



# MATHEMATICAL MODELLING IN ENGINEERING & HUMAN BEHAVIOUR 2016

July 18th-20th, 2016

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 18<sup>th</sup>**

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| 10:00-13:00   | <b>REGISTRATION (Venue: IMM)</b>                                                                                                                                               |                                                                                                                                                                                                     |
|               | Parallel Session:<br><br><b>MATHEMATICAL MODELLING OF COMBUSTION ENGINES &amp; ALGORITHMS</b><br><br>Venue: <b>Red Cube</b><br><br><i><b>Chairman: José Vicente Romero</b></i> | Parallel Session:<br><br><b>MATHEMATICAL MODELLING OF RAIL TRACKS AND TRANSPORTATION I</b><br><br>Venue: <b>Yellow Cube</b><br><br><i><b>Chairwoman: Julia Real</b></i>                             |
| 15:30-15:50   | <b>Francisco Denia, CIIM, UPV,</b><br><br>Computational performance of analytical methods for the acoustic modelling of automotive exhaust devices incorporating monoliths.    | <b>Fran Ribes, Inst. Matemática Multidisciplinar,</b><br>Probabilistic analysis of induced stresses and vibrations of a short-span bridge considering random irregularities.                        |
| 15:50 - 16:10 | <b>Marco Cialesi, CMT-Motores Térmicos,</b><br><br>Using a digital filter-based synthetic turbulence for DNS simulation of sprays atomization.                                 | <b>Laura Sánchez, Inst. Matemática Multidisciplinar,</b><br>Multiscale CFD analysis of a partial sectorization and longitudinal ventilation safety system in railway tunnels.                       |
| 16:10 - 16:30 | <b>Yan Wu, Politecnico di Milano,</b><br><br>Hybrid RANS/LES of turbulent flow field in engine-like geometry.                                                                  | <b>Teresa Real, Inst. Matemática Multidisciplinar,</b><br>Wheel-rail irregularities detection system using analytical and numerical methods.                                                        |
| 16:30 - 16:50 | <b>Juan Antonio Martínez, Univ. de Cartagena, Spain,</b><br><br>Performance Analysis of No-Propagation and ELM Algorithms in Classification with Non-Gaussian Noise.           | <b>Carlos Miñana, Inst. Matemática Multidisciplinar,</b><br>Thermal and acoustic analysis of an external insulation finish system composed by an innovative mixed material.                         |
| 16:50 - 17:10 |                                                                                                                                                                                | <b>Miriam Labrado, Inst. Matemática Multidisciplinar,</b><br>Study of thermal flux along railway track under extreme cold conditions. Comparison of a new material with traditional configurations. |

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| 17:10 - 17:30 | COFFEE BREAK                                                                                                                                                |                                                                                                                                                                           |
|               | <p>Parallel Session:</p> <p><b>MATRICIAL &amp; ALGEBRAIC METHODS</b></p> <p>Venue: <b>Red Cube</b></p> <p><i>Chairman: Rafael Bru</i></p>                   | <p>Parallel Session:</p> <p><b>MATHEMATICAL MODELLING OF RAIL TRACKS AND TRANSPORTATION II</b></p> <p>Venue: <b>Yellow Cube</b></p> <p><i>Chairwoman: Teresa Real</i></p> |
| 17:30 - 17:50 | <p><b>Rafael Cantó, Inst. Matemática Multidisciplinar,</b></p> <p>Jordan forms of irreducible TP matrices.</p>                                              | <p><b>Antonio José Pérez, CHM, Alicante, Spain,</b></p> <p>Study of attenuation capacity of new rubberized concrete in railway applications.</p>                          |
| 17:50 - 18:10 | <p><b>Emilio Defez, Inst. Matemática Multidisciplinar,</b></p> <p>A new efficient and accurate spline algorithm for the matrix exponential computation.</p> | <p><b>Silvia Morales, Inst. Matemática Multidisciplinar,</b></p> <p>Influence of wheels conicity on the risk of derailment in curved tracks.</p>                          |
| 18:10 - 18:30 | <p><b>Danny Guerrero, Inst. Matemática Multidisciplinar,</b></p> <p>Preconditioners for nonsymmetric linear systems with low-rank skew-symmetric part.</p>  | <p><b>Julia Real, Inst. Matemática Multidisciplinar,</b></p> <p>Influence of the friction coefficient on the squeal noise frequency appearing using FE models.</p>        |
| 18:30 - 18:50 | <p><b>Julio Benítez, Inst. Matemática Multidisciplinar,</b></p> <p>On generalized inverses of tensors and their applications.</p>                           | <p><b>Juan Giner, CIIM, UPV,</b></p> <p>Improved railway train-track interaction model in curves in the high-frequency domain.</p>                                        |
| 18:50 - 19:10 | <p><b>Leila Lebtahi, Univ. de la Rioja,</b></p> <p>Generalized centro-invertible matrices.</p>                                                              | <p><b>Beatriz Baydal, Inst. Matemática Multidisciplinar,</b></p> <p>Effects of rail cracking in different railway track typologies.</p>                                   |
| 19:10 - 19:30 | <p><b>Taher Lotfi, Islamic Azad University, Iran,</b></p> <p>Numerically stable and quadratic convergent method for solving absolute value equation.</p>    |                                                                                                                                                                           |

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| 19:30-19:50 | <b>José Mas, Instituto de Matemática Multidisciplinar,</b> Updating preconditioners for least squares problems |  |
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**Tuesday 19<sup>th</sup>**

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| 8:45-9:15     | <b>OPENING (Venue: RED CUBE)</b>                                                                                                                          |                                                                                                                                                                         |
|               | <b>Plenary Talks</b><br><br><b>(Venue: RED CUBE)</b><br><br><b>Chairman: Lucas Jódar</b>                                                                  |                                                                                                                                                                         |
| 9.15-9:45     | <b>Marian Blanco, Univ. Carlos III de Madrid, Spain</b><br><br>Influence of social networks in cases of adolescents' violence.                            |                                                                                                                                                                         |
| 9:45-10:15    | <b>Silvia Jerez, CIMAT, Mexico</b><br><br>Bone cancer modeling based on the interactions between the BMU and tumor cells.                                 |                                                                                                                                                                         |
|               | Parallel Session:<br><br><b>SOCIAL MODELS</b><br><br>Venue: <b>Red Cube</b><br><br><i>Chairwoman: Marian Blanco</i>                                       | Parallel Session:<br><br><b>DIFFERENTIAL EQUATIONS: DETERMINISTIC &amp; STOCHASTIC MODELS</b><br><br>Venue: <b>Yellow Cube</b><br><br><i>Chairman: J. R. Torregrosa</i> |
| 10:15 – 10:35 | <b>María T. Sanz, Universitat de València,</b><br>A stochastic dynamic model to evaluate the influence of economy and well-being on unemployment control. | <b>Lucía Guasp, Inst. Matemática Multidisciplinar,</b><br><br>A family of parametric iterative methods for solving nonlinear models: dynamics and applications.         |

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| 10:35-10:55 | <b>Antonio Hervás, Inst. Matemática Multidisciplinar</b> , Applying structural model for Access to spanish public university system. | <b>M. A. Sohaly, Mansoura University, Egypt</b> , Solving the random Cauchy problem for the heat model with unbounded spatial domain using a mean square finite difference scheme.                                                                   |
| 10:55-11:15 | <b>Lucía Ramírez, Inst. Matemática Multidisciplinar</b> , Mathematical modelling of bullying propagation in Spain.                   | <b>Luis Casado, Inst. Matemática Multidisciplinar</b> , Multidimensional high-order methods for solving nonlinear models: Applications to the heat conduction equation.                                                                              |
| 11:15-11:35 | <b>Francisco Morillas, Univ. de Valencia</b> , Wavelets and resampling applied to insurance and finances.                            | <b>Juan Carlos Cortés, Inst. Matemática Multidisciplinar</b> , Approximating the first probability distribution function of the solution stochastic process to second-order random linear time-dependent differential equations with regular points. |
| 11:35-12:00 | COFFEE BREAK                                                                                                                         |                                                                                                                                                                                                                                                      |
|             | <p>Parallel Session:</p> <p><b>STATISTICAL METHODS</b></p> <p>Venue: <b>Red Cube</b></p> <p><i>Chairman: Joaquín Izquierdo</i></p>   | <p>Parallel Session:</p> <p><b>NETWORK MODELS</b></p> <p>Venue: <b>Yellow Cube</b></p> <p><i>Chairman: Benito Chen-Charpentier</i></p>                                                                                                               |
| 12:00-12:20 | <b>Belén García, Inst. Matemática Multidisciplinar</b> , Managing dependence in reliability models by markovian arrival processes.   | <b>José Antonio Nescolarde, Univ. de Alicante, Spain</b> , Modelling social systems: A new network point of view in labour markets.                                                                                                                  |
| 12:20-12:40 | <b>Manuel Herrera, Univ. of Bath, UK</b> , Epidemiological approach to forecasting water demand consumption through SAX.             | <b>Julio Flores, Univ. Rey Juan Carlos, Spain</b> , Multiplex line graphs.                                                                                                                                                                           |

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| 12:40-13:00   | <p><b>Silvia Carpitella, Univ. degli Studi di Palermo, Italy,</b></p> <p>An equation to calculate the availability for the k-out-of-n system.</p>                                                                                                                 | <p><b>Francisco Pedroche, Inst. Matemática Multidisciplinar,</b> Definition, properties and Applications of multiplex PageRank.</p>                                                                                                                                                 |
| 13:00-13:20   | <p><b>José Carlos R. Alcantud, Univ. de Salamanca, Spain,</b></p> <p>A soft set approach for multiple attributes decision making problems under incomplete information.</p>                                                                                       |                                                                                                                                                                                                                                                                                     |
|               | <p style="text-align: center;"><b>Plenary Talk</b></p> <p style="text-align: center;"><b>(Venue: RED CUBE)</b></p> <p style="text-align: center;"><b>Chairman: J. C. Cortés</b></p>                                                                               |                                                                                                                                                                                                                                                                                     |
| 15:15-15:45   | <p><b>Óscar Angulo, Univ. de Valladolid, Spain,</b></p> <p>Investigating theoretically, numerically and experimentally the erythropoiesis modeling.</p>                                                                                                           |                                                                                                                                                                                                                                                                                     |
|               | <p style="text-align: center;">Parallel Session:</p> <p style="text-align: center;"><b>MATHEMATICAL MODELS IN ENGINEERING I</b></p> <p style="text-align: center;">Venue: <b>Red Cube</b></p> <p style="text-align: center;"><b>Chairman: Damián Ginestar</b></p> | <p style="text-align: center;">Parallel Session:</p> <p style="text-align: center;"><b>MATHEMATICAL MODELS IN MEDICINE &amp; EPIDEMIOLOGY I</b></p> <p style="text-align: center;">Venue: <b>Yellow Cube</b></p> <p style="text-align: center;"><b>Chairwoman: Silvia Jerez</b></p> |
| 15:45 - 16:05 | <p><b>Álvaro Bernal, ISIRYM, UPV,</b></p> <p>A spectral method for the steady state of the 2 energy-group neutron diffusion equation.</p>                                                                                                                         | <p><b>José A. Morano, Inst. Matemática Multidisciplinar,</b> Studying the evolution over the next few years of the meningococcal genogroups in Spain using a competition Lotka-Volterra model.</p>                                                                                  |

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| 16:05 - 16:25 | <b>Antoni Vidal, Inst. Matemática Multidisciplinar,</b> Homogenization techniques for the neutron transport equation using the finite element method.      | <b>Rafael Villanueva, Inst. Matemática Multidisciplinar,</b> An approach to customize a diabetes model to a patient.                                               |
| 16:25- 16:45  | <b>Amanda Carreño, ISIRYM, UPV,</b> Eigenvalue problems associated with the neutron diffusion equation.                                                    | <b>Ana Navarro, Inst. Matemática Multidisciplinar,</b> Markov process and random variable transformation technique to model a stroke disease.                      |
| 16:45- 17:05  | <b>Rafael Pérez, Inst. Matemática Multidisciplinar,</b> Optimal selection of sectors for gradual transition from intermittent to continuous water supply.  | <b>Adrián Colomer, I3B, UPV,</b> Retinal diseases characterization using fractal analysis.                                                                         |
| 17:00 - 17:30 | COFFEE BREAK                                                                                                                                               |                                                                                                                                                                    |
|               | Parallel Session:<br><br><b>MATHEMATICAL MODELS IN ENGINEERING II</b><br><br>Venue: <b>Red Cube</b><br><br><i>Chairman: Francisco J. Solis</i>             | Parallel Session:<br><br><b>MATHEMATICAL MODELS IN MEDICINE &amp; EPIDEMIOLOGY II</b><br><br>Venue: <b>Yellow Cube</b><br><br><i>Chairman: Óscar Angulo</i>        |
| 17:30 - 17:50 | <b>Miguel Ángel Piqueras, Inst. Matemática Multidisciplinar,</b> Positive stable numerical solutions of moving boundary problems for concrete carbonation. | <b>Miguel Ángel López Marcos, Univ. de Valladolid, Spain</b> Approximating finite life-span age-structured population models by means of the survival probability. |

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| 17:50-18:10 | <b>Víctor García, Univ. CEU Cardenal Herrera, Spain,</b> Stochastic fast marching method for resin infusion flow front propagation.                                                                                    | <b>Jesús Martín-Vaquero, Univ. de Salamanca, Spain</b> Efficient codes with extrapolated non-standard finite difference schemes for a SEIR malware model. |
| 18:10-18:30 | <b>Miguel Ángel García, Univ. de Alicante, Spain,</b><br>Nonstandard finite difference numerical schemes for delay differential models.                                                                                | <b>Rachad M. Shoucri, Royal Military College of Canada,</b><br>Classification of epidemiological observations based on the study of ROC curves.           |
| 18:30-18:50 | <b>Paulino J. García-Nieto, Univ. de Oviedo, Spain,</b><br>A comparison of several machine learning techniques for centerline segregation prediction in continuous cast Steel slabs and evaluation of its reliability. | <b>Luis Acedo, Inst. Matemática Multidisciplinar,</b><br>HPV transmission and control in lifetime sexual partner networks.                                |
| 18:50-19:10 | <b>Michael M. Tung, Inst. Matemática Multidisciplinar,</b><br>Modelling acoustics on the Poincaré half-plane.                                                                                                          | <b>J. Alberto Conejero, IUMPA, UPV,</b><br>Fleet-assignment on time-space networks with stable marriages and college admission algorithms.                |
| 19:10-19:30 | <b>Nicolás Montes, Univ. CEU Cardenal Herrera, Spain,</b> A greedy-one rank algorithm in Mobile robot applications.                                                                                                    | <b>A. Arenas, Univ. Córdoba, Colombia,</b> Periodic behaviour of the solutions of a model of RSV virus transmission for two age classes.                  |

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| 19:30-19:50 | <b>M. Cogollo,</b> A new modeling methodology of artificial neural networks for forecasting nonlinear time series. |  |
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**Wednesday 20<sup>th</sup>**

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|               | <b>Session: Plenary Talks (Venue: RED CUBE)</b><br><br><b>Chairman: Silvia Jerez</b>                                                                                     |                                                                                                                                                                                                    |
| 9:00-9:30     | <b>Benito Chen-Charpentier, University of Texas at Arlington, U. S. A.</b><br>A model of biological control of plant virus propagation with delays.                      |                                                                                                                                                                                                    |
| 9:30-10:00    | <b>Francisco J. Solis, CIMAT, Mexico</b><br>Invariant compact sets of nonexpansive iterated function systems.                                                            |                                                                                                                                                                                                    |
| 10:00-10:30   | <b>Rafael Bru, Inst. Universitario de Matemática Multidisciplinar,</b><br>The Mathematics of Google.                                                                     |                                                                                                                                                                                                    |
|               | <b>Session:</b><br><br><b>NUMERICAL METHODS</b><br><br>Venue: <b>RED CUBE</b><br><br><b>Chairman: Rafael Bru</b>                                                         | <b>Session:</b><br><br><b>COMPUTATIONAL METHODS</b><br><br>Venue: <b>YELLOW CUBE</b><br><br><b>Chairman: Sergio Blanes</b>                                                                         |
| 10:30 - 10:50 | <b>Juan Antonio Sicilia, Univ. Internacional de la Rioja, Spain</b><br><br>Expanding the applicability of the secant method in Banach space.                             | <b>Nikita Kopylov, Inst. Matemática Multidisciplinar,</b><br><br>Symplectic integrators for time-dependent linear wave equations.                                                                  |
| 10:50-11:10   | <b>Alberto Magreñán, Univ. Internacional de la Rioja, Spain</b><br><br>Starting points for Newton's method under a center Lipschitz condition for the second derivative. | <b>José A. López-Ortí, Univ. Jaume I de Castellón, Spain,</b><br><br>A generalization of a one-parametric family of geometric transformations of temporal variable to study the hyperbolic motion. |
| 11:10-11:30   | COFFEE BREAK                                                                                                                                                             |                                                                                                                                                                                                    |
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|                                       | <p><b>Session:</b></p> <p><b>MATHEMATICAL MODELS IN BUSINESS</b></p> <p>Venue: <b>RED CUBE</b></p> <p><i>Chairman: Rafael Company</i></p>                 | <p><b>Session:</b></p> <p><b>COMPUTATIONAL ALGORITHMS: IMAGE PROCESSING &amp; INFORMATICS</b></p> <p>Venue: <b>YELLOW CUBE</b></p> <p><i>Chairman: Rafael J. Villanueva</i></p>           |
| 11:30-11:50                           | <p><b>Francisco Álvarez, Complutense University of Madrid, Spain,</b> Market dynamics under price and search cost dispersions.</p>                        | <p><b>Pantaleón D. Romero, Univ. CEU Cardenal Herrera,</b> A general framework for nonlinear approximations with Applications to image restoration.</p>                                   |
| 11:50-12:10                           | <p><b>Julia Martínez, University of Valladolid, Spain,</b> Pricing commodity options in jump-diffusion models.</p>                                        | <p><b>Rafael Verdú, Univ. Politécnica de Cartagena, Spain,</b> Adaptive spatially variant morphological filters based on a multiple orientation vector field.</p>                         |
| 12:10-12:30                           | <p><b>Fazlollah Soleymani, Inst. Matemática Multidisciplinar,</b> Computing prices for the American option problems with multi assets</p>                 | <p><b>Jorge Larrey, Univ. Politécnica de Cartagena, Spain,</b> Efficient SSIM and landmark driven image registration in a variational framework.</p>                                      |
| 12:30-12:50                           | <p><b>Roberto Cervelló, UPV,</b> A firm model for the banks-Maximizing profit.</p>                                                                        | <p><b>Cristina Jordán, Inst. Matemática Multidisciplinar,</b> Graph theory methods for image processing: An image border detection method based on minimum spanning generating trees.</p> |
| 12:50-13:10                           | <p><b>Miguel Ángel López, Centro de Ingeniería Económica, UPV,</b> Mathematical modelling to monitor the differences of the appraised housing values.</p> | <p><b>Francisco J. Mora, Univ. de Alicante, Spain,</b> VAACA: Virtual adaptive agent cluster architecture</p>                                                                             |
| <p><b>LUNCH OF THE CONFERENCE</b></p> |                                                                                                                                                           |                                                                                                                                                                                           |

