



Dedicated to the 100<sup>th</sup> Anniversary of the Founding of the Republic of Türkiye

ORAL PRESENTATIONS

# CONFERENCE PROGRAM

## 7<sup>th</sup> INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES

20-21 May  
2023, ELAZIĞ - TÜRKİYE

"CMES 2023 Symposium is supported by TUBITAK."

Publish date: 20.05.2023



# **THE SEVENTH INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES (CMES-2023), ELAZIĞ/TÜRKİYE, MAY 20-21, 2023**

The Seventh International Conference on Computational Mathematics and Engineering Sciences (CMES-2023) will be held in Firat University from 20- to 21 May 2023 in Elazığ, Türkiye. It provides an ideal academic platform for researchers and professionals to discuss recent developments in both theoretical, applied mathematics and engineering sciences. This event also aims to initiate interactions among researchers in the field of computational mathematics and their applications in science and engineering, to present recent developments in these areas, and to share the computational experiences of our invited speakers and participants.

The Organizing Committee

*©All Rights Reserved. This conference is organized by a cooperation of several international organizations including Firat University, Moulay Ismail University, Private University of Fes, Université Privée De Fés, Kırgızistan-Türkiye Manas Üniversitesi, Fırat International University, Harran University, Van Yüzüncü Yıl University, İnönü University, Ordu University, İstanbul Ticaret University, Azarbaycan University and Atatürk Technical University. No part of this book can be reproduced or utilized in any forms or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval systems, without permission from the authors.*

© The informations provided in the papers published in this book are under the responsibility of their author(s).

## **Committee Chairs**

*Hasan Bulut*, Firat University, Elazığ, Türkiye

*Zakia Hammouch*, Ecole Normale Supérieure de Meknes, Moulay Ismail University, Morocco

## MESSAGE FROM THE GENERAL CHAIRS



Dear Conference Attendees,

We are honored to welcome you to the **Seventh International Conference on Computational Mathematics and Engineering Sciences (CMES-2023)** at Firat University from 20 to 21 May 2023 in Elazığ City, Türkiye.

CMES, founded in 2016 at Faculty of Science and Techniques Errachidia Moulay Ismail University Morocco is an annual international conference, which was very successful in the past years by providing opportunities to the participants in sharing their knowledge and informations and promoting excellent networking among different international universities. This year, the conference includes 200 extended abstracts, several submissions were received in response to the call for papers, selected by the Program Committee. The program features keynote talks by distinguished speakers such as: **Yusif Gasimov** from Azerbaijan University, Baku, Azerbaijan, **M. S. Osman** from Umm Al-Qura University, Makkah, Saudi Arabia, **Delfim F.M. Torres** from University of Aveiro, Portugal, **M.A. Aziz-Alaoui** from University of Le Havre, Normandy, France, **Rachid Yazami** from Nanyang Technological University Singapore, **Vatan Karakaya** from Ahi Evran University, Kırşehir, Türkiye, **Ömer Akın** from TOBB ETÜ University of Economics & Technology, Ankara, Türkiye, **Fernando León Saavedra** from University of Cádiz, Spain, **Bayram Şahin** from Ege University, Türkiye and **Zulqurnain Sabir** from United Arab Emirates University, UAE. The conference also comprises contributed sessions, posters sessions and various research highlights.

We would like to thank the Program Committee members and external reviewers for volunteering their time to review and discuss submitted abstracts. We would like to extend special thanks to the Honorary, Scientific and Organizing Committees for their efforts in making CMES-2023 a successful event. We would like to thank all the authors for presenting their research studies during our conference. We hope that you will find CMES-2023 interesting and intellectually stimulating, and that you will enjoy meeting and interacting with researchers around the world.

***Hasan Bulut,***

Firat University, Elazığ, Türkiye.

***Zakia Hammouch,***

ENS Meknes, Moulay Ismail University Morocco

Thu Dau Mot University, Binh Duong Province, Vietnam

China Medical University Hospital Taichung 40402, Taiwan.

## TOPICS

Applied Mathematics,	Information technology
Financial Mathematics,	Electrical and Electronic Engineering
Control Theory,	Ordinary, Partial, Stochastic and Delay
Game Theory	Differential Equations
Modeling of Bio-systems for Optimization	Chaos and Dynamical Systems
and Control,	Numerical methods and scientific
Linear and Nonlinear programming and	programming
Dynamics,	Fractional Calculus and Applications,
Artificial Intelligence,	Cryptography and its applications
Geometry and Its Applications,	Computational Fluids mechanics, Heat and
Analysis and Its Applications,	Mass Transfers.
Statistics and Its Applications,	Economics and Econometric Studies
Mathematics Education and Its Applications,	Topology and Its Application
Algebra and Its Applications.	Education Sciences
Engineering Sciences	Economics and Econometric Studies
Computer Science	Topology and Its Application

## COMMITTEE CHAIRS

Prof.Dr.Hasan Bulut, Firat University, Elazığ, Türkiye

Prof.Dr.Zakia Hammouch, ENS Meknes, Moulay Ismail University, Morocco

## COMMITTEE CO-CHAIRS

Prof.Dr. Carlo Cattani, Tuscia University, Viterbo, Italy

Prof.Dr. Haci Mehmet Baskonus, Harran University, Sanliurfa, Türkiye

Prof.Dr. Mohammed Ouazzani Jamil, University Privee of Fez, Morocco

## HONORARY COMMITTEE

- Prof.Dr. Fahrettin Göktaş (Rector of Fırat University, Elazığ, Türkiye)  
Prof.Dr. Alpaslan Ceylan (Rector of Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Dr. Saadat Aliyeva (Rector of Azerbaijan University, Baku, Azerbaijan )  
Prof.Dr. Hamdullah Şevli (Rector of Van Yüzüncü Yıl University, Türkiye)  
Prof.Dr. Hüseyin Yaratan (Rector of Final International University, Girne, Cyprus)  
Prof.Dr. Ekrem Savaş (Rector of Uşak University, Türkiye)  
Prof. Dr. Mehmet Tahir Güllüoğlu (Rector of Harran University, Sanliurfa, Türkiye)  
Prof.Dr. Vatan Karakaya (Rector of Ahi Evran University, Kırşehir, Türkiye)  
Prof.Dr. Bülent Çakmak (Rector of Erzurum Technical University, Erzurum, Türkiye)  
Prof.Dr. Ali Akdoğan (Rector of Ordu University, Ordu, Türkiye)  
Prof.Dr. Yücel Oğurlu (Rector of İstanbul Ticaret University, İstanbul, Türkiye)  
Prof.Dr. Hassane Sahbi (President of Moulay Ismail University, Morocco)  
Prof.Dr. Ouazzani Jamil Mohamed (Vice President of Universite Privee of fez, Morocco)  
Prof.Dr. Mohammed Aziz Lahlou (President of Universite Privee of Fes, Morocco)  
Prof.Dr. Omar Ossouaddi (Vice President of Moulay Ismail University, Morocco)  
Prof.Dr. Mohammed Amine (Director of ENS Meknes, Moulay Ismail University, Morocco)  
Prof.Dr. Etibar Penahlı (Baku State University, Baku, Azerbaijan)  
Prof.Dr. Yusif Gasimov (Azerbaijan University, Baku, Azerbaijan)  
Prof.Dr. Necdet Bildik (Retired Faculty Member)  
Prof.Dr. Mahmut Ergüt (Namık Kemal University, Tekirdağ, Türkiye)  
Prof.Dr. Rifat Colak (Fırat University, Elazığ, Türkiye)  
Prof.Dr. Doğan Kaya (İstanbul Ticaret University, İstanbul, Türkiye)  
İbrahim Taşel (Final International University, Girne, Cyprus)  
Şevket Ertem (Final International University, Girne, Cyprus)  
Veysel Demirci (Chairman of the board of Ziver Holding)  
İzzettin Toraman (Chairman of the board of Toraman Tekstil)

## SCIENTIFIC COMMITTEE

- Abdelhai Elazzouzi (Mohamed Ben Abdellah University, Morocco)  
Abdellah Rababah (University of Science and Technology Irbid, Jordan)  
Abdellah Rezzouk (Sidi Mohamed Ben Abdellah University, Morocco)  
Abdellatif Chaira (Moulay Ismail University)  
Abderhamane Ait Aadi (Ens Meknes, Moulay Ismail University, Morocco)  
Abdulhamit Subaşı (University of Turku, Finland)  
Abdulkadir Karakaş (Siirt University, Türkiye)  
Abdullah Çağman (Ağrı İbrahim Cecen University, Türkiye)  
Abdullah Kopuzlu (Ataturk University, Türkiye)  
Abdullahi Yusuf (Biruni University, İstanbul, Türkiye)  
Agamirza Bashirov (Eastern Mediterranean University, Cyprus)  
Ahmed El Khalfi (Sidi Mohamed Ben Abdellah University, Morocco)  
Ahmed Elngar (Beni Suef University Egypt.)

Ahmet Bedri Özer (Firat University, Elazığ, Türkiye)  
Ahmet Dumlu (Erzurum Technical University, Türkiye)  
Ahmet Ocak Akdemir (Ağrı İbrahim Cecen University, Türkiye)  
Ahmet Yıldız (İnönü Univeristy, Malatya, Türkiye)  
Akbar Barati Chiyaneh (Yüzüncüyıl University, Bitlis, Van)  
Ali Akgül (Siirt University, Türkiye)  
Ali Çakmak (Bitlis Eren University, Bitlis, Türkiye)  
Ali Karcı (İnönü University, Malatya)  
Ali Rostami (University of Tabriz, Tabriz, Iran)  
Ali Yousef (Kuwait College Of Science And Technology, Kuwait)  
Alireza Khalili Golmankhaneh (Department Of Physics, Faculty Of Science, Iau Urmia Branch, Iran)  
Alla Belousova (Don State Technical University, Russian Federation)  
Alper Ekinci (Bandırma 17 Eylül University, Türkiye)  
Alper Osman Öğrenmiş (Firat University, Elazığ, Türkiye)  
Alper Polat (Munzur University, Türkiye)  
Aly Ramadan Seadawy (Taibah University, Saudi Arabia )  
Amar Debbouche (Guelma University, Algeria)  
Anargül Urdaletova (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Aneta Barakoska (Faculty of Philosophy, University St. Cyril Macedonia)  
Anna Sandulyak (Université de Moscow, Russia)  
Arife Atay (Dicle University, Türkiye )  
Armando Ciancio (University of Messina, Italy)  
Arzu Akbulut (Eskisehir Osmangazi University, Türkiye)  
Arzu Denk Oguz ( Atılım University, Türkiye)  
Asan Ömüraliyev (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Asif Yokuş (Firat University, Elazığ, Türkiye)  
Avıt Asanov (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Ayhan Şerbetçi (Ankara University, Ankara)  
Aynur Keskin Kaymakçı (Selcuk University, Konya)  
Aynur Yalcıner (Selcuk University, Konya, Türkiye)  
Ayşe Dilek Maden (Selçuk University, Konya)  
Ayşe Metin Karakaş (Bitlis Eren Univeristy, Bitlis, Türkiye)  
Ayşegül Çetinkaya (Ahi Evran University, Türkiye)  
Bashar A.Al-Talip (University of Mosul, Iraq)  
Bayram Çekim (Gazi University, Türkiye)  
Bayram Şahin ( Ege University, İzmir, Türkiye)  
Behçet Öznacar (Near East University, Cyprus )  
Berivan Polat (Munzur University, Türkiye)  
Bilal Alatas (Firat University, Türkiye)  
Bilal Şenol (İnönü University, Malatya)  
Burcu Gürbüz (Johannes Gutenberg-University Mainz, Germany)  
Burçin Doğan (Malatya Turgut Özal University, Türkiye)  
Burhan Tiryakioğlu (Marmara University, Türkiye)  
Bülent Tavlı ( Tobb Economics And Technology University, Türkiye)  
Cameron Browne (University Of Louisiana At Lafayette, Usa)

Carla M.A. Pinto (ISEP | Instituto Superior de Engenharia do Porto, Porto – PORTUGAL)  
Carlo Cattani (Tuscia University, Viterbo Italy)  
Cem Oguz ( Kırsehir Ahi Evran University, Türkiye)  
Cemil İnan (Mardin Artuklu University, Türkiye)  
Ceren Kına (Malatya Turgut Özal University, Türkiye)  
Ceren Sultan Elmalı (Erzurum Technical University, Türkiye)  
Cesim Temel (Yüzüncüyıl University, Türkiye)  
Chérif Ziti (Moulay Ismail University, Morocco)  
Christos Volos (Aristotle University, Greece)  
Çağrı Karaman (Atatürk University, Erzurum, Türkiye)  
Çetin Kürşat Bilir (Ahi Evran University, Türkiye)  
Çiğdem İnan (Mersin University, Türkiye)  
Damla Yılmaz (Erzurum Technical University, Türkiye)  
Danyal Soybaş (Erciyes University, Türkiye)  
Davut Hanbay (İnönü University, Malatya)  
Delfim Torres, (Aveiro University, Portugal)  
Derya Arslan (Bitlis Eren University, Bitlis, Türkiye)  
Derya Avcı (Balıkesir University, Türkiye)  
Devendra Kumar (JECRC University Jaipur, India)  
Dilek Okuyucu (Erzurum Technical University, Türkiye)  
Dumitru Baleanu (Cankaya University, Türkiye)  
Dursun İrk ( Eskişehir Osmangazi University, Eskişehir)  
Dyyak Ivan (Ivan Franko National University, Lviv, Ukraine)  
Ebru Bozkurt (Ataturk University, Türkiye)  
El Hassan Ben Ahmed (Ens Meknes, Moulay Ismail University, Morocco)  
El Houcine Lafhim (Sidi Mohamed Ben Abdellah University, Morocco)  
El Mehdi El Khattabi (Ens Meknes, Moulay Ismail University, Morocco)  
Ella Abilayeva (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Elman Hazar (Iğdır University, Türkiye)  
Emel Biçer (Bingöl University, Türkiye)  
Emrah Yılmaz (Fırat University, Elazığ)  
Engin Özkan (Erzincan Binali Yıldırım University, Erzincan)  
Ennahnahi Nouredine (Sidi Mohamed Ben Abdellah University, Morocco)  
Erdal Baş (Fırat University, Elazığ, Türkiye)  
Erdal Ekici (Çanakkale Onsekiz Mart University, Çanakkale)  
Erdal Ulualan (Kutahya University, Türkiye)  
Erdal Ünlüyol (Ordu University, Türkiye)  
Erhan Deniz (Kafkas University, Türkiye)  
Erhan Güler (Bartın University, Türkiye)  
Erhan Pişkin (Dicle University, Diyarbakır, Türkiye)  
Erhan Set (Ordu University, Türkiye)  
Erol Yaşar (Mersin University, Mersin, Türkiye)  
Esin İlhan (Kırsehir Ahi Evran University / Türkiye)  
Esra Karataş Akgül (Siirt University, Türkiye)  
Eva Kaslik (University of Timisoara, Romania)



Evrin Toklu (Ağrı İbrahim Cecen University, Türkiye)  
Ezgi Kaya (Iğdır University, Iğdır, Türkiye)  
Fahd Jarad (Cankaya University Türkiye)  
Fahrettin Muhtarov (Bakû State University Bakû, Azerbaijan)  
Fahrettin Özbey (Bitlis Eren University, Bitlis, Türkiye)  
Fatma Ayaz (Gazi University, Türkiye)  
Fatma Berna Benli (Erciyes University, Türkiye)  
Fatma Erdoğan (Firat University, Elazığ)  
Fatma Sağsöz (Ataturk University, Türkiye)  
Fatma Taşdelen Yeşildal (Ankara University, Türkiye)  
Fethi Bin Muhammad Belgacem (Paaet, Shaamyia, Kuwait)  
Fethiye Müge Sakar (Dicle University, Türkiye)  
Feyza Esra Erdoğan (Ege University, İzmir, Türkiye)  
Fikret Aliyev (Bakû State University, Bakû, Azerbaijan)  
Filiz Taşcan (Eskişehir Osmangazi University, Eskişehir)  
Firat Evirgen (Balıkesir University, Türkiye)  
Francesco Villecco (University Salerno, Italy)  
Fulya Şahin (Ege University, İzmir, Türkiye)  
Gonca Onargan (Final International University, Girne, Cyprus)  
Gökhan Gökdere (Firat University, Elazığ)  
Gülşat Muhametjanov (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Gürhan İçöz (Gazi University, Türkiye)  
Güven Kaya (Bingöl University, Türkiye)  
Hacer Sengul (Harran University, Sanlıurfa, Türkiye)  
Hacı Bayram Karadağ (İnönü University, Malatya)  
Hacı Mehmet Baskonus (Harran University, Türkiye)  
Hakan Şimşek (Kırıkkale University /Türkiye)  
Halis Yılmaz (Dicle University, Türkiye)  
Halit Orhan (Ataturk University, Türkiye)  
Hamit Mirtağiloğlu (Bitlis Eren University, Bitlis, Türkiye)  
Hamza Erol (Mersin University, Mersin, Türkiye)  
Handan Öztekin (Firat University, Elazığ, Türkiye)  
Hanlar Reşitoğlu (Iğdır University, Türkiye)  
Harun Kaya (Malatya Turgut Özal University, Türkiye)  
Hasan Bulut (Firat University, Türkiye)  
Hasan Toğrul (Batman University, Batman, Türkiye)  
Hassan Qjidaa (Sidi Mohamed Ben Abdellah University, Morocco)  
Hatıra Günerhan (Kafkas University, Türkiye)  
Hatice Kuşak Samancı (Bitlis Eren University, Bitlis, Türkiye)  
Hatun Özlem Güney (Dicle University, Türkiye)  
Hayati Olgar (Gazi Osman Paşa University, Türkiye)  
Hayriye Esra Akyüz (Bitlis Eren University, Bitlis, Türkiye)  
Heybetkulu Mustafayev (Yüzüncüyıl University, Türkiye)  
Hıfı Altınok (Firat University, Elazığ, Türkiye)  
Hijaz Ahmad (Istanbul Ticaret University, Türkiye)

Hikmet Kemalođlu (Fırat University, Elazıđ, Türkiye)  
Hossein Jafari (Unısa University Pretoria, South Africa)  
Hristos Anastassiu (International Hellenic University, Serres, Greece)  
Hülya Durur(Ardahan University, Ardahan, Türkiye)  
Hüseyin Demir (Ondokuz Mayıs University, Türkiye)  
Hüseyin Merdan(TOBB University of Economics and Technology, Türkiye)  
Hüseyin Yıldırım (Maraş Sütçü İmam University, K.Maraş)  
Ihor Prokodushyn (Ivan Franko National University,Lviv,Ukraine)  
Inan Ünal (Munzur University, Türkiye)  
Irina Abakumova (Don State Technical University, Russian)  
Izhar Uddin (Jamia Millia İslamia University. New Delhi, India)  
İbrahim Aktaş (Gumushane University, Türkiye)  
İbrahim Alınur Büyükaksoy (Okan University, Türkiye)  
İbrahim Karahan (Erzurum Technical University, Türkiye)  
İnci Tođrul (Batman University, Batman, Türkiye)  
İpek Abasikeleş Turgut (İskenderun Technical University, Türkiye)  
İsa Yıldırım (Ataturk University, Türkiye)  
İsmail Onur Kıymaz (Ahi Evran University , Türkiye)  
İsmail Özgür Zembat (University of Glasgow, England)  
İsmet Altıntaş (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
İsrafil Okumuş(Erzincan Binali Yıldırım University, Erzincan)  
Jagdev Singh (Jecrc University Jaipur, India))  
Jaouad Danane (University Hassan Iı, Casablanca)  
Jaouad El Makkaoui (Sidi Mohamed Ben Abdellah University, Morocco)  
Jaouad Kharbach (Sidi Mohamed Ben Abdellah University, Morocco)  
Javid Ali (Aligarh Müslim University,India)  
Juan Luis Garcia Guirao (Cartagena University, Spain)  
Kadirhan Polat (Ađrı İbrahim Cecen University, Türkiye)  
Kadriye Aydemir ( Amasya University,Türkiye)  
Kalıřkan Matanova (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Karam Allali (University Hassan Iı, Casablanca)  
Kemal Aydın (Selçuk University ,Türkiye)  
Kexiang Xu (Nanjing University, China)  
Kolade Owolabi (Federal University Of Technology, Negeria)  
Kürřat Akbulut (Ataturk University, Türkiye)  
Lazar Stořić (College For Preschool Teachers, Aleksinac, Serbia)  
Luis Manuel Sánchez Ruiz (Technical University Of Valencia, Spain)  
M. Addam (Nat.School of Applied Sc.Hoceima, Morocco)  
M.A. Aziz Alaoui, (Universite De Normandie Lehavre France)  
Mahir Murat Cengiz (Ataturk University /Türkiye)  
Mahmut Isık (Harran University, Sanlıurfa,Türkiye)  
Mehmet Akif Akyol (Bingöl University, Bingöl, Türkiye)  
Mehmet Atçeken (Tokat Gaziosmanpařa University, Tokat)  
Mehmet Baki Yađbasan ( Kırřehir Ahi Evran University, Kırřehir)  
Mehmet Emir Köksal (Ondokuz Mayıs University, Türkiye)

Mehmet Karay (Final International University, Girne, Cyprus)  
Mehmet Korkmaz (Ordu University, Türkiye)  
Mehmet Küçükaslan (Mersin University, Türkiye)  
Mehmet Mendeş (Canakkale 18 Mart University, Türkiye)  
Mehmet Yavuz (Necmettin Erbakan University, Türkiye)  
Mesut Karabacak (Ataturk University, Türkiye)  
Mhamed El Omari (Sultan Moulay Slimane University, Morocco)  
Mhamed Sayyouri (Sidi Mohamed Ben Abdellah University, Morocco)  
Mohamed Addam (Nat.School Of Applied Sc.Hoceima, Morocco)  
Mohamed Lahby (University Hassan I, Casablanca)  
Mohamed Ouzahra (Mohamed Ben Abdellah University, Morocco)  
Mohamed Rhoudaf (Moulay Ismail University, Morocco)  
Mohammad Mursaleen (China Medical University, Taiwan)  
Mohammed Benslimane (Sidi Mohamed Ben Abdellah University, Morocco)  
Mohammed SEAID (Durham University United Kingdom)  
Muhammed Yiğider (Erzurum Technical University, Türkiye)  
Muhammet Kamali (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Muharrem Tuncay Gençoğlu (Fırat University, Elazığ, Türkiye)  
Murat Çağlar (Erzurum Technical University, Türkiye)  
Murat Karakaş (Bitlis Eren Univeristy, Bitlis, Türkiye)  
Murat Sat (Erzincan Binali Yıldırım University, Türkiye)  
Mustafa Açıkkar (Adana Science And Technology University, Türkiye)  
Mustafa Ali Dokuyucu (Ağrı İbrahim Cecen University, Türkiye)  
Mustafa Kemal Özdemir ( İnönü University, Malatya)  
Mustafa Mikail Özçiloğlu ( Kilis 7 Aralık University, Türkiye)  
Mustafa Yıldırım (Cumhuriyet University, Türkiye)  
Mustapha Ait Khellou (Ens Meknes, Moulay Ismail University, Morocco)  
Muzaffer Aşkın (Munzur University, Tunceli, Türkiye)  
Naci Genc (Van Yüzüncü Yıl University, Türkiye)  
Nagehan Kılınc Gecer ( Kırşehir Ahi Evran University, Türkiye)  
Najia Essbai (Sidi Mohamed Ben Abdellah University, Morocco)  
Nazlı Karaca (Atatürk Üniversitesi, Türkiye)  
Necati Ozdemir (Balıkesir University, Türkiye)  
Nejmi Cengiz (Ataturk University, Türkiye)  
Nergiz Önen Poyraz (Çukurova University, Türkiye)  
Nguyen Huy Tuan (Thu Dau Mot University, Vietnam)  
Nigar Yıldırım Aksoy (Kafkas University, Türkiye)  
Nizami Mustafa (Kafkas University, Türkiye)  
Numan Yalçın (Gumushane University, Türkiye)  
Ogün Doğru (Gazi University, Ankara, Türkiye)  
Okan Şakar (Bahçeşehir University, Türkiye)  
Olha Ivanyshyn (Izmir Institute Of Technology, Izmir, Türkiye)  
Omer Kisi (Bartın University, Türkiye)  
Onur Alp İlhan (Erciyes University, Türkiye)  
Oudie Koubaiti (Fst, Moulay Ismail University, Morocco)

Ouazzani Jamil Mohamed (Private University Of Fez, Morocco)  
Ozen Ozer (Kırklareli University, Türkiye)  
Ozlem Ertekin (Munzur University, Tunceli, Türkiye)  
Özge Kuran (Dicle University, Türkiye )  
Peyil Esengül Kızı (Kyrgyz-Turkish Manas University, Kyrgyzstan)  
Praveen Agarwal (ANAND International College of Engineering Jaipur, India)  
Rajiv Aggarwal (Deshbandhu College, University Of Delhi, India)  
Ram Jiware (Indian Institute of Technology, Roorkee, India)  
Ramadhan A. Mohammed (University Of Duhok-Iraq)  
Ramin Najafi (Islamic Azad University, Iran)  
Rauf Amirov (Cumhuriyet University, Sivas, Türkiye)  
Recep Şahin (Kırıkkale University, Kırıkkale)  
Remzi Tuntas (Van Yüzüncü Yıl University, Türkiye)  
Reşat Yilmazer (Fırat University, Elazığ, Türkiye)  
Rıdvan Cem Demirkol (Muş Alparslan University, Türkiye)  
Rıdvan Şahin(Gumushane University, Türkiye)  
Robert Tchitnga (Dshang University, Cameroon)  
Roman Chapko( Ivan Franko National University Lviv , Ukraine)  
Said Melliani (Sultan Moulay Slimane University, Morocco)  
Saima Rashid (Government College University Faisalabad, Pakistan)  
Sait Taş (Ataturk University, Türkiye)  
Sakthivel Rathinasamy (Bharathiar University, India)  
Salman Khodayifar (Institutue For Adv.Studies İn Basic Sciences,Iran)  
Sare Şengül (Marmara University, Türkiye)  
Seçil Yalaz (Dicle University, Türkiye )  
Seda İğreti Araz (Siirt University, Siirt, Türkiye)  
Sedat İlhan (Dicle University, Türkiye )  
Seenith Sivasundaram (Université De Bethune-Cookman, Usa)  
Selahaddin Maden (Ordu University, Türkiye)  
Selçuk Baş (Muş Alparslan University, Türkiye)  
Semih Çavusoglu ( Gazi Osman Paşa University,Türkiye)  
Semra Yurttaçıkırmaz (Ataturk University, Türkiye)  
Serap Şahinkaya (Tarsus University)  
Serdal Pamuk (Kocaeli Univercity, Türkiye)  
Serhan Eker (Ağrı İbrahim Cecen University, Türkiye)  
Sertaç Göktaş (Mersin University, Mersin, Türkiye)  
Shilpi Jain (Poornima College of Engineering, India)  
Sıdika Şule Şener (Ataturk University, Türkiye)  
Sibel Turanlı (Erzurum Technical University, Türkiye)  
Sinan Çalık (Fırat Univeristy,Elazığ,Türkiye)  
Sizar A. Mohammed (University Of Duhok-Iraq)  
Songül Kaya Merdan(Middle East Technical University,Türkiye)  
Sonja Velickovic (College For Preschool Teachers, Serbia)  
Sunil Kumar (National Institute Of Technology Jamshedpur, India)  
Sunil Purohit (Maharana Pratap University, India)

Süleyman Şenyurt (Ordu University, Türkiye)  
Şakir İşleyen (Van Yüzüncü Yıl University, Van, Türkiye)  
Şebnem Yıldız (Ahi Evran University, Kırşehir, Türkiye)  
Şevket Gür (Sakarya University, Türkiye)  
Şükran Konca (İzmir Bakırçay University, İzmir, Türkiye)  
Talat Körpınar (Muş Alparslan University, Türkiye)  
Tamer Uğur (Ataturk University /Türkiye)  
Thabet Abdeljawad (Prince Sultan University KSA.)  
Tukur Abdulkadir Sulaiman (Biruni University, Istanbul, Türkiye)  
Ufuk Kaya (Bitlis Eren University, Bitlis, Türkiye)  
Unal İç (Firat University, Elazığ)  
Ülkü Yılmaz (Malatya Turgut Özal University, Türkiye)  
Vali Bashiry (Cyprus International University, Cyprus )  
Vehpi Yıldırım (Erzurum Technical University, Türkiye)  
Vera Stojanovska (Faculty of Philosophy, University Ss. Cyril Macedonia)  
Wei Gao (Yunnan Normal University, China.)  
Yadigar Sekerci ( Amasya University, Türkiye)  
Yarema Savula ( Ivan Franko National University Lviv , Ukraine)  
Yasin Kaya (Dicle University, Türkiye )  
Yavuz Altın (Firat University, Elazığ, Türkiye)  
Yener Altun (Van Yüzüncü Yıl University, Van, Türkiye)  
Yeşim Saraç (Ataturk University, Türkiye)  
Yıldırım Çelik (Ordu University, Türkiye)  
Youssef El Haoui (ENS Meknes, Moulay Ismail University, Morocco)  
Yury Luchko (Beuth Hochschule Für Technik Berlin, Germany)  
Yusif Gasimov (Azerbaijan University, Bakû, Azerbaijan)  
Yusuf Gurefe (Mersin University, Mersin, Türkiye)  
Yusuf Pandır (Bozok University – Türkiye)  
Zakaria Chalh (Sidi Mohamed Ben Abdellah University, Morocco)  
Zakaria El Malki (Est Moulay Ismail University, Morocco)  
Zakia Hammouch (Ens Meknes, Moulay Ismail University Morocco)  
Zanyar Anwer Ameen (University of Duhok-Iraq)  
Zeliha Körpınar (Muş Alparslan University, Türkiye)  
Zhonglong Zhao (North University of China, China)  
Zoubida Mghazli (Ibn Toufail University, Kenitra Morocco)  
Zulqurnain Sabir (Hazara University, Pakistan)

## **ORGANIZING COMMITTEE**

Prof. Dr. Hasan Bulut (Chair) Firat University, Türkiye  
Prof. Dr. Zakia Hammouch (Chair) ENS of Meknes, Moulay Ismail University, Morocco  
Prof. Dr. Ouazzani Jamil Mohammed (Co-Chair), Universite Privee de Fes Morocco  
Prof. Dr. Haci Mehmet Baskonus (Co-Chair), Harran University, Türkiye  
Prof Dr. Hassan Qjidaa (Co-Chair), Sidi Mohammed Ben Abdellah University, Fes Morocco

Prof. Dr. Carlo Cattani (Co-Chair) Tuscia University, Italy  
Prof. Dr. Ercan Çelik (Co-Chair) Kyrgyz-Turkish Manas University, Kyrgyzstan  
Prof. Dr. Mikail ET, Fırat University, Türkiye  
Prof. Dr. Vedat Asil, Fırat University, Türkiye  
Prof. Dr. Mehmet Bektaş, Fırat University, Türkiye  
Prof. Dr. Fevzi Erdoğan, Yüzüncüyıl University, Türkiye  
Prof. Dr. Alaattin Esen, İnönü University, Türkiye  
Prof. Dr. Hassan Qjdaa, Sidi Mohamed Ben Abdellah University of Fes Morocco  
Assoc. Prof. Dr. Gülnur Yel, Final International University, Girne, Cyprus  
Assoc. Prof. Dr. Esin İlhan, Ahi Evran University, Türkiye  
Assoc. Prof. Dr. Tolga Aktürk, Ordu University, Türkiye  
Assoc. Prof. Dr. M. Gıyas Sakar, Yüzüncüyıl University, Türkiye  
Dr. Faculty Mem. Muhammed Yiğider, Erzurum Technic University, Türkiye

## LOCAL COMMITTEE

Özlem Orhan (Bandırma Onyedı Eylöl Üniv, Balıkesir)	Dilek Günaydın (Fırat University, Elazığ, Türkiye)
Mehmet Karay (Final Int. University, Girne, Cyprus)	Hajar Farhan Ismael (University of Zakho, Iraq)
Mustafa Yeneroglu (Fırat University, Elazığ, Türkiye)	Karmina K. Ali (University of Zakho, Iraq)
Münevver Tuz (Fırat University, Elazığ, Türkiye)	Sibel Şehriban Ataş (Fırat University, Elazığ, Türkiye)
Gülden Altay Suroglu (Fırat University, Elazığ, Türkiye)	Aysenur Akkılıç (Assistant, Fırat Un.Elazığ, Türkiye)
Fatma Erdogan (Fırat University, Elazığ, Türkiye)	Sibel Tarla (Assistant, Fırat University, Elazığ, Türkiye)
Ebru Cavlak Aslan (Fırat University, Elazığ, Türkiye)	Bahar Acay (Assistant, Fırat Ün., Elazığ, Türkiye)
Şeyma T. Demiray (Osmaniye Korkut Ata Ü, Türkiye)	Aslı Alkan (Fırat University ,Elazığ, Türkiye)
Tüba Gülşen (Fırat University, Elazığ, Türkiye)	Beyhan Kemaloğlu (Fırat University, Elazığ, Türkiye)
Hatice Aslan (Fırat University, Elazığ, Türkiye)	Mucahit Saydam (Fırat University, Elazığ, Türkiye)
Ahu Ercan (Fırat University, Elazığ, Türkiye)	Çağrı Yılmazer (Fırat University, Elazığ, Türkiye)
Berat Karaagac (Adıyaman University, Türkiye)	Merve Zeynep Gecmen ( Ağrı Ibrahim Çeçen University, Ağrı, Türkiye)
Ezgi Kaya ( Iğdır University, Iğdır, Türkiye)	Necati Erdoğan (Van Yüzüncü Yıl Un.,Van, Türkiye)
Mahmut İhtiyaroğlu (Van Yüzüncü Yıl Univ., Türkiye)	Arif Özkul (Fırat University, Elazığ, Türkiye)
Onur Saldır (Van Yüzüncü Yıl University, Van, Türkiye)	Sümeyye Kılbitmez (Fırat University, Elazığ, Türkiye)
Zelal Temel (Van Yüzüncü Yıl University, Van, Türkiye)	Süleyman Sarıkaya (Fırat University, Elazığ, Türkiye)
Sinan Deniz (Yüzüncü Yıl Üniversitesi, Türkiye)	Şeyma Firdevs Korkmaz (Fırat Üniv, Elazığ, Türkiye)
Beytullah Yağız (Yüzüncü Yıl Üniversitesi, Türkiye)	
Hajar Rezaei (Yüzüncü Yıl Üniversitesi, Türkiye)	
İbrahim Enam İnan (Fırat University, Elazığ, Türkiye)	

## LANGUAGE EDITORIAL COMMITTEE

Erkan Yuce (Aksaray University, Aksaray, Türkiye)  
Suheyła Demirkol Orak (Fırat University, Elazığ, Türkiye)  
Fatih Mehmet Cigerci (Harran Univeristy, Sanlıurfa, Türkiye)  
Zeki Tastan (Van Yuzuncuyıl University, Van, Türkiye)  
Fatma Şeyma Doğan (Harran University, Sanlıurfa, Türkiye)

# International Communications Consultant

Prof. Dr. Rengin AK, Kırklareli University, Kırklareli, Türkiye  
Prof. Dr. Hikmet Kemaloğlu, Fırat University, Elazığ, Türkiye  
Prof. Dr. İlkay Açıkgöz Erkaya, Ahi evran University, Türkiye  
Assoc. Prof. Dr. M. Evren Aydın, Fırat University, Elazığ, Türkiye

## PROCEEDINGS

Full version of submitted papers will be published in Special Volumes of reputed journals. Procedure, Guidelines and Checklist for the preparation and submission of papers to the Proceedings of CMES-2023 can be found in the journals websites. The journals in which selected and peer-reviewed full papers of CMES-2023 will be published are as follows:

### 1. BOOK OF ABSTRACTS [Free of charge]

If Authors submit ABSTRACT TEXTS, then, after getting referees evaluations for these abstracts, they will be published in ABSTRACT PROCEEDING BOOK of CMES-2023. For FULL TEXT PAPERS, Authors have to submit their FULL TEXT PAPERS online via submission system of CMES-2023. These FULL TEXT PAPERS will be published in FULL TEXT PROCEEDING BOOK of CMES-2023 after getting at least two positive reports.

### 2. CONFERENCE PROCEEDINGS [Free of charge]

At the beginning, if Authors submit FULL TEXT PAPERS, then, after getting at least two positive referee reports, FULL TEXT PAPERS will be published in FULL TEXT PROCEEDING BOOK of CMES-2023 with ISBN:77733 number. Therefore, Abstracts of these FULL TEXT PAPERS will **NOT** be published in ABSTRACT PROCEEDING BOOK of CMES-2023.

### 3. FRACTAL AND FRACTIONAL JOURNAL [SCI-E],

Selected papers from CMES-2023 will be published in a special issue dedicated to the Conference entitled "**New Challenges Arising in Engineering Problems with Fractional and Integer Order-III**".

[https://www.mdpi.com/journal/fractalfract/special\\_issues/44H88MD0G9](https://www.mdpi.com/journal/fractalfract/special_issues/44H88MD0G9)

This journal is indexed by SCI-E.

### 4. PROCEEDINGS OF THE INSTITUTE OF MATHEMATICS AND MECHANICS [E-SCI]

Selected papers from CMES-2023 will be published by <https://proc.imm.az/special/>

This journal is indexed by E-SCI.

### 5. TURKISH JOURNAL OF SCIENCE, [FREE]

Participants of CMES 2023 can submit their good quality papers to Turkish Journal of Science. After the peer review process, the papers will be published at TJOS. The authors must write "CMES 2023" as comments to the editor.

(Editor in Chief: Dr. Ahmet Ocak AKDEMİR) For on-line submission: <https://dergipark.org.tr/tr/pub/tjos>

### 6. TURKISH JOURNAL OF INEQUALITIES, [FREE]

"Participants of CMES 2023 can submit their good quality papers to Turkish Journal of Inequalities. Selected papers will be published at TJI after the peer review process. The participants can send their papers to [erhanset@tjinequality.com](mailto:erhanset@tjinequality.com). The authors must write "CMES 2023" as the subject.

(Editor in Chief: Prof. Dr. Erhan SET)  
<http://tjinequality.com/>

### 7. MATHEMATICS IN NATURAL SCIENCE (MNS)

Authors can submit their full text paper directly to the journal by using the following link  
<https://www.isr-publications.com/mns>

### 8. MATHEMATICS IN ENGINEERING, SCIENCE AND AEROSPACE (MESA), [FREE, SCOPUS]

"Selected papers will be published after peer review in the Journal of Mathematics in Engineering, Science and Aerospace (MESA)"  
(Editor in Chief: Prof. Seenith Sivasundaram)  
<http://nonlinearstudies.com/index.php/mesa>

### **9. APPLIED MATHEMATICS AND NONLINEAR SCIENCES, [E-SCI+ SCOPUS]**

Participants of CMES 2023 can submit their high quality full text papers to Applied Mathematics and Nonlinear Sciences by selecting CMES-2023 under the Select Article Type Menu.  
<https://www.editorialmanager.com/amns/default.aspx>

### **10. MATHEMATICAL MODELLING AND NUMERICAL SIMULATION WITH APPLICATIONS (MMNSA), [TR DİZİN]**

The Special Issue on “Advanced Methods of Modelling and Numerical Computation in Science and Engineering”. Authors can submit their full text paper directly to the journal by using the information provided in the following link  
[https://mmnsa.org/index.php/mmnsa/special\\_issues/SI-CMES2023](https://mmnsa.org/index.php/mmnsa/special_issues/SI-CMES2023)

### **11. SYMMETRY [SCI-E] ; SPECIAL ISSUE "ADVANCES IN MATRIX TRANSFORMATIONS, OPERATORS AND SYMMETRY"**

Authors can submit their full text paper directly to the journal by using the following link

[https://www.mdpi.com/journal/symmetry/special\\_issues/Advances\\_Matrix\\_Transformations\\_Operators\\_Symmetry](https://www.mdpi.com/journal/symmetry/special_issues/Advances_Matrix_Transformations_Operators_Symmetry)

### **12. YUZUNCU YIL UNIVERSITY JOURNAL OF THE INSTITUTE OF NATURAL AND APPLIED SCIENCES (TR-Dizin)**

Authors can submit their full text paper directly to the journal by using the following link

<https://dergipark.org.tr/tr/pub/yyufbed>

### **13. PEDAGOGICAL PERSPECTIVE (PEDPER)**

Pedagogical Perspective (**PedPer**) is an international, double blind reviewing, non-profit, professional scientific journal. PedPer is a journal that accepts manuscripts related to pedagogy and education.  
<http://pedagogicalperspective.com/>



# PLENARY & INVITED TALKS



## Applications of the Nonlinear Evolution Equations: An Efficient Analytical Technique

M. S. Osman

Department of Mathematics, Faculty of Applied Sciences, Umm Al-Qura University,  
Makkah, 21955, Saudi Arabia

[msosman@uqu.edu.sa](mailto:msosman@uqu.edu.sa); [mofatzi@cu.edu.eg](mailto:mofatzi@cu.edu.eg)

**Abstract:** Investigation of mathematical modeling and soliton concept relies mainly on the nonlinear evolution equations (NEEs) [1, 2]. Seeking exact solutions to the NEEs has emerged as one of the most intriguing and very active fields of research. The propagation of shallow-water waves, fluid dynamics, condensed matter physics, computational physics, and geophysics [3, 4] have all been extensively represented by a variety of well-known NEEs, including the nonlinear Ito integral differential equation, the nonlinear Schrödinger equation in higher dimensions, the modified KdV equation, and many others.

Our primary driving force behind this work is to look for various wave shapes for the NEEs' achieved solutions. To accomplish our objective, we use the unified method and its generalized form [5] to identify several analytical solutions, such as solitary, kink-soliton, anti-kink soliton, shock, dark-soliton, bright-soliton, elliptic wave solutions, multi-rational soliton solutions, and multi-wave solutions. Further, the diagrams of the results are additionally displayed. It's vital to note that this study is brand-new and has never been written about before, especially in relation to nonautonomous NEEs.

**Keywords:** Nonlinear Evolution Equations; Exact Solutions; The Unified Method; The Generalized Unified Method.

### References

1. Aktar, M.S., Akbar, M.A. and Osman, M.S., 2022. Spatio-temporal dynamic solitary wave solutions and diffusion effects to the nonlinear diffusive predator-prey system and the diffusion-reaction equations. *Chaos, Solitons & Fractals*, 160, p.112212.
2. Ismael, H.F., Bulut, H. and Osman, M.S., 2022. The N-soliton, fusion, rational and breather solutions of two extensions of the  $(2+1)$ -dimensional Bogoyavlenskii–Schieff equation. *Nonlinear Dynamics*, 107(4), pp.3791-3803.
3. Abdul Kayum, M., Ali Akbar, M. and Osman, M.S., 2022. Stable soliton solutions to the shallow water waves and ion-acoustic waves in a plasma. *Waves in Random and Complex Media*, 32(4), pp.1672-1693.
4. Akinyemi, L., Şenol, M. and Osman, M.S., 2022. Analytical and approximate solutions of nonlinear Schrödinger equation with higher dimension in the anomalous dispersion regime. *Journal of Ocean Engineering and Science*, 7(2), pp.143-154.
5. Osman, M.S., 2019. One-soliton shaping and inelastic collision between double solitons in the fifth-order variable-coefficient Sawada–Kotera equation. *Nonlinear Dynamics*, 96(2), pp.1491-1496.



## The speed-in-action problem for the nonlinear hyperbolic equation with a nonlocal condition

Yusif Gasimov<sup>1</sup>, Hamlet Guliyev<sup>2</sup>

<sup>1</sup>Azerbaijan University, Baku, Azerbaijan; <sup>2</sup>Baku State University, Baku, Azerbaijan  
[gasimov.yusif@gmail.com](mailto:gasimov.yusif@gmail.com)

**Abstract:** As is known, the speed-in-action problem is one of the first problems of mathematical theory of the optimal control. As a generalization of a number of practical problems of designing optimal control systems, it has become one of the intensively studied problems. In the theory of optimal control for the processes described by ordinary differential equations, the speed-in-action problems are studied rather well [1,2,3]. But for the processes described by partial differential equations, these problems are relatively less studied. Therefore, the study of speed-in-action problem for the different non-stationary partial differential equations having different applications are actual. For the systems with distributed parameters, the study of such problems relates to number of principal difficulties, while the problem statement itself can be more diverse and contain features which are not in the case of systems given by ODEs. Note that in some papers optimal control problems with an integral boundary condition are considered [4, 5].

In the present work, we study the speed-in-action problem for the non-linear second order hyperbolic equation with a non-local condition and with a control in the coefficient of the equation for the first time. The prototype of this problem is the equation rising in relativistic quantum mechanics. A theorem on the existence of an optimal control is proved and necessary optimality condition in the form of a variational inequality is derived.

**Keywords:** speed-in-action problem, nonlinear hyperbolic equation, nonlocal condition, optimality condition.

### References

1. Pontryagin L.S., Boltyansky V.G., Gornikrelidze R.V., Mishchenko E. (1969). Mathematical theory of optimal processes. Moscow, Nauka, 1969, 384 p.
2. Lee E.B, Markus L. (1972). Fundamentals of the theory of optimal control. Moscow, Nauka, 1972, 576 p.
3. Gabasov R., Kirillova F.M. (1981). Optimization Methods. Minsk, BSU, 1981, 350 p.
4. Tagiev, R.K., Habibov, V.M. (2016). On an optimal control problem for the heat equation with integral boundary condition. *J. Samara State Tech. Univ., Ser. Phys. and Math. Sci.*, 20(1), 54-64.
5. Guliyev H.F., Gasimov Y.S., Tagiev H.T., Huseynova T.M. (2017). On the inverse problem of finding the right side of the wave equation with a nonlocal condition. *Bulletin of Tomsk State University, Mathematics and Mechanics*, 49, 6-24.



## On modulated statistical and strong Cesàro convergences

Fernando León Saavedra<sup>1</sup>

<sup>1</sup>University of Cádiz, Spain

[fernando.leon@uca.es](mailto:fernando.leon@uca.es)

**Abstract:** The notions of modulated statistical convergence and modulated strong Cesàro convergences have appeared in the literature at different times and by different authors. Furthermore, there has been a great effort by different authors (for instance Et Mikail, Vinod K. Bhardwaj, Hacer Şengül,... and many others), to understand the existing structure between both notions. In lecture today we are going to see that there is a rich structure between both notions and that the concept of compatible module function is central to connect such structure. Finally, we will see that this circle of ideas continues to be efficient for double sequences, lacunary convergences, etc.

**Keywords:** Statistical convergence; Strong Cesàro convergence, modulus function, compatible modulus function.

### References

1. Bhardwaj, Vinod K. ; Dhawan, Shweta . Density by moduli and lacunary statistical convergence. *Abstr. Appl. Anal.* 2016, Art. ID 9365037, 11 pp.
2. Temizsu, Fatih ; Et, Mikail ; Çinar, Muhammed ; Şengül Kandemir, Hacer. On  $(\lambda, f)$ -statistical boundedness of order  $\alpha$  . *Comm. Statist. Theory Methods* 51 (2022), no. 19, 6766--6776.
3. León-Saavedra, Fernando ; Listán-García, María del Carmen ; Romero de la Rosa, María del Pilar . On statistical convergence and strong Cesàro convergence by moduli for double sequences. *J. Inequal. Appl.* 2022, Paper No. 62, 14 pp.
4. León-Saavedra, Fernando ; Listán-García, M. del Carmen ; Pérez Fernández, Francisco Javier ; Romero de la Rosa, María Pilar . On statistical convergence and strong Cesàro convergence by moduli. *J. Inequal. Appl.* 2019, Paper No. 298, 12 pp.
5. Romero de la Rosa, M.D.P. On Modulated Lacunary Statistical Convergence of Double Sequences(2023) *Mathematics*, 11 (4), art. no. 1042.



## Comparing Some Plant Communities in a Region of Turkey via Fuzzy Similarity

Ömer Akın

Honorary Chairman of Association of Mathematicians (MATDER),  
Department of Mathematics in TOBB Economics And Technology University, Türkiye  
[omerakin@etu.edu.tr](mailto:omerakin@etu.edu.tr)

**Abstract:** In this talk, firstly we explain crisp similarity, fuzzy similarity and compare them. After that, we answer the question of “why we need to use fuzzy similarity?” Furthermore, we extend the results obtained with crisp logic of “the results obtained in forest vegetation in the research project on plant sociology conducted in Black Sea Region in Turkey)” with fuzzy similarity. To do this application, it has been evaluated with the fuzzy similarity measures approach, and the similarity relations between the plant communities (plant associations) and among the relevés (sampling areas) they cover has been investigated. Finally, we compare the results by giving tables.

**Keywords:** Fuzzy similarity; crisp logic; plant communities; the relevés.

### References

- [1] Zadeh LA (1965) Fuzzy sets. *Information and Control* 8:338–353.
- [2] Lee-Kwang H, Yoon-Seon S, Keon-Myung L (1994) similarity measure between fuzzy sets and between elements. *fuzzy sets and systems* 62:291-293.
- [3] Bingöl MÜ, Geven F, Güney K (2007) “A Phytoecological and Phytosociological Research on the Sakarat Mountain (Amasya)”. Research Project. The Scientific and Technological Research Council of Turkey (TÜBİTAK). TÜBİTAK TOVAG-HD 1050018.
- [4] Akın Ö (Keynote speaker), Bingöl MÜ, Akdeniz Şafak S (2023) Fuzzy logic, fuzzy similarity and their applications on some plant communities. *International Congress on Engineering and Sciences* (Online conference), İstanbul, March 18-19, 2023, E-ISBN: 978 625-7367-93-6.

**Note:** This talk has been prepared By Bingöl M.Ü.( [mumit1111@hotmail.com](mailto:mumit1111@hotmail.com)), ŞAFAK S.A.([ssafak@ankara.edu.tr](mailto:ssafak@ankara.edu.tr), [sanem.akdeniz@hotmail.com](mailto:sanem.akdeniz@hotmail.com)) , AKIN Ö.([omerakin@etu.edu.tr](mailto:omerakin@etu.edu.tr))



## Spiral curves in computer aided geometric design

Bayram Şahin

Department of Mathematics, Faculty of Science, Ege University, İzmir-Türkiye  
[bayram.sahin@ege.edu.tr](mailto:bayram.sahin@ege.edu.tr)

**Abstract:** Bezier curves and surfaces are widely used in computer-aided geometric design because they have features that will provide convenience in a design. On the other hand, spiral curves are useful in the design of highway railway and satellite orbits. The reason for this is that the spiral curves behave with respect to the its arc parameter. The most well-known of these are the Clothoids. However, since Clothoids are not easy to analyze mathematically, it creates difficulties in design. In this talk, the spiral conditions of Bezier curves and their transition curves, namely from a line to circle, from a circle to a circle with S-shaped, from a circle to circle with C-shaped, from a line to a line and circle to circle where one circle lies inside the other, to be used in the design of highway, railway and satellite orbits, are discussed. In addition, the case of spiral and transition curves of Bezier-like curves, which arise due to the deficiencies of Bezier curves in defining closed curves and the property of local variation on the curve, are discussed.

**Keywords:** CAGD, Bezier curve, Bezier surface, Spiral, transition curves;

### References

- [1] Ayar, A., Şahin, B., Trigonometric Bézier-like curves and transition curves. *Appl. Math.* (Warsaw) 48, no. 2, 125–153, 2021.
- [2] Habib, Z. and Sakai, M., On ph quintic spirals joining two circles with one circle inside the other, *Computer-Aided Design*, 39, 125-132, 2007.
- [3] Levent, A., Şahin, B., Beta Bézier curves. *Appl. Comput. Math.* 18, no. 1, 79–94, 2019.
- [4] Tong, W., Chen, M., A sufficient condition for 3D typical curves. *Comput. Aided Geom. Design* 8, Paper No. 101991, 14 pp, 2021.
- [5] Walton, D. J. and Meek, D.S., A Planar Cubic Bezier Spiral, *Journal of Computational and Applied Mathematics* 72, 85-100, 1996.
- [6] Walton, D. J. and Meek, D.S., A Pythagorean Hodograph Quintic Spiral, *Computer-Aided Design*, Vol 28, No 12, p. 943-950, 1996.
- [7] Walton, D. J. and Meek, D.S., 2005, A Controlled Clothoid Spline, *Computers and Graphics*, 29 ,353-363, 2005.
- [8] Walton, D. J. and Meek, D.S., A Further Generalisation Of The Planar cubic Bezier Spiral, *J. Comput. Appl. Math.* 236(11), 2869-2882, 2012.
- [9] Yeoh, W. K.; Ali, J. M. A cubic Bézier like spiral as transition curve. *World Conference on 21st Century Mathematics 2004*, 244–252, Sch. Math. Sci. G. C. Univ., Lahore, 2004



**From Complex Systems & Interaction Networks to Real Life.  
Application in Neuroscience**

M. Aziz-Alaoui

LeHavre Normandie University, LMAH, FR-CNRS-3335, ISCN,  
BP. 540, 76600 Le Havre, France

[aziz.alaoui@univ-lehavre.fr](mailto:aziz.alaoui@univ-lehavre.fr)

**Abstract:** After having situated, in a somewhat vulgarized way, the context, which is that of complex systems and networks, of self-organization and emergent properties, a concept of which we will give an example that is quite omnipresent in many fields, that of synchronization, we propose to study a fairly typical example in neuroscience. We will talk a bit about modeling and will recall the origin of the Hodgkin-Huxley (HH) PDE model and its reduction to the FitzHugh-Nagumo (FHN) model. We will then give some mathematical results on the asymptotic behavior of complex reaction-diffusion networks (graphs of  $n$  nodes). We show the existence of the global attractor for these networks, as well as the emergence of a fundamental property, that of synchronization. We determine analytically, for any network topology, the threshold of such synchronization. We finally illustrate these theoretical results by numerical simulations and present heuristic laws giving the minimum coupling strength necessary to achieve synchronization, as a function of the number of nodes and the network topology.

**Keywords:** Dynamical Systems, Complex Systems and Networks, Reaction-Diffusion Systems, Attractor, Synchronization, Neural networks.

**References:**

1. S.Das, A.A. et al (2023). Traveling pulses and its wave solution scheme in a diffusively coupled 2D Hindmarsh-Rose excitable systems, to appear in *Nonlinear Dynamics*, <https://doi.org/10.1007/s11071-022-08168-x>
2. A.Mondal, A.A. et al, (2022). The generation of diverse traveling pulses and its solution scheme in an excitable slow-fast dynamics, *Chaos: An Interdisciplinary Journal of Nonlinear Science*, Vol. 32(8), pp: 083121.
3. A. Miranville, G. Cantin & M. Aziz-Alaoui, (2021). Bifurcations and synchronization in networks of unstable reaction-diffusion systems, *Journal of Nonlinear Science*, Vol.31(2).
4. L. Naudin, N. Corson, M. Aziz-Alaoui (2021). On the modeling of the three types of non-spiking neurons of the *Caenorhabditis elegans*, *International Journal of Neural Systems (World Scientific)*, Vol. 31(2), 2050063.
5. B. Ambrosio, M. Aziz-Alaoui, A. Balti, (2021). Propagation of bursting oscillations in coupled non-homogeneous Hodgkin-Huxley Reaction-Diffusion systems, *Differential Equations and Dynamical Systems*, Vol. 29(4), pp:841-855.
6. B. Ambrosio, M. Aziz-Alaoui, V.L.E. Phan, (2019). Large Time Behavior and Synchronization of Complex Networks of Reaction-Diffusion Systems of FitzHugh-Nagumo Type, *IMA Journal of Applied Mathematics*, Vol. 84(2), Pages 416-443.



## Designing computational frameworks for the nonlinear singular differential models

Zulqurnain Sabir<sup>1,2</sup>

<sup>1</sup>Department of Mathematics, United Arab Emirates University, UAE

<sup>2</sup>Department of Mathematics, Hazara University, Mansehra, Pakistan

[Zulqurnain\\_maths@hu.edu.pk](mailto:Zulqurnain_maths@hu.edu.pk)

**Abstract:** The present work shows the solutions of the singular models based on the stochastic computing schemes. These investigations not only presented for the numerical results of the singular models, but the prediction, delayed, and pantograph singular models can also be handled through these stochastic paradigms. The design of the Gudermannian function is presented using the neural networks optimized with the global/local search schemes. The obtained results have been performed using the hybridization of these schemes. The exactness is approved through the comparison of the proposed and exact solutions. Moreover, the neuron analysis has been provided to authenticate the efficiency and complexity of the designed approach. For the effectiveness of the proposed approach, the absolute error performances have been performed to the singular models. For the stability of the stochastic method, the statistical performances including Theil inequality Coefficient, Variance Account For and Mean Absolute Deviation have been provided for multiple executions to solve the singular differential models. This contribution of this work is categorized in two phases as:

The Gudermannian function is designed as a neural network under the optimization of global/local search methods for the nonlinear singular differential models. In the second phase, the nonlinear higher order singular models have been solved through the global/local search techniques. The applicability and dependability of such schemes have been monitored to solve these singular models, which arises in engineering and science as well.

**Keywords:** Singular models, Gudermannian neural networks, Global and local search methods, Numerical solutions; Neurons analysis.

## References

1. Sabir, Z., 2022. Neuron analysis through the swarming procedures for the singular two-point boundary value problems arising in the theory of thermal explosion. *The European Physical Journal Plus*, 137(5), p.638.
2. Sabir, Z., Nisar, K., Raja, M.A.Z., Ibrahim, A.A.B.A., Rodrigues, J.J., Al-Basyouni, K.S., Mahmoud, S.R. and Rawat, D.B., 2021. Heuristic computational design of Morlet wavelet for solving the higher order singular nonlinear differential equations. *Alexandria Engineering Journal*, 60(6), pp.5935-5947.
3. Sabir, Z., Raja, M.A.Z. and Baleanu, D., 2021. Fractional mayer neuro-swarm heuristic solver for multi-fractional order doubly singular model based on lane–emden equation. *Fractals*, 29(05), p.2140017.
4. Sabir, Z., Baleanu, D., Shoaib, M. and Raja, M.A.Z., 2021. Design of stochastic numerical solver for the solution of singular three-point second-order boundary value problems. *Neural Computing and Applications*, 33, pp.2427-2443.



**5/20/2023**

**10:00-10:30**

OPENING CEREMONY

Prof. Dr. Zakia HAMMOUCH-Chair of CMES

Prof. Dr. Fahrettin GÖKTAŞ-Rector of Firat University

Prof. Dr. Mikail ET-Dean of Science Faculty, Firat University

Prof. Dr. Vedat ASİL-Director of Mathematics Department, Firat University

**10:30-11:00**

PLENARY LECTURE-Hall 1

Speaker: Prof. Dr. M. S. Osman

Title: Applications of the Nonlinear Evolution Equations: An Efficient Analytical Technique

Chair: Prof. Dr. Hikmet Kemaloğlu

**11:00-11:15**

Coffee Break

**11:15-11:45**

PLENARY LECTURE-Hall 1

Speaker: Prof. Dr. Yusif Gasimov

Title: The speed-in-action problem for the nonlinear hyperbolic equation with a nonlocal condition

Chair: Prof. Dr. Alaattin Esen

**11:45-12:00**

Coffee Break

**12:00-12:30**

PLENARY LECTURE-Hall 1

Speaker: Prof. Dr. Fernando León Saavedra

Title: On modulated statistical and strong Cesàro convergences

Chair: Prof. Dr. Fevzi Erdoğan

**12:30-12:45**

PLENARY LECTURE-Hall 1

Speaker: Dr. Waseem Al Shehabi

Title: The future of academic works in scientific frame

Chair: Prof. Dr. Hacı Mehmet Baskonuş

12:45-14:00

LUNCH (FİRAT UNIVERSITY SOCIAL FACILITIES )

Hall 1

14:00-16:00

Chair

Prof. Dr. Mustafa İNÇ

20.05.2023

Authors

Titles

Abd Essamed Guettouche,  
Chaabane Djamal

A METHOD FOR SOLVING THE SET-COVERING  
PROBLEM OVER THE SET OF STOCHASTIC  
EFFICIENT SOLUTIONS

Bensid Yazid,  
Helal Mohamed,  
Lakmeche Abdelkader

A DELAYED MODEL DESCRIBING A-BETA  
OLIGOMERS NEUROTOXICITY

Khalid Zguaid, Fatima  
Zahrae El Alaoui

A DISCUSSION ON THE REGIONAL BOUNDARY  
OBSERVABILITY FOR FRACTIONAL EVOLUTION  
EQUATIONS WITH THE CAPUTO FRACTIONAL  
DERIVATIVE

Adem Irmak, Arzu Aykut,  
Sıdıka Şule Şener Kılıç

SOLITARY WAVE SOLUTIONS FOR THE  
CONFORMABLE TIME-FRACTIONAL EXTENDED  
(2+1)-DIMENSIONAL EQUATION

Gülsüm Şanal, Duygu  
Dönmez Demir

ON N-TIMES DIFFERENTIABLE STRONGLY  
S-CONVEX FUNCTIONS

Ömer Oruç

A NUMERICAL METHOD BASED ON RADIAL BASIS  
FUNCTIONS FOR SOME REACTION-DIFFUSION  
EQUATIONS

16:00-16:20

Coffee Break

Hall 1		
16:20-18:40 20.05.2023	Chair	Prof. Dr. Reşat YILMAZER
	Authors	Titles
	Gülistan Butakin, Erhan Pişkin	NONEXISTENCE OF GLOBAL SOLUTIONS FOR A PARABOLIC-TYPE PETROVSKY EQUATION WITH VARIABLE EXPONENTS
	Selçuk Kutluay, Nuri Murat Yağmurlu, Ali Sercan Karakaş	A ROBUST QUINTIC HERMITE COLLOCATION TECHNIQUE FOR ONE-DIMENSIONAL HEAT CONDUCTION EQUATION
	Ayşe Fidan, Erhan Pişkin	EXISTENCE AND ASYMPTOTIC BEHAVIOUR OF SOLUTIONS FOR A PETROVSKY EQUATION WITH A VARIABLE COEFFICIENTS
	Erhan Pişkin, Muhteşem Demir	EXPONENTIAL GROWTH OF SOLUTION FOR A COUPLE OF PARABOLIC KIRCHHOFF TYPE EQUATIONS
	Nebi Yılmaz, Erhan Pişkin	EXISTENCE AND NONEXISTENCE OF SOLUTIONS FOR A VISCOELASTIC-TYPE EQUATION WITH VARIABLE EXPONENTS
Selçuk Kutluay, Nuri Murat Yağmurlu, Ali Sercan Karakaş	A ROBUST SEPTIC HERMITE COLLOCATION TECHNIQUE FOR DIRICHLET BOUNDARY CONDITION HEAT CONDUCTION EQUATION	
Hall 2		
14:00-16:00 20.05.2023	Chair	Doç. Dr. Muhittin Evren AYDIN
	Authors	Titles
	Siti Nur Ainsyah Ghani, Noor Fadiya Mohd Noor	RADIATIVE BLOOD-BASED HYBRID COPPER-GRAPHENE NANOLIQUID FLOWS ALONG A SOURCE-HEATED LEANING CYLINDER
	S. Mirtagioğlu, H. Mirtagioğlu, A. Rostami	MONTE CARLO SIMULATION OF OPTICAL ANTENNA: A HIGH-QUALITY BROADBAND WIRELESS SERVICE
	Akbar Baratı Chiyaneh, Saruhan Mirtaoğlu	A NEURAL NETWORK-BASED METHOD FOR APPROXIMATING REAL AND COMPLEX ROOTS OF POLYNOMIALS
	Saqib Murtaza, Poom Kumam	HEAT TRANSFER ANALYSIS OF ZNO+AL <sub>2</sub> O <sub>3</sub> +TiO <sub>2</sub> /DW BASED TERNARY HYBRID NANOFLUID: A FRACTAL-FRACTIONAL MODEL
	Muhammet Büyükoğlu, Tuba Hatice Doğan, Orhan Arpa, Hayrunnisa Nadaroğlu, İlhan Volkan Öner	INVESTIGATION OF EFFECTS ON ENGINE PERFORMANCE AND EMISSIONS OF WASTE TRANSFER OIL, DIESEL AND BIODIESEL BLENDS IN A DIESEL ENGINE
Nihat Sami Şen, Tuba Hatice Doğan, Orhan Arpa, İlhan Volkan Öner	EFFECTS OF WASTE TRANSFER OILS AND DIESEL MIXTURE ON PERFORMANCE AND EXHAUST EMISSIONS OF A CI ENGINE	
16:00-16:20	Coffee Break	

## Hall 2

16:20-18:40 20.05.2023	Chair	Doç. Dr. Ebru ÇAVLAK AYDIN
	Authors	Titles
	Redwan Mohammed Mamu, Necla Togun	LINEAR VIBRATION OF NANOBEAM IN THERMAL ENVIRONMENT USING MODIFIED COUPLE STRESS THEORY
	Redwan Mohammed Mamu, Necla Togun	LINEAR VIBRATION OF NANOBEAM IN THERMAL ENVIRONMENT USING NONLOCAL ELASTICITY THEORY
	Taha Koç, Yeşim Akbulut	OPTIMAL CONTROL OF THE BOUNDARY CONDITION IN A PARABOLIC SYSTEM
	Nida Nur Geneş, İsrail Okumuş	COMPARING THE EFFICIENCY OF ASYMMETRIC ENCRYPTION ALGORITHMS BASED ON THE INTEGER FACTORIZATION PROBLEM
	Çetin Görür, Bahadır Yüzbaşı	INVESTIGATION OF WORK EFFECT IN THE POSTMIGRATION ADAPTATION PROCESS BY GEOGRAPHICALLY WEIGHTED POISSON REGRESSION: THE CASE OF VAN
	Murat Candan	COMPACT OPERATORS FOR SEQUENCE SPACES OBTAINED USING DOMAIN OF THE MATRIX B
Murat Candan	SOME PROPERTIES OF NEW SEQUENCE SPACES OBTAINED USING MOTZKIN NUMBERS	

## Hall 3

14:00-16:00 20.05.2023	Chair	Prof. Dr. Hıfısı ALTINOK
	Authors	Titles
	Nazlı Kadioğlu Karaca, İsa Yıldırım	FIXED POINT THEOREMS FOR A NEW CLASS OF GENERALIZED NONEXPANSIVE MAPPINGS IN BANACH SPACES
	Gülcan Atıcı Turan	ON TOPOLOGICAL PROPERTIES SOME NEW MODULAR SEQUENCE SPACES
	Sinan Deniz, Yener Altun	NONLINEAR LEAST SQUARES METHOD AND ITS APPLICATIONS
	Erdal Eker, Beytullah Yağız, Yener Altun	UTILIZING ARTIFICIAL GORILLA TROOPS ALGORITHM AT TRAINING OF MULTI-LAYER PERCEPTRON
	Çiğdem A. Bektaş , Mustafa I. Hatim	A STUDY ON LACUNARY STATISTICAL CONVERGENCE ACCORDING TO A COMPOSITE MODULUS FUNCTION
Kajtaz H. Bllaca	EXPLICIT FORMULA and PRIME NUMBER THEOREM FOR ZETA FUNCTION	
16:00-16:20	Coffee Break	

## Hall 3

16:20-18:20 20.05.2023	Chair	Prof. Dr. Yavuz ALTIN
	Authors	Titles
	Atilla Karabacak, Ömer Tarakcı	A STUDY OF THE GENERALIZED MAGNETIC CURVES ON PARA-KÄHLER MANIFOLDS
	Arif Salimov, Furkan Yildirim, Kürşat Akbulut, Kübra Atasever	SOME NOTES ON ALMOST CONTACT STRUCTURE AND ALMOST PARACONTACT STRUCTURE IN SEMI-TANGENT BUNDLE T(M)
	Furkan Yildirim, Hacer Cengiz	ON DIGONAL LIFTS IN THE SEMI-COTANGENT BUNDLE
	Olgun Durmaz, Büşra Aktaş	THE 4R PLANAR AND SPHERICAL MECHANISMS IN LORENTZIAN SPACE
	Furkan Yildirim, Merve Aydın	NOTE ON THE SEMI-TENSOR BUNDLE
	Ebru Korkmaz, Tuba Özer	EDUCATIONAL MATHEMATICS COMPUTER GAME IN CLASSROOM GAMING
19:00-21:00 5/21/2023	GALA DINNER WITH MUSIC PROGRAM IN RAMADA HOTEL	

10:00-11:00	PLENARY LECTURE-Hall 1	
	Speaker: Prof. Dr. Bayram Şahin	Title: Spiral curves in computer aided geometric design
	Chair: Prof. Dr. Mehmet Bektaş	
11:00-11:20	Coffee Break	
11:20-12:20	PLENARY LECTURE-Hall 1	
	Speaker: Dr. Zulqurnain Sabir	Title: Designing computational frameworks for the nonlinear singular differential models
	Chair: Prof. Dr. Hacı Mehmet Baskonuş	
12:30-14:00	LUNCH (FİRAT UNIVERSITY SOCIAL FACILITIES )	

## Hall 1

14:00-16:20 21.05.2023	Chair	Doç. Dr. Nigar YILDIRIM AKSOY
	Authors	Titles
	Auwalu Sa'idu, Hikmet Kemalöglu	A CONFORMABLE INVERSE PROBLEM WITH CONSTANT DELAY
	Nigar Yıldırım Aksoy, Ercan Çelik, Merve Zengin	THE NECESSARY OPTIMALITY CONDITION ON A CONTROL PROBLEM FOR THE SCHRODINGER EQUATION
	Esin İlhan, Muhammed Yiğider, Ercan Çelik, Hasan Bulut	SOME NEW SOLITON SOLUTIONS OF TIME FRACTIONAL RESONANT DAVEY-STEWARTSON EQUATIONS
	Derya Deniz, Ebru Cavlak Aslan	OPTICAL SOLITON SOLUTIONS OF THE NLS EQUATION WITH SINEGORDON EXPANSION METHOD
	Dilara Altan Koç, Mohamed S. Osman, Hasan Bulut	A VARIETY OF ANALYTICAL SOLUTIONS FOR VARIOUS CATEGORIES OF NPDES IN OPTICAL FIBERS AND THEIR APPLICATIONS
	Halil Arslan, İhsan Tolga Medeni, Tuğç Durmuş Medeni	DEVELOPMENT OF ONTOLOGIES THROUGH MAINTENANCE
	Tuğçem Partal	SIR EPIDEMIC MODEL FOR COVID-19 SPREAD
16:00-16:20	Coffee Break	

## Hall 1

16:20-18:40 21.05.2023	Chair	Prof. Dr. Erdal BAŞ
	Authors	Titles
	Erdal Baş, Merve Karaođlan	REPRESENTATION OF SOLUTION MSTRUM-LIOUVILLE PROBLEM WITH N-TRANSFORM
	Şeyma Firdevs Korkmaz, Gülnur Yel, Hasan Bulut	INVESTIGATION OF DRINFEL'D-SOKOLOV SYSTEM IN TRUNCATED M-FRACTIONAL DERIVATIVE VIA THE SARDAR SUB-EQUATION METHOD
	Gülnur Yel, Beyhan Kemalolu, Hasan Bulut	ON THE PHYSICAL DYNAMICS OF THE (2+1)-DIMENSIONAL ZOOMERON EQUATION BY RATIONAL SINE-GORDON METHOD
	Tolga Aktürk	ANALYSIS OF MATHEMATICAL MODEL SOLUTIONS OF WITH AN EFFECTIVE METHOD
	Yusuf Gurefe, Yusuf Pandir, Tolga Aktürk	SOLUTIONS OF TIME FRACTIONAL MATHEMATICAL MODEL WITH EFFECTIVE TECHNIQUES
	Sibel Tarla, Resat Yilmazer	EXPLORING NEW SOLUTIONS FOR GENERALIZED POCHAMMER CHREE EQUATION USING MODIFIED SARDAR SUB-EQUATION METHODS
Hasan Gunduz, Mesut Karabacak, Ercan Celik	COMPUTING OF $H_{\infty}$ -NORM OF TRANSFER FUNCTIONS OF DAES BY EXTENDED BALANCED SINGULAR PERTURBATION METHOD	

## Hall 2

14:00-16:00 21.05.2023	Chair	Prof. Dr. Kürşat AKBULUT
	Authors	Titles
	Akbar Barati Chiyaneh, Yener Altun, Fevzi Erdoğan	LYAPUNOV STABILITY ANALYSIS AND CONTROL OF AFFINE NONLINEAR SYSTEMS USING NEURAL NETWORKS
	Akbar Barati Chiyaneh, Fevzi Erdoğan	A RECURRENT NEURAL NETWORK-BASED APPROACH FOR A CLASS OF NONLINEAR CONVEX PROGRAMMING PROBLEMS
	Fatih Aydın, Mehmet Giyas Sakar, Onur Saldır	NUMERICAL SOLUTION OF TIME FRACTIONAL TRICOMI AND KELDYSH EQUATION
	Şelale Öztürk, Fevzi Erdoğan, Akbar Barati Chiyaneh	NUMERICAL SOLUTIONS OF HIGH-ORDER DIFFERENTIAL EQUATIONS USING NEURAL NETWORKS BASED ON NELDER-MEAD SIMPLEX ALGORITHM
	Ayşe Nur Akkılıç, Zulqurnain Sabir, Hasan Bulut	A RADIAL BASIS DEEP NEURAL NETWORK PROCESS USING THE BAYESIAN REGULARIZATION OPTIMIZATION FOR THE MONKEYPOX TRANSMISSION MODEL
Murat Karakaş, Nazlım D. Aral, Hacer Şengül Kandemir, Mikail Et	DIFFERENCE SEQUENCE SPACES OF FRACTIONAL ORDER GENERATED BY TRIBONACCI-LUCAS NUMBERS	
16:00-16:20	Coffee Break	

## Hall 2

16:20-18:20 21.05.2023	Chair	Doç. Dr. Münevver TUZ
	Authors	Titles
	Merve Karakaş, Bahadır Yüzbaşı	VAN PROVINCE IMMIGRATED TO ACCESS A BETTER LIFE
	Büşranur Küçük, Bahadır Yüzbaşı	THE EFFECT OF CLIMATE AND GEOGRAPHICAL CONDITIONS ON MIGRATIONS TO VAN PROVINCE
	Bahadır Yüzbaşı	MACHINE LEARNING IN GEOGRAPHICALLY WEIGHTED REGRESSION
	Meltem Aslaner , Hikmet Kemaloğlu	SCHWARZ CHRISTOFFER MAPPING WITH CONFORMABLE DERIVATIVE
	Songül Tütüncü, Hikmet Kemaloğlu	AMBARZUMYAN THEOREM FOR CONFORMABLE MATRIX-STURM-LIOUVILLE PROBLEM
	Yıldız Emül, Hikmet Kemaloğlu	UNIQUENESS THEOREM FOR CONFORMABLE M-DERIVATIVE STURM-LIOUVILLE PROBLEM

## Hall 3

14:00-16:00 21.05.2023	Chair	Prof. Dr. Handan ÖZTEKİN
	Authors	Titles
	Tuğba Tekin, Sezgin Akbulut	SOME FIXED POINT THEOREMS FOR MONOTONE NONEXPANSIVE MAPPINGS IN ORDERED BANACH SPACES
	Aslıhan Yıldırım, Mesut Karabacak	HISTORICAL DEVELOPMENT OF ARTIFICIAL NEURAL NETWORK
	Vedat Asil, Serhat Gülnaroğlu	ON SPHERICAL INDICATRIX ACCORDING TO BISHOP FRAME
	Muhittin Evren Aydın, Gülsüm Bozuyula	SEPARABLE HYPERSURFACES WITH APPLICATIONS TO MICROECONOMICS
	Sibel Erim, Semra Yurttançıkmaç	SOME SPECIAL ASSOCIATED CURVES IN E3-1
	Zühal Küçükarslan Yüzbaşı	A NEW APPROACH TO INVESTIGATING THE ASSOCIATIONS BETWEEN MOVING CURVES AND INTEGRABLE EQUATIONS

16:00-16:20

Coffee Break

## Hall 3

16:20-18:20 21.05.2023	Chair	
	Authors	Titles

## POSTER PRESENTATIONS

POSTERS PRESENTATIONS WILL BE PRESENTED at 14.30-18.00 on 20.05.2023 and 21.05.2023



**7<sup>th</sup> INTERNATIONAL CONFERENCE ON  
COMPUTATIONAL MATHEMATICS AND  
ENGINEERING SCIENCES**

[www.cmescongress.org](http://www.cmescongress.org)

