

2022 7th International Conference on Mathematics and Computers in Sciences and Industry (MCSI 2022)

**Athens, Greece
22 – 24 August 2022**



**IEEE Catalog Number: CFP2270Y-POD
ISBN: 978-1-6654-8191-5**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP2270Y-POD
ISBN (Print-On-Demand):	978-1-6654-8191-5
ISBN (Online):	978-1-6654-8190-8

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2022 7th International Conference on Mathematics and Computers in Sciences and Industry (MCSI) **MCSI 2022**

Table of Contents

Preface	x
Organizing Committee	xi
Program Committee	xii

Mathematical Methods and Applications

Efficient Multiparty Protocols using Generalized Parseval's Identity and the Theta Algebra..... 1 <i>Giorgio Sonnino (Université Libre de Bruxelles, Belgium) and Alberto Sonnino (Mysten Labs, U.K.)</i>	1
Euclidean Jordan Algebras and Some Properties of Strongly Regular Graphs 18 <i>Luis Vieira (University of Porto, Portugal)</i>	18
Mathematical Modeling of Errors and Complications of Total Arthroplasty Knee Joint 24 <i>Sulyma A. (Institute of Traumatology and Orthopedics of the National Academy of Medical Sciences of Ukraine) and Skuratoskii Ruslan (Interregional Academy of Personnel Management Kyiv, Ukraine, and National Aviation University, Ukraine, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine)</i>	24
Modified Comparison Theorems for Solutions of Caputo-Hadamard Fractional Differential Equations 29 <i>Yiyu Liu (Nanjing University of Science and Technology, China), Ziqiang Lu (Nanjing Audit University, China), and Yuanguo Zhu (Nanjing University of Science and Technology, China)</i>	29
On a Double Minimum Control Problem for a Parabolic Equation 35 <i>Irina Astashova (Lomonosov Moscow State University and Plekhanov Russian University of Economics, Russia), Alexey Filinovskiy (Bauman Moscow State Technical University and Lomonosov Moscow State University, Russia), and Dmitry Lashin (FITO Research and Production Company, Russia)</i>	35
On Maximal Permutation BH — Ideals of Permutation BH — Algebras 40 <i>Shuker Alsalem (University of Basrah, Iraq), Abu Firas Al Musawi (University of Basrah, Iraq), and Enoch Suleiman (Federal University Gashua, Nigeria)</i>	40
On Permutation B-Center and Derived Permutation B-Algebras 46 <i>Shuker Alsalem (University of Basrah, Iraq), Abu Firas Al Musawi (University of Basrah, Iraq), and Enoch Suleiman (Federal University Gashua, Nigeria)</i>	46

Scientific Computing with Applications in Sciences and Industry

A Python Application Software to Option Pricing and the Estimation of Price Sensitivities as a Component of a Financial Information System	51
<i>Abdunnasser Hatemi-J (UAE University, Al Ain, United Arab Emirates) and Alan Mustafa (IEEE Senior Member, Iraq)</i>	
An Analysis of Stability of Multiple Delayed Cohen-Grossberg Neural Networks of Neutral Type	55
<i>Ozlem Faydasicok (Istanbul University, Turkey) and Sabri Arik (Istanbul University-Cerrahpasa, Turkey)</i>	
Pairing Based Cryptography New Random Point Exchange key Protocol	61
<i>Ismail Assoujaa (University Sidi Mohammed Ben Abdellah FSDM (labo: LASMA) Fez, Morocco), Siham Ezzouak (University Sidi Mohammed Ben Abdellah FSDM (labo: LASMA) Fez, Morocco), and Hakima Mouanis (USMBA-FSDM FSDM (labo: LASMA) Fez, Morocco)</i>	
Peculiarities of the Hybrid Model Built using Parallel Data	66
<i>Merab Phkhovelishvili (Muskhelishvili Institute of Computational Mathematics Georgian Technical University, Georgia), Natela Archvadze (Ivane Javakishvili Tbilisi State University, Georgia), and Zurab Gasitashvili (Georgian Technical University, Georgia)</i>	

Computational Methods for Energy Systems

Generator and Transformer Efficiency Study for the Design of a Run-of-River Small Hydropower Plant with One Hydro-Turbine	71
<i>Angelos P. Moschoudis (University of West Attica, Greece), George J. Tsekouras (University of West Attica, Greece), Fotios D. Kanellos (Technical University of Crete, Greece), and Antonios G. Kladas (National Technical University of Athens, Greece)</i>	
Optimal Operation of a Run-of-River Small Hydropower Plant with Two Hydro-Turbines	80
<i>Vasiliki-Eleftheria K. Sarantopoulou (University of West Attica, Greece), Korina Konstantina Em. Drakaki (National Technical University of Athens, Greece), George J. Tsekouras (University of West Attica, Greece), Anastasios D. Salis (University of West Attica, Greece), Georgia-Konstantina Sakki (National Technical University of Athens, Greece), Andreas Efstradiatis (National Technical University of Athens, Greece), Dimitrios E. Papantonis (National Technical University of Athens, Greece), Vasilis Riziotis (National Technical University of Athens, Greece), George Caralis (National Technical University of Athens, Greece), and Konstantinos X. Soulis (Agricultural University of Athens, Greece)</i>	
Preliminary Technoeconomical Evaluation of Cold Ironing	89
<i>Eleni P. Lamprinidi (National Technical University of Athens, Greece), Stamatios Orfanos-Pepainas (University of West Attica, Greece), George J. Tsekouras (University of West Attica, Greece), Fotios D. Kanellos (Technical University of Crete, University Campus, Greece), John M. Prousalidis (National Technical University of Athens, Greece), and Andreas Vlachos (Renewable Energy Sources & Environmental Policy Regulatory Authority for Energy, Greece)</i>	

Systems Theory and Control

Control Theory Tools for Best Understanding Brain Learning Disorders	96
<i>M.I. García-Planas (Universitat Politècnica de Catalunya, Spain) and M.V. García-Camba (Clínica Corachan, Spain)</i>	
Gesture Control of a Robotic Head using Kinect	101
<i>Sebastian Daniel Rosca (University of Petrosani, Romania), Monica Leba (University of Petrosani, Romania), Remus Constantin Sibisanu (University of Petrosani, Romania), and Emanuel Muntean (University of Petrosani, Romania)</i>	
Integrated System for Real-Time Calculation of the Environmental Footprint of a Hotel	109
<i>Charalampos Theodorakopoulos (T. Alexandridis & SIA EE, Athens, Greece), Athanasios Bellos (T. Alexandridis & SIA EE, Athens, Greece), Konstantinos Kotsopoulos (T. Alexandridis & SIA EE, Athens, Greece), Alexandros Sofios (SenseWorks, Athens, Greece), Kotsantinos Karaiskos (SenseWorks, Athens, Greece), Dimitrios Bonis (NOSIS IKE, Chalandri, Greece), Panagiotis Morfis (NOSIS IKE, Chalandri, Greece), and Nikolaos V. Karadimas (Hellenic Army Academy, Vari, Greece)</i>	
Monitoring and Control of Water Requirements as Part of an Agricultural Management System using Internet of Things (IoT)	115
<i>Arunabh Bora (Gauhati University, India), Jyotishman Basistha (Gauhati University, India), Bhaswadeep Purkayastha (Gauhati University, India), Ifthikaruz Zaman Mazumder (Gauhati University, India), Surajit Deka (Gauhati University, India), Nupur Choudhury (Gauhati University, India), Anjan Kumar Talukdar (Gauhati University, India), Aradhana Misra (Gauhati University, India), Jyoti Prakash Medhi (Gauhati University, India), Kandarpa Kumar Sarma (Gauhati University, India), and Nikos Mastorakis (Technical University Sofia, Bulgaria)</i>	
Predicting Parkinson's Disease Based on Transformed Speech Signal by DWT with two Methods for Features Selection: GA-AdaBoost and BPSO	121
<i>Zayrit Soumaya (Laboratory Industrial Engineering, Information Processing and Logistics (GITIL). Faculty of Science Ain Chok. University Hassan II - Casablanca, Morocco), Nsiri Benayad (Research Center STIS, M2CS, National School of Arts and Crafts of Rabat (ENSAM), Mohammed V University in Rabat, Morocco. Casablanca, Morocco), Belhoussine Drissi Taoufiq (Laboratory Industrial Engineering, Information Processing and Logistics (GITIL). Faculty of Science Ain Chok. University Hassan II - Casablanca, Morocco), and Ammoumou Abdelkrim (Laboratory Industrial Engineering, Information Processing and Logistics (GITIL). Faculty of Science Ain Chok. University Hassan II - Casablanca, Morocco)</i>	
Study and Realization of a Control System Prototype for a Two-Axis LDR- Based Solar Tracker	131
<i>Khaldi Hamza (Mohammed V University, Mohammadia School of Engineers, Morocco), Mounir Hamid (Mohammed V University, Mohammadia School of Engineers, Morocco), Lahmim Imane (Université Mohammed V, École Nationale Supérieure d'Arts et Métiers, Morocco), and Sebrî Karima (Faculty of Sciences, Sidi Mohamed Ben Abdellah University, Morocco)</i>	

Simulation and Modeling in Sciences and Industry

A Proposed Model for Drugs' Review Analysis and Adverse Drug Reaction Discovery	139
<i>Mariam Gawich (Laboratoire Interdisciplinaire de l'Université Française d'Égypte (UFEID LAB), Université Française d'Égypte, Egypt) and Marco Alfonse (Department of Computer Science, Faculty of Computer and Information Sciences, Ain Shams University. Laboratoire Interdisciplinaire de l'Université Française d'Égypte (UFEID LAB), Université Française d'Égypte, Egypt)</i>	
An Analytical Model for Heat Transfer in Thermocline Storage Tanks of Non-Uniform Distributed Fillers	146
<i>Yuchao Hua (Nantes University, France) and Lingai Luo (Nantes University, France)</i>	
Analysis of Cardinal-Variables' Dependences Regarding Models' Structures in Applied Research of PISA	151
<i>Marek Vaclavik (University of Ostrava, Czech Republic), Tomas Barot (University of Ostrava, Czech Republic), Alena Valisova (University of Ostrava, Czech Republic), Iva Cervenkova (University of Ostrava, Czech Republic), and Zuzana Sikorova (University of Ostrava, Czech Republic)</i>	
Augmented Vehicle Wheels „Cat Claws“ Inspired	155
<i>Marius Leonard Olar (University of Petrosani, Romania), Monica Leba (University of Petrosani, Romania), Alexandru Costinas (University of Petrosani, Romania), and Bogdan Tomus (University of Petrosani, Romania)</i>	
Finding an Optimal Proximity Bound in a Very Special Scenario	160
<i>Aled Williams (London School of Economics and Political Science, UK)</i>	
Measurements and Magnetic Cleanliness Assessment for Reaction Wheels on CubeSats	164
<i>Alexandra Mavropoulou (National Technical University of Athens, Greece), Alexandros - Triantafyllos Bechrakis (National Technical University of Athens, Greece), Anargyros T. Baklezos (Hellenic Mediterranean University, Greece), Theodoros N. Kapetanakis (Hellenic Mediterranean University, Greece), Ioannis O. Vardiambasis (Hellenic Mediterranean University, Greece), and Christos D. Nikolopoulos (Hellenic Mediterranean University, Greece)</i>	
Simulation of an Autonomous car Drive Scenario	170
<i>Andrei Berceanu (University of Petrosani, Romania), Monica Leba (University of Petrosani, Romania), Marius Risteiu (University of Petrosani, Romania), Nelu Mija (University of Petrosani, Romania), and Andreea Ionica (University of Petrosani, Romania)</i>	

Socio-Economic Development in Conditions of Digital Transformations: Regional Features, Strategic Analysis, and Prospects	175
<i>Kramarenko Iryna (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), Irtyshcheva Inna (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), Stehnei Marianna (Mukachevo State University, Ukraine), Boiko Yevheniia (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), Nadtochii Iryna (Admiral Makarov National University of Shipbuilding, Kherson Educational-Scientific Institute, Ukraine), Pavlenko Olena (Admiral Makarov National University of Shipbuilding, Kherson Educational-Scientific Institute Odessa, Ukraine), Rakipov Vladislav (The main administration of the DPS in the Mykolaiv region Mykolaiv, Ukraine), Hryshyna Nataliya (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), Sirenko Ihor (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), Ishchenko Olena (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine), and Tubaltseva Natalia (Admiral Makarov National University of Shipbuilding Mykolaiv, Ukraine)</i>	

Industrial Applications

Into Strain Mapping of Structural Components	183
<i>Calin-Ioan Birdean (Politehnica University of Timisoara, Romania), Ioan Both (Politehnica University of Timisoara, Romania), and Ioan Marginean (Politehnica University of Timisoara, Romania)</i>	
Metal Powder Production by Atomization Methods	190
<i>Dimitar Karastoyanov (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria), Vladimir Monov (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria), and Todor Penchev (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria)</i>	
Metal Powder Production by Grinding in Ball Mills	196
<i>Dimitar Karastoyanov (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria), Vladimir Monov (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria), and Todor Penchev (Institute of Information and Communication Technologies-Bulgarian Academy of Sciences, Bulgaria)</i>	
Author Index	201