

**Chaos Theory and Applications (CHTA)**  
**Volume: 5 – Issue No: 3 (November 2023)**  
<https://dergipark.org.tr/en/pub/chaos/issue/80150>  
**Editorial Board Members**

Honorary Editorial Board

Otto E. ROSSLER, University of Tuebingen, GERMANY, oeross00@yahoo.com  
 Julien C. SPROTT, University of Wisconsin–Madison, USA, csprott@wisc.edu  
 Guanrong CHEN, City University of Hong Kong, HONG KONG, eegchen@cityu.edu.hk  
 José A. Tenreiro MACHADO<sup>†</sup>, Polytechnic Institute of Porto, PORTUGAL, jtm@isep.ipp.pt  
 Ravi P. AGARWAL, Texas A&M University, USA, Ravi.Agarwal@tamuk.edu

Editor-in-Chief

Akif AKGUL, Hitit University, TURKEY, akifakgul@hitit.edu.tr

Associate Editors

Miguel A. F. SANJUAN, Universidad Rey Juan Carlos, SPAIN, miguel.sanjuan@urjc.es  
 Chunbiao LI, Nanjing University of Information Science & Technology, CHINA, goontry@126.com  
 Dumitru BALEANU, Cankaya University, TURKEY, dumitru.baleanu@gmail.com  
 Yeliz KARACA, University of Massachusetts Chan Medical School, USA, yeliz.karaca@ieee.org  
 J. M. MUÑOZ PACHECO, Benemérita Universidad Autónoma de Puebla, MEXICO, jesusm.pacheco@correo.buap.mx  
 Martin BOHNER, Missouri University of Science and Technology, USA, bohner@mst.edu  
 Nikolay V. KUZNETSOV, Saint Petersburg State University, RUSSIA, n.v.kuznetsov@spbu.ru  
 Sifeu T. KINGNI, University of Maroua, CAMEROON, stkingni@gmail.com  
 Fahrettin HORASAN, Kırıkkale University, TURKEY, fhorasan@kku.edu.tr  
 Vinod PATIDAR, School of Computer Science UPES, INDIA, vinod.patidar@ddn.upes.ac.in  
 Hijaz AHMAD, International Telematic University, ITALY, hijaz555@gmail.com  
 Eyyüp Ensari ŞAHİN, Nigde Omer Halisdemir University, TURKEY, ensarisahin@ohu.edu.tr

Editorial Board Members

Jun MA, Lanzhou University of Technology, CHINA, hyperchaos@lut.edu.cn  
 René LOZI, University Côte D'azur, FRANCE, Rene.LOZI@univ-cotedazur.fr  
 Herbert Ho-Ching LU, The University of Western Australia, AUSTRALIA, herbert.lu@uwa.edu.au  
 Praveen AGARWAL, Anand International College of Engineering, INDIA, goyal.praveen2011@gmail.com  
 Shaher MOMANI, Ajman University, UAE, shaherm@yaho.com  
 Edmon PERKINS, North Carolina State University, USA, edmonperkins@gmail.com  
 Alexander PCHELINTSEV, Tambov State Technical University, RUSSIA, pchelintsev.an@yandex.ru  
 Yudong ZHANG, University of Leicester, UK, yudongzhang@ieee.org  
 Wesley Joo-Chen THIO, The Ohio State University, USA, wesley.thio@gmail.com  
 Yong WANG, Chongqing University of Posts and Telecommunications, CHINA, wangyong\_cqupt@163.com  
 Mustafa Zahid YILDIZ, Sakarya University of Applied Sciences, TURKEY, mustafayildiz@sakarya.edu.tr  
 Anastasios (Tassos) BOUNTIS, University of Patras, GREECE, anastasios.bountis@nu.edu.kz  
 Marcelo MESSIAS, São Paulo State University, BRAZIL, marcelo.messias1@unesp.br  
 Sajad JAFARI, Ton Duc Thang University, VIETNAM, sajadjafari83@gmail.com  
 Jesús M. SEOANE, Universidad Rey Juan Carlos, SPAIN, jesus.seoane@urjc.es  
 G. Cigdem YALCIN, Istanbul University, TURKEY, gcyalcin@istanbul.edu.tr  
 Marcelo A. SAVI, Universidade Federal do Rio de Janeiro, BRAZIL, savi@mecanica.coppe.ufrj.br  
 Christos K. VOLOS, Aristotle University of Thessaloniki, GREECE, volos@physics.auth.gr  
 Charalampos (Haris) SKOKOS, University of Cape Town, SOUTH AFRICA, haris.skokos@uct.ac.za  
 Ihsan PEHLIVAN, Sakarya University of Applied Sciences, TURKEY, ipehlivan@sakarya.edu.tr  
 Olfa BOUBAKER, University of Carthage, TUNUSIA, olfa\_insat@yahoo.com  
 Karthikeyan RAJAGOPAL, Defence University, ETHIOPIA, rkarthikeyan@gmail.com  
 Binoy Krishna ROY, National Institute of Technology Silchar, INDIA, bkr\_nits@yahoo.co.in  
 Jacques KENGNE, Université de Dschang, CAMEROON, kengnemozart@yahoo.fr  
 Fatih KURUGOLLU, University of Sharjah, UAE, fkurugollu@sharjah.ac.ae  
 Denis BUTUSOV, Petersburg State Electrotechnical University, RUSSIA, butusovdn@mail.ru  
 Iqtadar HUSSAIN, Qatar University, QATAR, iqtadarqau@qu.edu.qa  
 Sundarapandian VAIDYANATHAN, Vel Tech - Technical University, INDIA, sundarvtu@gmail.com  
 Irene M. MOROZ, University of Oxford, UK, Irene.Moroz@maths.ox.ac.uk  
 Serdar CICEK, Tarsus University, TURKEY, serdarcicek@gmail.com  
 Zhouchao WEI, China University of Geosciences, CHINA, weizhouchao@163.com  
 Qiang LAI, East China Jiaotong University, CHINA, laiqiang87@126.com  
 Viet-thanh PHAM, Phenikaa University, VIETNAM, pvt3010@gmail.com  
 Günyaz ABLAY, Abdullah Gul University, TURKEY, gunyaz.ablay@agu.edu.tr  
 Jay Prakash SINGH, Rewa Engineering College, INDIA, jp4ssm@gmail.com

Yılmaz UYAROĞLU, Sakarya University, TURKEY, uyaroglu@sakarya.edu.tr  
Shaobo HE, Central South University, CHINA, heshabo\_123@163.com  
Esteban Tlelo CUAUTLE, Instituto Nacional de Astrofísica, MEXICO, etlelo@inaoep.mx  
Dan-gheorghe DIMITRIU, Alexandru Ioan Cuza University of Iasi, ROMANIA, dimitriu@uaic.ro  
Jawad AHMAD, Edinburgh Napier University, UK, jawad.saj@gmail.com  
Metin VARAN, Sakarya University of Applied Sciences, TURKEY, mvaran@sakarya.edu.tr  
Ashish ASHISH, Government College Satnali, INDIA, drashishkumar108@gmail.com  
Murat TUNA, Kırklareli University, TURKEY, murat.tuna@klu.edu.tr  
Orhan Ozgur AYBAR, Piri Reis University, TURKEY, oaybar@pirireis.edu.tr  
Mehmet YAVUZ, Necmettin Erbakan University, TURKEY, mehmetyavuz@erbakan.edu.tr

#### Editorial Advisory Board Members

Ayhan ISTANBULLU, Balıkesir University, TURKEY, ayhanistan@yahoo.com  
Ismail KOYUNCU, Afyon Kocatepe University, TURKEY, ismailkoyuncu@aku.edu.tr  
Fatih OZKAYNAK, Fırat University, TURKEY, ozkaynak@firat.edu.tr  
Sezgin KACAR, Sakarya University of Applied Sciences, TURKEY, skacar@subu.edu.tr  
Ugur Erkin KOCAMAZ, Bursa Uludağ University, TURKEY, ugurkocamaz@gmail.com  
Erdinc AVAROĞLU, Mersin University, TURKEY, eavaroglu@mersin.edu.tr  
Ali DURDU, Social Sciences University of Ankara, TURKEY, ali.durdu@asbu.edu.tr  
Hakan KOR, Hitit University, TURKEY, hakankor@hitit.edu.tr

#### Language Editors

Muhammed Maruf OZTURK, Suleyman Demirel University, TURKEY, muhammedozturk@sdu.edu.tr  
Mustafa KUTLU, Sakarya University of Applied Sciences, TURKEY, mkutlu@subu.edu.tr  
Hamid ASADI DERESHGİ, Istanbul Arel University, TURKEY, hamidasadi@arel.edu.tr  
Emir AVCIOĞLU, Hitit University, TURKEY, emiravciogluhitit.edu.tr

#### Managing Editor

Akif AKGUL, Hitit University, TURKEY, akifakgul@hitit.edu.tr

#### Technical Coordinator

Muhammed Ali PALA, Sakarya University of Applied Sciences, TURKEY, pala@subu.edu.tr  
Murat Erhan CIMEN, Sakarya University of Applied Sciences, TURKEY, muratcimen@sakarya.edu.tr  
Harun Emre KIRAN, Hitit University, TURKEY, harunemre@hitit.edu.tr  
Berkay EMİN, Hitit University, TURKEY, berkayeminn@gmail.com