

# **9th Vienna International Conference on Mathematical Modelling (MATHMOD 2018)**

IFAC PapersOnline Volume 51, Issue 2

Vienna, Austria  
21-23 February 2018

Part 1 of 2

## **Editors:**

**Felix Breiteneker  
Andreas Korner  
Inge Troch**

**Wolfgang Kemmetmuller  
Andreas Kugi  
TU Wien**

ISBN: 978-1-5108-6308-8

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2018) by IFAC (International Federation of Automatic Control)  
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact the publisher, Elsevier Limited  
at the address below.

Elsevier Limited  
360 Park Ave South  
New York, NY 10010

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## PART 1

<b>NUMERICAL OPTIMAL CONTROL APPLIED TO AN EPIDEMIOLOGICAL MODEL</b> .....	1
<i>Christina Schreppel, Kurt Chudej</i>	
<b>ROBUST OPTIMAL CONTROL OF FISHING IN A THREE COMPETING SPECIES MODEL</b> .....	7
<i>Bernd Kugelman, Roland Pulch</i>	
<b>OPTIMAL VACCINATION STRATEGIES FOR A NEW DENGUE MODEL WITH TWO SEROTYPES</b> .....	13
<i>Kurt Chudej, Anne Fischer</i>	
<b>MODELING AND CONTROL OF INVERTER-BASED MICROGRIDS?</b> .....	19
<i>Bernhard Hammer, Kuangye Gong, Ulrich Konigorski</i>	
<b>CONVERTIBLE AIRCRAFT DYNAMIC MODELLING AND FLATNESS ANALYSIS?</b> .....	25
<i>Tudor-Bogdan Airimitoae, Gemma Prieto Aguilar, Loic Lavigne, Christophe Farges, Franck Cazaurang</i>	
<b>FLATNESS-BASED MODEL PREDICTIVE CONTROL WITH LINEAR PROGRAMMING FOR A SINGLE MAST STACKER CRANE</b> .....	31
<i>A. Galkina, K. Schlacher</i>	
<b>REDUCED LINEAR FRACTIONAL REPRESENTATION OF NONLINEAR SYSTEMS FOR STABILITY ANALYSIS?</b> .....	37
<i>Péter Polcz, Tamás Péni, Gábor Szederkényi</i>	
<b>CONTROL OF METHYL OLEATE SUPERCRITICAL EXTRACTION USING INPUT SHAPING</b> .....	43
<i>Guilherme A. S. De Souza, Bruno F. Santoro</i>	
<b>OPTIMAL BANG-BANG CONTROL OF A MECHANICAL DOUBLE OSCILLATOR USING AVERAGING METHODS</b> .....	49
<i>Christophe Coudurier, Olivier Lepreux, Nicolas Petit</i>	
<b>MODELING AND SIMULATION OF MOVING WOOD CHIPS AND RESIN DROPLETS WITHIN A RESINATING MIXER USING LATTICE GAS CELLULAR AUTOMATA</b> .....	55
<i>Carina Rößler, Martin Riegler, Felix Breitenecker</i>	
<b>A ROBUST REAL-TIME MODEL FOR PLATE LEVELING</b> .....	61
<i>R. Brauneis, A. Steinboeck, M. Jochum, A. Kugi</i>	
<b>MODEL DESIGN FOR A HYDRAULIC CLUTCH ACTUATION SYSTEM</b> .....	67
<i>Felix Mesmer, Lothar Kiltz, Knut Graichen</i>	
<b>MATHEMATICAL MODEL AND STABILITY ANALYSIS OF THE LATERAL PLATE MOTION IN A REVERSING ROLLING MILL STAND</b> .....	73
<i>Andreas Ettl, Katharina Prinz, Martin Mueller, Andreas Steinboeck, Andreas Kugi</i>	
<b>IDENTIFICATION OF DYNAMIC MODELS FOR THE SHORT-TERM TEMPERATURE PREDICTION IN A SINGLE ROOM</b> .....	79
<i>Fabian Paschke, Tobias Zaiczek</i>	
<b>MODEL-BASED POTENTIAL ANALYSIS OF DEMAND-CONTROLLED VENTILATION IN BUILDINGS</b> .....	85
<i>K. Ben Jemaa, P. Kotman, K. Graichen</i>	
<b>MODELS OF SYNCHRONOUS GENERATORS WITH EXCITATION SYSTEM, FOR TRANSIENT POWER SYSTEM STUDIES</b> .....	91
<i>Thomas Øyvang, Gunne J. Heggli, Bernt Lie</i>	
<b>DEVELOPMENT OF A TEST SYSTEM FOR IDENTIFICATION OF TURBINE DYNAMICS USING THE DC POWER FLOW</b> .....	97
<i>Sigurd Hofsmo Jakobsen, Kjetil Uhlen</i>	
<b>MECHANISTIC MODEL FOR FRANCIS TURBINES IN OPENMODELICA</b> .....	103
<i>Liubomyr Vytvytskyi, Bernt Lie</i>	
<b>SIMULATION AND DISCUSSION OF MODELS FOR HYDRAULIC FRANCIS TURBINE SIMULATIONS</b> .....	109
<i>Pål-Tore Storli, Torbjørn K. Nielsen</i>	
<b>INVESTIGATING THE CANNIBALIZING EFFECT IN A TWO-MARKET SITUATION USING AGENT-BASED SIMULATION</b> .....	115
<i>S. S. Moghadam, F. Klügl, F. Prenkert</i>	
<b>A DETERMINISTIC DYNAMIC MODEL OF OPTIMIZING UNIVERSITY TRAINING STRUCTURE</b> .....	121
<i>Andrey F. Shorikov, Anastasia E. Sudakova, Gavriil A. Agarkov, Alexandr A. Tarasyev</i>	
<b>CALCULATION OF NATURAL FREQUENCIES AND DAMPING COEFFICIENTS OF A MULTI-LAYERED COMPOSITE USING HOMOGENIZATION THEORY?</b> .....	126
<i>Alexey S. Shamaev, Vladlena V. Shumilova</i>	
<b>SOME PROBLEMS OF CONTROLLABILITY OF DISTRIBUTED SYSTEMS GOVERNED BY INTEGRODIFFERENTIAL EQUATIONS?</b> .....	132
<i>Igor Romanov, Alla Romanova</i>	
<b>METHOD OF APPROXIMATE CALCULATION OF THE STRESS TENSOR IN LAYERED ELASTIC-CREEPING ENVIRONMENTS</b> .....	138
<i>T. N. Bobyleva, A. S. Shamaev</i>	
<b>ON LIMITS OF APPLICABILITY OF THE HOMOGENIZATION METHOD TO MODELING OF LAYERED CREEP MEDIA</b> .....	144
<i>Alexander A. Gavrikov, Dmitri Knyazkov, Andrey M. Melnikov, Alexey S. Shamaev, Vasily V. Vedeneev</i>	

<b>ON THE MODELING OF CREEP LAYERED STRUCTURES WITH NONLINEAR CONSTITUTIVE RELATIONS?</b> .....	150
<i>Alexander A. Gavrikov, Alexey S. Shamaev</i>	
<b>ANALYSIS OF DYNAMICS AND CONTROLLABILITY OF A SYSTEM DESCRIBED BY THE EQUATION OF A PIPELINE WITH A MOVING FLUID</b> .....	156
<i>Vitaly V. Chernik</i>	
<b>TRAFFIC FLOW ON SINGLE-LANE ROAD NETWORKS: MULTISCALE MODELLING AND SIMULATION</b> .....	162
<i>Alberto De Marchi, Matthias Gerds</i>	
<b>NON-LINEAR MODEL PREDICTIVE CONTROL OF CONNECTED, AUTOMATIC CARS IN A ROAD NETWORK USING OPTIMAL CONTROL METHODS</b> .....	168
<i>Andreas Britzelmeier, Matthias Gerds</i>	
<b>NUMERICAL IDENTIFICATION OF MOTOR UNITS USING AN OPTIMAL CONTROL APPROACH</b> .....	174
<i>Tobias Sproll, Anton Schiela, Madeleine Lowery</i>	
<b>ON A MODEL FOR LASER CUTTING INVOLVING SURFACE TENSION</b> .....	180
<i>G. Vossen, N. A. Friedlich, T. Hermanns, M. Nießen, W. Schulz</i>	
<b>MODEL REDUCTION FOR CONVECTIVE PROBLEMS: FORMULATION AND APPLICATION</b> .....	186
<i>Julius Reiss</i>	
<b>PARAMETRIC MODEL-ORDER REDUCTION FOR ACCELERATING THE GRADIENT-BASED OPTIMIZATION OF MICROWAVE STRUCTURES USING FINITE-ELEMENTS</b> .....	190
<i>S. Brandl, R. Dyczij-Edlinger</i>	
<b>AN APPROACH FOR GLOBALIZED H<sub>2</sub>-OPTIMAL MODEL REDUCTION?</b> .....	196
<i>Alessandro Castagnotto, Siyang Hu, Boris Lohmann</i>	
<b>A SENSITIVITY STUDY OF ERROR ESTIMATION IN REDUCED ELASTIC MULTIBODY SYSTEMS?</b> .....	202
<i>Jörg Fehr, Dennis Grunert, Ashish Bhatt, Bernard Haasdonk</i>	
<b>EFFICIENT ESTIMATION OF INTERRUPTED ENERGY WITH TIME-VARYING LOAD MODELS FOR DISTRIBUTION SYSTEMS PLANNING STUDIES</b> .....	208
<i>A. S. Nazmul Huda, Rastko Živanovic</i>	
<b>MATHEMATICAL MODELLING AND PARAMETER ESTIMATION OF AN INDUSTRIAL STEAM TURBINE-GENERATOR BASED ON OPERATIONAL DATA</b> .....	214
<i>Ramtin Khalili, Hadi Rabiyeian, Abolfazl Khodadadi, Behrooz Zaker, Mehdi Karrari, Shahab Karrari</i>	
<b>A FRACTIONAL-ORDER ELECTRO-THERMAL AGING MODEL FOR LIFETIME ENHANCEMENT OF LITHIUM-ION BATTERIES</b> .....	220
<i>Sara Mohajer, Jocelyn Sabatier, Patrick Lanusse, Olivier Cois</i>	
<b>PERIODIC NON-REVERSE RECTILINEAR MOTION OF A TWO-BODY SYSTEM ON A ROUGH PLANE?</b> .....	226
<i>Nikolay N. Bolotnik, Tatiana Yu. Figurina, Pavel A. Gubko</i>	
<b>OPTIMAL CONTROL OF TWO-DIMENSIONAL MOTIONS OF A BODY BY A MOVABLE MASS</b> .....	232
<i>Felix L. Chernousko</i>	
<b>MATHEMATICAL MODELLING OF MOBILE ROBOT MOTION WITH PROPULSION DEVICE OF DISCRETE INTERACTING WITH THE SUPPORT SURFACE</b> .....	236
<i>Eugene S. Briskin, Yaroslav V. Kalinin, Alexander V. Maloletov, Nikolay G. Sharonov</i>	
<b>RPDEVS: REVISING THE PARALLEL DISCRETE EVENT SYSTEM SPECIFICATION</b> .....	242
<i>Franz Preysner, Bernhard Heinzl, Wolfgang Kastner</i>	
<b>USING UNIFIED ENHANCED TIME PETRI NET MODELS FOR CYBER-PHYSICAL SYSTEM DEVELOPMENT</b> .....	248
<i>T. S. Letia, A. O. Kilyen</i>	
<b>A GRAPH METRIC FOR MODEL PREDICTIVE CONTROL OF PETRI NETS</b> .....	254
<i>M. Appel, U. Konigorski, M. Walther</i>	
<b>COLORED PETRI NET MODEL OF ELECTRICAL NETWORKS FOR DIAGNOSTIC PURPOSES</b> .....	260
<i>A. I. Pózna, A. Fodor, M. Gerzson, K. M. Hangos</i>	
<b>PETRI NET MODEL OF A SMART FACTORY IN THE FRAME OF INDUSTRY 4.0</b> .....	266
<i>Juan-Ignacio Latorre-Biel, Javier Faulín, Angel A. Juan, Emilio Jiménez-Macías</i>	
<b>AN OPTIMAL CONTROL PROBLEM FOR A ROTATING ELASTIC CRANE-TROLLEY-LOAD SYSTEM</b> .....	272
<i>Sven-Joachim Kimmerle, Matthias Gerds, Roland Herzog</i>	
<b>OPTIMAL CONTROL OF AN OPTICAL SYSTEM FOR MATERIAL TESTING</b> .....	278
<i>Walter Alt, Christopher Schneider, Martin Seydenschwanz</i>	
<b>MODELING DEMAND PROPAGATION IN GUARANTEED SERVICE MODELS?</b> .....	284
<i>Madeleine Löhnert, Jörg Rambau</i>	
<b>HYBRID SIMULATION ALGORITHM FOR EFFICIENT NUMERICAL SOLUTION OF POPULATION BALANCE EQUATIONS</b> .....	290
<i>Robert Dürr, Steffen Waldherr</i>	
<b>REDUCED-ORDER GREEDY CONTROLLABILITY OF FINITE DIMENSIONAL LINEAR SYSTEMS</b> .....	296
<i>Giulia Fabrini, Laura Iapichino, Stefan Volkwein</i>	
<b>EXPONENTIAL CONVERGENCE OF ONLINE ENRICHMENT IN LOCALIZED REDUCED BASIS METHODS</b> .....	302
<i>Andreas Buhr</i>	
<b>DATA-DRIVEN SURROGATES OF VALUE FUNCTIONS AND APPLICATIONS TO FEEDBACK CONTROL FOR DYNAMICAL SYSTEMS</b> .....	307
<i>A. Schmidt, B. Haasdonk</i>	

<b>MODELING, EXPERIMENTAL IDENTIFICATION, AND OPTIMIZATION OF HEAT TRANSFER IN A METAL BAR CONTROLLED BY PELTIER ELEMENTS?</b> .....	313
<i>Georgy Kostin, Andreas Rauh, Harald Aschemann</i>	
<b>MODELING AND MOTION PLANNING FOR AN ARTIFICIAL FISHTAIL</b> .....	319
<i>Dirk Siebelts, Andreas Kater, Thomas Meurer</i>	
<b>A CONTROL-ORIENTED THERMAL MODEL FOR A MOVING DUAL-LAYER SUBSTRATE</b> .....	325
<i>Ruven Weiss, Ludwig Albrecht, Johannes Reuter, Olivier Gehan</i>	
<b>CONTROL ORIENTED MODELING OF DCDC CONVERTERS</b> .....	331
<i>Simon Schmidt, Max Richter, Jens Oberrath, Paolo Mercorelli</i>	
<b>AN INTERVAL APPROACH FOR PARAMETER IDENTIFICATION AND OBSERVER DESIGN OF SPATIALLY DISTRIBUTED HEATING SYSTEMS</b> .....	337
<i>Andreas Rauh, Julia Kersten, Harald Aschemann</i>	
<b>METHOD COMPARISON AND VALIDATION OF THE DETERMINATION OF EJECTION DURATION FROM OSCILLOMETRIC MEASUREMENTS</b> .....	343
<i>Andreas Bauer, Bernhard Hameter, Thomas Weber, Siegfried Wassertheurer</i>	
<b>MODELING OF GAS EXCHANGE DYNAMICS USING CYCLE-ERGOMETER TESTS</b> .....	349
<i>Nadia Rosero, John J. Martinez, Matteo Corno</i>	
<b>MODELLING OF BIS-INDEX DYNAMICS FOR TOTAL INTRAVENOUS ANESTHESIA SIMULATION IN MATLAB-SIMULINK?</b> .....	355
<i>Gorazd Karer, Vesna Novak-Jankovic, Adela Stecher, Iztok Potocnik</i>	
<b>COMPRESSION AND NOISE REDUCTION OF BIOMEDICAL SIGNALS BY SINGULAR VALUE DECOMPOSITION</b> .....	361
<i>Thomas Schanze</i>	
<b>THE BURDEN OF THE HIV VIRAL LOAD AND OF CELL-TO-CELL SPREAD IN HIV/HCV COINFECTION</b> .....	367
<i>Ana R. M. Carvalho, Carla M. A. Pinto</i>	
<b>GEOMETRICAL MODEL FOR CHARACTERIZATION OF FOOT DEFORMITY USING 3D IMAGING</b> .....	373
<i>Che-Wei Hu, Arnold Baca, Martin Groeber, Peter Dabnichki</i>	
<b>WOSPP - A WAVE ORIENTED SWARM PROGRAMMING PARADIGM</b> .....	379
<i>Ronald Thenius, Joshua Cherian Varughese, Daniel Moser, Thomas Schmickl</i>	
<b>A MODEL FOR BIO-INSPIRED UNDERWATER SWARM ROBOTIC EXPLORATION</b> .....	385
<i>Joshua Cherian Varughese, Ronald Thenius, Paul Leitgeb, Franz Wotawa, Thomas Schmickl</i>	
<b>A NONLINEAR BIKE MODEL FOR PURPOSES OF CONTROLLER AND OBSERVER DESIGN</b> .....	391
<i>Alen Turnwald, Steven Liu</i>	
<b>MODELING HIGH-SPEED POSITIONING SYSTEMS WITH FOCUS ON SUITABILITY FOR PARAMETER ESTIMATION</b> .....	397
<i>S. Mayr, G. Grabmair, J. Reger</i>	
<b>REDUCED MODELS FOR THE STATIC SIMULATION OF AN ELASTIC CONTINUUM MECHANISM</b> .....	403
<i>Bastian Deutschmann, Simon R. Eugster, Christian Ott</i>	
<b>REDUNDANT CONFIGURATION COORDINATES AND NONHOLONOMIC VELOCITY COORDINATES IN ANALYTICAL MECHANICS</b> .....	409
<i>Matthias Konz, Joachim Rudolph</i>	
<b>CLOSED-LOOP IDENTIFICATION FOR A CONTINUOUS-TIME MODEL OF A MULTIVARIABLE DUAL-RATE SYSTEM WITH INPUT FAST SAMPLING?</b> .....	415
<i>Mitsuhiro Nakayama, Hiroshi Oku, Shun Ushida</i>	
<b>A CASCADE PREDICTOR FOR NONLINEAR SYSTEMS WITH A CONSTANT OUTPUT DELAY</b> .....	421
<i>C. Tréangle, T. Ménard, M. Farza, M. M'Saad</i>	
<b>ROBUST OPTIMIZATION OF DYNAMICAL SYSTEMS WITH CORRELATED RANDOM VARIABLES USING THE POINT ESTIMATE METHOD?</b> .....	427
<i>Xiangzhong Xie, Ulrike Krewer, René Schenkendorf</i>	
<b>LEARNING GRAPH DYNAMICS USING DEEP NEURAL NETWORKS</b> .....	433
<i>Apurva Narayan, Peter H. O'N Roe</i>	
<b>RECOGNITION OF SYSTEMATIC SPATIAL PATTERNS IN SILICON WAFERS BASED ON SOM AND K-MEANS</b> .....	439
<i>Mika Liukkonen, Yrjö Hiltunen</i>	
<b>IMAGE PROCESSING USING COLOR SPACE MODELS FOR FORENSIC FIBER DETECTION</b> .....	445
<i>Elisabeth Wetzer, Hans Lohninger</i>	

## PART 2

<b>TOPOLOGICAL FITTING: BROADBAND MODELING OF PASSIVE COMPONENTS VIA AUGMENTED EQUIVALENT CIRCUIT MODELS?</b> .....	451
<i>Sanda Lefteriu, Stefano Grivet-Talocia</i>	
<b>ANALYSIS OF DISSIPATIVE NAMBU SYSTEMS WITH LIMIT CYCLES USING A SELF-CONSISTENT CARLEMAN LINEARIZATION</b> .....	457
<i>Harry Weber, Richard Mathis, Wolfgang Mathis</i>	
<b>TOWARDS PORT-HAMILTONIAN MODELING OF MULTI-CARRIER ENERGY SYSTEMS: A CASE STUDY FOR A COUPLED ELECTRICITY AND GAS DISTRIBUTION SYSTEM</b> .....	463
<i>Felix Strehle, Martin Pfeifer, Lukas Kölsch, Charlotte Degünther, Johannes Ruf, Lisa Andresen, Sören Hohmann</i>	

<b>DYNAMICAL MODELLING OF A DC MICROGRID USING A PORT-HAMILTONIAN FORMALISM</b> .....	469
<i>I. Zafeiratou, I. Prodan, L. Lefèvre, L. Piétraç</i>	
<b>GAIN SCHEDULING MODEL PREDICTIVE CONTROL OF THE NEW TCP-100 PARABOLIC TROUGH FIELD?</b> .....	475
<i>Antonio J. Gallego, Luis J. Yebra, Eduardo. F. Camacho</i>	
<b>FIRST PRINCIPLES SYSTEM LEVEL MODELLING OF TCP-100 FACILITY FOR SIMULATION OF OPERATION MODES?</b> .....	481
<i>Julia Pérez, Luis J. Yebra, Sebastián Dormido, Eduardo Zarza</i>	
<b>FLATNESS-BASED TRACKING CONTROL FOR A PNEUMATIC SYSTEM WITH DISTRIBUTED PARAMETERS</b> .....	487
<i>Nicole Gehring, Richard Kern</i>	
<b>MODELING AND STABILIZATION OF A ROTATING MECHANICAL SYSTEM WITH ELASTIC PLATES</b> .....	493
<i>Alexander Zuyev, Julia Novikova</i>	
<b>A MATHEMATICAL MODEL OF MODELLING – EPISTEMOLOGY AND NATURAL SCIENCES</b> .....	499
<i>Dirk Langemann, Cordula Reisch, Janina Dierkes</i>	
<b>THE PVAD ALGORITHM TO LEARN PARTIAL-VALUE VARIABLE ASSOCIATIONS WITH APPLICATION TO MODELLING FOR ENGINEERING RETENTION</b> .....	505
<i>Nong Ye, Ting Yan Fok, Xin Wang, James Collofello, Nancy Dickson</i>	
<b>FUZZY LOGIC AND OPTIMIZATION OF EDUCATIONAL PATHS</b> .....	511
<i>Alexandr A. Tarasyev, Gavriil A. Agarkov, Camilo A. Ospina Acosta, Viktor A. Koksharov</i>	
<b>MULTI LOOP CONTROL: SOME ASPECTS WITH REGARD TO ENGINEERING EDUCATION</b> .....	517
<i>Borut Zupancic</i>	
<b>DEVELOPING GREY-BOX DYNAMIC PROCESS MODELS</b> .....	523
<i>C. De Prada, D. Hose, G. Gutierrez, J. L. Pitarch</i>	
<b>LOCAL IDENTIFIABILITY ANALYSIS OF NONLINEAR ODE MODELS: HOW TO DETERMINE ALL CANDIDATE SOLUTIONS</b> .....	529
<i>Karl Thomaseth, Maria Pia Saccomani</i>	
<b>AN EFFICIENT METHOD TO ASSESS LOCAL CONTROLLABILITY AND OBSERVABILITY FOR NON-LINEAR SYSTEMS</b> .....	535
<i>J. D. Stigter, L. G. Van Willigenburg, J. Molenaar</i>	
<b>HOW TO ANALYSE URBAN RESOURCE CYCLES: A DYNAMIC SYSTEMS APPROACH TO FACILITATE DECISION-MAKING</b> .....	541
<i>Elvira Bozileva, Ingo Leusbrock, Hans J. Cappon, Huub H. Rijnaarts, Karel J. Keesman</i>	
<b>MODEL REDUCTION OF DESCRIPTOR SYSTEMS WITH THE MORLAB TOOLBOX?</b> .....	547
<i>Peter Benner, Steffen W. R. Werner</i>	
<b>MODEL ORDER REDUCTION FOR PARAMETER DEPENDENT SUBSTRUCTURED SYSTEMS USING KRYLOV SUBSPACES</b> .....	553
<i>Nadine Walker, Benjamin Fröhlich, Peter Eberhard</i>	
<b>DATA-DRIVEN APPROXIMATION OF A HIGH FIDELITY GUST-ORIENTED FLEXIBLE AIRCRAFT DYNAMICAL MODEL</b> .....	559
<i>C. Poussot-Vassal, D. Quero, P. Vuillemin</i>	
<b>MULTI-MODAL TRANSPORT PREDICTION FOR LINEAR ONE-DIMENSIONAL WAVE PROPAGATION PROBLEMS</b> .....	565
<i>T. Weinberger, A. Schirrer</i>	
<b>STRUCTURE PRESERVING FINITE DIFFERENCES IN POLAR COORDINATES FOR HEAT AND WAVE EQUATIONS</b> .....	571
<i>Vincent Trenchant, Weiwei Hu, Hector Ramirez, Yann Le Gorrec</i>	
<b>EVOLUTION OF STRESSES AND DEFORMATIONS IN HOLLOW CYLINDER WITH VARIABLE MATERIAL COMPOSITION: MATHEMATICAL MODELING AND OPTIMIZATION?</b> .....	577
<i>S. Lychev, G. Kostin, K. Koifman</i>	
<b>NUMERICAL INVESTIGATION OF LIQUID SLOSHING IN CARRIER SHIP FUEL TANKS</b> .....	583
<i>M. L. Hosain, U. Sand, R. Bel Fdhila</i>	
<b>COMPUTER SIMULATION OF THE TERNARY PROBLEM – TECHNICAL ASPECTS AND POSSIBILITIES?</b> .....	589
<i>L. Zedek, H. Lippold, J. Šembera</i>	
<b>A LINEAR MODEL OF TURBULENCE: REPRODUCING THE KOLMOGOROV-SPECTRUM</b> .....	595
<i>Bendegúz Dezsó Bak, Tamás Kalmár-Nagy</i>	
<b>MODELING FRACTIONAL ORDER STRAIN IN DIPOLAR THERMOELASTICITY</b> .....	601
<i>Lavinia F. Codarcea-Munteanu, Adina N. Chirila, Marin I. Marin</i>	
<b>ON THE EIGENSOLUTIONS OF CIRCULAR PLATE WITH VISCOELASTIC FILLING MEDIA USING FRACTIONAL DERIVATIVES</b> .....	607
<i>Junjie Luo, André Schmidt, Lothar Gaul</i>	
<b>TOWARDS DIGITAL TWINS THROUGH OBJECT-ORIENTED MODELLING: A MACHINE TOOL CASE STUDY</b> .....	613
<i>Bruno Scaglioni, Gianni Ferretti</i>	
<b>IMPLEMENTATIONS OF THE TENNESSEE EASTMAN PROCESS IN MODELICA</b> .....	619
<i>Carla Martin-Villalba, Alfonso Urquía, Guodong Shao</i>	
<b>APPROXIMATION OF REFRIGERANT PROPERTIES FOR DYNAMIC VAPOR COMPRESSION CYCLE MODELS</b> .....	625
<i>Cong Tuan Son Van, Christopher R. Laughman</i>	

<b>DYNAMIC FLUX BALANCE ANALYSIS FOR PREDICTING BIOMASS GROWTH AND ETHANOL PRODUCTION IN YEAST FED-BATCH CULTURES</b> .....	631
<i>J. Plaza, Ph. Bogaerts</i>	
<b>REDUCED ORDER METHODS FOR THE SOLUTION OF SOLIDIFICATION PHASE-FIELD MODELS?</b> .....	637
<i>E. López-Quiroga</i>	
<b>A NUMERICAL FRAMEWORK FOR DIFFUSIVE TRANSPORT IN ROTATIONAL SYMMETRIC SYSTEMS WITH DISCONTINUOUS INTERLAYER CONDITIONS</b> .....	643
<i>Kristinn Gudnason, Sven Sigurdsson, Fjola Jonsdottir</i>	
<b>INTRINSIC NOISE MODULATION IN CLOSED OLIGOMERIZATION-TYPE SYSTEMS?</b> .....	649
<i>Marianne Rooman, Fabrizio Pucci</i>	
<b>MODELLING AN ARTIFICIAL MICROALGAE-CYANOBACTERIA ECOSYSTEM</b> .....	655
<i>Margaux Caia, Olivier Bernard, Jean-Philippe Steyer</i>	
<b>MODEL REDUCTION OF CONSTRAINED MECHANICAL SYSTEMS IN M-M.E.S.S.?</b> .....	661
<i>Jens Saak, Matthias Voigt</i>	
<b>LOAD SNAPSHOT DECOMPOSITION TO CONSIDER HEAT RADIATION IN THERMAL MODEL ORDER REDUCTION</b> .....	667
<i>S. Rother, M. Beitel Schmidt</i>	
<b>REGRESSION ANALYSIS OF MARKOV CHAIN MIXING IN HUB AND SPOKE NETWORKS?</b> .....	673
<i>Haitham Elfaham, Mariia Anapolska, Ulrich Epple</i>	
<b>INDICATORS AS MODULAR-HIERARCHICAL MODELS FOR VALUATION</b> .....	679
<i>Jochen Wittmann</i>	
<b>TOWARD BETTER CONTROL OF WATER-INTENSIVE PROCESSES: CASE STUDY IN FLUTING MANUFACTURING</b> .....	683
<i>Mika Liukkonen, Jukka Silvennoinen, Yrjö Hiltunen</i>	
<b>SIMULATION-BASED ASSESSMENT OF ENERGY EFFICIENCY IN INDUSTRY: COMPARISON OF HYBRID SIMULATION APPROACHES</b> .....	689
<i>Bernhard Heinzl, Philipp Raich, Franz Preysler, Wolfgang Kastner</i>	
<b>A HYBRID HEURISTIC ALGORITHM FOR THE SEQUENCING GENERALIZED ASSIGNMENT PROBLEM IN AN ASSEMBLY LINE</b> .....	695
<i>S. E. Moussavi, M. Mahdjoub, O. Grunder</i>	
<b>ANALYTICAL MODELING OF CLAMPED DIELECTRIC ELASTOMER STRIP MEMBRANES EXHIBITING NECKING EFFECT</b> .....	701
<i>Gianluca Rizzello, Philipp Loew, David Naso, Stefan Seelecke</i>	
<b>NONLINEAR PHYSICS-BASED MODELING OF A PIEZOELECTRIC ENERGY HARVESTER</b> .....	707
<i>Pasquale Montegiglio, Claudio Maruccio, Giuseppe Acciani</i>	
<b>PASSIVITY ANALYSIS AND PORT-HAMILTONIAN FORMULATION OF THE MÜLLER-ACHENBACH-SEELECKE MODEL FOR SHAPE MEMORY ALLOYS: THE ISOTHERMAL CASE</b> .....	713
<i>Gianluca Rizzello, David Naso, Stefan Seelecke</i>	
<b>POMODORO: A NOVEL TOOLKIT FOR DYNAMIC (MULTIOBJECTIVE) OPTIMIZATION, AND MODEL BASED CONTROL AND ESTIMATION?</b> .....	719
<i>Satyajeet Bhonsale, Dries Telen, Dominique Vercammen, Mattia Vallerio, Jan Hufkens, Philippe Nimmegeers, Filip Logist, Jan Van Impe</i>	
<b>FIRST RESULTS OF OPTIMAL CONTROL OF AVERAGE BIOGAS PRODUCTION FOR THE CHEMOSTAT OVER AN INFINITE HORIZON</b> .....	725
<i>Antoine Haddon, Héctor Ramírez, Alain Rapaport</i>	
<b>OPTIMAL PERIODIC CONTROL OF THE CHEMOSTAT WITH CONTOIS GROWTH FUNCTION</b> .....	730
<i>T. Bayen, A. Rapaport, F.-Z. Tani</i>	
<b>MAXIMIZING MICROALGAE PRODUCTIVITY IN A LIGHT-LIMITED CHEMOSTAT?</b> .....	735
<i>Carlos Martínez, Olivier Bernard, Francis Mairet</i>	
<b>EXPERIMENTAL VALIDATION AND COMPARISON OF TIME-OPTIMAL AND INDUSTRIAL STRATEGY FOR MEMBRANE SEPARATION PROCESS</b> .....	741
<i>Ayush Sharma, Richard Valo, Martin Kalúz, Radoslav Paulen, Miroslav Fikar</i>	
<b>EXPERIMENTAL DESIGN IN A MULTICRITERIA OPTIMIZATION CONTEXT: AN ADAPTIVE SCHEME</b> .....	747
<i>M. Bortz, J. Höller, J. Schwientek, R. Böttcher, O. Hirth, N. Asprion</i>	
<b>MOMENT-INDEPENDENT SENSITIVITY ANALYSIS OF ENZYME-CATALYZED REACTIONS WITH CORRELATED MODEL PARAMETERS?</b> .....	753
<i>Xiangzhong Xie, Rüdiger Ohs, Antje Spieß, Ulrike Krewer, René Schenkendorf</i>	
<b>USING SIGMA-POINTS TO IDENTIFY OPTIMAL EXPERIMENTAL DESIGN FOR DIKE MONITORING?</b> .....	759
<i>Raoul Höfler, Elham Mahmoudi, Maria Datcheva, Tom Schanz</i>	
<b>ADAPTIVE OPTIMAL OPERATION OF A PARALLEL ROBOTIC LIQUID HANDLING STATION?</b> .....	765
<i>Tilman Barz, Andreas Sommer, Terrance Wilms, Peter Neubauer, M. Nicolas Cruz Bournazou</i>	
<b>UNCERTAINTY IN OPTIMAL EXPERIMENT DESIGN: COMPARING AN ONLINE VERSUS OFFLINE APPROACHES</b> .....	771
<i>Dries Telen, Philippe Nimmegeers, Jan Van Impe</i>	
<b>DEVELOPMENT AND APPLICATION OF A MULTI-DOMAIN DYNAMIC MODEL FOR DIRECT STEAM GENERATION SOLAR POWER PLANT</b> .....	777
<i>A. Rousset, R. Baviere, V. Vuïllerme</i>	
<b>MODELLING OF LOW-TEMPERATURE SOLAR THERMAL SYSTEMS WITH MODELICA</b> .....	783
<i>Gonzalo Hernandez-Albaladejo, Alfonso Urquia</i>	

<b>MODEL PREDICTIVE CONTROL FOR DIRECT STEAM GENERATION IN PARABOLOIDAL DISHES</b> .....	789
<i>José I. Zapata, Callum Woods</i>	
<b>FAULT DETECTION THROUGH EVOLVING FUZZY CLOUD-BASED MODEL</b> .....	795
<i>Goran Andonovski, Gašper Mušič, Igor Škrjanc</i>	
<b>FREQUENCY BASED MODEL PREDICTIVE CONTROL OF A MANUFACTURING SYSTEM</b> .....	801
<i>Tobias Sprodowski, Juliana Keiko Sagawa, Jürgen Pannek</i>	
<b>CAPACITY CONTROL IN DISTURBED AND TIME-DELAYED JOB SHOP MANUFACTURING SYSTEMS WITH RMTS?</b> .....	807
<i>Ping Liu, Undram Chinges, Qiang Zhang, Jürgen Pannek</i>	
<b>PREPARATION OF PAPERS FOR IFAC CONFERENCES &amp; SYMPOSIA: COMPUTER-AIDED PROCESSING OF MANUAL ASSEMBLY OPERATIONS WITH INTEGRATION OF SIMULATION TOOLS IN PRODUCTION PROCESSES</b> .....	813
<i>Maja Turk, Matevž Resman, Niko Herakovic</i>	
<b>A COMPUTATIONALLY EFFICIENT 3D MATHEMATICAL MODEL OF A MOLYBDENUM BATCH-REHEATING FURNACE</b> .....	819
<i>Florian Roetzer, Alexander Aschauer, Andreas Steinboeck, Andreas Kugi</i>	
<b>REPRESENTING WORKLOAD CONTROL OF MANUFACTURING SYSTEMS AS A DYNAMIC MODEL</b> .....	825
<i>Juliana K. Sagawa, Martin J. Land</i>	
<b>MODELS FROM AN IMPLICIT OPERATOR DESCRIBING A LARGE MASS-SPRING-DAMPER NETWORK</b> .....	831
<i>Kevin Leyden, Mihir Sen, Bill Goodwine</i>	
<b>A VEHICLE MODEL FOR CRASH STAGE SIMULATION</b> .....	837
<i>Dario Vangi, Filippo Begani, Michelangelo-Santo Gulino, Florian Spitzhüttl</i>	
<b>VIBRATION FREQUENCY OPTIMIZATION OF JOINTED STRUCTURES WITH CONTACT NONLINEARITIES USING HYPER-REDUCTION</b> .....	843
<i>D. Scheffold, C. Bach, F. Duddeck, G. Müller, M. Buchschmid</i>	
<b>OPTIMIZATION OF EH MULTI-BEAM STRUCTURES FOR FREIGHT CAR VIBRATION</b> .....	849
<i>Matheus V. Lopes, Jony J. Eckert, Thiago S. Martins, Auteliano A. Santos</i>	
<b>AN AUTOMATED APPROACH TO BUILDING AND SIMULATING DYNAMIC DISTRICT HEATING NETWORKS</b> .....	855
<i>Kristoffer Hermansson, Cristoffer Kos, Fredrik Starfelt, Konstantinos Kyprianidis, Carl-Fredrik Lindberg, Nathan Zimmerman</i>	
<b>EFFICIENT PIECEWISE-AFFINE COUPLED-SYSTEM FEED-FORWARD CONTROL OF A NONLINEAR ELASTOMER COUPLING?</b> .....	861
<i>Alexander Schirrer, Josef Mayrhofer, Daniel Ritzberger</i>	
<b>DYNAMICS OF A PENDULUM ANCHORED TO A ROTATING ASTEROID</b> .....	867
<i>Alexander A. Burov, Anna D. Guerman, Ivan I. Kosenko, Vasily I. Nikonov</i>	
<b>DYNAMICS OF MARTENSITE PHASE TRANSITIONS IN SHAPE MEMORY BEAMS UNDER BUCKLING AND POSTBUCKLING CONDITIONS?</b> .....	873
<i>Dmitry V. Nushtaev, Sergey I. Zhavoronok</i>	
<b>RESULTS OF SINGLE SCULLING TECHNIQUE ANALYSIS USING 1D MATHEMATICAL MODEL</b> .....	879
<i>M. Wychowanski, G. Slugocki, G. Orzechowski, Z. Staniak, D. Radomski</i>	
<b>SOLID SYSTEM WITH TWO MASSIVE ECCENTRICS ON A ROUGH PLANE: ROTATIONAL CASE</b> .....	884
<i>Sergey V. Semendyaev</i>	
<b>IMPROVED FRICTION MODEL OF THE AVIATION TYRE CONTACT WITH THE LANDING STRIP</b> .....	890
<i>Alexey A. Kireenkov</i>	
<b>Author Index</b>	