

|                                   |            |
|-----------------------------------|------------|
| <b>Preface</b> .....              | <b>XI</b>  |
| <b>Scientific Programme</b> ..... | <b>1</b>   |
| <b>Author Listing</b> .....       | <b>477</b> |

## TUTORIAL

|   |          |
|---|----------|
| <b>scMod/Sim.exe: A Modeller and Dynamic Simulator for Supply Chain Systems</b><br>J. Manuel Feliz Teixeira ..... | <b>5</b> |
|---|----------|

## METHODOLOGY

### METAKNOWLEDGE SIMULATION

|  |           |
|--|-----------|
| <b>Hard and Soft Approaches in a Simulation Meta-Methodology</b><br>László Muka and Gábor Lencse ..... | <b>17</b> |
|--|-----------|

|  |           |
|--|-----------|
| <b>A Clinical Decision Metaknowledge Model</b><br>Joël Colloc, Marie-Hélène Cuvelier and Peter Summons ..... | <b>23</b> |
|--|-----------|

|   |           |
|---|-----------|
| <b>Medical and Pharmaceutical Experiences: Knowledge Discovery with Strategy by Vote</b><br>Claude Dussart, François-Xavier Magaud and Claude Petit ..... | <b>30</b> |
|---|-----------|

|   |           |
|---|-----------|
| <b>Experimental Study with Metrics Indicating the Interpretation of Clinical Guidelines</b><br>Peter F. Summons and Joël Colloc ..... | <b>35</b> |
|---|-----------|

|  |           |
|--|-----------|
| <b>Discrete and Stochastic Simulation and Response Surface Methodology: An Approach to a varying experimental Error</b><br>Lucia Cassetari, Roberto Mosca, Roberto Revetria and Flavio Tonelli ..... | <b>40</b> |
|--|-----------|

### KRIGING METHODOLOGY

|   |           |
|---|-----------|
| <b>Performance Evaluation of the Evolution Control in design Optimization assisted by Kriging Surrogates</b><br>Gabriella Dellino, Paolo Lino, Carlo Meloni, and Alessandro Rizzo ..... | <b>49</b> |
|---|-----------|

|   |           |
|---|-----------|
| <b>Modeling of water pressure distribution in water nets using the kriging algorithms</b><br>Lucyna Bogdan and Jan Studzinski ..... | <b>52</b> |
|---|-----------|

# CONTENTS

## COMPLEX SYSTEMS SIMULATION

### COMPLEX SYSTEMS SIMULATION METHODOLOGY

#### **Finding Relationships that are Functions**

William Conley .....61

#### **A Discrete Model for the Dynamics of Sandpile Surfaces**

Ignacio Garcia-Fernandez, Marta Pla-Castells and Rafael J. Martinez-Dura....64

#### **Algorithms for Rare Event Simulation with Markov Chains**

Dimitar Radev and Izabella Lokshina.....69

### SOFTWARE MODEL DEVELOPMENT

#### **A Component Framework for the Development of Complex Simulators**

José A. Cortes, Jose A. Dianas, Manuel Díaz, Daniel Garrido and Enrique Soler .....77

#### **Modeling Complex Systems using the Web Ontology Language (OWL)**

Tobias Lehmann and Andreas Karcher .....82

### HUMAN BEHAVIOURAL MODELLING

#### **Multimodal Web based system for human emotion recognition**

Dragos Datcu and L.J.M. Rothkrantz .....91

#### **Christiansen Grammar Evolution for the Modelling of Psychological Processes**

Emilio del Rosal, Alfonso Ortega, Manuel Alfonseca and Marina de la Cruz....99

## MANUFACTURING SIMULATION

### STEEL MANUFACTURING SIMULATION

#### **Process Rules for Sheet Metal Hydroforming**

Antonio Del Prete, Teresa Primo, Gabriele Papadia and Barbara Manisi.....109

#### **Process Automation Tools development for Sheet Metal Hydroforming Simulation**

Antonio Del Prete, Alfredo Elia, Teresa Primo and Barbara Manisi .....114

#### **Detailed Model of Spot Welded Joints to simulate the Dynamical Failure of Car Assemblies**

Emmanuel H.J. Lamouroux, Daniel Coutellier and Falke Seeger .....119

## GRINDING AND MILLING SIMULATION

- A Study on the Development of High Precision Cam Profile CNC Grinding Machine with Maximum Grinding Speed to obtain Constant Surface Roughness**  
Younghwa Roh, Sangheon Lim, Sunghwan Ahn, Choonman Lee, Jongyun Jung and Sangdae Yoon ..... 131
- Advanced Kinematic Geometrical Model of Grinding Processes**  
Blazej Balasz and Tomasz Królikowski ..... 137
- A Study on the effect of Surface Roughness and cutting Force in MQL End Milling**  
Su Hyun Park, Jong Yun Jung, Choon Man Lee and Young Kug Hwang ..... 142

## ROBOTICS SIMULATION

### SERVO-ENGINE SIMULATION

- Informatics platform for determining the dynamic performances of a two stages servo valve**  
Alexandru Marin, Petrin Drumea, Marian Blejan and Ioana Ilie ..... 151
- Optimization of Electro-Hydraulic Systems using Mechatronic Concepts**  
Alexandru Marin, Petrin Drumea and Adrian Mirea ..... 155

### ERROR DETECTION SIMULATION

- Online Errors Identification in Multi-Axis Machines for Adaptive Compensation**  
Abderrazak El Ouafi and Nourredine Barka ..... 161
- On-line Simulation Based Fault Detection for a Hydraulic Driven Industrial Robot**  
C. Angeli and A. Chatzinikolaou ..... 165

### ROBOT NAVIGATION SIMULATION

- Hybrid Neuro-Fuzzy System for Mobile Robot reactive Navigation**  
Munaf S. N. Al-Din and Ahmed A. Abdullah ..... 173
- Particle filter-based localization of simulated mini-rovers with low-cost IR sensors**  
Fabrizio Abrate, Basilio Bona and Marina Indri ..... 178

# CONTENTS

## VALIDATION AND ANALYSIS IN ROBOTICS

**Modelling and Validation of a 1DOF Arm Powered by Pneumatic Muscles**  
Aron Pujana-Arrese, Javier Arenas, Leire Maruri, Ana Martinez-Esnaola  
and Joseba Landaluze.....185

**Modeling, Stress Analysis and Design of an Underwater Remotely  
Operated Vehicle (ROV)**  
Ahmad Bagheri, Shahed Aliakbar and Salar Basiri.....193

## AUTOMOTIVE SIMULATION

**A Concept of an Integrated Suspension Control Logic Architecture and  
its Testing**  
Grzegorz Slaski.....201

**Numerical Simulation of Vehicle Platoon Aerodynamics**  
Marek Maciejewski and Ewa Narbuntowicz .....206

## MATERIALS HANDLING, LOGISTICS AND TRAFFIC SIMULATION

### PRODUCTION SCHEDULING AND MATERIALS HANDLING

**Implementing an Evolutionary Algorithm for Production Scheduling in  
a Cardboard Corrugated Fabrication Plant**  
Fabian Vargas-Nieto, Jairo R. Montoya-Torres and German Velasquez .....215

**Design and Implementation of a Bi-Objective EA-Based Scheduling  
Strategy: Case Study in Thermal Printed Label Manufacturing**  
Fabian Vargas-Nieto and Jairo R. Montoya-Torres.....219

**Simulating Wireless Monitoring in Automated Maintenance of Belt  
Conveyor Systems**  
S. Güngen, A. Lopez de la Cruz, H. P.M. Veeke and G. Lodewijks .....223

**Performance Evaluation of Lot Dispatching and Automated Material  
Handling Approaches by Discrete Event Simulation**  
René Drießel and Lars Mönch .....230

### PRODUCTION EFFICIENCY IMPROVEMENT

**Model and simulation of a Gas Cookers Assembly Line: Performance  
Analysis and Suggestions to increase Efficiency**  
Giovanni Andrioli and Giorgio Romanin-Jacur .....239

**Simulation based Planning of Capacity Increase for the Production of Lithium Polymer Batteries**  
Claus-Burkard Boehnlein and Christian Sahr .....242

**Accelerating SoC Design using SysML and SystemC1**  
Waseem Raslan and Ahmed Sameh .....247

## SCHEDULING OPTIMIZATION AND ANALYSIS

**Simulation Based Optimization of Agent Scheduling in Multiskill Call Centers**  
Athanasios N. Avramidis, Michel Gendreau, Pierre L'Ecuyer and Ornella Pisacane.....255

**Modelization and analysis of trajectories in medical simulations**  
François-Xavier Magaud, Claude Dussart and Claude Petit.....264

## URBAN AND MOTORWAY TRAFFIC SIMULATION

**Urban Traffic Systems - Proposition and application of generic components**  
Michelle Chabrol, Michel Gourgand, Damien Hostin and Patrice Leclair .....273

**Neural Network Microsimulation of Motorway Traffic**  
Abs Dumbuya, George Lunt, Jill Weekley, Anna Booth and Andrew Lewis.....279

## TRAFFIC AND LOGISTICS CASE STUDIES

**Simulation Modelling of Airport Passenger Operations: An Improvement Case Study**  
Martin S. Barber and Peter Durie.....289

**Bulk Terminal modelling and simulation**  
Jaap A. Ottjes, Gabriel Lodewijks and Dingena L.Schott.....294

**Simulation of a Holding Unit between First Aid Center and Specialty Wards: A Case Study**  
A.C. van Bruggen, H.P.M. Veeke, G. Lodewijks and F.K. van Lambalgen .....299

## VR IN DESIGN AND MANUFACTURING

### PRODUCT DESIGN WITH VR

**Virtual Ergonomics Analysis to Validate Product Design**  
Giorgio Colombo, Demis Bronco, Caterina Rizzi and Daniele Regazzoni .....311

## CONTENTS

|  |     |
|--|-----|
| <b>A Simulator of Agent-Based Household Appliances</b><br>Konrad Steblovnik and Damjan Zazula..... | 316 |
|--|-----|

|  |     |
|--|-----|
| <b>Visualization for an Augmented Reality Construction Machinery Simulator</b><br>Alvaro Segura, Aitor Moreno, Gino Brunetti and Thomas Henn ..... | 324 |
|--|-----|

### VIRTUAL MANUFACTURING SIMULATION

|  |     |
|--|-----|
| <b>A Virtual Manufacturing Environment for Interoperability Testing</b><br>Charles R. McLean, Sanjay Jain, Andreas Craens and Deogratias Kibira..... | 331 |
|--|-----|

|   |     |
|---|-----|
| <b>A Software Simulator for Steel Plant</b><br>Osvaldo Barbarisi, Carmen Del Vecchio, Giovanni Palmieri and<br>Alessandra Parisio ..... | 338 |
|---|-----|

### COMMUNICATIONS MODELLING AND SIMULATION

|  |     |
|--|-----|
| <b>Modular Approach Based Decision Support for Communication Systems</b><br>Calin Munteanu, Simona Caramihai and Janetta Culi..... | 345 |
|--|-----|

|   |     |
|---|-----|
| <b>Combination and Interworking of Four Modelling Methods for<br/>Infocommunications and Business Process Modelling</b><br>Gábor Lencse and László Muka ..... | 350 |
|---|-----|

|  |     |
|--|-----|
| <b>Modeling and Simulation of Self-Similar Teletraffic</b><br>Dimitar Radev and Izabella Lokshina..... | 355 |
|--|-----|

### NUCLEAR ENERGY AND PETROCHEMICAL ENGINEERING

|   |     |
|---|-----|
| <b>Using Web Services in Nuclear Power Plant Simulators</b><br>José A. Cortés, Manuel Díaz, Daniel Garrido, Isabel Parrado and<br>Enrique Soler ..... | 363 |
|---|-----|

|  |     |
|--|-----|
| <b>Instrumentation and Control System Renewal using Simulation<br/>at PAKS Nuclear Power Plant</b><br>János Sebestyén Jánosy ..... | 368 |
|--|-----|

|  |     |
|--|-----|
| <b>Real-Time System for a Heavy Water Detritiation Plant</b><br>Florin Hartescu..... | 373 |
|--|-----|

|   |     |
|---|-----|
| <b>Using a Generic Methodology to Develop a Simulation Model of<br/>a Petrochemical Plant</b><br>Martin Albertyn and Paul S Kruger..... | 377 |
|---|-----|

**MILITARY OPTIMIZATION AND RISK ASSESSMENT**

**Using a Simulation Model to determine the optimum Number of Pilots in an Air Force**  
 Martin Albertyn and Stephen D. Trichard.....387

**Scenario Modeling in Environmental Monitoring and Civil Protection Applications**  
 Alexander Sabov, Gerhard Schreck and Jörg Krüger .....395

**Safety/Security Management Model supporting Hazard Identification and Risk Assessment in the Air Traffic Services**  
 Tomas Feglar .....400

**TEXTILE SIMULATION**

**MODELLING OF TEXTILE STRUCTURES**

**NTER Fiber Frictional Model in The Cotton Sliver**  
 Shahram Nowrouzieh, Artan Sinoimeri, Jean-Yves Drean, Richard Frydrich and Jean-Paul Gourlot.....409

**Finite Element Modelling of the Warp Knitted Structure**  
 Argyro Kallivretaki, Savvas Vassiliadis, Mirela Blaga and Christopher Provatidis.....413

**Introduction to Modelling of Virtual Garment Design in 3D**  
 Agnieszka Cichocka, Pascal Bruniaux and Vladan Koncar .....420

**Interactive Visualisation of Simulated Nonwoven Fabrics**  
 Carlo Moritz Göllner, Stefan Wundrak, Alvaro Segura, Aitor Moreno and André Stork .....426

**SMART TEXTILES MODELLING AND DEVELOPMENT**

**Textronics Device for Measuring the Breathing Rhythm**  
 Janusz Zieba and Michal Frydrysiak.....437

**Textile Magnetic Core**  
 Janusz Zieba.....442

**Textronic Model of Clothing considering changes in its Thermoinsulating Properties**  
 Michal Frydrysiak, Stefan Ziegler and Krzysztof Gniotek.....447

# CONTENTS

## MODELLING FOR EVALUATION AND PREDICTION

### **Userfriendly Permeability predicting Software for Technical Textiles**

B. Verleye, G. Morren, S.V. Lomov, H. Sol and D. Roose .....455

### **Modelling the Agility in the Apparel Industry**

Antonela Curteza and Adela Florea .....459

## LATE PAPER

### **Secondary Nucleation Study of Sucrose Crystallization: Experiments and Modeling**

S. Ouiazzane, B. Messnaoui, J. Wouters and T. Bounahmidi.....467