

---

# Contents

---

## Part I Plenary Lectures

---

<b>Modelling Living Tissues: Mechanical and Mechanobiological Aspects</b> <i>M. Doblaré and J.M. García-Aznar</i> .....	3
<b>New Mathematical Approaches for Image Reconstruction in the Oil and Medical Industries</b> <i>M. Moscoso</i> .....	9
<b>Continuum Models: Helping to Guide Industry</b> <i>Colin Please</i> .....	23
<b>Wax Segregation in Oils: A Multiscale Problem</b> <i>Mario Primicerio</i> .....	43
<b>Chebfun: A New Kind of Numerical Computing</b> <i>R.B. Platte and L.N. Trefethen</i> .....	69

---

## Part II Minisymposia

---

<b>Asymptotic Analysis</b> <b>Organizers: D. Dominici and R.B. Paris</b> .....	91
<b>Asymptotics of Orthogonal-Polynomial Functionals and Shannon Information Entropy of Rydberg Atoms</b> <i>J.S. Dehesa, S. López-Rosa, A. Martínez-Finkelshtein, and R.J. Yáñez</i> .....	93
<b>Asymptotic Analysis of the Zeros of Hermite Polynomials</b> <i>Diego Dominici</i> .....	99

<b>The Error Function in the Study of Singularly Perturbed Convection-Diffusion Problems with Discontinuous Boundary Data</b> <i>J.L. López, E. Pérez Sinusúa, and N.M. Temme</i> .....	105
<b>Singular Perturbations of Parabolic Equations With or Without Boundary Layers</b> <i>Denis R. Akhmetov, Mikhail M. Lavrentiev, Jr., and Renato Spigler</i> .....	111
<b>The Asymptotic Inversion of Certain Cumulative Distribution Functions</b> <i>A. Gil, J. Segura, and N.M. Temme</i> .....	117
<b>Asymptotic Properties of Complex Random Systems and Applications</b> <b>Organizer: Malwina J. Luczak</b> .....	123
<b>A Multi-Class Mean-Field Model with Graph Structure for TCP Flows</b> <i>C. Graham and Ph. Robert</i> .....	125
<b>Charge and Spin Transport in Nanostructures</b> <b>Organizers: L.L. Bonilla and M. Carretero</b> .....	133
<b>The Equilibrium Wigner Function in the Case of Nonparabolic Energy Bands</b> <i>V. Romano</i> .....	135
<b>Nonlinear Electron and Spin Transport in Semiconductor Superlattices</b> <i>L.L. Bonilla, L. Barletti, and M. Alvaro</i> .....	141
<b>Self-Sustained Spin-Polarized Current Oscillations in Multiquantum Well Structures</b> <i>M. Carretero, L.L. Bonilla, R. Escobedo, and G. Platero</i> .....	147
<b>Spin Dynamics in Quantum Dots</b> <i>Gloria Platero, Jesús Iñarrea, and Carlos López-Monís</i> .....	153
<b>Relocation Dynamics During Voltage Switching in Spin-Polarized Superlattices</b> <i>R. Escobedo, M. Carretero, L.L. Bonilla, and G. Platero</i> .....	159

**Dynamical Systems Methods in Aerospace Engineering**  
**Organizers: B. Krauskopf and M.H. Lowenberg** ..... 167

**A Combined Numerical/Experimental Continuation Approach Applied to Nonlinear Rotor Dynamics**  
*D. Rezgui, M. Lowenberg, and P. Bunniss* ..... 169

**Operational Parameter Study of an Aircraft Turning on the Ground**  
*J. Rankin, B. Krauskopf, M. Lowenberg, and E. Coetzee* ..... 175

**Geometric Nonlinearities of Aircraft Systems**  
*B. Krauskopf, P. Thota, and M. Lowenberg* ..... 181

**Application of Nonlinear Dynamics in Civil Aerospace**  
*E. Coetzee* ..... 187

**Global System Dynamics and Policies**  
**Organizer: Steven Bishop** ..... 193

**Systems Approaches for Critical Decisions**  
*Julian Hunt, Steven Bishop, and Yulia Timoshkina* ..... 197

**Application of System Dynamics to Climate Policy Assessment**  
*Klaus Hasselmann* ..... 203

**Multivariate and/or Multidimensional Image Processing in Biomedical Applications**  
**Organizers: J. Angulo and D. Jeulin** ..... 209

**Regionalized Random Germs by a Classification for Probabilistic Watershed Application: Angiogenesis Imaging Segmentation**  
*Guillaume Noyel, Jesús Angulo, and Dominique Jeulin* ..... 211

**Nucleus Modelling and Segmentation in Cell Clusters**  
*Jesús Angulo* ..... 217

**Spatio-Temporal Segmentation for Radiotherapy Planning**  
*Jean Stawiaski, Etienne Decencière, and François Bidault* ..... 223

**Tracking and Registration for Multidimensional Biomedical Image Analysis**  
*K. Rohr, W.J. Godinez, N. Harder, S. Yang, I.-H. Kim, S. Wörz, and R. Eils* ..... 229

**Industrial Applied Mathematics in Ireland**

**Patches of Finite Elements for Singularly-Perturbed Diffusion Reaction Equations with Discontinuous Coefficients**

*Massimiliano Culpo, Carlo de Falco, and Eugene O’Riordan* . . . . . 235

**Upgrading the UK Broadband Infrastructure by Monte Carlo Simulation**

*W.T. Lee and K. Mueller* . . . . . 241

**Multi-Stepping and Anti-Icing / De-Icing Devices**

*J.P.F. Charpin and P. Verdin* . . . . . 247

**A Diffusion Model for Spatially Dependent Photopolymerization**

*D. Mackey, T. Babeva, I. Naydenova, and V. Toal* . . . . . 253

**Interfacial Processes in Industrial and Environmental Turbulent Flows**

**Organizers: I. Eames and J.C.R. Hunt** . . . . . 259

**Wakes of Maneuvering Body in Stratified Fluids**

*S.I.Voropayev and H.J.S.Fernando* . . . . . 261

**Eddy Dynamics Near Sharp Interfaces and in Straining Flows**

*J.C.R. Hunt, I. Eames, and J. Westerweel* . . . . . 267

**Evolution and Run-Up of Tsunamis**

*C.A. Klettner, I. Eames, J.C.R. Hunt, and H.J.S. Fernando* . . . . . 273

**Interfacial Mixing by Horizontal Vortices and Shear Turbulence**

*J.B. Flór, E.H. Hopfinger, and E. Guyez* . . . . . 279

**Inverse Problems and Signal Processing in Industrial Applications**

**Organizers: R. Ramlau and G. Teschke** . . . . . 285

**Sparse Deconvolution for Peak Picking and Ion Charge Estimation in Mass Spectrometry**

*Kristian Bredies, Theodore Alexandrov, Jens Decker, Dirk A. Lorenz, and Herbert Thiele* . . . . . 287

**Mathematical Imbalance Determination from Vibrational Measurements and Industrial Applications**

*Jenny Niebsch and Ronny Ramlau* . . . . . 293

<b>An Update of Hopkins' Analysis of the Optical Disc Player Using Singular-System Theory</b> <i>Roy Pike</i> .....	299
<b>The Application of Wavelet Analysis for the Detection of Planetary Wave Type Oscillations in the Ionospheric Total Electron Content</b> <i>C. Borries</i> .....	305
<b>Statistical Significance of Gabor Frames Expansions: Simple Filtering Principles for Radar Wind Profiler Data</b> <i>G. Teschke and V. Lehmann</i> .....	311
<b>Multirate Time Integration for Multiscaled Systems</b> <b>Organizers: E. Jan W. ter Maten and Michael Günther</b> .....	317
<b>Domain Decomposition Based Multirating and its Perspective in Circuit Simulation</b> <i>Michael Striebel, Andreas Bartel, and Michael Günther</i> .....	319
<b>Multirate Numerical Integration for Stiff ODEs</b> <i>V. Savcenko and R.M.M. Mattheij</i> .....	327
<b>Terminal Current Interpolation for Multirate Time Integration of Hierarchical IC Models</b> <i>A. Verhoeven, E.J.W. ter Maten, J.J. Dohmen, B. Tasić, and R.M.M. Mattheij</i> .....	333
<b>On Extrapolated Multirate Methods</b> <i>Emil M. Constantinescu and Adrian Sandu</i> .....	341
<b>Numerical Simulation of Cardiac Bioelectric Activity</b>	
<b>Is Geometry or Dynamics More Important in Cardiac Arrhythmogenesis?</b> <i>Arun V. Holden, Stephen H. Gilbert, and Alan P. Benson</i> .....	349
<b>A Bidomain Numerical Validation for Assessing Times of Fast and Ending Repolarization from Monophasic Action Potentials</b> <i>P. Colli Franzone, L.F. Pavarino, S. Scacchi, and B. Taccardi</i> .....	355
<b>Framework for Modular, Flexible and Efficient Solving the Cardiac Bidomain Equations Using PETSc</b> <i>G. Seemann, F.B. Sachse, M. Karl, D.L. Weiss, V. Heuveline, and O. Dössel</i> .....	363
<b>On Efficiency and Accuracy in Cardioelectric Simulation</b> <i>M. Weiser, B. Erdmann, and P. Deuffhard</i> .....	371

<p><b>Computational and Numerical Methods for the Efficient and Accurate Solution of the Bidomain Equations</b>  <i>J.P. Whiteley</i> .....</p>	377
<p><b>Operational Applications of Data Assimilation</b>  <b>Organizers: J.P. Argaud and B. Bouriquet</b> .....</p>	383
<p><b>Data Fusion in the Navigation of Robots: Assessing Tools</b>  <i>Robin Jaulmes</i> .....</p>	385
<p><b>The Role of Balance in Data Assimilation</b>  <i>R.N. Bannister</i> .....</p>	393
<p><b>Data Assimilation in Nuclear Power Plant Core</b>  <i>J.P. Argaud, B. Bouriquet, P. Erhard, S. Massart, and S. Ricci</i> .....</p>	401
<p><b>Optimal Treatment Planning in Radiotherapy</b></p>	
<p><b>An Iterative Method for Transport Equations in Radiotherapy</b>  <i>Bruno Dubroca and Martin Frank</i> .....</p>	407
<p><b>Boundary Control of Radiative Transfer Equations for Application in Radiotherapy Planning</b>  <i>Martin Frank and Michael Herty</i> .....</p>	413
<p><b>Model Hierarchies and Optimal Control of Radiative Transfer</b>  <i>R. Pinnau and G. Thömmes</i> .....</p>	419
<p><b>Optimization and Model Order Reduction in Circuit Design</b>  <b>Organizer: G. Gangemi</b> .....</p>	425
<p><b>A Netlist Reduction Algorithm to Symbolic Circuit Analysis</b>  <i>Paola Barrera, Jochen Broz, and Thomas Halfmann</i> .....</p>	429
<p><b>Introduction of Symbolic Simplified Expressions in Circuit Optimization</b>  <i>Angelo Ciccazzo, Thomas Halfmann, Angelo Marotta, Salvatore Rinaudo, and Alberto Venturi</i> .....</p>	435
<p><b>Proper Orthogonal Decomposition Model Order Reduction of Nonlinear IC Models</b>  <i>A. Verhoeven, M. Striebel, J. Rommes, E.J.W. ter Maten, and T. Bechtold</i> .....</p>	441

<b>Surrogate Modeling of RF Circuit Blocks</b> <i>Luciano De Tommasi, Dirk Gorissen, Jeroen A. Croon, and Tom Dhaene</i> .....	447
<b>Precipitation, Deposition and Sedimentation of Particles in Fluid Flow</b>	
<b>Organizers: L.L. Bonilla and Y. Farjoun</b> .....	453
<b>Structure of Granular Deposits Formed by Aerosol Particles Conveyed by Fluid Streams</b> <i>J.L. Castillo, D. Rodríguez-Pérez, S. Martín, A. Perea, and P.L. García-Ybarra</i> .....	455
<b>Creation of Clusters via a Thermal Quench</b> <i>Yossi Farjoun</i> .....	463
<b>Theory of Surface Deposition from Boundary Layers Containing Condensable Vapor and Particles</b> <i>J.C. Neu, A. Carpio, and L.L. Bonilla</i> .....	469
<b>Mathematical Modelling in Sport</b>	
<b>Comparing League Formats with Respect to Match (Un)importance: A Case Study in Belgian Soccer</b> <i>Dries R. Goossens and Jeroen Belien</i> .....	475
<b>Modelling Batting Strategy in Test Cricket</b> <i>P. Scarf, X. Shi, and S. Akhtar</i> .....	481
<b>Interactions between Structure and Process in Manufacturing Systems</b>	
<b>Organizer: D. Hömberg</b> .....	491
<b>Modelling, Analysis and Stability of Milling Processes Including Workpiece Effects</b> <i>D. Hömberg and O. Rott</i> .....	493
<b>Adaptive Finite Element Discretisation of the Spindle Grinding Wheel System</b> <i>H. Blum and A. Rademacher</i> .....	499
<b>Optimal Control of Robot Guided Laser Material Treatment</b> <i>Andreas Steinbrecher</i> .....	505
<b>Mathematical Models for Supply Chains</b>	
<b>Organizers: S. Göttlich and A. Klar</b> .....	513
<b>Design Network Problem and Heuristics</b> <i>U. Ziegler and S. Göttlich</i> .....	515

<b>Time-Dependent Order and Distribution Policies in Supply Networks</b> <i>S. Göttlich, M. Herty, and Ch. Ringhofer</i> .....	521
<b>Dynamics of Supply Chains Under Mixed Production Strategies</b> <i>R. Donner, K. Padberg, J. Höfener, and D. Helbing</i> .....	527
<b>Analogies Between Social Interaction Models and Supply Chains</b> <i>Laurent Navoret, Richard Bon, Pierre Degond, Jacques Gautrais, David Sanchez, and Guy Theraulaz</i> .....	535
<b>Computing the Value of Transshipment Flexibility in Distribution Networks</b> <i>M. Laumanns</i> .....	541
<b>Validated Methods: Applications to Modeling, Analysis, and Design of Systems in Medicine and Engineering</b> <b>Organizers: Andreas Rauh and Ekaterina Auer</b> .....	547
<b>Verification Techniques for Sensitivity Analysis and Design of Controllers for Nonlinear Dynamical Systems with Uncertainties</b> <i>Andreas Rauh, Johanna Minisini, and Eberhard P. Hofer</i> .....	549
<b>Verified Solution of Nonlinear Dynamic Models in Epidemiology</b> <i>Joshua A. Enszer and Mark A. Stadtherr</i> .....	557
<b>Physically Motivated Constraints for Efficient Interval Simulations Applied to the Analysis of Uncertain Models of Blood Cell Dynamics</b> <i>Mareile Freihold, Andreas Rauh, and Eberhard P. Hofer</i> .....	563
<b>Application of M<small>OB</small>ILE for Accurate Bone Motion Reconstruction Using Motion-Measurements and MRI Measurements</b> <i>M. Tändl, T. Stark, and A. Kecskeméthy</i> .....	571
<b>Toward Verified Modelling and Simulation of Closed Loop Systems in SMARTMOBILE</b> <i>E. Auer</i> .....	577
<b>Reliably Safe Path Planning Using Interval Analysis</b> <i>R. Pepy, M. Kieffer, and E. Walter</i> .....	583



**Models and Methods for Viscous Jets, Break-up and Drop Forming**

**Organizer: Nicole Marheineke** ..... 589

**General String Theory for Dynamic Curved Viscida with Surface Tension**  
*Nicole Marheineke and Raimund Wegener*..... 591

**Instability of Non-Newtonian Liquid Jets Curved by Gravity**  
*J. Uddin and S.P. Decent* ..... 597

**Simulation and Optimization of Film Casting Processes**  
*T. Götz and K. Selvanayagam* ..... 603

**Wetting: Fundamentals and Applications**

**On the Effect of an Atmosphere of Nitrogen on the Evaporation of Sessile Droplets of Water**  
*S.K. Wilson, K. Sefiane, S. David, G.J. Dunn, and B.R. Duffy* ..... 611

**Similarity Solutions for Unsteady Rivulets**  
*Y.M. Yatim, S.K. Wilson, B.R. Duffy, and R. Hunt*..... 617

**Depinning of 2d and 3d Droplets Blocked by a Hydrophobic Defect**  
*P. Beltrame, P. Hänggi, E. Knobloch, and U. Thiele* ..... 623

**ECMIMIM: Concepts of Mathematical Modelling in the Curriculum of Mathematics in Industry**  
**Organizer: A. Noack**..... 631

**Why Teach Mathematical Modelling?**  
*G. Brandell* ..... 633

**Differential Equations in the ECMIMIM Curriculum**  
*P. Miidla* ..... 639

**Topics in Learning Applied and Industrial Mathematics**  
**Organizers: A. Kværnø and H.G. ter Morsche** ..... 645

**Modelling Reality: Motivate Your Students!**  
*M. Bracke* ..... 647

**The Impact of CAS Use in Introductory Engineering Mathematics**  
*K. Schmidt, P. Rattleff, and P.M. Hussmann*..... 653

<b>Web Based Courses: Reaching a Distributed Audience</b> <b>Organizers: Matti Heiliö and Helle Rootzén</b> .....	661
<b>Statlab: An Interactive Teaching Tool for DOE</b> <i>M.A.A. Boon, A. Di Bucchianico, J.J.M. Rijpkema,</i> <i>and E.E.M. van Berkum</i> .....	663
<b>Statmaster and HEROS: Web-based Courses First and Second Generation</b> <i>P.V. Larsen and H. Rootzén</i> .....	669
<b>University Network of Virtual Education in Serbia</b> <i>A. Tepavčević and M. Heilio</i> .....	675
<b>Introducing eLearning in Industrial Mathematics in Tanzania and Rwanda</b> <i>Verdiana Grace Masanja</i> .....	681

---

**Part III Contributed Papers**

---

<b>Management of Several Purifying Plants in the Same Area: A Multi-Objective Optimal Control Problem</b> <i>L.J. Alvarez-Vázquez, N. García-Chan, A. Martínez,</i> <i>and M.E. Vázquez-Méndez</i> .....	691
<b>Vector Space of Cooperative Games: Construction of Basis Related with Solutions Based on Marginal Contributions and Determination of Games with Predefined Allocations</b> <i>R. Amer and J.M. Giménez</i> .....	697
<b>Introduction of Measurement Rules on the Nodes of Oriented Structures by Using Concepts of Game Theory</b> <i>R. Amer, J.M. Giménez, and A. Magaña</i> .....	703
<b>Quasicontinuum Method at Finite Temperature Applied to the Study of Nanovoids Evolution in Fcc Crystals</b> <i>C. Arévalo, Y. Kulkarni, M.P. Ariza, M. Ortiz, J. Knap,</i> <i>and J. Marian</i> .....	709
<b>Second-Order Asymptotic Expansion for an Eigenvalue Set in Domain with Small Iris</b> <i>A. Bendali, A. Tizaoui, S. Tordeux, and J.P. Vila</i> .....	715
<b>Mathematical Modelling of Fuel Cells</b> <i>P. Berg</i> .....	721

<b>Meshless Solution of Singular Potential Flows in Strong Formulation</b> <i>Francisco Bernal and Manuel Kindelan</i> .....	727
<b>Estimation of a Piecewise Constant Function Using Reparameterized Level-Set Functions</b> <i>Inga Berre, Martha Lien, and Trond Mannseth</i> .....	733
<b>On the Trajectory of Rockets in the Atmosphere</b> <i>L.M.B.C. Campos and P.J.S. Gil</i> .....	739
<b>On Aircraft Response and Control During a Wake Encounter</b> <i>L.M.B.C. Campos and J.M.G. Marques</i> .....	747
<b>On Alternative Safety Metrics for the Probability of the Collision Between Aircraft</b> <i>L.M.B.C. Campos and J.M.G. Marques</i> .....	753
<b>Homogeneous Branched-Chain Explosions</b> <i>M. Carretero, L.L. Bonilla, and J.B. Keller</i> .....	759
<b>Wind Simulation Refinement: Some New Challenges for Particle Methods</b> <i>C. Chauvin, F. Bernardin, M. Bossy, and A. Rousseau</i> .....	765
<b>Parallel Numerical Algorithm for Simulation of Counter Propagation of Two Laser Beams</b> <i>R. Čiegis, I. Laukaitytė, and V. Trofimov</i> .....	771
<b>Modelling Burglaries in Streets</b> <i>John P. Curtis, Frank T. Smith, and Xiang Ye</i> .....	777
<b>Approximate Numerical Solutions of Autonomous Second-Order Matrix Models Using Cubic Matrix Splines</b> <i>E. Defez, M.M. Tung, J. Ibañez, and A. Hervás</i> .....	785
<b>The Mathematical Model of the Pan-Tilt Unit Used in Noise Measurements in Urban Traffic</b> <i>O.A. Detesan, M. Arghir, and G. Solea</i> .....	791
<b>Spread of Epidemics and Rumours with Mobile Agents</b> <i>M. Draief and A. Ganesh</i> .....	797
<b>A Two-Layer Algebraic Turbulence Model for Compressible Flow in Turbomachinery Cascade</b> <i>A. Dumitrache, H. Dumitrescu, and F. Frunzulica</i> .....	803

<b>Aerodynamic and Aeroacoustic Analysis of a HAWT in Yaw</b> <i>H. Dumitrescu, A. Dumitrache, and V. Cardos</i> .....	811
<b>Quasi-Positive Continuous Darcy-Flux Finite-Volume Methods</b> <i>Michael G. Edwards and Hongwen Zheng</i> .....	819
<b>Are Copying and Innovation Enough?</b> <i>T.S. Evans, A.D.K. Plato, and T.You</i> .....	825
<b>Pricing Options Under Stochastic Volatility with Fourier-Cosine Series Expansions</b> <i>F. Fang and C.W. Oosterlee</i> .....	833
<b>Topology and Motion Planning Algorithms in Robotics</b> <i>M. Farber</i> .....	839
<b>Some Hints on Finding the Most Important Components in a System</b> <i>Josep Freixas and Montserrat Pons</i> .....	845
<b>An Advanced Aeroelastic Model for Horizontal Axis Wind Turbines</b> <i>F. Frunzulica, H. Dumitrescu, A. Dumitrache, and V. Cardos</i> .....	851
<b>On One Nonlinear Mathematical Model for Intensive Steel Quenching and Its Analytical Solution in Closed Form</b> <i>Sh.E. Guseynov, J.S. Rimshans, and N.I. Kobasko</i> .....	857
<b>Designing a Cover for a Tank</b> <i>G. Gutiérrez, S. Merino, J. Martínez, and I. Ladrón de Guevara</i> .....	863
<b>An Advection-Dispersion Model for Spray Droplet Transport Including Interception by a Shelterbelt</b> <i>S.A. Harper, R. McKibbin, and G.C. Wake</i> .....	869
<b>Numerical Modelling of a Pulse Combustion Burner: Limiting Conditions of Stable Operation</b> <i>P.A. van Heerbeek, M.B. van Gijzen, C. Vuik, and M.R. de la Fonteyne</i> .....	875
<b>Optimal Control of Buoyant Flows with Temperature-Dependent Viscosity</b> <i>H. Herrero and F. Pla</i> .....	881
<b>Minimum Time Optimal Rendezvous on Circular and Elliptical Orbits</b> <i>V. Istratie</i> .....	887

<b>Distributed Particle Swarm Intelligence for Optimization in the Water Industry</b> <i>J. Izquierdo, I. Montalvo, R. Pérez, M.M. Tung, and M. Tavera</i> .....	893
<b>Application of the Method of Auxiliary Sources in Optical Diffraction Microscopy</b> <i>M. Karamehmedović, M.-P. Sørensen, P.-E. Hansen, and A. Lavrinenko</i> .....	899
<b>Radial Basis Function (RBF) Solution of the Motz Problem</b> <i>Manuel Kindelan and Francisco Bernal</i> .....	907
<b>Bilevel Optimization of Container Cranes</b> <i>M. Knauer and C. Büskens</i> .....	913
<b>Optimization of Satellite Constellations</b> <i>M. Knauer and C. Büskens</i> .....	919
<b>Moving Penalty Functions for Optimal Control with PDEs on Networks</b> <i>O. Kolb, P. Bales, and J. Lang</i> .....	925
<b>Numerical Analysis of Geometrical Characteristics of Machine Elements Obtained with CMM Scanning</b> <i>P. Krawiec</i> .....	933
<b>Plastic Yield of Particulate Materials Under the Effect of Temperature</b> <i>I. Malujda</i> .....	939
<b>A Model for Spray Droplet Adhesion, Bounce or Shatter at a Crop Leaf Surface</b> <i>Geoffry N. Mercer, Winston L. Sweatman, and W. Alison Forster</i> .....	945
<b>Optimisation through Control in Static and Dynamic Traffic Networks</b> <i>Richard Mounce</i> .....	953
<b>The Science of Desire: A Systematic Approach to Mathematical Modeling</b> <i>Kees van Overveld</i> .....	959
<b>Modeling, Analysis and Simulations of Case Hardening of Steel</b> <i>L. Panizzi, A. Fasano, and D. Hömberg</i> .....	965

**Surface Recording of His-Purkinje Activity by One-Beat Wavelet Analysis in Atrial Fibrillation and Flutter**  
*V. Pezza, B. Pezza, E. Pezza, L. Pezza, M. Curione, and V. Sanguigni* ..... 971

**Application of FEM in Analysis of Spigot Joint Contact Problems**  
*T. Podolski and J. Krocak*..... 977

**Fractional Cauchy Problem with Applications to Anomalous Diffusion**  
*E. Popescu* ..... 983

**Multi-scale Modeling of the Interplanetary Magnetic Field**  
*N.A. Popescu and E. Popescu* ..... 991

**Analytical and Numerical Modelling of Thermoviscous Shocks and Their Interactions in Nonlinear Fluids Including Dissipation**  
*A.R. Rasmussen, M.P. Sørensen, Yu.B. Gaididei, and P.L. Christiansen* ..... 997

**Study on Development of the Seated Human Body System Exposed to Vehicular Ride Vibration Environment**  
*S. Rodean and M. Arghir* ..... 1003

**Surrogate Modeling for Geometry Optimization**  
*M. Rojas, Y.B. Abraham, N.A.W. Holzwarth, and R.J. Plemmons* .... 1011

**Variational Optimization of Power Yield in Industrial Systems**  
*Stanislaw Sieniutycz*..... 1017

**An Age-Dependent Metapopulation Model**  
*Jacques A.L. Silva and Edgar Pereira* ..... 1027

**Two-Layer Shallow Water Equations with Complete Coriolis Force and Topography**  
*A.L. Stewart and P.J. Dellar* ..... 1033

**Optimising for Wind Power Contributions in an Electricity Grid**  
*Winston L. Sweatman, Geoff Pritchard, Bill Whiten, Mike Camden, and Kim Nan* ..... 1039

**A Novel Solution Method for Tokamak Plasma Force Balance**  
*A. Thyagaraja and P.J. Knight* ..... 1047

<b>A Differential-Geometric Approach to Model Isotropic Diffusion on Circular Conic Surfaces in Uniform Rotation</b>	
<i>M.M. Tung and A. Hervás</i> .....	1053
<b>A General Model of Lung Tumour Motion</b>	
<i>P.L. Wilson and J. Meyer</i> .....	1061
<b>The Lipid Bilayer at the Mesoscale: A Physical Continuum Model</b>	
<i>P.L. Wilson, S. Takagi, and H. Huang</i> .....	1067
<b>Wavelet Transform in Speech Segmentation</b>	
<i>M. Ziółko, J. Gałka, and T. Drwiega</i> .....	1073
<b>Author Index</b> .....	1079