



# MATHEMATICAL MODELLING IN ENGINEERING & HUMAN BEHAVIOUR 2017

July 17th-19th, 2017

Instituto Universitario de Matemática Multidisciplinar, (\*)

Universitat Politècnica de València, 46022 Valencia, Spain

Building 8G, 2º Floor, access A and C

Webpage: <http://jornadas.imm.upv.es>

## Schedule

- Communications: 15 min (exposition) + 5 min (for questions).

**Monday 17<sup>th</sup>**

10:00-13:00	<b>REGISTRATION (Venue: IMM)</b>	
	<p align="center">Parallel Session:</p> <p align="center"><b>BUSINESS AND FINANCIAL MATHEMATICS</b></p> <p align="center">Venue: <b>Red Cube</b></p> <p align="center"><i>Chairman: Rafael Company</i></p>	<p align="center">Parallel Session:</p> <p align="center"><b>NUMERICAL &amp; ANALYTICAL METHODS IN ENGINEERING</b></p> <p align="center">Venue: <b>Yellow Cube</b></p> <p align="center"><i>Chairman: Francisco J. Solis</i></p>
15:10-15:30	<p><b>María José Muñoz, University of Almería, Spain</b> Valuation fuzzy soft sets: a fuzzy soft set based decision making approach to the valuation of goods</p>	<p><b>Fiza Zafar, Bahauddin Zakariya University,</b> Optimal Iterative Methods for Finding Multiple Roots of Nonlinear Equations Using Weight Functions</p>
15:30-15:50	<p><b>M. Fakharany, Dept. of Mathematics, Tanta University, Egypt</b> Efficient three time level numerical scheme for the option pricing Heston-Hull-White model</p>	<p><b>Michael M. Tung, Inst. Matemática Multidisciplinar, UPV</b> Metamaterial Acoustics on the (2+1)D Schwarzschild Plane</p>
15:50 - 16:10	<p><b>Lourdes Gómez-Valle, Dpt. Applied Economics, Univ. of Valladolid, Spain</b> Risk-neutral processes estimation in interest rate models with stochastic volatility and jumps</p>	<p><b>D. Smetanoyá, The Institute of Technology and Business in České Budějovice, Czech Republic</b> On Legendre transformation for Hamiltonian Systems Corresponding to Second Order Lagrangians</p>
16:10 - 16:30	<p><b>Jiri Hozman, Technical University of Liberec, Czech Republic</b> A discontinuous Galerking framework for option pricing problems with stochastic volatilities</p>	<p><b>S. Singh, Dpt. of Mathematics, N.I.T. Hamirpur</b> Semilocal convergence of an efficient fifth order method under weaker conditions</p>
16:30 - 16:50	<p><b>M<sup>a</sup> Ángeles Alcaide, Dept. Economics and Social Sciences, UPV</b> Mathematical modelling of the value of technology brands</p>	<p><b>Julio Flores, Univ. Rey Juan Carlos, Madrid, Spain</b> Non-backtracking centrality, linegraphs and beyond</p>
16:50 – 17:10	<p><b>Raúl G. Sanchis, Department of Economics, Univ. Pontificia de Comillas, Madrid, Spain</b> Optimal pricing from shopping time distributions</p>	<p><b>M. A. Castro, University of Alicante, Spain</b> Effects of random environment and delayed responses on the dynamics of a semiarid vegetation model</p>
17:10 -	<b>COFFEE BREAK</b>	

17:30		
	<p>Parallel Session:</p> <p><b>NUMERICAL AND ITERATIVE METHODS</b></p> <p>Venue: <b>Red Cube</b></p> <p><i>Chairman: Juan Ramón Torregrosa</i></p>	<p>Parallel Session:</p> <p><b>MATHEMATICAL MODELLING OF RAIL TRACKS AND TRANSPORTATION</b></p> <p>Venue: <b>Yellow Cube</b></p> <p><i>Chairwoman: Teresa Real</i></p>
17:30 - 17:50	<p><b>Lucía Guasp, Inst. Matemática Multidisciplinar,</b></p> <p>Stability of a parametric family of iterative methods for root finding</p>	<p><b>Antonio José Pérez, CHM, Alicante</b></p> <p>Application of a modified concrete for vibration attenuation in railway infrastructures</p>
17:50-18:10	<p><b>Neus Garrido, Inst. Matemática Multidisciplinar,</b></p> <p>Efficient class of iterative schemes with memory for solving nonlinear problems</p>	<p><b>Piter Moscoso, Ministry of Public Works, Chile</b></p> <p>Detection of earthquake-induced soil liquefaction in harbours based on changes of the structure vibration modes</p>
18:10-18:30	<p><b>Abdolreza Amiri, Razi University, Iran</b></p> <p>Iterative methods based on HSS and GPSS schemes to solve systems of nonlinear equations</p>	<p><b>Fran Ribes, Inst. Matemática Multidisciplinar,</b></p> <p>Predictive maintenance of tunnels based on real-time acceleration registers on the concrete revetment</p>
18:30-18:50	<p><b>Daniel Guerrero, Univ. Pedagógica Nacional Francisco Morazán, Honduras</b></p> <p>Iterative solution of Rank deficient least squares problems</p>	<p><b>Beatriz Baydal, Instituto de Matemática Multidisciplinar,</b></p> <p>A methodology for the detection of rail irregularities and defects based on the vehicle dynamic response</p>
18:50-19:10	<p><b>Ángel A. Magreñán, Univ. Internacional de la Rioja, Spain</b></p> <p>Improving the starting points for Newton's method under a center Lipschitz condition</p>	<p><b>Fernando Roca , Instituto de Matemática Multidisciplinar,</b> Attenuation performance of track stiffness transitions under different vehicle speeds</p>
19:10-19:30	<p><b>Elena Giménez, Univ. Internacional de la Rioja, Spain</b></p> <p>Dynamical study of an optimal family of order four with applications</p>	<p><b>Julia Real, Inst. Matemática Multidisciplinar</b></p> <p>Effect of mixture gradation and thickness on the cooling process of hot mix asphalts</p>
19:30-19:50	<p><b>M. C. Casabán, Inst. Matemática Multidisciplinar,</b></p> <p>Constructive analytic-numerical solution of random parabolic problems in a one-dimensional random medium by a mean square Fourier integral method</p>	

**Tuesday 18<sup>th</sup>**

8:45-9:15 **OPENING (Venue: RED CUBE)**

**Plenary Talks**

**(Venue: RED CUBE)**

*Chairman: Lucas Jódar*

9:15-9:45 **Francisco J. Solis, CIMAT, Mexico**

Biological mechanisms of coexistence for a family of age structured population models

9:45-10:15 **Benito Chen-Charpentier, University of Texas at Arlington, U. S. A.**

Modeling of biological control of plant viruses with seasonality

Parallel Session:

**MATHEMATICAL MODELS IN PSYCHOLOGY AND SOCIOLOGY**

Venue: **Red Cube**

*Chairman: Joan C. Micó*

Parallel Session:

**DIFFERENTIAL EQUATIONS: DETERMINISTIC & STOCHASTIC MODELS**

Venue: **Yellow Cube**

*Chairman: Sergio Blanes*

10:15 – 10:35 **M. Rebollo, Universitat Politècnica de València,**  
Predicting sentiment evolution via Hidden Markov models

**Nikita Kopylov, Inst. Matemática Multidisplinar,**  
Magnus-Krylov methods for non-autonomous linear wave equations

10:35-10:55	<b>María T. Sanz, Dept. Didáctica de la Matemática, UPV</b> Including a human happiness index in a social well-being model	<b>Muaz Seydaoğlu, Dept. of Mathematics, Muş Alparslan University, Turkey</b> Numerical solution of the Burgers' equation by splitting methods using Crank-Nicholson schemes
10:55-11:15	<b>Salvador Amigó, Universitat de València,</b> Methylphenidate and the self-regulation therapy: A systemic mathematical model	<b>José A. López Ortí, Univ. Jaume I, Spain</b> Study of a set of symmetric temporal transformations for the study of the orbital motion
11:15-11:35	<b>Antonio Caselles, Universitat de València,</b> A genetic algorithm to calibrate systems: A case in psychology	
11:35-12:00	COFFEE BREAK	
	Parallel Session: <b>MODELLING OF COMBUSTION ENGINES AND FLOW MODELS</b> Venue: <b>Red Cube</b> <i>Chairman: José Vicente Romero</i>	Parallel Session: <b>NETWORK &amp; ENGINEERING MODELS</b> Venue: <b>Yellow Cube</b> <i>Chairman: Rafael J. Villanueva</i>
12:00-12:20	<b>Eva M. Sánchez-Orgaz, C. Investigación en Ingeniería Mecánica, UPV</b> Numerical mode matching for sound propagation in silencers with granular material	<b>Francisco Pedroche, Inst. Matemática Multidisciplinar,</b> New insights on multiplex PageRank
12:20-12:40	<b>Marco Crialesi, CMT- Motores Térmicos, UPV</b> Coupling Internal nozzle flow turbulence features to DNS of sprays primary atomization	<b>D. Alarcón, Universitat Politècnica de València</b> Local convergence of some third-order iterative methods for multiple roots
12:40-13:00	<b>Tomáš Nálík, The Institute of Technology and Business in České Budějovice, Czech Republic</b> Mathematical modelling of shaft in drives	<b>Claudio Masanet, Instituto de Matemática Multidisciplinar,</b> Numerical modelling of flying ballast phenomenon on high-speed lines. Part A: Analysis of the train-track aerodynamic interaction by means of field data and a CFD model

13:00-13:20		<p><b>Vera Egorova, Basque Center for Applied Mathematics, Spain</b></p> <p>The effect of atmospheric stability on fire-spotting in wildfire propagation</p>
	<p>Parallel Session:</p> <p><b>MATHEMATICAL MODELS IN ENGINEERING I</b></p> <p>Venue: <b>Red Cube</b></p> <p><i>Chairman: Damián Ginestar</i></p>	<p>Parallel Session:</p> <p><b>MATHEMATICAL MODELS IN MEDICINE &amp; EPIDEMIOLOGY</b></p> <p>Venue: <b>Yellow Cube</b></p> <p><i>Chairman: Benito Chen-Charpentier</i></p>
15:25-15:45	<p><b>R. Martínez-Cuenca, Universitat Jaume I, Spain</b></p> <p>The wall-lift matching model for Eulerian-Eulerian two phase flow simulations</p>	<p><b>Cristina Santamaría, Inst. Matemática Multidisciplinar,</b> Introducing covariates in reliability models by Markovian arrival processes</p>
15:45 - 16:05	<p><b>Antoni Vidal, Inst. Matemática Multidisciplinar,</b></p> <p>On the solution of different eigenvalue problems associated with the neutron transport using the finite element method</p>	<p><b>Clara Burgos, Inst. Matemática Multidisciplinar,</b> Predicting outbreaks of meningococcus W-135 infections in Spain</p>
16:05 - 16:25	<p><b>Miguel Á. Piqueras, Inst. Matemática Multidisciplinar,</b> Numerical solution of nonlinear moving boundary problems for carbonation in reinforced concrete structures</p>	<p><b>David Martínez, Inst. Matemática Multidisciplinar,</b> Quantification of the glucose levels of a patient customizing the Dalla-Mann mode</p>
16:25-16:45	<p><b>Amanda Carreño, Inst. Matemática Multidisciplinar,</b> Block iterative methods to compute the lambda modes of a nuclear power reactor</p>	<p><b>María T. Signes, Dept. Tecnología Informática y Computación, Univ. of Alicante, Spain</b></p> <p>The Susceptible-Infectious-Recovered (SIR) model of disease expansion: a new approach</p>
16:45-17:05	<p><b>Álvaro Bernal, Inst. for Industrial, Radiophysical and Environmental Safety, UPV</b></p> <p>Calculation of the adjoint flux of the neutron diffusion equation</p>	<p><b>Óscar Angulo, Univ. of Valladolid, Spain</b></p> <p>Numerical analysis of a cell dwarfism model</p>

17:00 - 17:30	COFFEE BREAK	
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	Parallel Session: <b>MATHEMATICAL MODELS IN ENGINEERING II</b> Venue: <b>Red Cube</b> <i>Chairman: Óscar Angulo</i>	Parallel Session: <b>OPTIMIZATION AND COMPETITION PROBLEMS IN ENGINEERING</b> Venue: <b>Yellow Cube</b> <i>Chairman: Francisco J. Solis</i>
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17:30 - 17:50	<b>Paulino J. García-Nieto, Dpt. of Mathematics, University of Oviedo, Spain</b> Modeling eutrophication using the hybrid ABC-SVM-based approach, multilayer perceptron neural network and M5 model tree in the Pozón de la Dolores lake (Norther Spain)	<b>A. Falcó, Univ. Cardenal Herrera, Valencia, Spain</b> On the proper generalized decomposition for shape spaces
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17:50-18:10	<b>Celestino Ordoñez, Dpt. of Mining Exploitation and Prospecting, Univ. of Oviedo, Spain</b> A multivariate time series based approach for the study of the remaining useful life for aircraft engines	<b>Óscar Trull, Dept. of Applied Statistics, UPV</b> General strike participation rate through electricity demand
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18:10-18:30	<b>Andrea Salandin, Centro Tecnologías Físicas, UPV</b> Using integer linear programming to study the relationship between the main variables involved in the construction of an external Wall	<b>David Postiguillo, Dpt. Economics and Social Science, UPV</b> Modeling the depreciation rate of construction machinery. An ordinary least-squares approach and quantile regression
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18:30-18:50	<b>Javier Martínez-Torres, Centro Univ. de la Defensa de Marín, Pontevedra, Spain</b> Predicting the commercial quality of slate slabs with a mathematical model	<b>Emilio Larrodé, University of Zaragoza, Spain</b> Proposal of a graphic model for solving delay time model inspection cases of repairable machinery
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18:50-19:10	<b>Silvia Marzal, Dpt. Electronic Engineering, UPV</b> A new content location and data retrieval algorithm for peer to peer in smart microgrids	<b>Victoria Muerza, Aragon Institute of Engineering Research,</b> An approach to assess the competitiveness in Logistics Centers through the analysis of its effectiveness
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19:10-19:30	<b>Juan R. Sánchez, ITEAM, Univ. Politècnica de València</b> , Modal method for the efficient analysis and design of microwave filters based on multiple discontinuities	<b>Cristina Pérez, Instituto de Biomécanica de Valencia, UPV</b> ,  Simultaneous smoothing and sharpening of colour images
19:30-19:50	<b>Jesús Martín-Vaquero, Dpt. of Mathematics, University of Salamanca, Spain</b>  Numerical study on monitored foot temperature	<b>Silvia Carpitella, Università degli Studi di Palermo, Italy</b>  Some awkward issues on pairwise comparison matrices

**Wednesday 19<sup>th</sup>**

	<b>Session: Plenary Talks (Venue: RED CUBE)</b>	
	<b>Chairman: Gregorio Rubio</b>	
9:00-9:30	<b>Javier Maquilón, University of Murcia, Spain</b> Role Prevalence in Cyber-Bullying and its connection with information and communication technology.	
9:30-10:00	<b>Alexandre Aussem, Université Claude Bernard, Lyon, France</b> Causal inference with graphical models: A brief review	
	<b>Session:</b>  <b>MATHEMATICAL MODELLING OF RAIL TRACKS AND WATER DISTRIBUTION</b>  Venue: <b>RED CUBE</b>  <i>Chairwoman: Julia Real</i>	<b>Session:</b>  <b>COMPUTATIONAL METHODS</b>  Venue: <b>YELLOW CUBE</b>  <i>Chairman: Benito Chen-Charpentier</i>



10:10-10:30	<b>Manuel Herrera, University of Bath, UK,</b> Network analysis for inferring spatio-temporal predictive models in water demand consumption	<b>Ana Navarro, Inst. Matemática Multidisciplinar,</b> The randomized non-autonomous scaled logistic differential equation: Theory and applications
10:30 - 10:50	<b>Teresa Real, Inst. Matemática Multidisciplinar,</b> Numerical modelling of flying ballast phenomena on high-speed lines. Part B: Analysis of the stability of the ballast layer by means of a DEM model	<b>Emilio Defez, Inst. Matemática Multidisciplinar,</b> On new rational-polynomial Hermite matrix expansions. Application for the matrix cosine approximation
10:50-11:10	<b>Miriam Labrado, Inst. Matemática Multidisciplinar,</b> Development of a high precision algorithm for predictive maintenance of industrial belt conveyors	<b>José Mas, Inst. Matemática Multidisciplinar,</b> Using randomization to compute the least squares solution of overdetermined linear systems by preconditioned iterations
11:10-11:30	COFFEE BREAK	
	<b>Session:</b>  <b>APPLICATIONS IN SOCIAL MODELS: DIRECTIONAL NETWORKS, CLUSTERS AND LEARNING ANALYTICS</b>  Venue: <b>RED CUBE</b>  <i>Chairman: Antonio Hervás</i>	<b>Session:</b>  <b>COMPUTATIONAL AND MATHEMATICAL MODELS OF SOCIAL PROBLEMS</b>  Venue: <b>YELLOW CUBE</b>  <i>Chairman: Javier Maquilón</i>
11:30-11:50	<b>J. M. Montañana, Universitat Politècnica de València,</b> A procedure of generation of directed graphs for the comparative study of algorithms for the detection of communities.	<b>Paulino J. García-Nieto, Dpt. of Mathematics, Univ. of Oviedo, Spain</b>  Optimal control of counter-terrorism tactics
11:50-12:10	<b>Rubén Pazmiño, Escuela Superior Politécnica de Chimborazo, Ecuador</b> SIA's asymmetric rules approximation to hierarchical clustering in Learning Analytics: mathematical issues	<b>David Vivas, C. Investigación en Economía y Gestión de la Salud, UPV</b>  Spatial modelling of diabetes patients in the region of Valencia

12:10-12:30	<p><b>Eva Onaindia, Dept. Sistemas Informáticos y Computación, UPV</b></p> <p>Determinant factors associated with the choice of university degrees in Spain through Principal Component and Factor analysis</p>	<p><b>Joan C. Micó, Inst. Matemática Multidisciplinar,</b> Biology and personality: A mathematical approach to the body-mind problem</p>
12:30-12:50	<p><b>Lenin G. Lemus-Zúñiga, ITACA, Univ. Politècnica de Valencia</b></p> <p>A web-based application tool for university career choosing factors analysis</p>	<p><b>Elena de la Poza, Faculty of Business Management, UPV</b> Mathematical modeling of the suicidal risk growth of the Spanish population: a qualitative and quantitative dynamic approach</p>
12:50-13:10	<p><b>Camilo Lombana, Facultad de Ingeniería Civil, Universidad Cooperativa de Colombia, Sede Ibagué, Colombia</b></p> <p>Uncertainty quantification of the users of electronic commerce over the next few years</p>	

**LUNCH OF THE CONFERENCE**