

SCIENTIFIC PROGRAM OF THE

Third International Conference on
Mathematical **A**nd **C**omputational **M**odelling, **A**pproximation and **S**imulation
New trends, recent developments and applications in environment and natural resources

MACMAS 2025

CONFERENCE VENUE

The event will take place at the Radisson Blu Resort Saidia Beach Hotel in Saidia, Morocco.

PL: Plenary Lecture	
MS: MiniSymposium	
MS 01: Advanced Strategies for Function Approximation and Numerical Simulation	MS 02: Numerical solution of integral equations of the second kind
MS 03: Non linear approximation techniques	MS 04: Advances in statistical modelling and learning
MS 05: Mesh adaptation and approximation tools in finite elements and spline-based methods	MS 06: Numerical methods for nonlinear integral equations
Topics of contributed talks	
AMES: Approximation and Modeling applied to Environment Sciences and natural resources	MMIP: Mathematical Methods in Image Processing
DAMA: Developments in Approximation Methods and Applications	OMANP: Optimization Methods and Applications to Natural Phenomena
AMFEA: Approximation Methods for Functional Equations and Applications	MAI: Mathematics and Artificial Intelligence: Theory and Applications
NMNP: Numerical Methods for Nonlinear Problems	
Posters	

Links for online attendances and schedules

Link for Room 1 26-29 May, 2025	Link for Room 2 26-29 May, 2025:	Link for Room 3 26-29 May, 2025
meet.google.com/prs-knsy-mua	meet.google.com/jnn-vvdn-oge	meet.google.com/mrm-yjtv-uzx

Monday May 26

Time	Radisson Blu Resort Saidia Beach hotel		
8h30-9h30	Welcoming the participants		
9h30-10h00	Opening ceremony		
10h00-11h00	PL1: Hendrik Speleers		Chair: Sara Remogna
11h00-11h30	Coffee break		
	DAMA: Room 1 Chair: Sara Remogna	MS 01: Room 2 Chair: Martin Buhmann	NMNP: Room 3 Chair: Domingo Barrera
11h30-12h00	DAMA – 1: H. Orera	MS 01 – 1: L. Coppolino	NMNP – 1: S. Imperatore
12h00-12h30	DAMA – 2: T. E. Pérez	MS 01 – 2: F. Larosa	NMNP – 2: T. Mejsrik
13h00-14h00	Lunch (on site)		
	DAMA: Room 1 Chair: Héctor Orera	MS 01: Room 2 Chair: Martin Buhmann	NMNP: Room 3 Chair: Abdelhafid Serghini
14h30-15h00	DAMA – 3: S. Eddargani	MS 01 – 3: F. Nudo	NMNP – 3: I. Garcés
15h00-15h30	DAMA – 4: M. Naimi	MS 01 – 4: N. Siar	NMNP – 4: M. Chaher
15h30-16h00	DAMA – 5: J. A. Villegas		NMNP – 5: F. Moutahir
16h00-16h30	Coffee break		
	DAMA: Room 1 Chair: Abdelouahed Kouibia	AMES: Room 2 Chair: Réda Korikache	NMNP: Room 3 Chair: Abdelhafid Serghini
16h30-17h00	DAMA – 6: J. Ballarín	AMES – 1: A. Haddach	NMNP – 6: H. Boullouz
17h00-17h30	DAMA – 7: J. M. Ramón	AMES – 2: M. Frihessane	NMNP – 7: S. Jelti
17h30-18h00	DAMA – 8: M. Aoulad Abdenabi	AMES – 3: A. Bouaziz	NMNP – 8: C. Harrafa

Tuesday May 27

Time	Radisson Blu Resort Saidia Beach hotel		
9h00-10h00	PL2: Michael Bartoň Chair: Domingo Barrera		
	DAMA: Room 1 Chair: Domingo Barrera	MS 02: Room 2 Chair: Mohamed Lamnii	MS 03: Room 3 Chair: Dionisio F. Yáñez
10h00-10h30	DAMA – 9: A. Kouibia	MS 02 – 1: M. Tahrichi	MS 03 – 1: S. López-Urena
10h30-11h00	DAMA – 10: L. Omri	MS 02 – 2: C. Allouch	MS 03 – 2: J. Ruiz-Álvarez
11h00-11h30	Coffee break		
	DAMA: Room 1 Chair: Sara Remogna	MS 02: Room 2 Chair: C. Allouch	MS 03: Room 3 Chair: Dionisio F. Yáñez
11h30-12h00	DAMA – 11: S. Biasotti	MS 02 – 3: F. El Mokhtari	MS 03 – 3: D. Zorío
12h00-12h30	DAMA – 12: T. Okayama	MS 02 – 4: M. El Boujaddaini	MS 03 – 4: F. Di Tommaso
13h00-14h00	Lunch (on site)		
	OMANP: Room 2 Chair: Ali Haddach	MS 02: Room 2 Chair: Mohamed Tahrichi	NMFE: Room 3 Chair: Rachid Jennane
14h30-15h00	OMANP – 1: M. Elkaf	MS 02 – 5: A. El Bouayadi	AMFEA – 1: A. Belhachmi
15h00-15h30	OMANP – 2: J.D. Wilhelmi	MS 02 – 6: M. Sennour	AMFEA – 2: C. Mouhoub
15h30-16h00	OMANP – 3: M. Ziane		AMFEA – 3: A. Rahouti
16h00-18h00	Coffee break + Posters		

Wednesday May 28

Heure	Radisson Blu Resort Saidia Beach hotel		
9h00-10h00	PL3: Alessandra Aimi Chair: Hendrik Speleers		
	MS 05: Room 1 Chair: Angelos Mantzaflaris	MS 06: Room 2 Chair: Maria Grazia Russo	MS 04: Room 3 Chair: Beatriz Cobo
10h00-10h30	MS 05 – 1: M. Bahari	MS 06 – 1: M. G. Russo	MS 04 – 1: B. Cobo
10h30-11h00	MS 05 – 2: M. Marsala	MS 06 – 2: M. Rebelo	MS 04 – 2: H. Ortiz
11h00-11h30	Coffee break		
	MS 05: Room 1 Chair: Michelangelo Marsala	MS 06: Room 2 Chair: Maria Grazia Russo	MS 04: Room 3 Chair: Beatriz Cobo
11h30-12h00	MS 05 – 3: A. Mantzaflaris	MS 06 – 3: V. Sagaria	MS 04 -3: W. Pérez-Rocano
12h00-12h30	MS 05 – 4: C. Bracco	MS 06 – 4: S. Micula	MS 04 -4: A.F. Roldán López de Hierro
12h30-13h00	MS 05 – 5: L. Akhmouch		MS 04 – 5: M.M. Rueda
13h30-14h30	Lunch (on site)		
15h30-20h00	Scientific and tourist visits to the region		
21h00-23h00	SOCIAL DINNER		

Thursday, May 29

Time	Radisson Blu Resort Saidia Beach hotel	
9h00-10h00	PL4: Martin Buhmann Chair: Alessandra Aimi	
	MAI: Room 1 Chair: Alessandra Aimi	MMIP: Room 2 Chair: Juan Ruiz-Álvarez
10h00-10h30	MAI – 1: M. Saillot	MMIP – 1: D. F. Yáñez
10h30-11h00	MAI – 2: V. Vocca	MMIP – 2: H KharKhour
11h00-11h30	Coffee break	
	MAI: Room 1 Chair: Alessandra Aimi	MMIP: Room 2 Chair: Juan Ruiz-Álvarez
11h30-12h00	MAI – 3: P. E. Calabrese	MMIP – 3: R. Sefti
12h00-12h30	MAI – 4: V. Bruni	MMIP – 4: S. Saidi
13h00-14h00	Lunch (on site)	
	MAI: Room 1 Chair: Mohamed Tahrichi	MMIP: Room 2 Chair: Ahmed Boujraf
14h30-15h00	MAI – 5: A. Zaroual	MMIP – 5: I. Choukri
15h00-15h30	MAI – 6: A. Arhandou	MMIP – 6: A. El Beghdadi
15h30-16h00	MAI – 7: O. Gamgami	MMIP – 7: L. Chafiq
16h00-16h30	MAI – 8: I. Oubarka	MMIP – 8: D. Michel
16h30-17h00	Coffee break	
17h00-17h30	Conference closing	

List of Plenary Lectures, MiniSymposia, Contributed Talks and Posters

Ref.	Title	Authors: Speaker in Blue	Page
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PL	Plenary Lecture		
PL1	Spline representations of maximal smoothness on general triangulations	Hendrik Speleers	6
PL2	Geometric modeling of 5-axis flank CNC machining	Michael Bartoň	4
PL3	Some recent advances in space-time boundary element method for wave propagation problems	Alessandra Aimi	3
PL4	Quadrature Formula on compact spaces with kernel functions	Martin Buhmann	5

Minisymposia

MS 01	Advanced Strategies for Function Approximation and Numerical Simulation	Organizers: Luca Desiderio (Messina Univ.) and Federico Nudo (Padova Univ.)	
MS 01 - 1	Energetic approach to Space-Time Galerkin BEM for 3D elastodynamics	L. Coppelino, L. Desiderio	27
MS 01 - 2	A smooth rational quasi-interpolant through the multinode Shepard functions	Francesco Larosa	46
MS 01 - 3	Reconstruction of Functions through an Enrichment of the Crouzeix–Raviart Finite Element	Federico Nudo	58
MS 01 - 4	C^∞ rational approximation and quasi-histopolation of functions with jumps through multinode Shepard functions	Francesco Dell'Accio, Francesco Larosa, Federico Nudo, Najoua Siar	84

MS 02	Numerical solution of integral equations of the second kind	Organizers: Chafik Allouch and Mohamed Tahrichi (University Mohammed Premier)	
MS 02 - 1	Projection and Multi-projection type methods for Fredholm integro-differential equation	C. Allouch, D. Sbibi, M. Tahrichi	85
MS 02 - 2	Fredholm integral equations with non-smooth kernels in weighted spaces: Nyström approximations, stability and convergence	Chafik Allouch	11
MS 02 - 3	Galerkin methods in Weighted Spaces for Second-Kind Volterra Integral Equations	Abdelmajid El Bouayadi, Chafik Allouch	30
MS 02 - 4	A Nyström method for variable exponent second kind Fredholm integral equations	Mohammed El Boujaddaini, Chafik Allouch	31
MS 02 - 5	Solving Multi-Dimensional Fredholm Integral Equations Using Physics-Informed Neural Networks	Fadila El Mokhtari, Mohamed Lamlili E.N., Mohamed Lamnii	33
MS 02 - 6	Superconvergence Nystrom and degenerate kernel methods for Hammerstein integral equations of the second kind	M. Sennour, M. Tahrichi	83

MS 03	Nonlinear approximation techniques	Organizers: Juan Ruiz-Alvárez (Polytechnic University of Cartagena) and Dionisio F. Yáñez (University of Valencia)	
MS 03 - 1	Growing Neural Networks Without Forgetting: A Subdivision-Inspired Solution	Sergio López-Urena	45
MS 03 - 2	Nonlinear quasi-interpolation RBF method	José E. Kuruc, David Levin, Juan Ruiz-Álvarez , Dionisio F. Yáñez	77
MS 03 - 3	High order space-time scheme for scalar hyperbolic conservation laws with reduced numerical domain of dependence	Antonio Baeza, Pep Mulet, Dionisio F. Yáñez, David Zorío	93
MS 03 - 4	On the numerical solution of elliptic PDEs through the multinode Shepard method	F. Dell'Accio, F. Di Tommaso , E. Francomano	94

MS 04	Advances in statistical modelling and learning	Organizers: Beatriz Cobo and Christian Acal (University of Granada)	
MS 04 - 1	Applying multiple frames in the integration of surveys	Beatriz Cobo , María del Mar Rueda, Jorge L. Rueda	26
MS 04 - 2	A new dimensional reduction approach for functional regression model estimation	Helena Ortiz , Marc Vidal, Christian Acal, Ana M. Aguilera	63
MS 04 - 3	A robust functional outlier detection method using FPCA	Wilson Pérez-Rocano , Antonio G. López-Herrera, Manuel Escabias	67
MS 04 - 4	Square root of fuzzy numbers containing negative numbers on their supports. Application to fuzzy standard deviation	M.M. Rueda, C. Roldán, A.F. Roldán López de Hierro	73
MS 04 - 5	Measuring the accuracy of estimators in the case of non-probability surveys	María del Mar Rueda , Beatriz Cobo, Jorge L. Rueda	75

MS 05	Mesh adaptation and approximation tools in finite elements and spline-based methods	Organizers: Angelos Mantzaflaris (Inria Center at University Côte d'Azur, Sophia-Antipolis) and Michelangelo Marsala (University degli Studi di Firenze)	
MS 05 - 1	Optimal Moving Mesh Solver for Parabolic Equations	Mustapha Bahari , Angelos Mantzaflaris	13
MS 05 - 2	Isogeometric Analysis with Hierarchical Almost- C^1 Biquadratic Splines	Cesare Bracco, Carlotta Giannelli, Michelangelo Marsala , Thomas Takacs, Deepesh Toshniwal	48
MS 05 - 3	A Performance Comparison of r- and h-Adaptive Isogeometric Analysis	Mustapha Bahari, Angelos Mantzaflaris	47
MS 05 - 4	Hierarchical systems of generators of spline spaces for quasi interpolation	Cesare Bracco , Paola Lamberti, Kshitij Kumar Pandey, Sara Remogna	20
MS 05 - 5	Convergence analysis of the Galerkin boundary node method using compactly supported radial basis functions	L. Akhmouch , A. Naji	8

MS 06	Numerical methods for nonlinear integral equations	Organizers: Maria Grazia Russo (Department of Engineering, University of Basilicata, Italy)	
MS 06 - 1	A Nyström method for 2D Fredholm-Hammerstein integral equations on a square	L. Fermo, A. L. Laguardia, C. Laurita, M. G. Russo	76
MS 06 - 2	A spectral approach to non-linear weakly singular fractional integro-differential equations	Magda Rebelo , Amin Faghih	70
MS 06 - 3	Spline collocation for nonlinear Fredholm integral equations of the Hammerstein type	Sanda Micula	51
MS 06 - 4	A Nyström method for a Volterra nonlinear integral equations	Maria Grazia Russo, Valeria Sagaria	79

Contributed Talks

AMES	Approximation and Modeling in Environment Sciences and natural resources		
AMES - 1	Numerical simulation of tidal energy extraction using the lattice Boltzmann method: Application to Dakhla Bay	Ali Haddach , Hassan Smaoui, Bouchaib Radi	40
AMES - 2	Finite Volume Method for Coupled Hydrodynamic-Sediment Transport Models	Mohammed Frihessane , Ouafae Boulrhcha , Daoudi Salah	35
AMES - 3	Shear Influence on the Aerodynamic Performance of Tandem Wind Turbines Using the Actuator Line Method	Abdelmalek Bouaziz , Radouan Boukharfane	16

MMIP	Mathematical Methods in Image Processing		
MMIP - 1	Image processing using some new non-linear techniques	Inmaculada Garcés, Juan Ruiz- Álvarez, Dionisio F. Yáñez	90
MMIP - 2	Fractional Gaussian Processes in Biomedical Imaging with Applications to Osteoporosis	Hala KharKhour , Aissa Sghir	44
MMIP - 3	3D PID-Snake: A Progressive Iterative Deformation of the Active Surface Model for Medical Image Segmentation	Rania Sefti , Driss Sbibi, Rachid Jennane	82
MMIP - 4	Adaptive Parameters for Precise Approximation of Curves and Surfaces Using Spline Functions and Application in Medical Imaging	S. Saidi , R. Sefti, A. Abbadi, M. Tahrichi	80
MMIP - 5	Object Tracking with Viola-Jones and Mean-Shift Algorithm	Imane Choukri , Mohammed Merzougui	25
MMIP - 6	Continuous Method for CLH Computation in Digital Image Processing	Abdelhamid El Beghdadi , Mohammed Merzougui	29
MMIP - 7	Mimicking reptile skin using Voronoï diagrams	Dominique Michel , Ahmed Zidna	50

MAI	Mathematics and Artificial Intelligence: Theory and Applications		
MAI - 1	Improvements and Explorations on Transformer-based B-spline curve approximation	Mathis Saillot , Ahmed Zidna, Dominique Michel	78
MAI - 2	Learning Knots for Adaptive Mollified Splines	Abdellah Lamnii, Mohamed-Yassir Nour, Ayoub Zaroual	91
MAI - 3	Deep Learning-Based Optimization of Subdivision Schemes for Geometric Surface and Curve Modeling	Amine Arhandou , Abdellah Lamnii, Mohamed-Yassir Nour	12
MAI - 4	A Neural Network - based classifier for the estimation of the optimal HP-Spline frequency parameter	Vittoria Bruni, Paola Erminia Calabrese , Rosanna Campagna, Costanza Conti, Domenico Vitulano	22
MAI - 5	A multiscale representation method for efficient hyperspectral data classification	V. Bruni , G. Monteverde, D. Vitulano	21
MAI - 6	Enhancing polyolefin recycling through Artificial Intelligence	Vincenzo Vocca , Roberta Cipullo, Francesco Piccialli	87
MAI - 7	Predicting Radiotherapy Response in Bladder Cancer Patients: A Cloud-Based Machine Learning Approach	Lotfi Chafiq , Mohammed Guezar, Abdelhafid Serghini	23
MAI - 8	CNN-Based Classification of Cardiac Arrhythmias Using Transformed ECG Signals as Images	Oumaima Gamgami , Reda Korikache, Amine Chaieb	36
MAI - 9	Adjoint-based deep learning for efficient pointwise residence time estimation in coastal environments	Ismail Oubarka , Imad Kissami, Fayssal Benkhaldoun, Imad Elmahi, Eric Deleersnijder	64

DAMA	Developments in Approximation Methods and Applications		
DAMA - 1	Total positivity of Bernstein-type polynomial bases and accurate computations	Jorge Delgado, Héctor Orera , Juan Manuel Peña	62
DAMA - 2	Approximation on the disk via Appell polynomials: the Zernike case	Teresa E. Pérez	65
DAMA - 3	Quadrature rules for smooth uniform macro-element splines defined on 3- and 6-splits	S. Eddargani , C. Manni, H. Speleers	28
DAMA - 4	Some applications of trigonometric quasi-interpolants	M. Lamnii, M. Naimi	56
DAMA - 5	A new framework for Multivariate Approximation: Multivariate Multiple Orthogonal Polynomials	Juan Antonio Villegas , Lidia Fernández	86
DAMA - 6	Corner cutting algorithms with high relative accuracy	Jorge Ballarín , Jorge Delgado, Juan Manuel Peña	14
DAMA - 7	Weighted Essentially Non-Oscillatory Shepard method	David Levin, José M. Ramón , Juan Ruiz-Álvarez, Dionisio F. Yáñez	69
DAMA - 8	Approximation of off-line signatures by spline functions	Mourad Aoulad Abdenabi , Ahmed Zidna, Dominique Michel	10
DAMA - 9	Detecting and filling holes to reconstructing explicit surfaces using bicubic splines bases functions	A. Kouibia , M. Pasadas	66
DAMA - 10	A Shape-Preserving Variational Spline Approximation Problem for Hole Filling in Generalized Offset Surfaces	Abdelouahed Kouibia, Loubna Omri	61
DAMA - 11	Resampling and modeling of 3D point clouds through mathematical reconstruction and preservation of feature curves	Chiara Romanengo, Silvia Biasotti , Bianca Falcidieno	74
DAMA - 12	Sinc approximation combined with the double-exponential transformation for unilateral rapidly decreasing functions	Tomoaki Okayama	59

AMFEA	Approximation Methods for Functional Equations and Applications		
AMFEA - 1	Anisotropic Smoothing Energy for Geological Data Interpolation	Ayoub Belhachmi, Azeddine Benabbou, Bernard Mourrain	95
AMFEA - 2	Numerical solution of differential equations based on GA	Mohamed Lamnii, Chaimae Mouhoub, Fadila El Mokhtari	52
AMFEA - 3	Collocation Spline Quasi-Interpolation: An Effective Approach for Second-Order Problems	Afaf Rahouti and Abdelhafid Serghini	68

NMNP	Numerical Methods for Nonlinear Problems		
NMNP - 1	Towards novel gradient-enhanced sparse grid uncertainty quantification	A. Bressan, S. Imperatore, F. Locatelli, L. Tamellini	42
NMNP - 2	Constructing a common invariant cone of matrices	Thomas Mejstrik, Vladimir Yu. Protasov	49
NMNP - 3	Non-Linear Partition of Unity - Moving Least Squares (NLPU-MLS) method in R^n	Inmaculada Garcés, Juan Ruiz- Álvarez, Dionisio F. Yáñez	37
NMNP - 4	An algebraic hyperbolic spline quasi-interpolation method for solving singularly perturbed time-dependent parabolic convection-diffusion problems	Mohamed Chaher, Abdellah Lamnii, Mohamed-Yassir Nour	24
NMNP - 5	An improved staggered approach for numerical solution of radiative heat transfer in composite materials	F. Moutahir, Y. Belhamadia, M. El-Amrani and M. Seaid	53
NMNP - 6	A 3D Finite-Volume Solver for Suspension Flow in Fibrous Media: Advancing Simulations of the RTM Process	Hamza Boullouz, Saturné Ayidegnon, Imad Kissami, Imad Elmahi, Abdelghani Saouab	18
NMNP - 7	The turbulence impact on the two dimensional non-capacity model for sediment transport	Sanae Jelti, Abdelhafid Serghini	43
NMNP - 8	Fredholm type integral equation in Homothetic rectangular metric space	Charif Harrafa, Abderrahim Mbarki	41

OMANP	Optimization Methods and Applications to Natural Phenomena		
OMANP - 1	Mathematical Modeling of Cancer Dynamics with Immunotherapy Responses and Virotherapy : Deterministic and Stochastic Approaches	Mariem Elkaf , Loubna Karbil and Sunday Emmanuel Fadugba	34
OMANP - 2	Harvesting Water in a Cyclone Chimney Designed by Means of Meta-Optimization Based on Sustainability Criteria	J.D. Wilhelmi , G. Klochok, P. Gózzlez.-Rodelas, E. Moreno	88
OMANP - 3	Bridging the Gap in Portfolio Selection: A Multi-Criteria and Optimization-Based Approach to Investor-Centric Decision Making	Mohammed Ziane , Abdelhakim Chillali, Karim El-moutaouakil	92

	Posters		
P1	A novel mathematical non-linear and non-classic thermal conduction model for RRAM and its numerical solution	E. Moreno, D. Barrera , M.J. Ibáñez, J. Roldán	15
P2	A simple method for constructing integro spline quasi-interpolants	A. Boujraf , D. Sbibih, M. Tahrichi	17
P3	Optimization Treatment and Numerical Simulation Using deep neural networks for Finite Vibrating String Modeled by Wave Equation	Loubna El Houari , Ahmed Naji	32
P4	Parametric Surface Design for Static Solar Concentration: Enhancing Plastic Waste Pyrolysis in Sustainable Housing	E. Moreno, P. Glez.-Rodelas , V. Pascual, N. Martínez	38
P5	Modified Domain Decomposition for Urban Traffic Flow Simulation Using the Lighthill-Whitham-Richards Model	S. Khallouq, N. Nagid , H. Zaddouk	55
P6	NKANs : Nodel Kolmogorov-Arnold Networks	Rachid Jennane, Mohamed Lamnii, Soumia Ngadi , Driss Sbibih	57
P7	Plant viability: Modeling the impacts of harvesting non-timber forest products in a fragmented landscape	Maria C.A. Leite, Ruth I. Oliva--Zúniga , Pedro J. Torres	60
P8	Non standard paramaters for bivariate Bernstein--type approximants	Teresa E. Pérez, Marlon J. Recarte	71
P9	Quasi-interpolating projectors based on HB-splines	Rosanna Campagna, Paola Lamberti, Sara Remogna	72
P10	Spline Quasi-Interpolation Numerical Methods for Integro-Differential Equations with Weakly Singular Kernels	A. Saou , D.Sbibih, M.Tahrichi, D.Barrera	81
P11	Local Hermite quasi-interpolation operators in the Bernstein basis	D. Barrera, M. Boushabi , A. Lamnii, S. Remogna	19