



SYMCOMP 2021



5th International Conference on Numerical and Symbolic Computation:
Developments and Applications
25-26 March, Évora, Portugal

5th International Conference on Numerical and Symbolic Computation Developments and Applications

PROGRAMME

March, 25 - 26

UE – Universidade de Évora

Évora, Portugal





THURSDAY, MARCH, 25 2021

University of Évora – ROOM A

OPENING CEREMONY: 08:30 – 08:55

SP I	PLENARY SESSION I – CHAIR: Prof. Mourad Bezzeghoud NEURAL NETWORKS VERSUS IMMUNE NETWORKS: INTERESTING OBSERVATIONS AND NEW QUESTIONS Professor Ton Coolen, Radboud University, The Netherlands	09:00 09:45
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SESSION I A: Numerical and Symbolic Computation in Mathematics, 10:00 – 11:00 CHAIR: Prof. Ana C. Conceição and Prof. José Alberto Rodrigues		
ID	COMMUNICATION TITLE	AUTHORS
A07	A Domain Specific Language for Operator Theory	Tiago Corrêa, Ana C. Conceição and Paula V. Martins
A23	First results from a novel multiple species predator-prey optimization algorithm	Sérgio Cavaleiro Costa, F. M. Janeiro and Isabel Malico
A29	MATLAB data structure for the test batch plants aiming to an efficient PID controller auto-tuning	João Lima
A26	The design of new operator theory algorithms	Ana Conceição
A27	Dynamic and interactive active learning tools	Ana Conceição

SESSION II A: Discrete Dynamical Systems, 11:15–13:00 CHAIR: Prof. Sara Fernandes and Prof Clara Grácio		
ID	COMMUNICATION TITLE	AUTHORS
A40	Characterization of marble blocks	Nada El Bouziani, Carlos Correia Ramos, Mouhaydine Tlemçani and Sara Fernandes
A42	Modelling Forest Fires using Complex Networks	Sara Perestrelo, Maria C. Grácio, Luís M Lopes and Nuno A. Ribeiro
A44	Coupling, chaos and stabilization strategy	Sara Fernandes, Luís Mário Lopes and Maria Clara Grácio
A46	Vibrational Properties of Non-Homogeneous Materials	Luís Bandeira and Carlos Correia Ramos
A52	Several approaches to synchronization	Rosário Laureano, Clara Grácio, Luis Mário Lopes and Sara Fernandes



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SESSION III A: Instrumentation and Signal Processing I, 14:00–15:30 CHAIR: <i>Prof. Mouhaydine Tlemçani and Prof. Mourad Bezzeghoud</i>		
ID	COMMUNICATION TITLE	AUTHORS
A34	Mathematical modelling and simulation techniques review for hybrid photovoltaic thermal system	Md Tofael Ahmed, Masud Rana Rashel, F. M. Janeiro and Mouhaydine Tlemçani
A35	Different optimization techniques of wireless mesh networks for photovoltaic application	Masud Rana Rashel, Oumaima Mesbahi, Md Tofael Ahmed, Mouhaydine Tlemçani and F. M. Janeiro
A36	Impact models comparison using numerical simulation: application to semi-automatic pistol dynamics modeling	Ricardo Pereira, Masud Rashel and Mouhaydine Tlemçani
A38	A survey on human behaviour inspired algorithms	Oumaima Mesbahi, Mouhaydine Tlemçani, F. M. Janeiro, Khalid Kandoussi and Abdeloawahed Hajjaji

SESSION IV A: Instrumentation and Signal Processing II, 15:45–16:45 CHAIR: <i>Prof. Mouhaydine Tlemçani and Prof. Fernando M. Janeiro</i>		
ID	COMMUNICATION TITLE	AUTHORS
A39	Development of an auto-calibration algorithm for spectra measurement	Samuel Fernandes, Mouhaydine Tlemçani, Daniele Bortoli and Manuel Feliciano
A41	Geotechnical and chemical study and analysis of the marble quarry in the Alentejo area, Portugal	Chabane Souhila, Adnane Leila, Tlemçani Mouhaydine, Jardim Antonio and Bezzeghoud Mourad
A43	Characterization and Sensitivity Analysis of a Photovoltaic Panel	Mina Nezamisavojbolaghi, Erfan Davodian and Mouhaydine Tlemçani

SP II	<p>PLENARY SESSION II – CHAIR: <i>Prof. Amélia Loja</i></p> <p>MESHLESS METHODS IN COMPUTATIONAL MECHANICS <i>Professor Afzal Suleman, University of Victoria, Canada</i></p>	17:00 17:45
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THURSDAY, MARCH, 25 2021

University of Évora – ROOM B

OPENING CEREMONY: 08:30 – 08:55

SP I	PLENARY SESSION I – CHAIR: Prof. Mourad Bezzeghoud	
Room A	NEURAL NETWORKS VERSUS IMMUNE NETWORKS: INTERESTING OBSERVATIONS AND NEW QUESTIONS Professor Ton Coolen, Radboud University, The Netherlands	09:00 09:45

SESSION I B: Control and Optimization Applications, 10:00 – 11:00 CHAIR: Prof. Eugénio Garção and Prof. Inês Barbosa		
ID	COMMUNICATION TITLE	AUTHORS
A11	Analysis of a football kick by means of artificial intelligence	André Carvalho and Inês Barbosa
A49	Assessing on-off control for regulating temperature on a resin transfer moulding process	João Fonseca and José Garção
A33	Design, build and test of a UAV wing: a study on the interaction between topology optimization and additive manufacturing	Tiago Proença, Frederico Afonso, Fernando Lau, Hugo Policarpo and João Lourenço

SESSION II B: Computational Methodologies in Health Applications, 11:15–13:00 CHAIR: Prof. Lina Vieira and Prof. Margarida Ribeiro		
ID	COMMUNICATION TITLE	AUTHORS
A01	3D Printing of Abdominal Immobilization Masks for Therapeutics: Dosimetric, Mechanical and Financial Analysis	Jessica Duarte, Amélia Loja, Ricardo Portal and Lina Vieira
A09	Different methods of measuring anxiety in patients undergoing bone scintigraphy	Maria Boal, Edgar Pereira and Lina Vieira
A14	Electric fields and new access gates in drug and gene delivery into the retina: a computational study	Pascoal Silva, José Ferreira, Paula Oliveira and Rufino Silva
A30	Accuracy comparison of two radiographic measurement techniques in maxillary sinus morphometry to define the human biological profile after death: a study in vivo and post-mortem	M. Margarida Ribeiro, Cátia Cartaxo, Daniela Nunes, Carlos Pereira and Silva Carina



THURSDAY, MARCH, 25 2021

University of Évora – ROOM B

SESSION III B: Computational Mechanics, 14:00–15:30		
CHAIR: <i>Prof. Pedro Areias and Prof. Luís L. Ferrás</i>		
ID	COMMUNICATION TITLE	AUTHORS
A04	Hermite finite elements for the vibrations and buckling of strain gradient nano plates in hygro-thermal environment	Michele Baccocchi, Nicholas Fantuzzi and Antonio J.M. Ferreira
A24	A distributed order fractional viscoelastic model for small deformations	Luís L. Ferrás, Maria Luísa Morgado and Magda Rebelo
A21	Coupled instability problem of solids with periodic micro-structure: symbolic computation and finite element model	Mariana João Figueiredo and Miguel Matos Neves
A45	Fully anisotropic hyperelasto-plasticity with exponential approximation by power series and scaling / squaring	Pedro Areias

SESSION IV B : Computational Methods for Integro-Differential Problems, 15:45–16:45		
CHAIR: <i>Prof. Paulo Vasconcelos and Prof. José A. Matos</i>		
ID	COMMUNICATION TITLE	AUTHORS
A10	Rational approximation from spectral Tau solutions	João Matos, José Matos and Paulo Vasconcelos
A12	Effectiveness of floating-point precision on the numerical approximation by Spectral methods	José A. Matos and Paulo B. Vasconcelos
A13	Tau method for pde's: contribution for the spectral numerical software Tau toolbox	Paulo Vasconcelos, José A. M. Matos and Nilson Lima

SP II	PLENARY SESSION II – CHAIR: <i>Prof. Amélia Loja</i>	
Room A	<i>MESHLESS METHODS IN COMPUTATIONAL MECHANICS</i> <i>Professor Afzal Suleman , University of Victoria, Canada</i>	17:00 17:45



FRIDAY, MARCH, 26 2021

University of Évora – ROOM A

SP III	PLENARY SESSION III – CHAIR: Prof. José Alberto Rodrigues FRACTURE MECHANICS ACROSS SPACE AND TIME Professor Stéphane Bordas – Université du Luxembourg, Luxembourg	09:00 09:45
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SESSION V A: Simulation and Optimization of Fluid Flow, Heat and Mass Transfer, 10:00 – 11:45 CHAIR: Prof. Isabel Malico and Prof. Eugénio Garção		
ID	COMMUNICATION TITLE	AUTHORS
A31	Numerical results of flames impinging on a curved surface	Sérgio Cavaleiro Costa and Isabel Malico
A22	Geometric optimization of linear Fresnel reflector solar collector using a genetic algorithm	Sérgio Cavaleiro Costa, André V. Santos, Diogo Canavarro, Isabel Malico and F. M. Janeiro
A18	On the coupling of aerodynamic shape optimization with topology optimization of airfoils	Isaac Gibert Martínez, Frederico Afonso, Simão Rodrigues and Fernando Lau
A28	Numerical study on the path of expelled and exhaled water vapor particles	Inês Teixeira, Tomás Correia, Violeta Carvalho, Nelson Rodrigues, Rui Lima and Senhorinha Teixeira
A55	Development of a solver for fully-coupled particle laden flows and challenges for model order reduction	Martin Isoz and Martin Šourek

SP IV	PLENARY SESSION IV – CHAIR: Prof. Amélia Loja PAST, PRESENT AND FUTURE OF SYMBOLIC COMPUTATION AT WOLFRAM RESEARCH Jon McLoone, Director of Technical Services, Communication and Strategy at Wolfram Research Europe	12: 00 – 12:45
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SESSION VI A: Applied Machine Learning, 14:00–15:20 CHAIR: <i>Prof. Antonio J. Tallón-Ballesteros and Prof. Luís Ferrás</i>		
ID	COMMUNICATION TITLE	AUTHORS
A56	Machine Learning applied to spectrometry : a preliminary analysis	Alberto F. Merchán and Antonio J. Tallón-Ballesteros
A53	Ordered feature-based regression	Miriam Contreras, A. J. Tallón-Ballesteros and B. G. Carrillero
A06	Feature subset selection in regression. A comparative study comprising noisy data sets	Antonio J. Tallón-Ballesteros and Gerardo Felix-Benjamín
A51	Development of a machine learning model and a user interface to detect illegal swimming pools	Cecília Coelho, Fernanda Costa, Luís Ferrás and Ana Jacinta Soares

SESSION VII: Computational structural and thermal safety engineering, 15:30–16:50 CHAIR: <i>Prof. Paulo Piloto and Prof. Elza Fonseca</i>		
ID	COMMUNICATION TITLE	AUTHORS
A50	Analytical and numerical methodologies to study four different hot-rolled steel profiles under fire	Elza M. M. Fonseca, Pedro N. Oliveira, Raul D.S.G. Campilho and Paulo A.G. Piloto
A54	Load bearing capacity of fire rated light timber frame walls	Paulo A. G. Piloto and Elza Fonseca
A47	Coupling of differential and integral numerical models used in the improvement of comfort and energy management in indoor ventilated spaces	Eusébio Conceição, João Gomes, M ^a Inês Conceição, M ^a Manuela Lúcio, Andre Fonseca Ramos, Vasco Mendes and Hazim Awbi
A48	Numerical model of a tree thermal response nearby a forest fire environments in transient conditions	Eusébio Conceição, João Gomes, M ^a Manuela Lúcio, Rafael Raposo, Domingos Xavier Viegas and M ^a Teresa Viegas

PLENARY SESSION V – CHAIR: <i>Prof. Isabel Malico</i>		
SP V	CONFRONTING THE MODERN LIFE TRILEMMA: ENERGY, FOOD AND THE ENVIRONMENT <i>Professor Marcelo de Lemos , ITA - Aeronautical Institute of Technology, São José dos Campos, Brazil</i>	17:00 17:45



FRIDAY, MARCH, 26 2021

University of Évora – ROOM B

SP III	PLENARY SESSION III – CHAIR: Prof. José Alberto Rodrigues	
Room A	FRACTURE MECHANICS ACROSS SPACE AND TIME Professor Stéphane Bordas – Université du Luxembourg, Luxembourg	09:00 09:45

SESSION V B: Computational Mathematics' Applications, 10:00 – 11:45 CHAIR: Prof. Teresa Mesquita and Prof. José Alberto Rodrigues		
ID	COMMUNICATION TITLE	AUTHORS
A05	A new weak formulation for eigenvalue problems by the Schwarz alternating method: numerical studies	Guilherme H. da Silva and José A. Rodrigues
A08	Some advances on evolution algebras and their applications to scientific disciplines	Desamparados Fernández-Ternero, Víctor M. Gómez-Sousa and Juan Núñez-Valdés
A15	Validation of a moving mesh finite volume interface tracking method through the numerical simulation of the newtonian extrudate swell	Ahmad Fakhari, Olga Sousa Carneiro, João Miguel Nóbrega, Zeljko Tukovic and Célio Fernandes
A17	Symbolic approach to \mathbb{S}^2-orthogonal polynomial solutions of a third order differential equation	Teresa Augusta Mesquita
A32	A new strategy for three-dimensional image processing	Alberto Adán-Más, Pablo Arévalo-Cid, Amélia Loja, Fátima Montemor, José A. Rodrigues and Teresa M. Silva

SP IV	PLENARY SESSION IV – CHAIR: Prof. Amélia Loja	
Room A	PAST, PRESENT AND FUTURE OF SYMBOLIC COMPUTATION AT WOLFRAM RESEARCH Jon McLoone, Director of Technical Services, Communication and Strategy at Wolfram Research Europe	12: 00 – 12:45



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University of Évora – ROOM B

SESSION VI B: Economics and Financial Computation Modeling, 14:00–15:20		
CHAIR: Prof. Peter Mitic and Prof. Paulo Vasconcelos		
ID	COMMUNICATION TITLE	AUTHORS
A03	A framework for analysis and prediction of financial stress	Peter Mitic
A57	Operational risk reverse stress testing: optimal solutions	Peter Mitic
A16	Testing hysteresis in the joint dynamics of employment and capital stock with a simultaneous equation framework	Paulo Mota and Paulo Vasconcelos
A25	How Symbolic Computation can be a Motivation Support for Undergraduate Courses in Economics	Jorge Andraz, Ana Conceição and Renato Ponte

SP V	PLENARY SESSION V – CHAIR: Prof. Isabel Malico	
Room A	CONFRONTING THE MODERN LIFE TRILEMMA: ENERGY, FOOD AND THE ENVIRONMENT Professor Marcelo de Lemos , ITA - Aeronautical Institute of Technology, São José dos Campos, Brazil	17:00 17:45

18:00 – 18:15 - WOLFRAM RESEARCH AWARDS FOR THE YOUNG RESEARCHER BEST PAPER

18:15 – 18:30 - Information about Submissions to Special Issues

Mathematical and Computational Applications (MCA)
Mathematics in Computer Science (MCS) (in connection with SYMCOMP2021)

18:30 – CLOSURE