

Proceedings of the 2011

Grand Challenges In Modeling and Simulation Conference

**June 27-30, 2011
The Hague, Netherlands**

**Editors
Roy Crosbie
Hamid Vakilzadian
Terry Ericson
Ralph Huntsinger
Priscilla Elfrey**

Sponsored by:



**The Society for Modeling and Simulation
International (SCS)**

**Technical Co-
Sponsor:**

**Association for
Computing
Machinery**



ISBN: 978-1-61782-951-2

Printed from e-media with permission by:

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



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

© 2011 SIMULATION COUNCILS, INC.

Responsibility for the accuracy of all statement in each paper rests solely with the author(s). Statements are not necessarily representative of, nor endorsed by, The Society for Modeling and Simulation International.

Printed by Curran Associates, Inc. (2011)

Permission is granted to photocopy portions of this publication for personal use and for the use of students provided credit is given to the conference and publication. Permission does not extend to other types of reproduction nor to copying for incorporation into commercial advertising nor for any other profit-making purpose. Other publications are encouraged to include 300- to 500-word abstracts or excerpts from any paper contained in this book, provided credits are given to the author and the conference. For permission to publish a complete paper write: The Society for Modeling and Simulation International (SCS), 6 Jì Áq !c } ^ Á æ Ëc Á Ë x a c Ë Á C Ë F Á Ú Ë

Additional copies of the Proceedings are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
curran@proceedings.com
www.proceedings.com/0128.html

or

The Society for Modeling
and Simulation International
2598 Fortune Way, Ste I
Vista, CA 92081 USA

ISBN: 978-1-61782-951-2
PRINTED IN THE UNITED STATES

TABLE OF CONTENTS

A Basic Proactive System Model for the Self-Adaptive Systems of Systems Approach.....	1
<i>M. Itmi, A. Cardon</i>	
A Design for the Interface Between a Battery Storage and Charging Unit, and a Medium Voltage DC (MVDC) Bus, as Part of an Integrated Propulsion System (IPS) in the All Electric Ship (AES).....	6
<i>T. Trapp, P. Prempraneerach, C. Chrysostomidis, J. Kirtley Jr., G. Karniadakis</i>	
A Matrix Converter Fed Sinusoidal Input Output High Frequency Transformer for Power System Applications.....	12
<i>S. Nath, N. Mohan</i>	
A Review Of Agent-Based Models For Forecasting The Deployment Of Distributed Generation In Energy Systems.....	16
<i>J. Veneman, M. Oey, L. Kortmann, E. Brazier, L. Vries</i>	
Accelerating the Simulation of Shipboard Power Systems.....	22
<i>F. Uriarte, R. Hebner, A. Gattozzi</i>	
Advantages and Challenges of Non-intrusive Polynomial Chaos Theory.....	30
<i>K. Togawa, A. Benigni, A. Monti</i>	
An Agent-Based Service Composition Framework.....	36
<i>L. Zhang, Y. Guan, F. Tao, Y. Luo, A. Hu, R. Huntsinger</i>	
Application of Quantized Discrete Event Simulation Methods to Naturally Coupled Systems.....	43
<i>C. Mamai, A. Smith, I. Kondratiev, A. Dougal</i>	
Autonomous Operation of Multiple Active Front-Ends for Power Quality Improvement.....	51
<i>S. Leng, I. Chung, C. Edrington, D. Cartes</i>	
Bottleneck-Analysis on Intermodal Maritime Transportation Chains.....	59
<i>D. Moller, J. Froese, H. Vakilzadian</i>	
Coherent Design Methodology using Modelling, Simulation and Optimisation.....	65
<i>P. Palmer, A. Molina-Cristobal, G. Parks</i>	
Computational Modelling and Simulation of Disposition and Fate of Medication.....	76
<i>D. Moller, H. Vakilzadian, J. Wittmann</i>	
Conceptual Framework for Simulating the Diverging Diamond Interchange.....	83
<i>D. Moeller, M. Anderson, B. Schroer</i>	
Conceptual Model for Design of Human-Exoskeleton Biomechatronic System.....	88
<i>K. Miatliuk, F. Siemieniako</i>	
Cooling System Early-Stage Design Tool for Naval Applications.....	90
<i>E. Fledel, J. Chalfant, C. Chrysostomidis</i>	
Design and Simulation of Current Limiting Controller for Bidirectional Converter in a MVDC Shipboard Power System.....	98
<i>B. Ramachandran, S. Srivastava, M. Andrus, D. Cartes</i>	
Developing Simulation Based Decision Support Tool for Cut-to-size Plants.....	108
<i>S. Schmid, C. Hillbrand, R. Schoch</i>	
Development of a Model-based Specification of a Medium Voltage DC Amplifier for DC Shipboard System Studies.....	116
<i>M. Steurer, O. Vodyakho, J. Langston, S. Bhattacharya, H. Mirzaee</i>	
Development of a Platform for Hardware In the Loop Testing of Network Controller.....	124
<i>A. Benigni, A. Monti</i>	
Dynamic Simulations of a Large High-Frequency Power System.....	129
<i>R. Hebner, J. Beno, A. Ouroua</i>	
Efficient High-Speed Ethernet for Real Time Simulation.....	137
<i>J. Yusta, J. Zenor, K. Kredo II</i>	
Efficient Real-Time Simulation of Linear Differential Equations Arising from Simulation of Electronic Power Systems.....	144
<i>J. Zenor, R. Bednar, R. Crosbie, N. Hingorani</i>	
ESRDC Ship Notional Baseline Medium Voltage Direct Current (MVDC) Architecture Thermal Simulation and Visualization.....	150
<i>J. Vargas, J. Souza, J. Ordonez, R. Hovsapian, T. Chiocchio, J. Chalfant, C. Chrysostomidis</i>	
Estimation of Discretization Error in Electromagnetic Transient Simulation Models of Power Systems.....	161
<i>J. Langston, I. Leonard, M. Steurer</i>	
Global Optimization Of Interdependent Turnaround Processes At Airports.....	167
<i>Y. Farschtschi, D. Moeller, M. Widemann, J. Wittmann, H. Vakilzadian</i>	

Guiding the Selection of Physical Experiments Supporting Validation of Electric Power System Models.....	173
<i>D. Infante, J. Langston, L. Graber, M. Steurer</i>	
High-performance Cloud Simulation Platform Advanced Research of Cloud Simulation Platform	181
<i>X. Chai, Z. Zhang, T. Li, Y. Zhang, B. Hou</i>	
Lift-And-Project Relaxations Of AC Microgrid Distribution System Planning	187
<i>J. Taylor, F. Hover</i>	
MATLAB Tools for Power Spectral Analysis, Simulation Step-Size Optimization, and Bi-Rate Root Locus Generation.....	192
<i>R. Bednar, R. Crosbie</i>	
Model Driven Reverse Engineering For A Grassland Model With Design Of Experiments In The Context Of Climate Change.....	199
<i>R. Lardy, A. Graux, M. Gaurut, G. Bellocchi, D. Hill</i>	
Model Level Selection for the Simulation of Complex Power Systems: A Test Case.....	207
<i>A. Benigni, F. Ponci, A. Monti</i>	
Modeling a New Connectors Contribution to Humanitarian Relief Response Using Discrete Event Simulation	213
<i>E. Beisecker, S. Balestrini, D. Mavris</i>	
Modeling a New Naval Connectors Logistical Contribution with a System of Systems Discrete Event Simulation	222
<i>E. Beisecker, P. Pritchard, S. Balestrini, D. Mavris</i>	
Modeling and Simulation of an Electric Warship Integrated Engineering Plant for Battle Damage Response	230
<i>A. Cramer, E. Zivi, S. Sudhoff</i>	
Modeling, Simulation and Experimental Validation of a DC Power System Testbed	238
<i>M. Bash, R. Chan, J. Crider, C. Harianto, J. Lian, J. Neely, S. Pekarek, H. Suryanarayana, S. Sudhoff, N. Vaks, Y. Lee, E. Zivi</i>	
Multi-discipline, Multi-tool Simulation Developments.....	246
<i>J. Pearce, R. Kraft</i>	
New Approach to Parallel Simulation of Large Power Systems.....	252
<i>M. Marin, A. Benigni, A. Monti</i>	
New Basic Linear Algebra Methods for Simulation on GPUs	258
<i>J. Shi, Y. Zhang, B. Langeland, J. Tang, R. Dougal</i>	
Optimal Strategy to Dispatch Storage in Real-Time Markets	266
<i>S. Tewari, N. Mohan</i>	
Optimally Applying Latency Insertion Method In Large System Models.....	271
<i>Y. Zhang, R. Leonard, J. Tang, R. Dougal</i>	
Real Time Implementation of PSO for Artificial Neural Network Fault Detection.....	277
<i>Y. Nyanteh, S. Srivastava, C. Edrington, D. Cartes</i>	
Research on High-Efficiency Simulation Technology for Complex System	285
<i>B. Li, T. Li, B. Hou, X. Chai, Y. Zhang, Z. Zhang, Y. Yao, L. Zhang</i>	
Research on Independent and Dynamic Fault-Tolerant and Migration Technology for Cloud Simulation Resources	290
<i>B. Hou, X. Chai, B. Li, T. Li, Y. Zhang, Z. Zhang</i>	
Reversible and Symplectic Methods for the Ablowitz-Ladik Discrete Nonlinear Schrodinger Equation	297
<i>R. Zhang, J. Huang, Y. Tang, L. Vazquez</i>	
Simulation of a DC to DC Power Conversion Module for the All-Electric Ship	307
<i>W. Gray, J. Kirtley Jr., J. Chalfant, C. Chrysostomidis</i>	
Simulation of a DC-DC Boost Converter with Network Models	315
<i>S. Chudjuarjeen, S. Jayasuriya, J. Jimenez, C. Nwankpa, K. Miu, A. Sangswang</i>	
βSn Grain Boundary Structure and Self-Diffusivity via Molecular Dynamics Simulation.....	321
<i>M. Sellers, A. Schultz, C. Basaran, D. Kofke</i>	
Stiffness Of The Beam-Foundation System Under A Moving Load - A Bi-Linear Asymmetrical Model.....	333
<i>J. Solkowski</i>	
The Augmented Reality Research Progress in Collaboration Environment of CAR-CA.....	340
<i>L. Zhao, X. Shen</i>	
The Simulation Tool for Mission-Optimized System Design	348
<i>T. Zhang, J. Shepherd, J. Tang, R. Dougal</i>	
Using Co-simulation Method to Analyze the Communication Delay Impact in Agent-Based Wide Area Power System Stabilizing Control.....	356
<i>W. Li, H. Li, A. Monti</i>	

Validation Of Simulated Integrated Circuit Reliability In Conjunction With Field Data	362
<i>A. Hava, J. Qin, J. Bernstein</i>	
Vehicle Control in a CFD Environment.....	370
<i>R. Coe, W. Neu</i>	
Input Filter Design of a Current Source Inverter or a Front End Rectifier : Analysis and Simulation.....	375
<i>K. Basu, S. Nath, N. Mohan</i>	
Author Index	