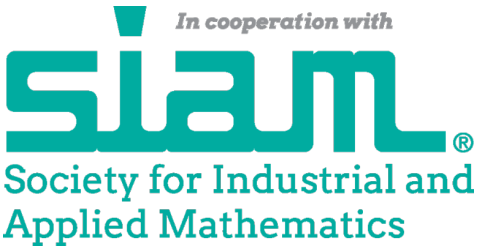
ICMSAO'23

The Ninth International Conference on Modeling, Simulation and Applied Optimization

April 26th-28th 2023
Barceló Palmeraie, Marrakech, Morocco



Welcome Message
General Information

Registration

The registration desk will be open every day of the conference from 8:30 a.m. to 5:00 p.m. Pre-registered attendees may pick up their badges and conference material at any time.

Venue for Technical Sessions

All technical sessions will be held at Barcelo Palmeraie Marrakech.

Lunches and Coffee Breaks

Buffet lunches and coffee breaks as listed in the conference program are included in the conference fees.

Banquet

The conference gala dinner will take place on Thursday, April 27, 2023 (19:00–22:00). The event is included in the conference fees for all international participants. Tickets are available at the registration desk for 55 Euros per person.

Marrakech City Tour

A two-hour Marrakech city tour will be held on Friday April 28, 2023 starting at 17:00 pm. The city tour will consist of a **horse-drawn carriage tour of** some of the popular places of Marrakech at a cost of 20 Euros per person. The carriage can hold up to five people. Seats are limited so please make your reservation at the registration desk.

Program Overview

Time	Day 1: April 26, 2023			
8:30 onwards	Registration			
9:00-10:00	Opening Ceremony			
10:00-11:00	Keynote 1: Prof. Chaker Necibi, UM6P, Morocco.			
11:00-11:30	Coffee Break			
11:30-12:30	Keynote 2: Prof. Bruno Sudret, ETH Zürich, Switzerland.			
12:30-14:00	Lunch Break and Networking			
14:00-15:20	Session 1 Applied Mathematics	Session 2 Civil Engineering	Session 3 Biomedical and Chemical Engineering	Session 4 Statistics, Machine Learning, and Data Science
15:20-16:00	Coffee Break			
16:00-17:20	Session 5 Applied Mathematics	Session 6 Civil Engineering	Session 7 Mathematical Modeling and Simulation	Session 8 Statistics, Machine Learning, and Data Science

Time	Day 2: April 27, 2023			
8:30 onwards	Registration			
9:00-10:00	Keynote 3: Prof. Enrique Zuazua, FAU, Germany			
10:00-10:30	Coffee Break			
10:30-11:50	Session 9 Applied Mathematics	Session 10 Computer and Electrical Engineering	Session 11 Mathematical Modeling and Simulation	Session 12 Artificial Intelligence
12:00-14:00	Lunch Break and Networking			
14:00-15:20	Session 13 Applied Mathematics	Session 14 Computer and Electrical Engineering	Session 15 Mathematical Modeling and Simulation	Session 16 Materials and Mechanical Engineering
15:20-16:00	Coffee Break			
16:00-17:20	Session 17 Applied Mathematics	Session 18 Engineering Systems Management	Session 19 Mathematical Modeling and Simulation	Session 20 Materials and Mechanical Engineering
18:30-21:00	Conference Banquet			

Time	Day 3: April 28, 2023		
8:30 onwards	Registration		
9:00-10:30	Tutorial 1: Prof. Ching-Shyang Chen Meshless Methods with Scientific Computing.	Session 21 Engineering Systems Management	Session 22 Civil Engineering
10:30-11:00	Coffee Break		
11:00-12:30	Tutorial 2: Prof. Božidar Šarler Computational Modelling of Multiphase Systems	Session 23 Other Science and Engineering	Session 24 Other Science and Engineering
12:30-15:00	Lunch Break and Networking		
15:00-16:30	Tutorial 3: Prof. Jamil Renno Modelling the Vibration of Waveguides using the Wave and Finite Element Method.		
16:30-17:00	Coffee Break		
17:00-19:00	Marrakech City Tour		

Keynote Speeches

Keynote 1:

Wednesday, April 26, 2023 Time: 10:00- 11:00

Integrated optimization framework for circular wastewater management: Closing the loop and retaining the value

Professor: Mohamed Chaker Necibi

Abstract: Cities around the world hold key competences to untap a multitude of opportunities in their pursuit to achieve SDGS in various sectors (SDG #2 No hunger, and SDG #6 Clean water and sanitation, to name a few). In this context, introducing circular economy principles and business models in the critical sector of wastewater management can lead to leapfrogging opportunities for water reclamation, resources recovery and bioenergy production, if implemented at an early planning stage within an integrated framework for sustainable development. It can thus provide economically viable and efficient alternatives to the conventional and wasteful linear-based water management and wastewater treatment strategies.

Hence, in order to reclaim and valorize the valuable resources in municipal and industrial wastewaters, a symbiotic and optimized framework based of the circular economy paradigm need to be developed. In this regard, we will explore related initiatives from public and private sectors establishing cross-boundaries platforms for the flow of resources, the various innovative circular designs, and the set of enabling advanced technologies. Selected inspiring success stories from around the world are also showcased.

Overall, and through these 'circular' levers, our cities are well placed to promote sustainable water and resources management patterns via circular economy.

About the Presenter

Professor: Mohamed Chaker Necibi

Mohammed VI Polytechnic University (UM6P), Morocco.

Lead of the Sustainable Water Treatment & Reuse Lab at the International Water Research Institute (IWRI).

Chaker Necibi holds a PhD in Environmental Engineering from the University of Sousse, Tunisia, in 2008. After an international research career of more than 10 years in France (University of Montpellier), Germany (Technical University of Braunschweig), and in Finland (Lappeenranta University of Technology) where he was an Assistant Professor in Circular Economy, he is a permeant professor at UM6P since 2019.

C. Necibi and his research team focus on the development of advanced and sustainable technologies for water treatment, based on the principles of circular economy, including the optimization and integration of physicochemical, hydrothermal or biological processes for water reclamation, pollution removal, resources recovery bioenergy production and solar-driven desalination, in Morocco and Africa, though ongoing collaboration with the OCP group, MIT, and Arizona State Univ. He published more than 70 articles in ISI journals, three books on Biomass of Sustainable Applications (RSC), Bioeconomy (Springer), and Circular Economy (Academic Press), and he is in Stanford university's list of the world's top 2% scientists since 2019.

Keynote 2:

Wednesday, April 26, 2023 Time: 11:30-12:30

Uncertainty quantification using surrogate modelling

Professor: Bruno Sudret

Abstract: Nowadays, computational models have become an integral part of various fields of applied sciences and engineering. These models are used to forecast the behaviour of complex natural or man-made systems. Also known as simulators, they enable engineers and scientists to evaluate a system's performance in a virtual environment, and then help optimize its design or operation.

Simulators, such as high-fidelity finite element models, often comprise numerous parameters, and their execution is expensive, even when using the available computing power to the fullest. Additionally, the complexity of a system leads to greater uncertainty in its governing parameters, environmental and operating conditions. In this context, uncertainty quantification (UQ) methods have gained popularity in both academia and industry in recent times, as they can be used to address reliability, sensitivity, or optimal design problems. Monte Carlo simulation, a well-known brute-force method, uses random number generation to solve these questions. However, it may require thousands to millions of simulations to produce accurate predictions, making it impractical for high-fidelity simulators.

In contrast, surrogate models can solve these UQ problems by creating an accurate approximation of the simulator's response, using a limited number of runs at selected values (the experimental design) and a learning algorithm. In this lecture, we will first introduce the general features of surrogate models and their relationship with machine learning. Next, we will discuss polynomial chaos expansions in detail, along with their sparse version for high-dimensional problems. We will also address recent extensions to structural dynamics. Finally, we will explore Gaussian processes and their use in conjunction with active learning to solve reliability analysis problems.

About the Presenter

Professor: Bruno Sudret

ETH Zürich, Switzerland.

Institute of Structural Engineering, Chair of Risk, Safety & Uncertainty Quantification.

Bruno Sudret is a professor of Risk, Safety and Uncertainty quantification at ETH Zurich since 2012. B. Sudret received a master's of science from the Ecole Polytechnique (France) in 1993. He then obtained a master's degree and a Ph.D in civil engineering from the Ecole Nationale des Ponts et Chaussées (France) in 1996 and 1999, respectively. Dr. Sudret has been working in probabilistic engineering mechanics and uncertainty quantification for engineering systems since 2000: first as a post-doctoral fellow at the University of Berkeley (California), then as a researcher at EDF R&D (the French world leader in nuclear power generation) where he was the head of a group specialized in probabilistic engineering mechanics (2001-2008). From 2008 to 2011 he has worked as the Director of Research and Strategy at Phimeca Engineering (France).

B. Sudret is the author and co-author of more than 250 publications in journal and conference proceedings. He currently serves in the editorial board of Reliability Engineering and Systems Safety, Probabilistic Engineering Mechanics and Structural Safety. He promotes the dissemination of uncertainty quantification techniques through the development of the software UQLab (www.uqlab.com) and the community platform UQWorld (www.uqworld.org).

Keynote 3:

Thursday, April 27, 2023 Time: 9:00- 10:00

Control and Machine Learning

Professor: Enrique Zuazua

Abstract: We present some recent results on the interplay between control and Machine Learning.

We adopt the perspective of the simultaneous or ensemble control of systems of Residual Neural Networks (ResNets) and present a genuinely nonlinear and constructive method, allowing to show that such an ambitious goal can be achieved, estimating the complexity of the control strategies.

This property is rarely fulfilled by the classical dynamical systems in Mechanics and the very nonlinear nature of the activation function governing the ResNet dynamics plays a determinant role. The turnpike property is also analyzed in this context.

This lecture is inspired in joint work, among others, with Borjan Geshkovski (MIT), Carlos Esteve (Cambridge), Domènec Ruiz-Balet (IC, London), Dario Pighin (Sherpa.ai) and Martin Hernández (FAU).

About the Presenter

Professor: Enrique Zuazua

Friedrich–Alexander University, Germany.

Director of the Chair in Applied Analysis Humboldt Professorship (Germany) and the Chair of Computational Mathematics. University of Deusto (Spain).

Enrique Zuazua Iriondo (Basque Country – Spain, 1961) holds the Chair of Dynamics, Control and Numerics – Alexander von Humboldt Professorship at FAU- Friedrich–Alexander University, Erlangen–Nürnberg (Germany), and secondary appointments at Universidad Autónoma de Madrid and the University of Deusto in Bilbao, Spain. His research in Applied Mathematics covers topics in Partial Differential Equations, Systems Control, Numerical Analysis and Machine Learning. He holds a degree in Mathematics from the University of the Basque Country, and a dual PhD degree from the same university (1987) and the Université Pierre et Marie Curie, Paris (1988).

He has been awarded the Euskadi (Basque Country) Prize for Science and Technology 2006, the Spanish National Julio Rey Pastor Prize 2007, the Advanced Grants NUMERIWAVES in 2010 and DyCon in 2016 of the European Research Council (ERC) and the SIAM W.T. and Idalia Reid Prize 2022. He is an honorary member of the of Academia Europaea and Doctor Honoris Causa from the Université de Lorraine in France and Ambassador of the Friedrisch- Alexandre University in Erlangen-Nurenberg, Germany. He was an invited speaker at ICM2006 in the section on Control and Optimization.

Tutorials

Tutorial 1:

Friday, April 28, 2023 Time: 9:00 – 10:30

Meshless Methods with Scientific Computing

Professor: Ching-Shyang Chen

Abstract: During the past two decades, radial basis functions have emerged as a popular meshless method which is analogy to the wireless in communicational technology or paperless in the digital communication. With the new meshless technology, no tedious mesh generation is required for solving various kinds of science and engineering problems and enormous saving for human labor in data preparation and computational time can be achieved. In this lecture, we first present the basic idea of radial basis functions with some simple and yet effective techniques for the reconstruction of 3D surface. Next, the state-of-the-art computational methods using radial basis functions and the method of fundamental solutions for solving partial differential equations in science and engineering will be introduced. Demonstration for computer graphics using meshless methods via MATLAB will also be presented.

About the Presenter

Professor: Ching-Shyang Chen

University of Southern Mississippi, USA.

Department of Mathematics.

C.S. Chen is currently Professor of Mathematics at the University of Southern Mississippi where he served as the Chair of the Department of Mathematics during 2005-2010. Prior to joining the University of Southern Mississippi, Prof Chen was a faculty member at the University of Nevada, Las Vegas for 17 years. His main research interests lie in meshless methods, and more specifically, in using radial basis functions and the method of fundamental solutions for solving partial differential equations. Over the past 30

years, Prof Chen has devoted his time developing numerical algorithms for solving various types of partial differential equations in highly irregular domains, using easy-to-understand mathematics and simplified computer coding. He served as the founding Editor-in-Chief for the journal Computers, Materials, and Continua during 2000-2004 and members of editorial board for a number of professional journals. He is currently serving as an Associate Editor of Engineering Analysis with Boundary Elements and Advances in Applied Mathematics and Mechanics.

Tutorial 2:

Friday, April 28, 2023 Time: 11:00 – 12:30

Computational Modelling of Multiphase Systems

Professor: Božidar Šarler

Abstract: Multiphase systems are found in a vast spectrum of natural and technological systems. These systems have many unique features, such as forming precious jewels found in nature and casting high-tech casts weighing several hundreds of tons. This tutorial aims to give an overview of the physical processes typical for these systems and present the multiscale computational modelling of them from the nucleation at the microscopic level to the properties of large systems. We will explain how the external fields can alter the behaviour of these systems and what type of defects can be found in the related technological processes. We will focus on the contemporary physical, artificial intelligence and numerical modelling strategies for coping with these systems. Several simulation cases will be demonstrated based on experimentally verified physical models to mitigate these systems' porosity, macrosegregation, and cracks.

About the Presenter

Professor: Božidar Šarler

University of Ljubljana, Slovenia

Faculty of Mechanical Engineering & Institute of Metals and Technology, Ljubljana.

Professor Božidar Šarler chairs the Department for Fluid Dynamics and Thermodynamics, Faculty of Mechanical Engineering, University of Ljubljana and the Laboratory for Simulation of Materials and Processes at the Institute of Metals and Technology in Ljubljana, Slovenia.

He worked abroad cumulative for more than four years at prestigious institutions in Europe, USA, China and Australia. He is giving courses as a visiting professor at the University of Naples "Parthenope" Italy, Yanshan University China, and Hohai University China.

His research interest is focused on multiscale and multiphysics simulations of multiphase systems. He conducts related projects for EU funding schemes, National Academies USA, Helmholtz Association Germany, Chinese Academy of Sciences and leading metallurgical equipment producers, to name a few.

He has received several domestic and international awards. He serves in the European Union ESFRI Energy Working Group and Eurotherm Committee.

Tutorial 3:

Friday, April 28, 2023 Time: 14:30 – 16:00

Modelling the Vibration of Waveguides using the Wave and Finite Element Method

Professor: Jamil Renno

Abstract: To model the dynamic behavior of waveguides (e.g., beams, bars, etc.) can be performed analytically in a few simple cases only. For waveguides with complicated cross-sections or at higher frequencies, one has to use element-based methods such as the finite element or boundary element method. However, at high-frequency, short-wavelength vibrations, the number of elements used to accurately describe the dynamics of the waveguide will grow considerably such that the computational cost becomes prohibitive. Many methods have been developed in the literature to address this issue. However, in this tutorial we will introduce the audience to the following:

- Modelling the dynamic behavior of waveguides
- A comparison between low-frequency and high-frequency methods
- Introduction to the Wave and Finite Element method
- Modelling of free wave propagation and its applications
- Modelling of the forced response of waveguides
- Academic and Industrial Case Studies

About the Presenter

Professor: Jamil Renno

Qatar University, Qatar.

Department of Mechanical & Industrial Engineering.

Dr. Jamil Renno is Associate Professor in the Department of Mechanical & Industrial Engineering at Qatar University. His research interests lie in the area of vibration and structural dynamics with applications to the oil and gas industry and transportation sectors.

Before joining Qatar University, Jamil was the Technical and Business Development Lead of the Department of Dynamic Engineering in Doosan Babcock where he led investigations and proposed solutions to vibration problems in the oil and

gas industry. His experience includes working in the North Sea (both the UK and Norwegian sectors), Middle East and Central Asia. Before working in industry, Dr. Renno held a Lectureship in Structural Dynamics at the Institute of Sound and Vibration Research at the University of Southampton and was also Fellow of the UK Engineering and Physical Sciences Research Council. At the University of Southampton, Jamil worked on solving vibroacoustic problems in the mid-frequency range, mainly using the wave finite element method.

Jamil is a Chartered Engineer, a Fellow of the UK Institute of Mechanical Engineers (CEng FIMechE) and a Fellow of the UK Higher Education Academy (FHEA).

Conference Tracks

Track 1: Applied Mathematics

Day 1 - Session 1: Applied Mathematics (Chair: Ching-Shyang Chen) – Room: Koutoubia			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	1570854200	Multi-objective Optimization of Radial Basis Function Neural Network Training using Genetic Algorithm	Taoufyq Elansari, Ouanan Mohammed and Hamid Bourray (Moulay Ismail University, Morocco)
14:20-14:40	1570854246	A discrete kinetic model for studying crowd dynamics in evacuation emergencies	Abdelghani EL Mousaoui (Teaching and Research Assistant à l'EMINES - School of Industrial Management Université Mohammed VI, Morocco); Aissam Jebrane (Ecole Centrale Casablanca, Morocco); Abdelilah Hakim (Université Cadi Ayyad, Morocco)
14:40-15:00	A1570874726	Global existence of the 3D rotating second grade fluid system	Basma Jaffal-Mourtada (Pôle Universitaire Léonard de Vinci, DVRC, Paris La Défense, France)
15:00-15:20	1570855669	An Emotional Contagion Model To Assess The Impact Of Factors Governing The Spread Of Panic In A Crowd	Yassine Lamrhary (Université Gustave Eiffel & Université Hassan II - Ecole Centrale Casablanca, Morocco); Aissam Jebrane (Ecole Centrale Casablanca, Morocco); Pierre Argoul (Université Gustave Eiffel, France); Adnane Boukamel and Amina Alaoui Soulimani (Ecole Centrale Casablanca, Morocco)

Day 1 - Session 5: Applied Mathematics (Chair: Ahmed Naji) – Room: Koutoubia			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570856429	Mixed Finite Element Method in 3D for a Nonlinear Eddy Current Problem	Montasser Hichmani (Ecole Nationale Supérieure des Mines de Rabat, ENSMR, Morocco); Marc Laforest (Polytechnique Montreal, Canada); El Miloud Zaoui (Ecole Nationale Supérieure des Mines de Rabat, ENSMR, Morocco)
16:20-16:40	1570856194	A Multiscale model to Investigate the Impact of the ventilation Airflow Type on the Risk to Contract COVID-19 in a Classroom	Dramane Sam Idris Kanté (University Cadi Ayyad & Ecole Centrale Casablanca, Morocco); Aissam Jebrane and Adnane Boukamel (Ecole Centrale Casablanca, Morocco); Abdelilah Hakim (Université Cadi Ayyad, Morocco)

16:40-17:00	1570863224	Series solution for MHD fluid flow due to nonlinear accelerating surface with suction/injection	Gabriella Bognar (Hungary); Ulavathi S Mahabaleshwar (Davangere University, India)
17:00-17:20	1570869969	Constrained Optimal Tracking for a DPS in the Discrete-time setting	Guilherme Ozorio Cassol and Stevan Dubljevic (University of Alberta, Canada)

Day 2 – Session 9: Applied Mathematics (Chair: Jens Peter Lang) – Room: Koutoubia			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
10:30-10:20	1570864061	Control and Switching Synchronization of Chaotic Finance Systems with Integer and Non-Integer Orders	Talal Sahud Al mutairi (Shaqra University, Saudi Arabia)
10:20-10:40	1570857257	Chance-constrained Fuzzy Optimization Model for Enhancing Facultative Ponds: A Case Study at Bantul Wastewater Treatment Plant	Kartono Kartono (Diponegoro University, Indonesia); Sutrisno Sutrisno (Universitas Diponegoro, Indonesia); Sunarsih Sunarsih and Widowati Widowati (Diponegoro University, Indonesia)
10:40-11:00	1570872374	Data visualization techniques for the identification of missing values in dairy farming	Amira Rachah (SINTEF Industry, Norway); Peter Lovendahl (Aarhus University, Norway); Olav Reksen (Animal and Veterinary Sciences, Norway); Camilla Kielland (University of Life Sciences, Norway)
11:00-11:20	A1570873247	A deterministic nonsmooth mean field game with control and state constraints	Sarah Essadi and Michael Hintermueller (Weierstrass Institute for Applied Analysis and Stochastics, Germany)

Day 2- Session 13: Applied Mathematics (Chair: Ching-Shyang Chen) – Room: Koutoubia			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	A1570874433	Gradient Projection Method with Implicit Peer Triplets for ODE Constrained Optimal Control Problems	Jens Peter Lang (Technical University of Darmstadt, Germany)
14:20-14:40	A1570874558	Fourier Analysis for Peridynamics and Nonlocal Models	Bacim Alali and Nathan Albin (Kansas State University, USA)
14:40-15:00	1570855033	Positive LQ-optimal Control For Infinite-Dimensional Positive Linear Systems	Toufik Ennouari, Bouchra Abouzaid and Mohammed Elarbi Achhab (Chouaib Doukkali University, Morocco)

15:00-15:20	A1570890942	Residual Power series solution for the fractional corneal shape model	Marwan Abukhaled (American University of Sharjah, United Arab Emirates)

Day 2 - Session 17: Applied Mathematics (Chair: Marwan Abukhaled) – Room: Koutoubia			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570890519	Agent-based model for control of transmission dynamics of pandemic infectious diseases with face masks use	Amira Rachah (SINTEF Industry, Norway); Thiago L Silva (Sintef Industry, Norway)
16:20-16:40	A1570887034	Prediction and control of medical mask use during the COVID19 pandemic	Amira Rachah (SINTEF Industry, Norway)
16:40-17:00	A1570902677	Towards efficient numerical models for assessment and management of flood risks in Oued Martil	Rafia Belhajjam (University Abdelmalek Essaâdi, Morocco); Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco); Mohammed Seaid (Durham University, United Kingdom); Naji Yebari (University Abdelmalek Essaâdi, Morocco)
17:00-17:20	1570900643	ALPS: A System Dynamic simulator towards food Security policies in Africa. Application to Morocco	Safae Elmisaoui (Um6p, Morocco); Souhail Maazioui and Saad Benjelloun (Mohammed VI Polytechnic University, Morocco); Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco)

Track 2: Artificial Intelligence

Day 2 - Session 12: Artificial Intelligence (Chair:) – Room: Bab doukkala			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
10:00-10:20	1570867611	Word-Level Arabic Sign Language Recognition using Millimeter Wave Radar and Convolutional Neural Networks	Abdulrahman Alobaidlei, Ali Alsuwaidi, Mohammed Alfalasi, Amer Zakaria and Mahmoud H. Ismail (American University of Sharjah, United Arab Emirates)
10:20-10:40	1570869614	Innovative method of voice activity detection using an artificial neural network	Abajaddi Nesrine (IMII & LAPSSII, Morocco); Youssef Elfahm (Hassan First University of Settat, Morocco); Badia Mounir (Graduate School of Technology, Morocco); Abdelmajid Farchi (Faculty of Sciences & Technics, Morocco)
10:40-11:00	1570886334	Flood Detection using Deep Learning Methods from Visual Images	Ghazanfar Latif (Prince Mohammad bin Fahd University, Saudi Arabia); Akhtar Hussain (University of North Dakota, USA); Jaafar Alghazo (VIRGINIA MILITARY INSTITUTE Lexington,

			Virginia, USA); Eunjin Kim (University of North Dakota, USA)
11:00-11:20	A1570890933	Development of Synthetic Data Benchmarks for Feature Selection	Hana Sulieman and Rohan Mitra (American University of Sharjah, United Arab Emirates); Firuz Kamalov (Canadian University Dubai, United Arab Emirates)

Track 3: Biomedical and Chemical Engineering

Day 1 - Session 3: Biomedical and Chemical Engineering (Chair: Mostafa Shaaban) – Room: Mouassine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	A1570874685	Isoperimetric constraint for chemotherapy of tumors: an optimal control approach	Samira Zouhri and Mohcine El baroudi (Hassan II University of Casablanca, Morocco)
14:20-14:40	1570862222	Numerical Investigation of Chemical Reaction Flux Control by Linear and Heaviside Temperature Gradients	Mohammed Loukili (National Research Institute for Agriculture, Food and the Environment (INRAE), France); Raphael Plasson (Avignon University, France); Ludovic Jullien (PSL University, France)
14:40-15:00	1570897216	Combating Medical Image Tampering using Deep Transfer Learning	Ghazanfar Latif (Prince Mohammad bin Fahd University, Saudi Arabia); Ghassen Ben Brahim (PMU, Saudi Arabia); Nazeeruddin Mohammad (Prince Mohammad Bin Fahd University, Saudi Arabia); Jaafar Alghazo (VIRGINIA MILITARY INSTITUTE Lexington, Virginia, USA)
15:00-15:20	1570870755	Uncertainty-Aware Classification of Tuberculosis Subtypes with Machine Learning Techniques and Probabilistic Calibration	Jayroop Ramesh, Zahrasadat Solatidehkordi and Donthi Sankalpa (American University of Sharjah, United Arab Emirates); Amar Khamis (Mohammed Bin Rashid University of Medicine and Health Sciences, United Arab Emirates); Assim Sagahyroon and Fadi Aloul (American University of Sharjah, United Arab Emirates)

Track 3: Civil Engineering

Day 1 - Session 2: Civil Engineering (Chair: Fouad Mohammad) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	1570778598	Nonlinear Finite Element Modeling of Circular Geopolymer Concrete Columns with GFRP Bars and Spirals	Khaled Megahed (Mansoura University, Egypt); Fouad Mostafa Amin (American University of Sharjah, United Arab Emirates & Mansoura University,

			Egypt); Mohammad AlHamaydeh (American University of Sharjah, United Arab Emirates)
14:20-14:40	1570858813	Heat Transfer Analysis of FRP-Strengthened RC Columns under Fire	Reem Talo (American University of Sharjah, United Arab Emirates); Salem Mazen Khalaf (American University of Sharjah, UAE, United Arab Emirates); Farid Abed and Yazan Alhoubi (American University of Sharjah, United Arab Emirates); Ahmed El-Refai (Laval University, Quebec, Canada)
14:40-15:00	1570862007	A Partial-Least Square Structural Equation Model to Assess the Impact of Traditional Selection Criteria of Project Delivery Methods on the Success of Sustainable Construction Projects	Salma N Ahmed and Sameh El Sayegh (American University of Sharjah, United Arab Emirates)
15:00-15:20	1570855968	Workload Fluctuation Analysis Using System Dynamic Simulation in Project Based Organizations	Ahmed Abdelrady Okasha M. Elnady (University of Alberta, Canada); Ahmed Hammad (Associate Professor, Canada)

Day 1 - Session 6: Civil Engineering (Chair: M Shadi Mohamed) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570862803	Microscopic Traffic Simulation Model for Bus Transport Operations under Heterogeneous Traffic Conditions	Thenuwan Jayasinghe, Thillaiampalam Sivakumar and Amal S Kumarage (University of Moratuwa, Sri Lanka)
16:20-16:40	1570869688	Finite Element Modeling of Strengthened T-Beams with CFRP U-Wraps	Maha Assad, Haya Mhanna, Rami Hawileh and Jamal Abdalla (American University of Sharjah, United Arab Emirates)
16:40-17:00	1570875069	Finite Element Modeling of the Seepage Flow of Water Under Concrete Dams with Sheet Piles	Raed Abokwiek, Rami Hawileh and Jamal Abdalla (American University of Sharjah, United Arab Emirates)
17:00-17:20	1570890329	Minimisation of Embodied Energy in Three-Dimensional Steel Framed Structures Using Two Optimisation Techniques	Fouad Mohammad and Abdalhakem Alkhadashi (Nottingham Trent University, United Kingdom (Great Britain))

Day3 - Session 20: Civil Engineering (Chair: M Shadi Mohamed) – Room: Mouassine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
9:00-9:20	1570868846	A Faster Region-based Convolutional Neural Network Approach to Automated Structural Damage Recognition and Detection of Reinforced Concrete Bridge Structures	Rhea Mae M. Cuasay, Nicole Grace I. Tan, Joseph Nathaniel A. Torres and Gilford B. Estores (Mapua University, Philippines)
9:20-9:40	1570865666	Study of the Potential of Coral Rocks as Coarse Aggregate Materials in Asphalt Mixture in the Archipelago Region of East Nusa Tenggara Region	Mauritius Ildo Rivendi Naikofi, Christiani Chandra Manubulu and Don Gaspar Noesaku da Costa (Universitas Katolik Widya Mandira, Indonesia)

9:40-10:00	1570862871	Management of Excessive Vibration on Floor Slabs System	Don Gaspar Noesaku da Costa (Universitas Katolik Widya Mandira); Christiani Chandra Manubulu and Mauritius Ildo Rivendi Naikofi (Universitas Katolik Widya Mandira, Indonesia)

Track 5: Computer and Electrical Engineering

Day 2- Session 10: Computer and Electrical Engineering (Chair: Mohamed S. Hassan) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
10:30-10:50	1570862794	Simulating Time Sensitive Networks: Overview and Open Challenges	Anas Bin Muslim and Ralf Tönjes (University of Applied Sciences Osnabrück, Germany)
10:50-11:10	1570855677	Proposed Design Models of Axial-Flux Permanent Magnet Synchronous Generator for Small-Scale Hydro Power Generation Unit	Mohamed Abdo Husien (Arab Academy for Science and Technology and Maritime Transport, Egypt); Walid A. M. Ghoneim (Arab Academy for Science and Technology, Egypt); Hamdy Ashour (Arab Academy for Science and Technology (AAST), Egypt)
11:10-11:30	1570861260	Impact of Charging and Discharging of Electric Vehicles in Parking Lots on the Distribution System Reliability	Rana Hassan AlNahhal (The German University in Cairo, Egypt); Mostafa Shaaban (American University of Sharjah, United Arab Emirates)
11:30-11:50	1570862713	Finite-Time Variable Gains Super-Twisting Control for Lane-Changing of Autonomous Vehicles	Yassine Kali (École de Technologie Supérieure, Canada); Maarouf Saad (University of Quebec, Canada); Mario Landry and Pier-Marc Comtois-Rivet (Institut Du Véhicule Innovant, Canada)

Day 2 - Session 14: Computer and Electrical Engineering (Chair: Ahmed Osman) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	1570869300	Flexibility Assessment of Smart EV Charging Strategies in Different Parking Lots	Sarah M.A Kandil and Ahmed Osman (American University of Sharjah, United Arab Emirates)
14:20-14:40	1570896901	Monitoring of critical motor temperatures using virtual sensing	Ludwig Christoph, Vincent Malik, Mohamed Khalil, and Dimitrios Loukrezis (Siemens AG, Germany)
14:40-15:00	1570902604	Modeling and Simulation of Parabolic Trough Power Plant using Molten Salt: Case Study of NOOR I Solar Power Station in Morocco, Ouarzazate	Hamzah Bakhti (University of Hamburg, Germany); Ingenuin Gasser (University of Hamburg, Germany)
15:00-15:20	1570870045	Discrete Misalignment Detection for Roadway Powered Electric Vehicles using Sensor Coil Arrays	Eiman A Elghanam, Mohamed S. Hassan and Ahmed Osman (American University of Sharjah, United Arab Emirates)

Track 6: Engineering Systems Management

Day 2 - Session 18: Engineering Systems and Management (Chair:) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570781811	Integrated blockchain systems for UAE Cold Food SMART Logistics	Inas Al Khatib (American University of Sharjah, United Arab Emirates); Vian S Ahmed (American University of Sharjah, United Arab Emirates); Malick Ndiaye (American University of Sharjah, United Arab Emirates)
16:20-16:40	1570869516	Decoupling Relationship Between Income and Housing Energy Consumption in Morocco	Charifa Haouraji (University Hassan 1er, Morocco); Badia Mounir and Ilham Mounir (Graduate School of Technology, Morocco); Abdelmajid Farchi (Faculty of Sciences & Technics, Morocco)
16:40-17:00	1570877014	Maintenance 4.0 Research Landscape: Insights and Key Trends from a Bibliometric Network Analysis	Afef Saihi and Mohamed Ben Daya (American University of Sharjah, United Arab Emirates); Rami As'ad (American University of Sharjah - UAE, United Arab Emirates)
17:00-17:20	1570857998	Development of a Decision-making Support Model for Order Allocation and Production Planning in Uncertain Environment	Sutrisno Sutrisno (Universitas Diponegoro, Indonesia); Solikhin Solikhin (Diponegoro University, Indonesia); Purnawan Adi Wicaksono (Diponegoro University & Undip, Indonesia); Abdul Aziz (Diponegoro University, Indonesia)

Day 3 - Session 21: Engineering Systems and Management (Chair:) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
9:00-9:20	1570862719	Resilience analysis of large-scale dynamic food flow networks using an optimization-based N-1 contingency approach	Sissi Adeli Bazan Santos (Technical University of Munich & Siemens AG, Germany); Sebastian Albrecht (Siemens AG, Germany); Hanno Friedrich (Kühne Logistics University, Germany); Rudolf Sollacher (Siemens AG, Germany); Thomas Hamacher (Technische Universität München, Germany)
9:20-9:40	1570871676	Smart Monitoring of Waste Bins and Municipal Solid Waste Forecast Using LSTM for Smart Cities	Maram Helmy and Mohamed S. Hassan (American University of Sharjah, United Arab Emirates)
9:40-10:00	1570868736	The Optimal Coordination between Production, Logistics and Maintenance in Fuel Supply Chain	Kamar Diaz (University of Lorraine, France & University of Abdelmalek Essaâdi, Morocco); Mohamed Ali Kammoun and Hajej Zied (University of Lorraine, France); Naoufal Sefiani

			(Abdelmalek Essaâdi University, Morocco); Maria Francesca Milazzo (University of Messina, Italy)
10:00-10:20	1570862535	Integrated Material Ordering and Multi-Resource Leveling Problem with Time-Varying Resource Profile	Hessa Almatroushi and Moncer Hariga (American University of Sharjah, United Arab Emirates); Rami As'ad (American University of Sharjah - UAE, United Arab Emirates)

Track 7: Materials and Mechanical Engineering

Day2 - Session 16: Materials and Mechanical Engineering (Chair: Said Sakhi) – Room: Bab doukkala			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	1570862709	Fluid-based honeycomb sandwich panel core structure for blast mitigation	Yaqoub S. AlAhmed, Noha M. Hassan and Zied Bahroun (American University of Sharjah, United Arab Emirates)
14:20-14:40	1570886525	Heat Transfer through Protective Face Masks and Respirators	Radostina A. Angelova and Daniela Sofronova (Technical University of Sofia, Bulgaria)
14:40-15:00	1570853416	Simulation of two phase flow using a modified accurate conservative level set method	Radouan Boukharfane (UM6P & MSDA, Morocco)
15:00-15:20	1570870930	Optimising Stop-Bands in Periodic Waveguides using Genetic Algorithms and Wave Finite Element Method	Jamil Renno (Qatar University, Qatar); M. Shadi Mohamed (Heriot-Watt University, United Kingdom (Great Britain))

Day2 - Session 20: Materials and Mechanical Engineering (Chair: Jamil Renno) – Room: Bab doukkala			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570869940	Toward an efficient approach for blended wing body UAV design development	Mohamed Hakim (ERG2ME. Mohammadia School of Engineers, Mohammed V University in Rabat, Morocco); Saad Choukri (ERG2ME, Mohammadia School of Engineers, Mohammed V University in Rabat, Morocco)
16:20-16:40	A1570874536	Instability of the phase of the 3-dimensional phi-6 theory with spontaneously broken scale invariance	Said Sakhi (American University of Sharjah, United Arab Emirates)
16:40-17:00	1570869863	Monte Carlo Simulation of Secondary Particles Produced by Carbon Ion Beams and their Contributions to the Dose in PMMA Phantom	Mohamed El-asery (University Ibn Tofail & FSK, Morocco); Zouhair Sadoune (University Ibn Tofail, Morocco); Hassane El bekkouri (Ibn Tofail University, Morocco); Adil Bardane (Khalifa University United Arb Emirates, Morocco & Ibn Tofail

			University, Morocco); Abdessamad Didi (University of Sidi Mohamed Ben Abdellah, Morocco); El mahjoub Chakir (LHESIR Laboratory Faculty of Science Kenitra, Morocco)
17:00-17:20	1570901225	Assessing the Accuracy of ARTEMIS Simulation Model for Wave Propagation Analysis Using Experimental Data Validation: A Comparative Study of Experimental and Numerical Models	Nadya Chakir (Cadi Ayyad University, Morocco); Abdellah Elkacimi (Cadi Ayyad University, United Arab Emirates); Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco); Mohammed Seaid (Durham University, United Kingdom)

Track 8: Mathematical Modeling and Simulation

Day 1 - Session 7: Mathematical Modeling and Simulation (Chair: Radouan Boukharfane) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570854547	FEM for Modeling And Simulation of Thixo-viscoplastic Flow Problems	Naheed Begum (University of Dortumud, Germany)
16:20-16:40	1570887624	Numerical Simulation of the Air Permeability of Protective Face Masks	Radostina A. Angelova (Technical University of Sofia, Bulgaria)
16:40-17:00	1570862729	Manapy: An MPI-Based Python Framework For Solving Poisson's Equation Using Finite Volume On Unstructured-Grid	Imad Kissami (Mohammed VI Polytechnic University, Morocco)
17:00-17:20	1570862887	Squared-SAV schemes for Allen-Cahn equation	Aziz Takhirov (University of Sharjah, United Arab Emirates)

Day 2 - Session 11: Mathematical Modeling and Simulation (Chair: Jamil Renno) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
10:30-10:50	1570863005	CFD study of a fLOFA in the IAEA 10 MW generic MTR reactor using a 3D analytical heat source term	Ulisses Alves Maciel Neto (Amazônia Azul Tecnologias de Defesa S.A., Brazil & Analysis, Evaluation and Risk Management Laboratory (LabRisco) - University of Sao Paulo, Brazil); Pedro Paludetto Silva de Paula Lopes, Maritza Rodríguez Gual, Nathália Nunes Araújo, Marcos Coelho Maturana and Marcelo Ramos Martins (University of Sao Paulo, Brazil)
10:50-11:10	1570862401	Reverse Osmosis Desalination Process Modeling and Simulation with Membrane Fouling	Arash Golabi, Abdelkarim Erradi and Hazim Qiblawey (Qatar University, Qatar); Ashraf Tantawy (De Montfort University, United Kingdom (Great Britain)); Ahmed Ben Saïd (Qatar University, Qatar); Khaled Bashir

			Shaban (Qatar University & College of Engineering, Qatar)
11:10-11:30	1570869870	Mathematical modeling of fractional visco-electroelastic composite using regularized micromechanical method	Nada Tassi (Mohammed V University in Rabat, Morocco & ENSAM-Rabat, Morocco); Lahcen Azrar (ENSET Mohammed V University Rabat, Morocco); Nadia Fakri (Abdelmalik Essaidi University, Morocco)
11:30-11:50	1570855915	Heat and Mass Transfer Analysis of nano-Fluid Flows in a Non-Uniform Magnetic Field	Krisztián Hriczó (University of Miksolc, Hungary)

Day2 - Session 15: Mathematical Modeling and Simulation (Chair: Aziz Takhirov) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	A1570873010	Accurate Numerical Solutions of the Three-Dimensional Bratu's Problem by Simple Discretization	Helmi Temimi and Mohamed Ben-Romdhane (Gulf University for Science and Technology, Kuwait); Maboub Baccouch (University of Omaha at Nebraska, USA)
14:20-14:40	1570862734	Numerical computation of the Residence Time Related to the Water Renewal in the Nador Lagoon	Ismail Oubarka and Imad Kissami (Mohammed VI Polytechnic University, Morocco); Imad Elmahi (ENSAO LMCS Mohammed I University, Morocco); Eric Deleersnijder (Université cath. Louvain, Belgium)
14:40-15:00	1570862762	A Finite Element Approach For Modeling Biomembranes In Incompressible Power-Law Flow	Aymen Laadhari and Ahmad Deeb (Khalifa University, United Arab Emirates)
15:00-15:20	1570869957	Numerical Approach Based on the Composition of One-Step Time-Integration Schemes For Highly Deformable Interfaces	Aymen Laadhari and Ahmad Deeb (Khalifa University, United Arab Emirates)

Day2 - Session 19: Mathematical Modeling and Simulation (Chair: Aymen Laadhari) – Room: Tiskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	A1570896082	Mixed Convection Coupled with Thermal Radiation in a Vented Horizontal Channel Containing Different Heat-Generating Cylinders	Rachid Hidki (Cadi Ayyad University & Marrakesh, Morocco); Lahcen El Moutaouakil, Mohammed Boukendil and Zouhair Charqui (Cadi Ayyad University, Morocco)
16:20-16:40	A1570902600	Efficient numerical methods for phase change problems	Mofdi Elamrani (Abdelmalek Essaâdi University, Morocco); FatimaEzzahrae Moutahir (Abdelmalek Essaadi University, Morocco); Youssef Belhamadia (American University of Sharjah, United Arab Emirates); Mohammed Seaid (Durham University, United Kingdom)

16:40-17:00	A1570905783	Scenario-based CFD Application to Optimize the Performance of an Industrial Seawater Pump Intake	Mohamed Amine Rabitat Eddine (Mohamed VI Polytechnic University & JESA, Morocco); Mohamed Chakerr Necibi and Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco); Mohammed Seaid (UM60, Morocco)
17:00-17:20	A1570906209	On meshfree particle methods for dispersion in large-scale waters	Nafea Lachhab (Faculty of Sciences and Techniques of Tangier, Morocco); Mohammed Seaid (Durham University, United Kingdom); Mofdi El-Amrani (Faculty of Sciences and Techniques of Tangier, Morocco)

Track 9: Statistics, Machine Learning, and Data Science

Day 1 – Session 4: Statistics, Machine Learning, and Data Science (Chair: Mohammed Loukili) – Room: Bab doukkala			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
14:00-14:20	1570848036	MCMC Analysis for a Continuous Time Hidden Markov Autoregressive Process in Disease Progression	El houcine Hibbah and Hamid El Maroufy (Sultan Mouly Slimane University, Morocco)
14:20-14:40	1570856274	Outlier correction and treatment with an innovative technique	Juan Zuluaga (1890 Lincoln Avenue, USA); Navid Shaghaghi, Andres Calle and Michael Castillo (Santa Clara University, USA)
14:40-15:00	1570862518	Support Vector Regression (SVR) for Prediction of Ultrasound Drug Release	Ibrahim Shomope and Nabil Abdel Jabbar (American University of Sharjah, United Arab Emirates); Ghaleb Husseini (AUS, United Arab Emirates)
15:00-15:20	1570862810	Client Selection in Federated Learning Based on Gradients Importance	Ouiame Marnissi and Hajar EL Hammouti (Mohammed VI Polytechnic University, Morocco); El Houcine Bergou (UM6P, Morocco)

Day 1 - Session 8: Statistics, Machine Learning, and Data Science (Chair: Mohammed Loukili) – Room: Bab doukkala			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
16:00-16:20	1570869329	A modeling framework for a global COVID 19 preventive system	Kawtar Retmi (Mohammed VI Polytechnic University, Morocco); Fatima Ouzayd (ENSIAS, Morocco); Hamid Echcheikh (ISEM, Morocco); Manal Tamir (ENSIAS, Morocco)
16:20-16:40	1570869927	A Relief-TOPSIS based feature selection for high dimensional data	Fatima Zahra Janane, Tayeb Ouaderhman and Hasna Chamlal (Hassan II University, Morocco)
16:40-17:00	1570869932	Filter-based relevance and instance selection	Basma El mourtji (University of Hassan II & FSAC, Morocco); Tayeb Ouaderhman and Hasna Chamlal (Hassan II University, Morocco)

17:00-17:20	1570869924	A systematic evaluation of univariate filter feature selection methods for Leukemia datasets	Fatima Ezzahra Rebbah, Hasna Chamlal and Tayeb Ouaderhman (Hassan II University, Morocco)

Track 10: Other Science and Engineering

Day3 - Session 23: Other Science and Engineering (Chair: Radouan Boukharfane) – Room: Tskiwine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
11:00-11:20	1570856161	An isochronic measurement for the analysis of proximity to restaurants and locations of food delivery parking	Ouidad Benhlima (Laboratoire Génie Industriel Centrale Supeléc Université Paris-Saclay & Ecole Centrale de Casablanca, Morocco); Fouad Riane (Laboratoire Génie Industriel Centrale Supeléc Université Paris-Saclay, Morocco); Jakob Puchinger (EM Normandie Business School, France); Hicham Bahi (School of Architecture Planning and Design - Mohammed VI Polytechnic University, Morocco)
11:20-11:40	1570890344	A splitting method for a stationary second grade fluid model	Driss Yakoubi (Pole Universitaire Leonard de Vinci, France)
11:40-12:00	1570894373	Uncertainty quantification for stochastic morphodynamics	Alia Radwan Al-ghosoun (Philadelphia University, Jordan); Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco); Mohammed Seaid (Durham University, United Kingdom)
12:00-12:20	1570901261	Rheology data-driven machine learning models for phosphate slurry pipeline in Morocco	Nabil El Moçayd (University Mohammed VI Polytechnic, Morocco); Mohammed Seaid (Durham University, United Kingdom)

Day3 - Session 24: Other Science and Engineering (Chair: M. Shadi Mohamed) – Room: Mouassine			
Time	**Paper ID**	**Title**	**Authors and Affiliations**
11:00-11:20	1570856141	Modeling and simulating transient close-contact melting via space-time finite elements	Leonardo Boledi (RWTH Aachen University, Germany); Stefanie Elgeti (TU Wien, Austria); Julia Kowalski (RWTH Aachen University, Germany)
11:20-11:40	1570856135	DEA And Bootstrap Approaches For Measuring Efficiency In Higher Education Sector: Evidence From Abomey-Calavi University, Benin	Karamoko Sita Diallo and Guy A. Degla (Institute of Mathematics and Physical Sciences, Benin.); Babacar Mbaye Ndiaye and Pierre Mendy (University of Cheikh Anta Diop, Senegal)
11:40-12:00	1570878199	Traveling Salesman Problem with a Moving Depot: A Mathematical Formulation and a Saving-Based Algorithm	Batool Madani and Malick Ndiaye (American University of Sharjah, United Arab Emirates)
12:00-12:20	1570892338	A Simulation Approach to estimate the General Motor Car-Following Model Constant Term	Roaa Sabah Naser and Saad Talib Hasson (University of Babylon &

			College of Information Technology, Iraq)

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