions for a Lotka-Volterra diseased predator-prey model are analyzed. Properties such as positivity, boundedness for solutions are studied. The threshold parameters for existence of both species are determined. Based on these parameters, local and global asymptotic stability is then analyzed. Finally, a numerical simulation that verifies the obtained analytical discussion is presented.

Keywords: Prey-predator, Lotka-Volterra model, Threshold parameter, Stability.

AMS Mathematical Subject Classification [2010]: 34D20, 34D23, 93D20.

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*Speaker

Applying Computer Algebra for Parametric Representation of the Steady States of Overlapping Generations Model

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Abstract. In this paper, we address the problem of analyzing and computing the steady-states of the overlapping generation model. The computation of steady-states coincides with a geometrical representation of the algebraic variety of a polynomial ideal which tends to apply computational algebraic geometry methods to solve the problem. However, as the associated polynomial ideal to these models have parametric coefficients, it is necessary to deal with the ring of parametric polynomials. In doing so, we apply novel parametric computational tools such as comprehensive Gröbner systems to discuss the parameters space. In addition, the parameters are bounded and in fact restricted into some real intervals. This property causes to do some extra steps more than the computation a comprehensive Gröbner system. Having all the constraints on the parameters, we design a new algorithm to determine the value of each steady-state depending on the different behaviour of parameters. Doing so, the space of parameters will be divided into a finite number of algebraic sets in the way that each one determine a number of steady states, if there is any.

Keywords: Computer algebra, Gröbner basis, Comprehensive Gröbner system, Steady-states, OLG model.

AMS Mathematical Subject Classification [2010]: 13P10, 91B52.

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*Speaker

Deriving Coherent and Non-Coherent Risk Measures under the Logistic Distribution

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Abstract. Financial markets may face with high volatilities and instabilities. In such circumstances, traders and managers use some concepts such as value-at-risk (VaR) to handle the amount of risk in a financial firm. In this paper, the improved versions of VaR known as Conditional VaR (CVaR) and Entropic VaR (EVaR) are derived for the logistic distribution. Hence, closed formulations for these measures are contributed.

Keywords: Value-at-risk, Conditional value-at-risk, Entropic value-at-risk, Logistic distribution, Risk management.

AMS Mathematical Subject Classification [2010]: 91B30, 62P05, 91G70.

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*Speaker

Fuzzy n-Fold Obstinate (Pre)Filters of EQ-Algebras

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Abstract. In this paper, we defined the concepts of fuzzy n-fold obstinate (pre)filter and fuzzy maximal (pre)filter of EQ-algebras and discussed the properties of them. We show that every fuzzy maximal (pre)filter of $\mathcal{E}$ is normalized and takes only the values $\{0, 1\}$ and in good EQ-algebra, if μ is a normalized fuzzy (pre)filter of $\mathcal{E}$, then μ is a fuzzy n-fold obstinate (pre)filter of $\mathcal{E}$ if and only if every normalized fuzzy (pre)filter of quotient algebra $\mathcal{E}/\mu$ is a fuzzy n-fold obstinate (pre)filter of $\mathcal{E}/\mu$.

Keywords: EQ-algebra, Fuzzy n-fold obstinate (pre)filter, Maximal (pre)filter, Fuzzy maximal (pre)filter.

AMS Mathematical Subject Classification [2010]: 03G25, 06B10, 06B99.

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*Speaker

Multi-Strategy Decision-Making on Enhancing Customer Acquisition Using Neutrosophic Soft Relational Maps

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Abstract. Decision making by the business managerial on framing strategies to foster customer acquisition is a challenging task. The aim of this paper is to introduce a new method of Multi-Strategy Decision-Making (MSDM) integrated with neutrosophic soft relational maps to determine the significant and feasible strategies of customer acquisition and their inter impacts. The proposed method comprises of two-stage processes and it is validated with twenty strategies, five factors associated with customer acquisition and expert 's opinion based on multivalued neutrosophic soft sets.

Keywords: Multi-Strategy, Decision-Making, Neutrosophic soft sets, Relational maps.

AMS Mathematical Subject Classification [2010]: 94Dxx, 90B50.

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*Speaker

Neutrosophic H-Ideal on BCK-Algebras

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Abstract. In this paper, we introduce the notion of neutrosophic H-ideals in BCK-algebras and study their fundamental properties. Then we investigate the relation between neutrosophic H-ideals and intuitionistic H-ideals and fuzzy H-ideals.

Keywords: BCK-algebra, BCI-algebra, Neutrosophic, H-ideal.

AMS Mathematical Subject Classification [2010]: 03B47, 03G25, 06D99.

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Contributed Talks

Logic

NIP Theories and Actions

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Abstract. The class of NIP theories is one of the most important classes of first order theories studied in mathematical logic and model theory. In recent years, the machinery of modern stability theory has been used to analyze several aspects of this class. We will consider this class from the point of view of dynamics of actions which naturally exist in there and prove some results on the entropy of those actions.

Keywords: NIP theories, Model theory (mathematical logic), Dynamics of group actions.

AMS Mathematical Subject Classification [2010]: 03C45, 03C95, 03C98.

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*Speaker

Logic and Operator Algebras

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Abstract. The following paper is a survey on interactions between model theory and operator algebras. For this reason, the model theory of metric structures is used. Not only some methods of model theory in operator algebras are mentioned, but also, some operator algebras in which model theory can be applied are introduced.

Keywords: Model theory of metric structures, Operator algebras, C*-algebras.

AMS Mathematical Subject Classification [2010]: 03C00, 47B00.

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Contributed Talks

Numerical Analysis

Simultaneous Hard Thresholding Algorithms for Multiple Measurement Vectors

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Abstract. Given $Y \in R^{m\times k}$ and a sensing matrix $A \in R^{m\times N}$ with $m \ll N$, the multiple measurement vectors (MMV) problem aims to recover row-sparse matrices $X \in R^{N\times k}$ of an underdetermined linear system $AX = Y$. In this work, we introduce two iterative algorithms, Simultaneous Null Space Tuning with Hard Thresholding with FeedBack (SNST+HT+FB) and SNST+HT with stretching for jointly sparse vectors recovery in MMV model. These algorithms are based on the null space tuning with hard thresholding techniques in single measurement vector (SMV) model of compressive sensing. Finally, some numerical results are presented to demonstrate the advantages of the algorithms.

Keywords: Compressive sensing, Sparse recovery, Null space tuning, Hard Thresholding algorithm, Multiple measurment vectors.

AMS Mathematical Subject Classification [2010]: 65F50, 65F10, 15A29.

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*Speaker

Analysis of the Stability of a High Order Numerical Method for Solving Unsteady Nonlinear Parabolic Differential Equations

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Abstract. In this study, after introducing a fourth order spacial numerical method, we demonstrate that this scheme guaranteed unconditional stability (under L_2 norm). Also, the presented method is second order in time and fourth order in space. Comparative results show that this method is accurate than the other existing methods in the literature.

Keywords: Fourth order spacial numerical method, Unconditional stability.

AMS Mathematical Subject Classification [2010]: 65Nxx, 65N06.

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*Speaker

Local Radial Point Interpolating Method (LRPIM) for Solving the Fractional Black–Scholes Model Governing European Options

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Abstract. The current paper devotes a local radial point interpolation method for solving the time fractional Black–Scholes model governing European options. In the proposed numerical formulations the time fractional derivative is discretized by a difference scheme with convergence order $O(\tau^{2-\alpha}),\ 0<\alpha<1$. Also, the space derivative is discretized by using the LRPIM approach. Numerical examples confirm the theoretical results and high accuracy of proposed scheme.

Keywords: Time fractional PDEs, Black–Scholes equation, Local radial point interpolation method.

AMS Mathematical Subject Classification [2010]: 65M30.

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*Speaker

A Preconditioner for Three-by-Three Block Saddle Point Problems

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Abstract. Using the idea of dimensional splitting method we present an iteration method for solving three-by-three block saddle point problems. We prove that the method is convergent unconditionally. The induced preconditioner is used to accelerate the convergence of the GMRES method for solving the problem.

Keywords: Saddle point, Block, Dimensional, Split, Preconditioner, GMRES.

AMS Mathematical Subject Classification [2010]: 65F10, 65F50, 65F08.

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*Speaker

A Stable Hybridized Discontinuous Galerkin Method for the Telegraph Equation

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Abstract. In this paper, we present a hybridized discontinuous Galerkin (HDG) method for solving the telegraph equation. Stability of the method is perused during a theorem for periodic and Dirichlet boundary conditions. Moreover convergence of the HDG method is investigated by testing some numerical examples and we observe optimal convergence order for the approximate solution and its first temporal and spatial derivatives.

Keywords: Hybridized discontinuous Galerkin method, Telegraph equation, Stability analysis.

AMS Mathematical Subject Classification [2010]: 65M60, 65M12.

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*Speaker

A New Meshless Method for Two-Dimensional Time Fractional Diffusion Wave Equation

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Abstract. In this paper, we propose a direct meshless local Petrov-Galerkin (DMLPG) method for solving the two-dimensional time fractional diffusion wave equation. This method is based on a generalized moving least square (GMLS) and a local weak form of this equation.

Keywords: DMLPG method, Local weak form, GMLS approximation, 2D time fractional diffusion wave equation.

AMS Mathematical Subject Classification [2010]: 34K37, 65M99, 35L20.

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*Speaker

A Numerical Scheme for Solving the Time-Fractional Stochastic Diffusion Equation via Orthonormal Chebyshev Polynomials

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Abstract. In this paper, a spectral collocation approach based on the sixth-kind Chebyshev polynomials (SKCPs) is constructed to solve a time-fractional stochastic diffusion equation (TFSDE). This method is applied to convert the solution of TFSDE to the solution of a system of nonlinear algebraic equations (NAEqs). Moreover, the convergence analysis of this suggested method is established. A numerical example is implemented to validate the efficiency of the proposed approach.

Keywords: Fractional calculus, Stochastic diffusion equation, Collocation scheme, Convergence analysis.

AMS Mathematical Subject Classification [2010]: 60H35, 26A33.

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*Speaker

Numerical Solutions of Time-Fractional Allen-Cahn Equation with Sinc Collocation Method

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Abstract. This paper deals with the numerical solution of time fractional Allen-Cahn equation with Caputo derivative. The time fractional derivative is discretized by using finite forward difference formula, then we use the Sinc collocation method to approximate the solution of semi-discrete scheme. Numerical experiments demonstrate the accuracy and good performance of the algorithm.

Keywords: Time fractional derivative, Allen-Cahn equation, Sinc collocation method.

AMS Mathematical Subject Classification [2010]: 26A33, 65N06, 65N35.

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*Speaker

Meshless Local Procedure for Solving the Couette Hydromagnetic Flow

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Abstract. In this paper the direct meshless local Petrov-Galerkin is used to simulate the Couette flow based on the incompressible Navier-Stokes equation and the generalized Couette hydromagnetic flow of a two-stage exothermic chemical reaction in a channel. The results show that the new numerical method is not only more accurate than other meshless methods, but is also simple for others models.

Keywords: Generalized moving least squares approximation, Meshless local Petrov-Galerkin technique, Couette flow.

AMS Mathematical Subject Classification [2010]: 65Mx.

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*Speaker

A Hybrid Laguerre Method for the European Exchange Option Pricing

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ABSTRACT. In financial markets, a lot of traded options are multi-asset options. A European exchange option gives the holder the right to exchange two assets at expiration time. This paper is considered the numerical solution of two dimensional Black-Scholes partial differential equation (PDE) for evaluating the European exchange options. We use a hybrid method based on the finite difference method and Laguerre approximation method. It is shown that the two dimensional Black-Scholes PDE is reduced to a nonsingular upper triangular linear system. The numerical results demonstrate efficiency and capability of the proposed method.

Keywords: European exchange option, Two dimensional Black-Scholes PDE, Laguerre polynomials, Finite difference scheme.

AMS Mathematical Subject Classification [2010]: 65M50, 91G20.

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*Speaker

Numerical Solution of Two-Dimensional Sinh-Gordon Equation via Integrated RBF-FD

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Abstract. We present a method based on integrated RBF (IRBF)-finite difference (FD) for numerical solution of two-dimensional sinh-Gordon equation. An example is solved by applying IRBF-FD method to campare it with radial basis functions (RBFs) collocation based on Kansa's approach, RBF-pseudospectral (RBF-PS) technique and moving least squares (MLS) method. The aim of this paper is to show that IRBF-FD method is more accurate than other meshless methods.

Keywords: Integrated radial basis function, The sinh-Gordon equation, Integrated RBF-FD.

AMS Mathematical Subject Classification [2010]: 65L60, 34B15.

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*Speaker

Robust CAS Wavelet Approach for Optimal Control of Nonlinear Volterra-Fredholm Integral Equation

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Abstract. The current paper deals with elaborating a numerical framework for estimating the optimal control and state of nonlinear Volterra-Fredholm integral equation (**VFIE**) by using the CAS wavelet bases. Wavelet bases have various resolution capability for approximating of different functions. The properties of CAS wavelet together with numerical integration and collocation method are utilized to discretize the continuous optimal control problem (**OCP**) to large-scale finite-dimensional nonlinear programming (**NLP**) problem. Also, the exact optimal control and state functions of OCP governed by VFIE can be approximated by series solutions based on CAS wavelet. The reduced problem is solved by existing well-developed algorithm in Mathematica software. Numerical experiments are reported to demonstrate the applicability and efficiency of the propounded technique.

Keywords: CAS wavelet, Volterra-Fredholm integral equation, Collocation method.

AMS Mathematical Subject Classification [2010]: 49M25, 90C30.

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*Speaker

A Reproducing Kernel Particle Method for 2D Time Fractional Telegraph Equation

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Abstract. This work is concerned with the numerical solution of two-dimensional time fractional telegraph equation by the reproducing kernel particle meshless method (RKPM). A meshless point collocation scheme is employed to furnish the spatial approximation. The Caputos fractional derivatives are approximated by two schemes of orders $\mathcal{O}(\tau^{3-\alpha})$ and $\mathcal{O}(\tau^{2-\alpha})$, $1/2 < \alpha < 1$. The RKPM is a meshless method that obtain desire accuracy and convergence by reproducing polynomial condition.

Keywords: Time fractional telegraph equation, Caputo's fractional derivative, Reproducing kernel particle method, Meshless method.

AMS Mathematical Subject Classification [2010]: 65M70, 35R11.

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*Speaker

Spectral Galerkin Method Using Fractional-Order Generalized Jacobi Functions for Solving Linear Systems of Fractional Differential Equations

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Abstract. A spectral Galerkin scheme based on the newly defined fractional-order generalized Jacobi functions as basis functions are introduced to approximate the solutions of a class of systems of fractional differential equations. The numerical solvability as well as the complexity analysis of the proposed method are also investigated.

Keywords: Fractional-order generalized Jacobi functions (FGJFs), Linear systems of fractional differential equations, Galerkin method.

AMS Mathematical Subject Classification [2010]: 34A09, 65L05, 65L20.

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*Speaker

Numerical Solution of Nonlinear PDEs Using Modal Spectral Element Method (SEM) in Complex Geometries with Approach of Reduction of Aliasing Error

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Abstract. High-order SEM using orthogonal basis is proposed for solving nonlinear PDEs in complex geometries. The nonlinear terms in the weak form of equation are expanded in terms of basis by a fast Fourier transform. So, inner products of nonlinear terms can be computed using orthogonal properties of basis with reduction of aliasing error. Some examples show efficiency and accuracy of the proposed method.

Keywords: Modal spectral element, Lobatto polynomials, Aliasing error, Fast Fourier transform (FFT).

AMS Mathematical Subject Classification [2010]: 65M70, 65T50.

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*Speaker

A Polynomial Preconditioner for the LSQR Method

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Abstract. LSQR is an attractive iterative method for solving the linear system $Ax = b$, and least-squares problem $\min \|Ax - b\|_2$, where A is a large and sparse matrix. Similar to other iterative methods, applying this method to ill-conditioned systems can be slow or even stagnant. To accelerate the convergence rate, we propose a polynomial type preconditioner. Some numerical examples illustrate the potency and efficiency of this preconditioned method.

Keywords: LSQR, Preconditioner, Krylov subspace methods.

AMS Mathematical Subject Classification [2010]: 15A06, 65F10, 65F20.

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*Speaker

An Inverse Problem for the Damped BBM Equation

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Abstract. Here, we study an inverse problem related to the damped BBM equation with noisy data. By applying the quartic B-spline and Haar wavelet methods, we investigate numerically this problem. By the convergence analysis and stability, we show that our results give a fine estimation of the unknown functions of the mention inverse problem.

Keywords: BBM-type equation, Inverse problem, Quartic B-spline, Haar wavelet method.

AMS Mathematical Subject Classification [2010]: 35Q55, 65D07, 68W25, 35R30.

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*Speaker

A Numerical Meshless Method for Fractional Differential Equations

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Abstract. This manuscript proposed an efficient meshless method for numerical solution of fractional differential equations. The main advantage of this scheme is to obtain a global approximation for this problem which reduces such problems to a system of algebraic equations. To approximate the first and derivative fractional order against the time, we use the finite difference relations. To discretization this model in space variables, we use the MK interpolation. An example is provided and the results are compared to their analytical solutions to verify the efficiency of our method.

Keywords: Fractional differential equations, Moving Kriging (MK) interpolation.

AMS Mathematical Subject Classification [2010]: 65M12, 65M60, 34A45.

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*Speaker

The Fragile Points Method (FPM) for Solution of the Two-Dimensional Wave Equation Using Point Stiffness Matrices

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Abstract. In this paper, the Fragile Points Method (FPM) is presented for the numerical solution of Wave Equation. The generalized finite difference method has been applied to achieve the test and trial functions that these functions are discontinuous polynomials. Interior Penalty Numerical Fluxes (IPNF) has been proposed to establish the consistency of the method. Finally, numerical results are provided.

Keywords: Fragile points method, Interior penalty numerical fluxes, Wave equation.

AMS Mathematical Subject Classification [2010]: 35L05, 65M99, 68W25.

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*Speaker

New Positive Definite RBFs via Completely Monotone Functions of Order k

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Abstract. In this article, we first give a recursive relation for obtaining completely monotone (CM) functions from CM functions of order k. Then the Schoenberg theorem leads to a class of new positive definite RBFs. Numerical results give accurate reconstruction of the Frank's function and original function in the well-known Runge phenomenon.

Keywords: Radial basis functions (RBFs), Interpolation, Completely monotonic functions, Positive definite.

AMS Mathematical Subject Classification [2010]: 65D05, 65D12, 65D20.

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*Speaker

An Efficient Meshfree Machine Learning Approach to Simulate the Generalized Fitzhugh-Nagumo Equation Inspired by Neuroscience

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Abstract. In this paper, we propose an efficient meshfree least square support vector machine regression approach (LS-SVR) to simulate the generalized Fitzhugh-Nagumo (gFHN) equation in a large spatial domain. By discretizing the problem in time, we turn it into a system of ordinary differential equations and then solve the reformed problem with LS-SVR at each time step. In addition, we have used Richardson extrapolation to increase the accuracy of the problem over time ($\Delta\tau^2$). Numerical results are tested with C^6 Wendland kernels and its comparison with the other numerical solution shows that this approach is highly accurate for solving gFHN types partial differential equations.

Keywords: Meshfree least square support vector machine, Machine learning, Fitzhugh-Nagumo, Partial differential equation, Neuroscience.

AMS Mathematical Subject Classification [2010]: 35Q92, 65M70, 68T05.

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*Speaker

A Fast Meshless Method for Solving Coupled Nonlinear Advection-Diffusion-Reaction Systems on Irregular Domains

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Abstract. In this paper, a fast meshless method is proposed for solving coupled nonlinear advection-diffusion-reaction systems on irregular domains. In this method, the Petrov-Galerkin strategy is used to build the primary local weak forms. Based on the generalized moving least squares technique, direct approximations of local weak forms are performed to construct the stiff and mass matrices. The computational efficiency is the most significant advantage of this method in comparison with the original MLPG method. This is because the numerical integrations are performed over polynomials instead of complicated MLS shape functions. The numerical results confirm the good efficiency of this method for solving coupled nonlinear advection-diffusion-reaction systems on irregular domains.

Keywords: Coupled nonlinear advection-diffusion-reaction system, Meshless method, Petrov-Galerkin formulation, Generalized moving least squares approximation.

AMS Mathematical Subject Classification [2010]: 65M99, 65N99.

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*Speaker

A Hybrid of Diagonal Preconditioner and Shift-Splitting Method for Double Saddle Point Problems

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Abstract. In this paper, we study a hybrid of diagonal preconditioner and shift-splitting method for numerical solution of double saddle point problems. Theoretical analysis shows that the proposed iterative method is unconditionally convergent. Some numerical results are presented to clarify the effectiveness and accuracy of the presented preconditioner for Krylov subspace method, like GMRES.

Keywords: Saddle point problem, Diagonal preconditioner, Shift-splitting, GMRES.

AMS Mathematical Subject Classification [2010]: 65F08, 65F50, 65N22.

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*Speaker

Computation of the Eigenvalues of the Sturm-Liouville Problem Using the Mittag-Leffler Function

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Abstract. In this work, we have presented a method for obtaining the eigenvalues of the Sturm-Liouville fourth order problem using the Mittag-Leffler function and its the integral representation.

Keywords: Mittag-Leffler function, Sturm-Liouville problem, Asymptotic form.

AMS Mathematical Subject Classification [2010]: 26A33, 65Q10.

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*Speaker

Spectral Accuracy for Singularly Perturbed Boundary Value Problems with Thin Interior Layer Using Differential Evolution Algorithms

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Abstract. For problems whose solutions have thin interior layers, an improvement on the exponential convergence rate of rational pseudospectral methods is presented. The transformed Chebyshev points generated by conformal mapping play the role of collocation points. To determine the width of interior layer of the given problem, which is chosen as conformal mapping parameter, an unconstrained optimization problem is proposed. A differential evolution algorithm is used to solve the optimization problem. Numerical results demonstrate that the new method outperform both the accuracy and efficacy of existing methods.

Keywords: Singularly perturbed problems, Pseudospectral method, Differential evolution algorithms, Interior layer.

AMS Mathematical Subject Classification [2010]: 65M70, 65M50, 30C30.

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*Speaker

On the CRI Method for Solving Sylvester Equation with Complex Symmetric Semi-Definite Positive Coefficient Matrices

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Abstract. Combination of real and imaginary parts (CRI) method is an efficient method for solving a class of large sparse linear systems with complex symmetric positive semi-definite coefficient matrices. In this work we will extend CRI approach to determine the approximate solution of Sylvester equation with complex symmetric semi-definite positive coefficient matrices. We show that this, without any condition, converges to the unique solution of the Sylvester equation. In the end we test the new scheme by solving a numerical example.

Keywords: Complex Sylvester matrix equation, CRI iteration method, Convergence.

AMS Mathematical Subject Classification [2010]: 15A30, 15A69, 65F10.

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*Speaker

A New Iterative Method for Solving a Class of Two-By-Two Block Complex Linear Systems

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Abstract. We present an iterative method for solving the system arisen from finite element discretization of a distributed optimal control problem with time-periodic parabolic equations. We prove that the method is unconditionally convergent. Numerical results are presented to demonstrate the efficiency of the proposed method.

Keywords: Iterative, Finite element, PDE-constrained, Cptimization, Convergence.

AMS Mathematical Subject Classification [2010]: 49M25, 49K20, 65F10, 65F50.

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*Speaker

Higher-Order Bi-CGSTAB and Bi-CRSTAB Algorithms to Solve Some Tensor Equations

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Abstract. This paper investigates the tensor form of the Bi-CGSTAB and Bi-CRSTAB methods, by employing Kronecker product and vectorization, to solve the generalized coupled Sylvester tensor equations with no matricization. Some numerical examples are provided to compare the efficiency of the proposed methods.

Keywords: Tensor equations, HOBi-CGSTAB, HOBi-CRSTAB, Iterative methods, k-mode product.

AMS Mathematical Subject Classification [2010]: 15A69, 65F10, 65W05.

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*Speaker

Moore–Penrose Inverse of Adjointable Operators on Hilbert C^*-Modules

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Abstract. Let T be an adjointable operator between C^*-modules and $T^{'}$ be its Moore–Penrose inverse. In this paper, we prove that the Moore–Penrose inverse of T exists if and only if T is proper and its range is closed. In addition, we show a relationship between the inverse and the Moore–Penrose inverse.

Keywords: Hilbert C^*-module, Moore-Penrose inverse, C^*-algebra proper.

AMS Mathematical Subject Classification [2010]: 46L08, 46L05, 15A09.

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*Speaker

Hybrid of Finite Difference and Spectral Methods for Parabolic Time-Fractional Integro-Differential Equation

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Abstract. In the present study, a habrid of finite difference method and a Legendre-collocation spectral method are applied for solving the linear and nonlinear time-fractional parabolic integro-differential equations by the Caputo fractional derivative. In the proposed method, for space-dependent partial differential equations is used the finite difference and the time-dependent integro-differential equation is applied the spectral method. The time and space variables are on the basis of Legendre-Gauss (LG) interpolation points. We have investigated the convergence analysis of the proposed method on the L^{∞}-norm and L^{2}-norm while it is not mentioned in the paper due to high volume of calculations.

Keywords: Time-fractional parabolic integro-differential equations, Legendre-collocation spectral method, Finite difference method, Caputo derivative.

AMS Mathematical Subject Classification [2010]: 78M20, 65R20, 65M70.

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*Speaker

Desynchronization of Neural Oscillator Populations Using Least Squares Support Vector Machines

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Abstract. Excessive synchronization of neurons in the brain networks can be a reason for some episodic disorders such as epilepsy. In this paper, we develop a machine learning method based on the least square support vector machine to simulate controlling synchronization in a population of noise-free and uncoupled neural oscillators. The control algorithm is based on phase reduction and uses the probability phase distribution partial differential equation to change the distribution of oscillators. We apply the proposed method on a population of Hidnmarsh-Rose neural oscillators to show the control algorithm can desynchronize the neurons efficiently.

Keywords: Phase distribution control, Neural oscillator population, Computer simulation, Support vector machine, Partial differential equations.

AMS Mathematical Subject Classification [2010]: 35Q92, 65M70, 68T05.

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*Speaker

Solving Time-Dependent PDEs with Rational Radial Basis Function Collocation and Semi-Implicit Time Discretization

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Abstract. The stability of solving time-dependent PDEs with RBF collocation method, depends on time discretization method. In many problems we use implicit methods to increase the stability range of numerical methods. Rational RBF (RRBF) is an improvement of standard RBF which has more potential to approximate discontinuous problems than standard RBF. As RRBFs are non-linear, so to avoid calculating nonlinear system of equations, we need to discretize time variable with explicit methods which they are conditionally stable and usually their stability ranges are smaller than implicit methods. In this paper we present an approach to increase the stability of solving time-dependent PDEs with RRBFs methods.

Keywords: Rational RBF, Burgers equation, Advection equation, Semi-implicit scheme.

AMS Mathematical Subject Classification [2010]: 65D05.

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*Speaker

An Anisotropic Fractional Nonlinear Diffusion Equation for Multiplicative Noise Removal of Texture Images

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Abstract. We present here a fractional-order diffusion equation to denoise the texture images corrupted by the multiplicative noises. The fractional derivative can preserve texture image features, and the proposed gray level indicator controls anomalous diffusion and causes more details of the image to be preserved.

Keywords: Fractional-order diffusion equation, Gray level indicator, Texture images.

AMS Mathematical Subject Classification [2010]: 65M06, 35R11, 26A33.

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*Speaker

A Meshless Method of Lines for the Multi-Term Time-Fractional Nonlinear Mixed Diffusion and Diffusion-Wave Equation

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Abstract. In this work, the multi-term time-fractional nonlinear mixed diffusion and diffusion-wave equation is considered. The time-fractional derivative is defined in Caputos sense. The spatial derivative is discretized based on finite difference and the numerical solution of nonlinear fractional ordinary differential equations system is approximated by using the radial basis functions. The numerical results demonstrate the effectiveness of the algorithm.

Keywords: Meshless method, Multi-term time-fractional equation, Mixed diffusion and diffusion-wave equation.

AMS Mathematical Subject Classification [2010]: 35R11, 65J15.

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*Speaker

Realizable Interval List of Real Numbers by Interval Nonnegative Matrices via Lower Triangular Matrices

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Abstract. In this paper for a given set of real interval numbers σ that has one positive interval number and nonnegative summation, we find an interval nonnegative matrix C^I such that for each point set δ of given interval spectrum σ, there exists a point matrix C of C^I such that δ is its spectrum. For this purpose, we use unit lower triangular matrices and specially try to use binary unit lower triangular matrices. We also study some conditions for existence solution of the problem.

Keywords: Interval arithmetic, Interval matrix, Inverse eigenvalue problem, Nonnegative matrices.

AMS Mathematical Subject Classification [2010]: 15A18, 15A60, 15A09.

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*Speaker

Multiscale Representation of Weakly Singular Integral Equations Based on Multiwavelets

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Abstract. In this work, weakly singular integral equations are represented based on Alperts multiwavelets as a sparse matrix and then the non-linear weakly singular integral equations of the second kind are solved by multiwavelets Galerkin method. Nonlinearity and singularity make the numerical procedure more challenging. But the proposed scheme overcomes these problems. Convergence analysis is investigated and some numerical examples validated this analysis.

Keywords: Weakly singular integral equations, Multiwavelets, Galerkin method.

AMS Mathematical Subject Classification [2010]: 45D05, 65T60, 65N30.

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*Speaker

Numerical Solutions of the Initial Boundary Value Problem for the Perturbed Conformable Time Modified Kawahara Equation by Using the Finite Element Method

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Abstract. We investigate the initial-boundary-value problem for the nonhomogeneous modified Kawahara equation with conformable derivative on time part of it. We use the finite element method with B-spline as the basis function for obtaining the numerical solutions for this nonlinear equation. We prove a posteriori and a priori errors for it. These show the adaptivity and convergence of our method.

Keywords: Conformable derivative, Finite element method, Modified Kawahara equation, Nonhomogeneous partial differential equation, Error estimate.

AMS Mathematical Subject Classification [2010]: 65N30, 65M12,65M15.

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*Speaker

A Meshless Partition of Unity Method for Electromagnetic Scattering Problem of Anisotropic Obstacle

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Abstract. In this work, the partition of unity method based on radial basis functions as an efficient local meshless technique is examined to solve an interesting electromagnetic scattering problem. In such a problem, the scattering from infinitely long anisotropic cylinder with circular cross-section embedded in free space is investigated. The numerical results demonstrate the efficiency and accuracy of the suggested method.

Keywords: Local meshless method, Radial basis function, Partition of unity method, Electromagnetic scattering problem.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Hybride of Laplace Transform and Chelyshkov Wavelets Integral Operator for Solving Fractional-Order Differential Equations with Delay

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Abstract. In this work, we use hybride of Laplace transform and Chelyshkov wavelets integral operator for solving fractional differential equations and time-fractional partial differential equations with delay. By using Laplace transform method, fractional-order differential equations are turned into integer-order differential equations. Then, Chelyshkov wavelets integral operator and collocation method are applied for solving obtained integer-order differential equations.

Keywords: Chelyshkov wavelets, Laplace transform, Integral operator, Fractional-order delay differential equations.

AMS Mathematical Subject Classification [2010]: 34A08, 65L60, 42C40.

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*Speaker

A New Operational Vector for Solving the General Form of Distributed Order Fractional Differential Equations

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Abstract. In this research study, we present a new and efficient numerical method, based on the second kind Chebyshev wavelets, for solving the general form of distributed order time-fractional differential equations (DOFDEs) with the Caputo fractional derivatives. Discussion on the error bound and convergence analysis for the proposed method is presented. Finally, two test problems are considered to illustrate the accuracy and computational efficiency of the method, and this method is compared to already present methods. Numerical results show that the new method provides more efficient results in comparison with other methods.

Keywords: Distributed order fractional differential equations, Caputo fractional derivative, The second kind Chebyshev wavelets, Operational vector, Error bound.

AMS Mathematical Subject Classification [2010]: 26A33, 65T60, 65N35.

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*Speaker

A New Operational Matrix of Fibonacci Polynomials for Solving a Class of Distributed Order Fractional Differential Equations

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Abstract. Here, we propose a numerical method for solving linear distributed-order fractional differential equations. Distributed order fractional derivative operational matrix and fractional derivative operational matrix for Fibonacci polynomials are presented. Using the operational matrices and Galerkin method, the problem is converted into a system of algebraic equations. Several examples are tests to investigate the efficiency of the technique.

Keywords: Distributed-order fractional derivative operational matrix, Distributed order fractional equation, Fibonacci polynomial, Galerkin method.

AMS Mathematical Subject Classification [2010]: 65D15, 11B39, 68M14.

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*Speaker

On the Stability Analysis of Continuous Block Backward Differentiation Formulas up to Order 9

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Abstract. In this paper, we investigate the stability of continuous block backward differentiation formula (CBBDF) of orders 7, 8 and 9 and compare the stability regions of these methods with CBBDF of orders 2, 3,..., 6. The results show that the stability regions of methods with orders 7, 8 and 9 are piecewise but larger than the methods with orders 2 , 3,..., 6 and therefore these methods are suitable for solving stiff systems.

Keywords: Continues block BDF, Collocation and interpolation, Numerical schemes, Stability region, Stiff problems.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Shape Preserving Interpolation by Bézier-Like Curve

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Abstract. In this work we study the shape preserving properties of a Bézier-like model. The model has been proposed by Yan and Liang in 2011. We prove that the proposed Bézier-like curves can preserve monotonicity and boundedness.

Keywords: Shape preserving interpolation, Monotonicity preservation, Boundedness.

AMS Mathematical Subject Classification [2010]: 65D17, 65D05.

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*Speaker

The Numerical Solution of 2D VO Galilei Advection Diffusion Equation with Nonlinear Source Term

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Abstract. At the present work, a numerical scheme with first order temporal accuracy is developed to simulate two dimensional variable-order Galilei invariant advection diffusion equation with nonlinear source. We use the collocation meshless method to discretize this equation in spatial direction. Finally, we consider a test problem to demonstrate the accuracy and applicability of the proposed method.

Keywords: Variable-order Galilei invariant advection diffusion equation, Meshless method, Radial basis function, Thin plate spline.

AMS Mathematical Subject Classification [2010]: 65M50, 65M70, 65N35.

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*Speaker

Numerical Solution of Stochastic Black-Scholes-Merton Model Occuring in Financial Market

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Abstract. Providing a suitable method for solving stochastic Black-Scholes-Merton model and investigating the efficiency of the proposed method are the most important purposes of this paper. This technique, which is based on operational matrices of hat functions, converts the mentioned model into a linear system of algebraic equations. Numerical results confirm accuracy and efficiency of suggested method.

Keywords: Stochastic differential equations, Operational matrix method, Hat functions.

AMS Mathematical Subject Classification [2010]: 60H10, 65L05.

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*Speaker

Solution of a Model Describing Biological Species Living Together Using the Jacobi Wavelets

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Abstract. In this work, a system of two nonlinear integro-differential equations which arises in biology is considered and the well-known Jacobi functions are implemented for finding the solution of this system. An approximation of the unknown function is considered in terms of Jacobi wavelets functions with unknown coefficients, which must be determined. By substituting this approximation into the equation, a system of algebraic equations is obtained. The proposed method is quite accurate. Numerical example is given to illustrate the applicability, efficiency, and accuracy of the new scheme.

Keywords: Jacobi wavelets, Mathematical biology, Integro-differential equation.

AMS Mathematical Subject Classification [2010]: 41A10, 65G99.

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*Speaker

Extrapolated Iterative Method for Solving Absolute Value Equations

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Abstract. In this paper, we present a generalized Newton Gauss-Seidel iteration method (NGS) to solve absolute value equations. Also we introduce extrapolated version of NGS method (ENGS) to increase the rate of convergence. Furthermore, we find upper bound for extrapolation parameter and discuss the convergence of proposed methods. Finally the efficiency of methods are illustrated by giving several examples.

Keywords: Absolute value equation, Gauss-Seidel iteration, Extrapolation method, Convergence.

AMS Mathematical Subject Classification [2010]: 65F10, 90C05, 90C30.

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*Speaker

Refinement of Diagonal and Off-Diagonal Splitting Iteration Method for Solving the Linear Systems

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Abstract. Recently, Dehghan et al. presented the diagonal and off-diagonal splitting (DOS) iteration method for solving the linear systems $\mathcal{A}x = b$. In this paper, we present a refinement for this method (RDOS) which increases its rate of convergence up to the rate of convergence of DOS method. Few numerical examples are considered to show the efficiency of the RDOS method.

Keywords: Refinement, Splitting method, H-Matrix.

AMS Mathematical Subject Classification [2010]: 65F10, 65F30.

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*Speaker

A Numerical Method for Pricing Discrete Barrier Option by CAS Wavelet

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Abstract. In this article, a numerical method for pricing knock-out discrete double barrier options based on CAS wavelets basis functions is proposed. According to the well-known Black-Scholes partial differential equations, the price of option could be obtained by a recursive formulas. These solutions has been approximated by CAS wavelets basis functions and expressed in operational matrix form.

Keywords: Barrier options, CAS wavelets, Option pricing.

AMS Mathematical Subject Classification [2010]: 65D15, 35E15, 46A32.

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*Speaker

Composite Interpolation Method and its Application in Numerical Solution of Optimal Control Problems

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Abstract. In this paper, we develop a composite interpolation method and explain its application in numerical solution of optimal control problems. For this purpose, we divide the time interval of the problem into some nonequal subintervals and transfer the Lagrange polynomials to each subintervals. By applying the present method, an optimal control problem is discretized as a parameter optimization problem in which the time locations of the discontinuities happen in state and control functions are considered as unknown parameters. We examine an example to illustrate the efficiency of the proposed method.

Keywords: Lagrange polynomials, Legendre-Gauss quadrature, Optimal control.

AMS Mathematical Subject Classification [2010]: 65D25, 65M70, 49M25.

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*Speaker

Application of B-Spline Method for Solving Inverse Kawahara Equation

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Abstract. In this paper, a numerical method is proposed to approximate the solution of the nonlinear inverse Kawahara equation. We apply B-spline for spatial variable and derivatives which produce a system. We solve this system by using the Tikhonov regularization method. The aim of this paper is to show that the method based on B-spline is also suitable for the treatment of the nonlinear inverse parabolic partial differential equations. Numerical example also verified the efficiency and accuracy of the method that can be obtained in the MATLAB 7.10 (R2017b) and is tested on a personal computer with intel(R) core(TM)2 Duo CPU and 4GB RAM.

Keywords: B-Spline method, Inverse problems, Noisy data.

AMS Mathematical Subject Classification [2010]: 65M32, 35K05.

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*Speaker

Steffensen-Like Methods with Twelveth-Order Convergence for Solving Nonlinear Equations

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Abstract. In this paper, a general procedure to develop some two-parametric with-memory methods to find simple roots of nonlinear equations is proposed. The new methods are improved extensions of without memory iterative methods.We used two self-accelerating parameters to boost up the convergence order and computational efficiency of the proposed methods without using any additional function evaluations. Numerical examples are presented to support the theoretical results of the methods.

Keywords: Root finding, Two-parametric, Self-accelerated, Order of convergence, With memory method.

AMS Mathematical Subject Classification [2010]: 65H04, 65H05.

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*Speaker

A New Modified Generalized Shift-Splitting Preconditioner for Saddle Point Problems

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Abstract. In this paper, a new modified generalized shift-splitting (NMGSS) method and its induced preconditioner is proposed for solving nonsymmetric saddle point problems. The convergence analysis of NMGSS iteration method is discussed. Finally the efficiency of methods are illustrated by giving one example.

Keywords: Saddle-point, Generalized shift-splitting, Preconditioner, Convergence.

AMS Mathematical Subject Classification [2010]: 65F10, 65F08.

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*Speaker

Fully Spectral Galerkin Method for the Modified Distributed-Order Anomalous Sub-Diffusion Equation

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Abstract. We present a high-order spectral method for the modified time-fractional distributed-order anomalous sub-diffusion equations. First, we discretize the integral term using a Gauss-quadrature formula and convert it into a multi-term equation. The discretization leads to converting the problem to a Sylvester matrix equation. Two numerical examples represent the accuracy and efficiency of the method.

Keywords: Distributed-order anomalous sub-diffusion equation, Galerkin spectral element method, Sylvester matrix equation, Riemann-Liouville fractional derivative.

AMS Mathematical Subject Classification [2010]: 26A33, 76M22, 35R11.

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*Speaker

Efficient Determination of Regularization Parameter in Tikhonov-Type Regularization of Discrete Ill-Posed Problems

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Abstract. This paper presents a new approach for choosing an appropriate regularization parameter in Tikhonov-type regularization of discrete ill-posed problems. Using the basic concepts of multi-objective optimization, we derive a single-objective problem that its minimizer gives an appropriate estimation of the regularization parameter. The numerical efficiency of the presented method is compared with the L-curve and the GCV parameter choice methods.

Keywords: Multi-objective optimization, Regularization parameter, Tikhonov regularization.

AMS Mathematical Subject Classification [2010]: 65F22, 90C29.

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*Speaker

A Direct Method for Solving a Class of Volterra Functional Equations

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Abstract. In this paper, we propose direct method to solve a class of Volterra delay-integro-differential equations (VDIDEs) based on vector forms of Block-Pulse Functions (BPFs). Operational matrix of integration of BPFs is applied to transform a VDIDE to a linear set of algebraic equations.

Keywords: Volterra delay-integro-differential equations, Block-Pulse functions, Direct method.

AMS Mathematical Subject Classification [2010]: 65R20, 45D05, 34K06.

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*Speaker

Contributed Talks

Optimization

Relaxation Method to Estimate the Nondominated Frontier of the Biobjective Quadratic Optimization Problems

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Abstract. Finding the nondominated frontier of multiobjective optimization problems is an interesting research subject for some researchers. In recent years, various researches have been conducted on finding the bounds of objective functions in quadratic optimization problems using copositive relaxation. These researches have been focused on single objective quadratic optimization problems. In this manuscript, we propose an approach to estimate a piece-wise linear nondominated frontier of the nondominated frontier of biobjective quadratic optimization problems with quadratic and linear constraints using copositive relaxation.

Keywords: Copositive optimization, Biobjective optimization, Quadratic optimization, Piece-wise linear nondominated frontier.

AMS Mathematical Subject Classification [2010]: 90C20, 90C29.

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*Speaker

Optimality and Duality for Efficiency in Nonsmooth Multiobjective Fractional Optimization Problems

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Abstract. This paper is devoted to the study of optimality conditions and duality for nonsmooth multiobjective fractional optimization problems, involving inequality and equality constraints in terms of the limiting/ Mordukhovch subdifferential. Based on the concept of Mordukhovch subdifferential and using suitable generalized constraint qualification, we derive necessary and sufficient optimality conditions for these problems. In addition, we propose a type of Wolfe dual problems and examine weak/strong duality relations under generalized convexity.

Keywords: Multiobjective fractional optimization problems, Optimality conditions, Duality, Generalized convexity.

AMS Mathematical Subject Classification [2010]: 90C32, 90C46, 49J52.

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*Speaker

Calculating Optimum Control Law for a Non-Homogeneous Linear Time-Invariant Control System via HJB Equation

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Abstract. In this paper, we consider the problem of linear quadratic continuous time optimal control. Our assumed system for this problem is a special case of non-homogeneous control systems with non-zero terms. To minimize the certain cost function assigned to this system, we will propose an optimum control strategy which is calculated by incorporating Hamilton-Jacobi-Bellman partial differential equation.

Keywords: Non-homogeneous linear control system, Optimization, Hamilton-Jacobi-Bellman equation.

AMS Mathematical Subject Classification [2010]: 49L20, 93C05.

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*Speaker

Reduced DC Parametric-Margin ν-Support Vector Machine

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Abstract. In this paper, we propose the reduced difference of convex parametric-margin ν-support vector machine (RDC-Par-ν-SVM) that uses the notion of rectangular kernels to obtain significant improvements in execution time over the difference of convex parametric- margin ν-support vector machine (DC-Par-ν-SVM), thus bested its application to larger sized data sets. Numerical experiments showed the superiority of the RDC-Par-ν-SVM in terms of both accuracy and learning speed.

Keywords: Parametric-margin ν-support vector machine, Non-convex optimization, Generalized Newton's method, DC programming, DCA.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Semidefinite Relaxation for Total Dominating Set Problem

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Abstract. Finding a solution for the combinatorial optimization problems has always been important due to their applications. But most of them are NP-Complete and unsolvable in polynomial time. Therefore, the approximation algorithms have been designed for them. One of these problems is total dominating set problem. In this paper, we present a new quadratic integer programming model for total dominating set problem and design an approximation method to find a lower bound for total dominating number.

Keywords: Total dominating set, Integer programming, Semidefinite programming.

AMS Mathematical Subject Classification [2010]: 05C69, 90C10, 90C22.

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*Speaker

A Non-convex Non-Linear Optimization Model for Optimizing Lifetime in Wireless Sensor Networks

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Abstract. Saving energy and prolonging lifetime are the main challenges of Wireless Sensor Networks (WSNs), consisting of many energy-constrained sensors. Topology control and network coding are two energy management protocols that improve the throughput of WSNs. In this paper, we propose an optimization model to combine these two techniques to improve the network lifetime. Furthermore, we consider the energy consumed by sensor nodes to detect, receive, and decode the transmitted signals, which causes a more realistic environment. Due to the non-convex and non-linear nature of the proposed model, a problem-specific Genetic algorithm is developed to convert the model to a linear programming problem where various available solvers or methods can effectively solve it. By adopting topology control, the number of network coding opportunities increases, and the network can obtain a higher lifetime than the conventional-topology-control-based networks.

Keywords: Wireless sensor network, Topology control, Network coding, Optimization, Graph.

AMS Mathematical Subject Classification [2010]: 68U01, 18C05, 05C30.

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*Speaker

A New Approach to Fuzzy Rough DEA Model

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Abstract. In the real world, many data are inaccurate, and we are dealing with vague, unreliable, and inaccurate data. Measuring the performance of any creature in such uncertain conditions is inevitable. Fuzzy Rough Data Envelopment Analysis (FRDEA) provides the space to evaluate the relative performance of homogeneous organisms, known as decision units (DMUs) in the Envelopment Analysis (DEA) literature. In this paper, we used the data envelopment analysis model and assumed the performance measurements to be inaccurate. The aim of this paper is to convert the data envelopment analysis model with uncertain performance measurements into a crisp model, which is done using the principle of fuzzy expansion and the expected value of rough. Inaccurate assumption of performance measurements means fuzzy rough assumptions of inputs and outputs.

Keywords: Rough method, Data envelopment analysis, Fuzzy sets.

AMS Mathematical Subject Classification [2010]: 90C08, 03E72.

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*Speaker

Nonsmooth Quasiconvex Optimization Using Lower Global Subdifferential

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Abstract. In this talk, some properties of the lower global subdifferential as a new notion in nonsmooth analysis are presented. Then, some KKT type optimality conditions in terms of lower global subdifferentials are derived for a quasiconvex constrained optimization problem.

Keywords: Quasiconvexity, Nonsmooth analysis, Global subdifferential, Global derivatives.

AMS Mathematical Subject Classification [2010]: 90C30, 90C26.

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*Speaker

A Two-Step Benchmarking Approach in Value Efficiency Analysis

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Abstract. Basic Data Envelopment Analysis models are intrinsically preference-free. However, there exist several approaches for incorporating decision maker's preference(s) into the procedure of efficiency analysis; among them value efficiency analysis is one of the most practical approaches. In value efficiency analysis it is assumed that the decision maker has an implicit value function and he/she presents his/her preferences by means of determining the most preferred solution among all existing activities. Besides estimating the value efficiency score for each unit, value efficiency analysis is capable of setting benchmarks for value inefficient units. In this paper, we develop a two-step target setting approach in the framework of value efficiency analysis, in order to provide more realistically achievable targets.

Keywords: Benchmarking, Value efficiency, Value efficient frontier, Intermediate layer.

AMS Mathematical Subject Classification [2010]: 90B30, 90B50.

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*Speaker

An Efficient Trust Region Line Search Method for Solving the Unconstrained Optimization Problems

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Abstract. In this paper, we propose a new algorithm for solving unconstrained optimization problems. Using a modified definition of trust region ratio and an appropriate adaptive choice, an efficient adaptive nonmonotone scheme is provided. To avoid resolving the trust region subproblem whenever the trial step is rejected, we employ a line search strategy. Under some suitable and standard assumptions, the global convergence properties of the New Algorithm is established. Numerical experiments show the efficiency of the new proposed algorithm.

Keywords: Trust region methods, Nonmonotone adaptive technique, Line search method, Global convergence.

AMS Mathematical Subject Classification [2010]: 65K05, 90C30, 90C06.

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*Speaker

Applying Game Theory in Tumor Growth Analysis

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Abstract. The behavior and growth of cancerous tumor is an interesting research subject and it has been widely analyzed from theoretical and empirical aspects. Various models have been applied to determine the growth pattern of cancerous tumor. In one of the current models, which we refer to as the competitive model, the tumor growth rate is determined based on the competition between the healthy and cancer cells. According to the effective application of this model in determining the tumor growth rate, some methods to get rid of the model restrictions are presented so that it can be used for tumor progression pattern. Finally, in order to evaluate the efficiency of the developed model, it has been implemented in some empirical examples.

Keywords: Cancerous tumor, Evolutionary game theory, Fitness, Growth rate.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Speaker

Contributed Talks

Probability and Statistical Process

Stochastic Comparisons of Parallel Systems with Exponentiated Kumaraswamy-G Components Having Archimedean Copulas

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Abstract. This paper treats the problem of stochastic comparisons of two parallel systems with dependent heterogeneous components having lifetimes following exponentiated Kumaraswamy-G model. We obtain the usual stochastic order for the largest order statistic of samples having exponentiated Kumaraswamy-G model and Archimedean copulas.

Keywords: Archimedean copula, Exponentiated Kumaraswamy-G model, Majorization, Usual stochastic order, Parallel systems.

AMS Mathematical Subject Classification [2010]: 60E15, 62G30.

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*Speaker

Optimal Time-Frequency Spectrum for Impendence Cardiography Signals Analysis

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Abstract. In this paper, we propose a new method to select the optimal time-frequency distribution kernel for modeling the impendence Cardiography Signals (ICG). We use synthesis signals, that maximize the performance of the method. The proposed methodology is based on selecting an appropriate time-frequency kernel for analyzing ICG signals. Furthermore the performance of the method is tested for noise resistance of clinical data bases. Also, it is compared for different time-frequency kernels. The results show that the spectrograms with Hanning or Hamming windows give the most performance for ICG signals.

Keywords: Impedance cardiography, Kernel, Synthetized signal, Time-frequency distributions.

AMS Mathematical Subject Classification [2010]: 60Gxx, 60Kxx.

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*Speaker

A New Variant of Three Towers Problem and its Simulation

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Abstract. In this paper, the three towers problem has been studied and a new definition of this problem has been proposed. With this new definition, an extension of the problem to n-towers is given. Finally, by means of simulation, the correctness of some derived formulas for some specific problems has been verified.

Keywords: Three towers problem, Gambler's ruin problem, Ruin time, n-Player gambler's ruin.

AMS Mathematical Subject Classification [2010]: 60G20, 60G50.

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*Speaker

INAR(1) Model with Zero-and-One Inflated Poisson-Lindley Innovations

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Abstract. In this paper, Zero and One inflated Poisson lindley distribution is introduced and some basic properties of it are obtained. The first order integer valued autoregressive model with zero and one inflated Poisson Lindley distributed innovations is presented. Some basic properties of this model are obtained and using the conditional maximum likelihood (CML) estimation method the model is fitted to the set of real data and by AIC and BIC criteria the goodness of fitting this model is demonstrated.

Keywords: INAR process, Poisson-Lindley distribution, Probability generating function, Zero and one inflated Poisson-lindley distribution.

AMS Mathematical Subject Classification [2010]: 62M10, 60E07.

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*Speaker

Multivariate Tail Conditional Expectation for Mean-Mixtures Family of Normal Distribution

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ABSTRACT. In this paper, the theoretical formula of a famous risk measure, multivariate tail conditional expectation for a new mixture family of multivariate normal distributions, namely mean-mixtures of multivariate normal ($\mathcal{MMN}$) distributions, formed by mixing multivariate normal distribution and a skewed distribution, is studied.

Keywords: Mean mixtures of multivariate normal distribution, Risk measurement, Multivariate tail conditional expectation, Value-at-Risk.

AMS Mathematical Subject Classification [2010]: 62P05, 60E05.

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*Speaker

Reliability Analysis for a Class of an Exponential Distribution Based on Progressive First-Failure Censoring

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Abstract. Based on progressively first-failure censored data, the problem of estimating parameters as well as reliability and hazard rate functions for a class of an exponential distribution is considered. The classic and Bayes approaches are used to estimate the parameters. The maximum likelihood estimates and exact confidence interval as well as exact confidence region for parameters are developed based on this censoring scheme. Also, when the parameters have discrete and continuous priors, several Bayes estimators with respect to squared error and linear-exponential(Linex) loss functions are derived. Finally, a real data analysis is presented to illustrate the methods of inference developed in this paper.

Keywords: Bayes estimator, Confidence region, Exponential distribution, Maximum likelihood estimator, Progressive first-failure censoring scheme.

AMS Mathematical Subject Classification [2010]: 62N01, 62N02.

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*Speaker

A Center-Outward Rank Test for Multivariate Paired Data

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Abstract. In this paper, a class of test statistics is defined based on the center-outward depth ranking to test the equality of mean vectors in multivariate paired data. The tests are implemented through the idea of permutation tests that require no distributional assumption, except the symmetric paired data joint distribution assumption. Therefore, the tests have broader applicability than some of the existing tests. This class of test statistics is very easy to compute for data in any practical dimension. This distinguishes it from some of the other tests in the literature. The performance of the proposed tests is evaluated using a Monte Carlo study. The results show that the tests perform well comparing other procedures in the literature.

Keywords: Center-outward ranking, Depth function, Multivariate paired data, Permutation test.

AMS Mathematical Subject Classification [2010]: 62H15, 62G10.

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*Speaker

Optimal Design of Step Stress Test under Periodic Inspection for Exponential Distribution

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Abstract. In this paper, we discuss the optimal step stress accelerated life test plan under periodic inspection and Type I censoring. The exponential distribution with a failure rate function that a log-quadratic function of stress and the tampered failure rate model are considered. The asymptotic variance of the maximum likelihood estimators of parameters is derived as an optimality criterion and the optimal stress change times are determined. A numerical example will be given to illustrate the proposed inferential procedures.

Keywords: Asymptotic variance, Exponential distribution, Periodic inspection, Tampered failure rate model, Three step stress test.

AMS Mathematical Subject Classification [2010]: 62N05, 90C31, 62N01.

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*Speaker

Stress-Strength Reliability of a Weibull-Standard Normal Distribution Based on Type-II Progressive Censored Samples

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Abstract. In this paper, under the Type-II progressive censored scheme, we obtain the point and interval estimates of stress-strength parameter (R), when stress and strength are two independent Weibull-standard normal variables. Assuming that stress and strength have the different scale parameters and the common shape parameter, we obtain maximum likelihood estimation (MLE) and approximation maximum likelihood estimation (AMLE).

Keywords: Stress-strength model, Type-II progressive censored sample, Weibull-standard normal distribution.

AMS Mathematical Subject Classification [2010]: 62F10, 62F15, 62N05.

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*Speaker

The Initial Conditions Problem in L_1 Regularization of Dynamic Random-Intercepts Models

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Abstract. In this paper, we address the initial conditions problem in regularization of the random-intercepts model with the first-order lag response. This model uses random effects to cover the intra-class correlation and the first lagged response to address the serial correlation, which are the two common sources of dependency in longitudinal data. We demonstrate that ignoring the correlation between the initial response and the random effects called the initial conditions problem, can lead to biased regularized estimates.

Keywords: Penalized likelihood, Random effects, Serial correlation.

AMS Mathematical Subject Classification [2010]: 62J07.

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*Speaker

Numerical Evaluation of Sample Sizes in Two Stage Pretest Estimation from a Rayleigh Distribution

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Abstract. In this paper, we consider the problem of expected sample size in a two stage pretest estimation for the scale parameter σ of a Rayleigh distribution. In the presence of prior information for σ, i.e. σ_0, the probability of avoiding the second sample and the expected sample size are derived and plotted for different cases.

Keywords: Rayleigh distribution, Sample size, Two stage estimation.

AMS Mathematical Subject Classification [2010]: 62F15.

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*Speaker

Bayesian Inference of Mortality Models in Joint Life Insurance Products

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Abstract. In this paper, the Bayesian inference of mortality model is considered in joint life models. We compute the Bayesian estimations using the squared error loss function and a priori distributions that create a dependency between the hyper-parameters for this model of dependent lives. Also, we use the importance sampling method to calculate the Bayes estimations and also to create the corresponding HPD credible intervals. Finally, we analyze one real data set for illustrative purposes.

Keywords: Bayesian analysis, HPD credible interval, Importance sampling method, Joint life insurance.

AMS Mathematical Subject Classification [2010]: 62H10, 62H12, 62E15.

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*Speaker

Contributed Posters

Algebra

On Some Properties of a BCC-Algebra

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Abstract. In this paper, we introduce a new property in a BCC-algebra, and we link these properties with other properties of BCC-algebra. We give some properties of closed ideal and we study properties of completely closed ideal implication algebra, self distributive BCC-algebra and transitive BCC-algebra.

Keywords: BCC-Algebra.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Presenter

Some Results on Finitistic n-Self-Cotilting Modules

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Abstract. Let R be a ring, ${}_RU$ a module and n a non-negative integer. In this paper, we obtain some another properties of finitistic n-self-cotilting modules. For instance, if ${}_RU$ is finitistic n-self-cotilting, then k-cop_R(n-$\mathrm{cop}_R(U)$) =k-$\mathrm{cop}_R(U)$ for every $k \geq 1$. Some applications are also given.

Keywords: n-Finitely U-copresented module, Finitistic n-self-cotilting module.

AMS Mathematical Subject Classification [2010]: 13D02, 13E15, 16E10.

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*Presenter

Semiprime Hyperideals in Multiplicative Hyperrings

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Abstract. Let R be a muliplicative hyperring. In this paper, we introduce and study the notion of semiprime hyperideals of a multiplicative hyperring R. Also, we give a number of results concerning semiprime hyperideals.

Keywords: Hyperring, Hyperideal, Semiprime hyperideal.

AMS Mathematical Subject Classification [2010]: 20N20.

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*Presenter

Secondary Hypermodules over Krasner Hyperrings

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Abstract. Let R be a Krasner hyperring and M be an R-hypermodule. In this paper, we introduce and study the concept of secondary hypermodules. A number of results concerning of these class of subhypermodules are given.

Keywords: Primary subhypermodule, Prime subhypermodule, Secondary hypermodule.

AMS Mathematical Subject Classification [2010]: 20N20, 13E05.

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*Presenter

Torsion Submodule of a Finitely Generated Module over an Integral Domain

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ABSTRACT. Let R be a commutative ring and M be an R-module. In this paper, we introduce Fitting ideals of M. Then we obtain a constructive description of $\mathrm{T}(M)$ which asserts the relation between torsion submodule and Fitting ideals of M.

Keywords: Torsion submodule, Fitting ideals, Integral domain.

AMS Mathematical Subject Classification [2010]: 13C05, 13D05.

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*Presenter

On the Structure of a Module and its Torsion Submodule

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Abstract. Let R be a commutative ring and M be a finitely generated R-module. In this paper we investigate the structure of an R-module and the torsion submodule, using Fitting ideals and comaximal ideals.

Keywords: Decomposition, Fitting ideal, Torsion submodule, Comaximal ideals.

AMS Mathematical Subject Classification [2010]: 13C05, 13D05.

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*Presenter

On Decomposition of Semi-Symmetric Semihypergroups

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Abstract. We define the breakable semihypergroups and present their characterizations using a generalization of Rédei's theorem for semi-symmetric semihypergroups, that permits to decompose them in a certain way. This decomposition is similar with that one proposed by Rédei's for semigroups, but slightly modified, to cover all the types of algebraic semihypergroups.

Keywords: Semigroup, Semihypergroup, Breakable semi(hyper)group.

AMS Mathematical Subject Classification [2010]: 20N20.

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*Presenter

Characterization of $L_2(29)$ by the Number of Sylow Subgroups

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ABSTRACT. Let G be a finite group with trivial center and $n_p(G)$ be the number of Sylow subgroup of G. In this paper we prove that if $n_p(G) = n_p(L_2(29))$, for every prime $p \in \pi(G)$, then $G \cong L_2(29)$.

Keywords: Projective special linear group, Sylow subgroup, Characterization.

AMS Mathematical Subject Classification [2010]: 20D06, 20D20.

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*Presenter

2-Absorbing Powerful Ideals and Related Results

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Abstract. Let R be an integral domain. In this paper, we will introduce the concepts of 2-absorbing powerful (resp. 2-absorbing powerful primary) ideals of R and obtain some related results. Also, we investigate a submodule N of an R-module M such that $Ann_R(N)$ and $(N :_R M)$ are 2-absorbing powerful (resp. 2-absorbing powerful primary) ideals of R.

Keywords: Powerful ideal, 2-Absorbing powerful ideal, 2-Absorbing powerful submodule, 2-Absorbing powerful primary ideal, 2-Absorbing powerful primary submodule.

AMS Mathematical Subject Classification [2010]: 13C13, 13C99.

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*Presenter

Rings over which Every Simple Module is FC-Pure Flat

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Abstract. In this paper, we study rings over which every simple right module is FC-pure flat. It is shown that a normal right Artinian ring R with Jacobson radical J is a principal right ideal ring if and only if every simple right R-module is FC-pure flat. As a consequence, we deduce that a normal ring R is Köthe (i.e., each right and left R-module is a direct sum of cyclic R-modules) if and only if it is an Artinian ring that every simple right and left R-module is FC-pure flat.

Keywords: FC-Pure flat module, Simple module, Köthe ring.

AMS Mathematical Subject Classification [2010]: 16D50, 16D40, 16P70.

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*Presenter

EL-K-Algebras

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Abstract. The article deals with EL-hyper structures. The concepts of EL-hyperstructures were introduced in 1995 by Chvalina. In this article, we state EL-K-algebras that are constructed by applying the concept of EL-hyperstructures on BCK-algebras, the product and the union of two EL-K-algebras and some types of EL-K-algebras.

Keywords: BCK-Algebra, HV-K-Algebra, EL-K-Algebra.

AMS Mathematical Subject Classification [2010]: 06F35, 20N99.

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*Presenter

Spectrum Topology on Lattice Equality Algebras

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Abstract. In this paper, we construct an spectrum topology on a lattice equality algebra (where spectrum is the set of all $\vee$-irreducible filters of an equality algebra) and prove this topology is a compact T_0-space and maximal spectrum (as a subspace of that) is a compact T_1 topological space.

Keywords: Equality algebra, Maximal filter, $\vee$-Irreducible filter, Spectrum topology.

AMS Mathematical Subject Classification [2010]: 03G10, 06B99, 06B75.

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*Presenter

On (P)-Regularity of Rees Factor Acts

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Abstract. By a regular act we mean an act that all its cyclic subacts are projective. In this paper we introduce $P-$regularity of acts over monoids and will give a characterization of monoids by this property of their right Rees factor acts.

Keywords: $(P)-$Regularity, Rees factor act.

AMS Mathematical Subject Classification [2010]: 20M30.

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*Presenter

Cofiniteness and Associated Primes of Local Cohomology Modules via Linkage

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Abstract. Let R be a commutative Noetherian ring and M be a finitely generated R-module. Considering the new concept of linkage of ideals over a module, we study associated prime ideals and cofiniteness of local cohomology modules of M with respect to some linked ideals over it.

Keywords: Linkage of ideals, Local cohomology, Cohen-Macaulay modules.

AMS Mathematical Subject Classification [2010]: 13D45, 13C45, 13C14.

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*Presenter

Properties of Common Neighborhood Graph under Types Product of Cayley Graph

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Abstract. Let G be a finite group and $\Gamma_{G,S} = Cay(G, S)$ be a Cayley graph on G. The common neighborhood graph $\mathbf{Con}(\Gamma_{G,S})$ is a graph with vertex set $V(\mathbf{Con}\Gamma_{G,S}) = \{x, x \in V(\Gamma_{\{G,s\}})\}$ and the set of all edges defined by $E(\mathbf{Con}\Gamma_{G,S}) = \{\{x, y\} \mid N(x) \cap N(y) \neq \emptyset\}$. The neighborhood of a vertex x is denoted by $N(x)$. In this paper, we establish some properties of the common neighborhood graph of on the cyclic group C_n and dihedral group D_{2n}.

Keywords: Common neighborhood graph, Cayley graph, Graph operation.

AMS Mathematical Subject Classification [2010]: 05C75, 05C50.

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Contributed Posters

Analysis

Continuous Frames and Orthonormal Bases

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ABSTRACT. We present some properties of general frames. In particular, we study the relation between an orthonormal basis for space and normalized tight (Ω, μ)-frame.

Keywords: Frame, Continuous frame, Orthonormal bases.

AMS Mathematical Subject Classification [2010]: 00A69, 06D22.

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*Presenter

Some Results on Hermite-Hadamard Inequality with Respect to Uniformly Convex Functions

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Abstract. In this paper, we obtain Hermit-Hadamard inequality for uniformly s-convex functions.

Keywords: Uniformly s-convex, Hermite-Hadamard, Hölder inequality.

AMS Mathematical Subject Classification [2010]: 26D15, 26D07, 39B62.

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*Presenter

On M^*-Paranormal Operators

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Abstract. Let H be a Hilbert space and $B(H)$ be the algebra of all bounded linear operators acting on H. We show T and $T^* \in B(H)$ have the single valued extension property. Also, we show that if T^* is algebraically M^*-paranormal operators, then $f(T) \in aW$ for all $f \in H(\sigma(T))$.

Keywords: Weyls theorem, Browders theorem, a-Browders theorem.

AMS Mathematical Subject Classification [2010]: 47A53.

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*Presenter

Some Note on Morphism Product of Banach Algebras

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Abstract. Let T be a Banach algebra homomorphism from a Banach algebra $\mathcal{B}$ to a Banach algebra $\mathcal{A}$ with $\|T\| \leq 1$. Recently it has been obtained some results about $\mathcal{A} \times_T \mathcal{B}$, in the case where $\mathcal{A}$ is commutative. In the present paper, some of these results have been generalized and proved for an arbitrary Banach algebra $\mathcal{A}$.

Keywords: Amenability, Character amenability, Character inner amenability, θ-Lau product.

AMS Mathematical Subject Classification [2010]: 46H05.

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*Presenter

On the Supercyclicity Criterion for a Pair of Operators

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Abstract. In this paper we characterize some conditions for operator $T = (T_1, T_2)$. A pair of operators T_1 and T_2 acting on an infinite dimensional Banach space X satisfying the Supercyclicity Criterion.

Keywords: Hypercyclic vector, Supercyclic vector, Supercylicity criterion.

AMS Mathematical Subject Classification [2010]: 47B37, 47B33.

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*Presenter

Power Bounded Weighted Composition Operators on the Bloch Space

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Abstract. In this paper, we investigate about power boundedness of weighted composition operators on Bloch space and we give some necessarily and sufficient conditions under which a weighted composition operator is power bounded on Bloch space.

Keywords: Weighted composition operator, Power bounded, Bloch space.

AMS Mathematical Subject Classification [2010]: 47B38, 46E15, 47A35.

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*Presenter

Some Variants of Young Type Inequalities

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Abstract. The simple inequality

$$\sqrt{ab} \leq \frac{a+b}{2}, \quad a, b > 0$$

is known in the literature as the arithmetic-geometric mean (AM-GM) inequality. Though simple, this inequality has received a considerable attention due to its applications in mathematical inequalities. This article presents a new treatment of the arithmetic-geometric mean inequality and its sibling, the Young inequality.

Keywords: Operator inequality, Young inequality, Arithmetic-geometric mean inequality, Positive operator.

AMS Mathematical Subject Classification [2010]: 47A63, 47A60.

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*Presenter

General Additive Functional Equations in k-Ary Banach Algebras

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Abstract. In this paper, we introduce the concept of k-ary hom-derivation. We investigate on the relation between the generalized additive functional equations and $\mathbb{C}-$linearity. We also, prove the Hyers-Ulam stability of these equations in k-ary Banach algebras.

Keywords: k-Ary hom-derivation, k-Ary Banach algebras, Hyers-Ulam stability.

AMS Mathematical Subject Classification [2010]: 17A40, 39B52, 17B40, 47B47.

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[*]Presenter

Hyers-Ulam Stabilities for 3D Cauchy-Jensen ρ-Functional

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Abstract. In this paper, we introduce and solve the following $3D$ Cauchy-Jensen $\rho-$functional

$$\begin{aligned} f(\frac{\mu x+\mu y}{2}+\mu z)+f(\frac{\mu x+\mu z}{2}+\mu y)+f(\frac{\mu y+\mu z}{2}+\mu x) \\ -2\mu f(x)-2\mu f(y)-2\mu f(z) \\ =\rho(f(x+y+z)-f(x)-f(y)-f(z)), \end{aligned}$$

where $\rho\neq 0,\pm 1$ is a real number. We investigate the Hyers-Ulam stability of ternary Jordan derivation in ternary algebras for $3D$ Cauchy-Jensen $\rho-$functional equation.

Keywords: Hyers-Ulam stability, Ternary Jordan derivation, Ternary algebras, $3D$ Cauchy-Jensen.

AMS Mathematical Subject Classification [2010]: 39B52, 39B82, 22D25.

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*Presenter

A Finite Variable Quadratic Functional Equation in Quasi-Banach Spaces

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Abstract. In this paper, we introduce a finite variable quadratic functional equation and establish the general solution of the functional equation and investigate the stability for the functional equation in the framework of quasi-Banach spaces.

Keywords: p-Banach space, Quasi-normed space, Quadratic functional equation, Stability.

AMS Mathematical Subject Classification [2010]: 46A16, 39B82.

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*Presenter

Integral Type Contraction in Ordered G-Metric Spaces

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Abstract. In this paper, we apply the idea of integral type contraction and prove some new coupled fixed point theorems for such contractions in ordered G-metric space. Also, we support the main results by an illustrative example.

Keywords: Integral type contraction, Ordered G-metric space, Coupled fixed point.

AMS Mathematical Subject Classification [2010]: 47H09, 54E35, 47G10.

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*Presenter

Some New Inequality for Operator Means and the Hadamard Product

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Abstract. The paper contains some new theorems for Hadamard product. Some inequalities for Heinz and Heron means has been proved using operator means.

Keywords: Hadamard product, Heinz means, Heron means, Mean adjoint, Positive operator.

AMS Mathematical Subject Classification [2010]: 47A63, 15A42, 15A45.

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*Presenter

Bounds for Heron Mean by Heinz Mean and other Means

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Abstract. In this paper, some bound for Heron mean by Heinz mean and other means are peresented. we give some new inequality for scalars and we use them to establish new inequality for operators.

Keywords: Heinz operator means, Heron operator means, Positive operator.

AMS Mathematical Subject Classification [2010]: 15A45, 47A63.

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*Presenter

F-Cone Metric Spaces over Fréchet Algebra

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Abstract. The paper deals with the achievements of introducing the notion of F-cone metric spaces over Fréchet algebra as a generalization of F-cone metric spaces over a Banach algebra. First, we study some of its topological properties. Next, we define a generalized Lipschitz for such spaces. Also, we investigate some fixed points for mappings satisfying such conditions in the new framework. Subsequently, as an application of our results, we provide an example. Our work generalizes some well-known results in the literature.

Keywords: F-Cone metric spaces over Fréchet algebra, c-Sequence, Generalized Lipschitz mapping, Fixed point.

AMS Mathematical Subject Classification [2010]: 46B20, 47H10.

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*Presenter

Generalized T_F-Contractive Mappings and Solving Some Polynomials

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Abstract. In this paper, by considering generalized T_F-contractive mapping and the concept of sequentially convergent, we give the existence and uniqueness of a fixed point. These conditions are analogous to Ćirić conditions. Also, we show that the concept of sequentially convergent is a special case of the concept of graph closed. Finally, by using the main theorem, we present an application to solving some polynomials.

Keywords: Contractive mapping, Generalized T_F-contractive mapping, Graph closed.

AMS Mathematical Subject Classification [2010]: 46J10, 46J15, 47H10.

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A Perturbation of Controlled Generalized Frames

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Abstract. We define a new perturbation of controlled g-frames by appropriate bounded invertible operators to obtain new g-frames from a given one with optimal g-frame bounds. Also we generalize an identity to the controlled g-frames.

Keywords: g-Frames, Controlled g-frames, Perturbation.

AMS Mathematical Subject Classification [2010]: 42C15, 68M10, 46C05.

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*Presenter

Some Common Fixed Point Results in Cone Metric Spaces

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ABSTRACT. In this paper, we introduce the concept of $\alpha - \psi - f$-contractive mappings and establish some specific common fixed point results, inparticular, generalized Lipschitz condition for such mappings in cone metric spaces over Banach algebras.

Keywords: Cone metric space, Contractive mapping, Weakly compatible, Fixed point, Common fixed point.

AMS Mathematical Subject Classification [2010]: 47H10, 54H25.

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*Presenter

On Generalization of Knaster-Kuratowski-Mazurkiewicz Theorem

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Abstract. This paper deals with some results in generalized convex spaces. The notion of minimal generalized convex space is introduced and then two well known results in nonlinear analysis, that is the open and closed versions of Fan-KKM principle in this new setting are considered. Indeed, it is shown that, for any m-closed(m-open) valued KKM map $F : D \multimap X$ in a minimal generalized convex space (X, D, Γ), $\{F(z) : z \in D\}$ has the finite intersection property.

Keywords: Generalized convex space, Fan-KKM Principle, Finite intersection property.

AMS Mathematical Subject Classification [2010]: 26A51, 26B25, 54A05.

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*Presenter

Generalized Inverses of Unbounded Regular Operators and Their Bounded Transforms

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Abstract. We investigate about generalized invertibility of unbounded regular operator on Hilbert C*-modules and and give a relation between the graph of a regular operator and its generalized inverse. We also obtain the bounded transform of a regular operator in terms of the bounded transform of its generalized inverse. We also give a metric on the space of closed densely defined operators on Hilbert C*-modules over C*-algebra of compact operators. Some further identities of closed and regular modular operators are also obtained.

Keywords: Hilbert C*-module, Unbounded regular operators, Projections, Graph of operators, Generalized inverse.

AMS Mathematical Subject Classification [2010]: 46L08, 47A05, 46C05.

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*Presenter

on φ-Connes Amenability of Dual Banach Algebras and φ-splitting

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Abstract. Let φ and ψ be ω^*-continuous homomorphisms from dual Banach algebras to $\mathbb{C}$. We present a characterization of φ-Connes amenability of a dual Banach algebra $\mathcal{A}$ with predual $\mathcal{A}_*$ in terms of so-called φ-splitting of the short exact sequences. Also, we investigate the relation between φ-splitting of the certain short exact sequence and φ-σwc virtual diagonal of a Banach algebra. The relation between φ-splitting and ψ-splitting with $\varphi\otimes\psi$-splitting of the certain short exact sequence is obtained. Other results in this direction are also obtained.

Keywords: φ-σwc Virtual diagonal, φ-Connes amenability, φ-Splitting, Dual Banach algebra.

AMS Mathematical Subject Classification [2010]: 46J10, 43A22, 16D40.

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Contributed Poster

Code and Cryptography

Coding Theory on the Generalized Balancing Sequence

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Abstract. In this paper, we introduce the generalized balancing sequence and its matrix. Then, we get the nth power of its matrix denoted by Q_m^n. At last, by using Q_m^n, we give the coding and the decoding method.

Keywords: Generalized k-balancing number, Coding and decoding method.

AMS Mathematical Subject Classification [2010]: 11C20, 11B39, 68P30.

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Differential Equations and Dynamical Systems

The Fibering Method Approach to a Singular (p, q)-Laplacian Equation

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Abstract. In this paper, the existence of two weak non-negative non-trivial solutions of a nonlinear problem involving the (p, q)-Laplacian operator in a bounded domain with smooth boundary in $\mathbb{R}^N$ is proved via fibering method.

Keywords: (p, q)-Laplacian equation, Fibering method, Nehari manifold.

AMS Mathematical Subject Classification [2010]: 35J75, 35D30, 35P30.

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*Presenter

The Existence and Uniqueness of Solution for Fuzzy Differential Equations in Dual Form

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ABSTRACT. In this paper, we introduce the dual form of a fuzzy differential equation, the so-called dual fuzzy differential equation. We obtain the results of existence and uniqueness of solution to a class of dual fuzzy differential equations from the point of view G-differentiability concept.

Keywords: Fuzzy, Fuzzy differential equations, Fuzzy dual differential equations.

AMS Mathematical Subject Classification [2010]: 34A07, 34K36, 35R13.

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*Presenter

Some Properties for a Class of Fourth Order Difference Equation with Boundary Balue Condition in Finite Dimension Space

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Abstract. In this paper we provide some properties that to be useful for solving a class of fourth order difference equation with boundary value condition in finite dimension space. This discrete anisotropic boundary value problem involving $p(k)$-Laplacian operator with Dirichlet and Neumann boundary value conditions are known to be mathematical models of various phenomena such as elastic mechanics, electrorheological fluids and image restoration. These properties can be applied in variational approach.

Keywords: Discrete nonlinear boundary value problems, Nontrivial solution, Variational methods, Critical point theory.

AMS Mathematical Subject Classification [2010]: 39A10, 47A75, 34B15.

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*Presenter

Generalized Two-Sided Shift Map

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Abstract. The two-sided shift maps are automorphisms and one-sided shift maps are endomorphisms. These maps can be conjugate or semi-conjugate to some automorphisms or endomorphisms which admit appropriate Markov partitions. Here, we aim to introduce a generalized two-sided shift map for endomorphisms.

Keywords: Shift map, Endomorphism.

AMS Mathematical Subject Classification [2010]: 37B10, 08A35.

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*Presenter

Chaotic Behaviour of Baker-Like Maps with One Discontinuity Point

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Abstract. This paper deals with a family of one dimensional discontinuous maps known as Baker like maps. For this family it is studied the problem of existence of chaos according to the well known definition by Devaney. In fact, it is shown that if f is a generalized semi-baker map with two branches and its derivative greater than or equal to $\sqrt{2}$, then the dynamical system related to that is chaotic in the sense of Devaney.

Keywords: Dynamical system, Devaney chaos, Discontinuity point.

AMS Mathematical Subject Classification [2010]: 37B99, 37C70.

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Symbolic Dynamics of All Degrees of Freedom Around Symmetric Homoclinics

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Abstract. In this paper, we consider a spatial symmetric system with double spiral homoclinic orbits. We construct the global Poincare map in the outer region of the homoclinic orbits and show that the system has symbolic dynamics of all degrees of freedom.

Keywords: Poincare map, Double symmetric homoclinic orbit, Symbolic dynamic of N_0 degrees of freedom.

AMS Mathematical Subject Classification [2010]: 37C29, 37B10.

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*Presenter

Discontinuous Sturm-Liouville Problem and Prüfer Substitutions

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Abstract. In this work, we consider a discontinuous Sturm-Liouville problem with separated boundary conditions and discontinuity conditions in $\frac{b}{2} \in (0, b)$. First, we present new Prüfer substitutions for discontinuous case. Then, the asymptotic form of the eigenvalues and the nodal points are obtained. Finally, by using the nodal lengths, we obtain the solution of the inverse nodal problem.

Keywords: Discontinuous Sturm-Liouville problem, Prüfer substitutions, Nodal points, Inverse problem.

AMS Mathematical Subject Classification [2010]: 34A55, 34B24.

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*Presenter

Contributed Posters

Geometry and Topology

An Expansion for the Prime Counting Function

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Abstract. In this article, we obtain a connection between the function $\omega(n) = \sum_{\substack{p|n \\ p \text{ is prime}}} 1$ and the prime counting function $\pi(x)$. This connection implies an elementary formula for $\pi(x)$ in terms of the Möbius function $\mu(n)$. Also, we obtain a conditional asymptotic expansion for the fractional part sum $\sum_{p\leqslant x}\{\frac{x}{p}\}$.

Keywords: Arithmetic function, Prime number.

AMS Mathematical Subject Classification [2010]: 11A25, 11A41.

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*Presenter

Some Results on Generalized Harmonic Maps with Potential

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Abstract. In this paper, the second variation formula for exponential harmonic maps with potential is obtained. As an application, instability and nonexistence theorems for exponential harmonic maps with potential are given.

Keywords: Exponential harmonic maps, Stability, Riemannian manifolds, Calculus of variations.

AMS Mathematical Subject Classification [2010]: 53C43, 58E20.

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*Presenter

A New Generalization of Orbifolds Using of Generalized Groups

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Abstract. Our ultimate goal in this paper is to introduce a special type of topological spaces including manifolds and also, orbifolds. Because of using of generalized groups, we call them *GG-spaces.* We will study their properties, and then we will introduce a special GG-space that is not manifold and orbifold. Finally we obtain conditions that cause a GG-space to become manifold.

Keywords: Generalized group,T-Space, Quotient space, Orbifold.

AMS Mathematical Subject Classification [2010]: 22A20, 22A99, 16W22.

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*Presenter

Anti-Invariant Riemannian Submersion from a Golden Riemannian Manifold

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Abstract. In this paper, we define anti-invariant Riemannian submersions from golden Riemannian manifolds onto Riemannian manifold and study some properties of them.

Keywords: Riemannian submersion, Anti-invariant Riemannian submersion, Golden Riemannian manifold.

AMS Mathematical Subject Classification [2010]: 53C15, 53B20.

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*Presenter

Notes on Maximal Subrings of Rings of Continuous Functions

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ABSTRACT. In this paper, by using the notion of singly generated subrings and subalgebras, and realcompactifications generated by subsets of $C(X)$, we investigate some new observations on maximal subrings of rings of continuous functions form which some new proofs to some results of [1] follow.

Keywords: Maximal subing, Intermediate ring, Realcompactification, Singly generated subalgebra.

AMS Mathematical Subject Classification [2010]: 54C30, 46E25.

References

1. F. Azarpanah and A. R. Olfati, *On subrings of the form* $I+\mathrm{Re}$ *of* $C(X)$*,* J. Commut. Algebra **11** (2019) 479–509.

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*Presenter

On Ideals of the Subalgebra $L_{cc}(X)$ of $C(X)$

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ABSTRACT. Let $L_{cc}(X) = \{f \in C(X) : |X \setminus C_f| \leq \aleph_0\}$, where C_f is the union of all open subsets $U \subseteq X$ such that $|f(U)| \leq \aleph_0$. We prove that for any space X (not necessarily completely regular) there is a co-locally countable completely regular space Y which is a continuous image of X and $L_{cc}(X) \cong L_{cc}(Y)$. An ideal J in $L_{cc}(X)$ is a z_L-ideal if and only if it is a contraction of a z-ideal of $C(X)$. If P is a prime ideal in $L_{cc}(X)$ which is minimal over a z_L-ideal I in $L_{cc}(X)$, then P is a z_L-ideal. It is shown that every z_L-ideal I is a flat $L_{cc}(X)$-module. An ideal I of $L_{cc}(X)$ is a z_L-ideal if and only if every minimal overideal of I is a z_L-ideal.

Keywords: Co-Locally functionally countable subalgebra, *lcc*-Completely regular space, z_L-Ideal.

AMS Mathematical Subject Classification [2010]: 54C30, 54C40, 54C05.

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Graphs and Combinatorics

Global Accurate Dominating Set of Trees

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Abstract. A dominating set D of a graph $G = (V, E)$ is an accurate dominating set, if $V - D$ has no dominating set of cardinality $|D|$. An accurate dominating set D of a graph G is a global accurate dominating set, if D is also an accurate dominating set of $\overline{G}$. The global accurate domination number $\gamma_{ga}(G)$ is the minimum cardinality of a global accurate dominating set. In this paper we study the global accurate dominating sets of trees and characterize the trees by their global accurate domination numbers.

Keywords: Global accurate dominating set, Tree.

AMS Mathematical Subject Classification [2010]: 05C65.

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*Presenter

The Metric Dimension of the Composition Product of Some Families of Graphs

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ABSTRACT. A set of vertices W is a resolving set for a connected graph G if every vertex is uniquely determined by its vector of distances to the vertices in W. The minimum cardinality of a resolving set of G is the metric dimension of G. The composition product of graphs G and H, $G \circ H$, is the graph with vertex set $V(G) \times V(H) := \{(u, v) \mid u \in V(G), v \in V(H)\}$, where (a, b) is adjacent to (u, v) whenever a is adjacent to u, or $a = u$ and b is adjacent to v. In this paper, the metric dimension of composition product $G \circ H$ is considered when G or H or both of them is in some families of graphs such as paths, cycles, bipartite graphs and Kneser graphs.

Keywords: Composition product, Metric dimension, Adjacency dimension.

AMS Mathematical Subject Classification [2010]: 05C12.

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*Presenter

The Forgotten Coindex of Several Random Models

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Abstract. The forgotten coindex of a graph G is defined as

$$\overline{F}(G) = \sum_{uv \notin E(G)} [deg(u)^2 + deg(v)^2],$$

where $deg(u)$ is the degree of the vertex u of G. In this article, we investigate the forgotten coindex of several random models, including random recursive trees, random heap-ordered trees, and random d-ary increasing trees.

Keywords: Forgotten coindex, Random trees, Mean.

AMS Mathematical Subject Classification [2010]: 05C05, 60F05.

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*Presenter

Inequalities on Energy of Graphs and Matrices

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Abstract. Let D be a symmetric matrix. The energy of D is defined as the sum of the absolute values of its eigenvalues. In addition, the energy of a simple graph G is defined as the energy of the adjacency matrix of G. We study the energy of matrices, in particular the energy of graphs, and obtain some inequalities for them.

Keywords: Energy of graphs, Energy of matrices.

AMS Mathematical Subject Classification [2010]: 05C31, 05C50, 15A18.

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*Presenter

Binary Words and Majorization

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ABSTRACT. The majorization graph of binary words, denoted by $\mathcal{MG}_n$, is a graph whose vertex set is the set of all non-trivial bianary words with length n and two distinct vertices are adjacent if one of them majorizes the other one. Here, the connectivity and weakly perfecness of $\mathcal{MG}_n$ are studied and graph parameters such as girth, clique and chromatic numbers are determined.

Keywords: Majorization graph, Binary word, Weight.

AMS Mathematical Subject Classification [2010]: 68Q87, 05C30, 05C15.

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A Novel Method for Finding PI Index of Polyomino Chains and its Extremals

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Abstract. The PI index of a graph G is the sum of the number of edges which are not equidistant to u and v. In this paper the PI index of polyomino chains by different method is computed. Then first, second extremal of polyomino chains with respect to the PI index are also determined.

Keywords: PI index, Polyomino chain.

AMS Mathematical Subject Classification [2010]: 92E10, 05C35.

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Logic

A Note on Finite Version of the Thin Set Theorem

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Abstract. The Thin Set Theorem states that for all $f : \mathbb{N}^k \to \mathbb{N}$, there exists an infinite set $A \subseteq \mathbb{N}$ such that $f[A^k] \neq \mathbb{N}$. In this talk, we study the finite version of the Thin Set Theorem in Peano Arithmetic, PA. Moreover, we present some problems concerning this theorem.

Keywords: Ramsey theory, Peano arithmetic, Thin set theorem, Free set theorem.

AMS Mathematical Subject Classification [2010]: 03B30, 03F30, 03C62.

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Interdisciplinary Mathematics

Mackey-Glass Time Series Prediction Using Rough-Neural Networks

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Abstract. Due to the wonderful properties of artificial neural networks (ANNs) such as universal approximation, they have been used to approximate the nonlinearities in many disciplines of science and engineering. In this work, we propose the rough-neural networks (R-NNs) for the one-step ahead prediction of the Mackey-Glass time series (TS) as an important benchmark problem in TS forecasting. We train the R-NNs with a Lyapunov-based learning algorithm and we compare the simulation results with multilayer perceptron.

Keywords: Artificial neural networks, Time series prediction, Rough-neural networks, Mackey-Glass time series, Lyapunov-based learning algorithm.

AMS Mathematical Subject Classification [2010]: 68T05, 62M10.

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*Presenter

Some Families of Composite Graphs and Distance-Based Invariants

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Abstract. In this paper, we consider some families of composite graphs such as double graphs, extended double covers, and strong double graphs, and study the relation between some distance-based graph invariants of the resulting graphs with the corresponding invariants of the parent graph.

Keywords: Eccentricity of a vertex, Graph invariant, Composite graph.

AMS Mathematical Subject Classification [2010]: 05C12, 05C76.

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*Presenter

Graph Theoretical Models for Genome Rearrangements Analysis

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Abstract. The computational study of genome rearrangements is one of the most important research area in computational biology and bioinformatics. In this paper, we define a novel graph data structure as a rearrangement model for whole genome alignment in large scales. This model is capable of realizing non-collinear changes as well as collinear changes. Also we apply our rearrangement graphical model to present a dynamic programing method for alignment of an arbitrary sequence to a pan-genome reference which is encoded as an outerplanar graph. In this method, a gapped alignment is considered where the gaps could be affine, linear or constant.

Keywords: Genome analysis, Graph theory, Multiple alignment, Genome rearrangement.

AMS Mathematical Subject Classification [2010]: 92B05, 92C05, 92C42.

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*Presenter

Controlling A Class of Nonlinear Time-Delayed Systems by Using SMC Technique

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Abstract. This paper considers a sliding mode control (SMC) of nonlinear systems. The systems under consideration involve perturbations and time delay. The aim of this paper is to design a sliding mode controller such that the nonlinear system is asymptotically stable and its trajectory can be driven onto the sliding surface in finite time. A numerical example is given to illustrate the effectiveness of the proposed main results.

Keywords: Delay, Sliding Mode Control, Finite-Time Bounded Control.

AMS Mathematical Subject Classification [2010]: 93C43, 93C05, 93D05.

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*Presenter

Nonstandard Finite Difference Scheme to Approximate the Coronavirus Disease Model

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Abstract. In this paper, numerical solution of the Coronavirus disease 2019 (COVID-19) model is presented on the basis of nonstandard finite difference (NSFD) scheme. At first, the positivity and boundedness of the model are discussed. Afterwards, the stability analysis of the equilibrium point model is discussed in detail. The nonstandard finite difference scheme is implemented to study the dynamic behaviours COVID-19 model. Numerical results show that the NSFD scheme approach is easy to be implemented and accurate when applied to COVID-19 model.

Keywords: Boundedness, COVID-19, Nonstandard finite difference scheme, Positivity, Stability.

AMS Mathematical Subject Classification [2010]: 34D05, 92D30.

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*Presenter

Pricing European and American Options with Rationality Parameter

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Abstract. In this paper finite element methods for pricing European and American option with rationality parameter are proposed. Although the solution converges to the solution of the classical American option price when the parameter tends to infinity, for finite values of the parameter the classical boundary conditions cannot apply and we propose specific ones. finally, we present numerical results to examine our method.

Keywords: Finite element method, Rationality parameter, Black-Scholes equations.

AMS Mathematical Subject Classification [2010]: 60G40, 65N06, 65N12.

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*Presenter

Numerical Solution of Fuzzy Differential Equations by Two-Step Modified Simpson Rule

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Abstract. In this paper, a numerical explicit two-step modified Simpson rule for fuzzy first-order initial value problem is present, and their applicability is illustrated with an example.

Keywords: Fuzzy differential equations, Fuzzy Cauchy problem, Two-step methods, Midpoint rule, Trapezoidal rule, Modified Simpson rule.

AMS Mathematical Subject Classification [2010]: 03B52, 03E72, 28E10.

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*Presenter

On Neutro Quadruple Groups

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Abstract. As generalizations and alternatives of classical algebraic structures there have been introduced in 2019 the Neutro Algebraic Structures (or Neutro Algebras) and Anti Algebraic structures (or Anti Algebras). Unlike the classical Algebraic Structures, where all operations are well-defined and all axioms are totally true, in Neutro Algebras and Anti Algebras the operations may be partially well-defined and the axioms partially true or respectively totally outer-defined and the axioms totally false. These Neutro Algebras and Anti Algebras form a new field of research, which is inspired from our real world. In this paper, we study neutrosophic quadruple algebraic structures and Neutro Quadruple Algebraic Structures. Neutro Quadruple Group is studied in particular and several examples are provided. It is shown that $(NQ(\mathbb{Z}), \div)$ is a Neutro Quadruple Group. Substructures of Neutro Quadruple Groups are also presented with examples.

Keywords: Neutrosophic quadruple number, Neutro quadruple group, Neutro quadruple subgroup.

AMS Mathematical Subject Classification [2010]: 03E72, 06F35, 08A72.

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Numerical Analysis

A New Approach for Numerical Solution of the q-Fractional Differential Equations

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Abstract. In this paper, we first convert the problem under investigation into the equivalent q-integral equation by some essential results of fractional q-calculus. Next, the RBF collocation method and the Newton-Raphson iterative algorithm are combined for solving the latter q-integral equation. Finally, one test problem including nonlinear example is presented to illustrate the robustness of the proposed global scheme with respect to recent methods in the literature.

Keywords: q-Fractional derivative, q-Fractional integral, q-Fractional differential equation, Radial basis functions, Collocation method.

AMS Mathematical Subject Classification [2010]: 05A30, 39A13, 74H20.

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*Presenter

A Note on Family of Additive Semi-Implicit Runge-Kutta Schemes

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ABSTRACT. In this paper, we deal with the order conditions of a family of an additive semi-implicit Runge-Kutta schemes for solving ordinary differential equations (ODEs). It is shown that for the multi-dimensional case, some of extracting order conditions must be added to the order conditions obtained from these methods in the one-dimensional case.

Keywords: Additive semi-implicit Runge-Kutta, Order conditions.

AMS Mathematical Subject Classification [2010]: 65Nxx, 65N06.

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*Presenter

An Inverse Problem for an Equation Modeling Shallow Water under Small Rotation

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Abstract. This article we consider a nonlinear inverse problem related to an equation modeling shallow water under small rotation. By using noisy data, we apply two B-Splines with different levels, the quitic B-spline and septic B-spline, to study this problem. For both levels, we prove the stability and convergence analysis. The results show that an excellent estimation of the unknown functions of the nonlinear inverse problem.

Keywords: Shallow water, Inverse problem, Quartic B-spline, stability.

AMS Mathematical Subject Classification [2010]: 35Q53, 35B35, 68W25, 35R30, 65M70.

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*Presenter

Local RBF-PUM for the Steady-State Diffusion-Reaction System with Discontinuous Coefficients

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Abstract. In this work, we propose the radial basis function (RBF) partition of unity method (PUM) for system of steady-state diffusion-reaction equations with discontinuous coefficients in 2D. The collocation based RBF-PUM is a local mesh-free method that reduces the computational cost of the global versions. To ensure the stability of the solution, as the shape parameter ε goes to zero, the RBF-QR algorithm is employed. This algorithm bypasses troubles associated with the determination of ε and enables us to get higher accuracy. Our results show the potential of proposed method in handling arbitrary interfaces and relatively large scale domains.

Keywords: Radial basis function (RBF), Partition of unity method (PUM), RBF-QR algorithm, Steady-state diffusion-reaction system.

AMS Mathematical Subject Classification [2010]: 35J57, 65N35, 82B24.

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*Presenter

The Three-Term Recurrence Variant of the Conjugate Gradient Squared Method to Solve the Non-Symmetric Linear System $Ax = b$

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Abstract. In this paper, the three-term recurrence variant of conjugate gradient squared algorithm for solving the non-symmetric linear system $Ax = b$ is obtained. Numerical examples are provided to compare the efficiency of the proposed method with common CGS method.

Keywords: Cgs, Cgs-ttrv, Iterative methods.

AMS Mathematical Subject Classification [2010]: 65F22, 65F25, 65L80.

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*Presenter

Simulation of Some Numerical Methods for RODEs Driven by Fractional Brownian Motion

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Abstract. Similar to the deterministic calculus, most of the stochastic differential equations and random ordinary differential equations (RODEs) do not have explicit analytical solutions and numerical methods are important tools to investigate these equations. The aim of this paper is to investigate simulation of some numerical methods for RODEs which are derived by fractional brownian motions with Hurst Parameter H.

Keywords: Random ordinary differential equations, Fractional Brownian motion, implicit methods.

AMS Mathematical Subject Classification [2010]: 60G22, 37H10, 65C30.

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*Presenter

The Local Meshless Collocaion Method for Solving 2D Fractional Klein-Kramers Dynamics Equation on Irregular Domains

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Abstract. Here, we propose a local meshless collocation method to solve two-dimensional (2D) Klein-Kramers equation with a fractional derivative in the Riemann-Liouville sense, in the time term. The radial basis function-differential quadrature method (RBF-DQ) has been employed to estimate the spatial directions. To discrete the time-variable, we employ two different strategies with convergence orders $\mathcal{O}(\tau^{1+\alpha})$ and $\mathcal{O}(\tau^{2-\alpha})$ for $0 < \alpha < 1$.

Keywords: Fractional Klein-Kramers, RBF-differential quadrature method, Local meshless collocation method, Riemann-Liouville fractional derivatives.

AMS Mathematical Subject Classification [2010]: 26A33, 34K37, 35R11.

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*Presenter

Operational Matrices for Solving Two-Dimensional Nonlinear Fractional Integral Equations

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Abstract. The aim of this research is to present a new and efficient numerical method to approximate the solutions of some classes of two-dimensional nonlinear fractional integral equations using the operational matrices of two-variable shifted fractional-order Jacobi polynomials (SFOJPs). Discussion on the convergence analysis and error bound of the proposed method is presented. The efficiency, accuracy, and validity of the presented method are demonstrated by its application to two test examples and by comparing our results with the results obtained by existing methods available in the literature recently.

Keywords: Two-dimensional nonlinear fractional Fredholm and Volterra integral equations, Two-variable shifted fractional-order Jacobi polynomials, Operational matrices, Collocation method, Convergence analysis.

AMS Mathematical Subject Classification [2010]: 33C45, 26A33, 65N35.

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*Presenter

Existence Theorem of a Quasi Solution to Inverse Source Problem in a Space Fractional Diffusion Equation

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Abstract. In this paper, the existence solution of an inverse source problem related to a space fractional diffusion equation is studied. To this end, we consider a methodology, involving minimization of a cost functional to identify the unknown source function $f = f(x,t)$. Firstly, the stability of the corresponding direct problem is proved and then the continuity of the cost functional is concluded. Using these results the existence solution of the inverse source problem is given in an appropriate compact subset of admissible functions.

Keywords: Minimization of a cost functional, Inverse source problem, Space fractional diffusion equation.

AMS Mathematical Subject Classification [2010]: 35R30.

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*Presenter

The Spectral Element Method for the Solution of Two Dimensional Telegraph Equation

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Abstract. In this paper, we present a numerical scheme for the solution of two dimensional telegraph equation. We use spectral element method in spatial direction and Crank-Nicolson method in temporal direction. The unconditional stability of the semi discrete scheme is proved and error estimate of the fully discrete method is presented. Finally, we consider a test problem to demonstrate the accuracy and applicability of the proposed method.

Keywords: Two dimensional telegraph equation, Spectral element method, Crank-Nicolson scheme.

AMS Mathematical Subject Classification [2010]: 65M06, 65M60, 65M12.

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*Presenter

Approximation of Wiener Integrals via Rationalized Haar Functions

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ABSTRACT. In this paper, we present a suitable numerical technique to approximate the Wiener integrals which either their exact values are not available or finding their exact values are complicated. This suggested method is based on rationalized Haar functions which form a orthogonal basis for Hilbert space $L^2[0, 1]$. Finally, we estimate some numerical examples to indicate the high accuracy and efficiency of the suggested technique.

Keywords: Brownian motion process, Wiener integrals, Rationalized Haar functions.

AMS Mathematical Subject Classification [2010]: 60J65, 60H05.

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*Presenter

Construction of a New Family of Optimal Fourth Order Methods without Derivative for Solving Nonlinear Equations

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Abstract. In this investigation, a new one-parameter family of derivative free two-point methods of the optimal order four to find simple roots of nonlinear equations is proposed and analyzed. The new scheme is constructed using the idea of rational interpolation. Several numerical examples are given to illustrate the performance of the presented method.

Keywords: Derivative free method, Rational interpolation, Order of convergence, Iterative methods.

AMS Mathematical Subject Classification [2010]: 65H05, 65B99, 65G30.

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*Presenter

An Operational Matrix Based-Method Using the Barycentric Basis Functions to Solve the Model of HIV Infection of CD4$^+$ T-cells

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Abstract. In this study, a class of nonlinear ordinary differential equation systems that arising in the HIV infection model of CD4$^+$ T-cells is approximated by the numerical method based on operational matrices of the barycentric rational basis functions. Applying the proposed method, the nonlinear governing ordinary differential equations are reduced to a system of nonlinear algebraic equations. In the end, the efficiency of the proposed method is illustrated with some numerical examples and compared with some existing numerical methods.

Keywords: HIV Infection of CD4$^+$ T-cells, Barycentric rational basis functions, Operational matrices.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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Contributed Posters

Optimization

A Modified Conjugate Gradient Method for Nonsmooth Optimization Problems

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Abstract. In this paper, we introduce an efficient conjugate gradient method for solving nonsmooth optimization problems by using the Moreau-Yosida regularization approach. The search directions generated by our proposed procedure satisfy the sufficient descent property, and more importantly, belong to a suitable trust region. Our proposed method is globally convergent under mild assumptions. The numerical comparative results on a collection of test problems show the efficiency and superiority of our proposed method.

Keywords: Conjugate gradient method, Nonsmooth optimization, Global convergence.

AMS Mathematical Subject Classification [2010]: 65K10, 65Kxx.

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*Presenter

Minimal Zero Norm Solution for Quadratic Programming Problem

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Abstract. The Quadratic Programming (QP) is used in many important issues in our lives, such as finance, agriculture, economics, and marketing. So far, a variety methods have been presented to solve this problem and each method has its own advantages and disadvantages. In this article, we will reach the minimal zero norm solution of the non-linear problem equal with QP, using the Karush-Kuhn-Tucker (KKT) method. Since the conditions in KKT method are the sufficient conditions required for solving the problem, with the new method the general optimal would be found. In the last part, there would be numerical examples solved and the results would be compared with other resources, to study the efficiency of the method.

Keywords: Karush-Kuhn-Tucker conditions, Minimal zero norm, Non-linear programming, Quadratic programming.

AMS Mathematical Subject Classification [2010]: 90C20, 90C29, 65F35, 65F99.

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*Presenter

A New Proof of the Second Order Conditions of Non-Linear Fractional Programming

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Abstract. In this paper we give a new, simple proof of the standard first and second order necessary conditions, under the Mangasarian-Fromovitz constraint qualification (MFCQ), for non-linear fractional programming problems. We work under a mild constraint qualification, which is implied by (MFCQ). This makes it possible to reduce the proof to the relatively easy case of inequality constraints only under (MFCQ). The new proof is based on the duality theorem for linear programming.

Keywords: Fractional programming, Second order conditions, Constraint qualification, Optimality conditions.

AMS Mathematical Subject Classification [2010]: 90C32, 90C46, 90C30.

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*Presenter

A Novel Scaled Conjugate Gradient Method for Large Scale Unconstrained Optimization Problems

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Abstract. Here, a new spectral conjugate gradient method, based on a modified secant equation, is proposed for solving large scale unconstrained optimization problems. The new method has two main features contain sufficient descent and conjugacy conditions, which are essential for the global convergence. Numerical experiments are done on a set of test functions of the CUTEr collection and the results are compared with some well-known methods.

Keywords: Large scale unconstrained optimization (LUO), Spectral conjugate gradient (SCG), Modified secant equations.

AMS Mathematical Subject Classification [2010]: 90C06, 90C26, 65Y20.

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*Presenter

Function Approximation Using Feed-Forward Neural Networks

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Abstract. Here, a three layer backpropagation feed-forward neural network with batch updating approach, is proposed for function approximation. The training process is considered as different conjugate gradient (CG) algorithms. Numerical experiments show that the Fletcher Reeves CG algorithm is the most accurate than other methods.

Keywords: Feed-forward neural network, Function approximation, Conjugate gradient.

AMS Mathematical Subject Classification [2010]: 13F55, 05E40, 05C65.

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*Presenter

The Minimax Location Problem with Closest Distance with Circle Demand Regions

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Abstract. We consider the constrained minimax location problem with closest distance and circle demand regions. Some properties concerning existence and uniqueness of the optimal solution are provided. The existence and uniqueness of the optimal solution are investigated. Moreover, we develop an efficient algorithm for solving this class of problems and we provide its convergence under some mild assumptions.

Keywords: Minimax, Location, Algorithm, Optimality condition, Uniqueness.

AMS Mathematical Subject Classification [2010]: 49J52, 65K10, 90C26.

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Contributed Posters

Probability and Statistical Process

On the Tsallis Entropy Rate of Hidden Markov Chains

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Abstract. We study the Tsallis entropy rate of a hidden Markov process, defined by observing the output of a symmetric channel whose input is a first order Markov process. Although this definition is very simple, obtaining the exact amount of entropy rate in calculation is very difficult. We introduce some probability matrices based on Markov chain's and channel's parameters. Then, we try to obtain an estimate for the Tsallis entropy rate of hidden Markov chain by matrix algebra and its spectral representation. To do so, we use the Taylor expansion, and calculate some estimates for the first terms, for the entropy rate of the hidden Markov process.

Keywords: Perron-Frobenius theorem, Probability matrices, Spectral representation, Taylor expansion.

AMS Mathematical Subject Classification [2010]: 60J10, 94A17.

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*Presenter

Generalized Entropy for Super Diffusion Walks in Graphs

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Abstract. In this paper, the entropy of the stochastic processes created by the movement of a walker in a graph is investigated. The Shannon-Khinchin entropy has four axioms that ignore one of them can make the generalized entropy. Here, we investigate the number of different finite paths asymptotically, for determining a generalized entropy. Then, we will study a special graph with finite nodes, with two different types of motion.

Keywords: Generalized entropies, Khinchins axioms, Random walks, Perron-Frobenius theorem.

AMS Mathematical Subject Classification [2010]: 60J10, 94A17.

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*Presenter

A New Wrapped Probability Distribution with Application in Weather Studies

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ABSTRACT. Some important variables such as wind directions are plays major role in the weather studies. Given the widespread use of the gamma variance probability distribution in the study of circular data, in this paper, we have proposed a generalization of this probability distribution named as the wrapped variance gamma probability distribution along with its probability density function. We also have studied some important features of this probability distribution. In practice, we have applied this probability distribution to a data set which consists of the wind directions data at a site on the Black mountain in the Australian Capital Territory. Because it has been made clear that wind directions and its characteristics are important for the maintenance of climate change and wind energy functioning.

Keywords: Circular data, Wrapped probability distribution, Wrapped variance gamma probability density function, Moments, Wind directions.

AMS Mathematical Subject Classification [2010]: 60E05.

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*Presenter

Extended Cumulative Residual Entropy for Coherent Systems Lifetime

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Abstract. Recently, a new extension of cumulative residual entropy is introduced by [1]. In this paper, we study this measure of information for the coherent systems lifetime with identically distributed components. We also obtain the bounds for this measure in coherent systems with dependent and identically distributed components.

Keywords: Coherent systems, Extended cumulative residual entropy, Measure of information.

AMS Mathematical Subject Classification [2010]: 62D05, 62F07, 62G30.

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