

Editorial Board

Simone Diniz Junqueira Barbosa

*Pontifical Catholic University of Rio de Janeiro (PUC-Rio),
Rio de Janeiro, Brazil*

Phoebe Chen

La Trobe University, Melbourne, Australia

Alfredo Cuzzocrea

ICAR-CNR and University of Calabria, Italy

Xiaoyong Du

Renmin University of China, Beijing, China

Joaquim Filipe

Polytechnic Institute of Setúbal, Portugal

Orhun Kara

TÜBİTAK BİLGEM and Middle East Technical University, Turkey

Tai-hoon Kim

Konkuk University, Chung-ju, Chungbuk, Korea

Igor Kotenko

*St. Petersburg Institute for Informatics and Automation
of the Russian Academy of Sciences, Russia*

Dominik Ślęzak

University of Warsaw and Infobright, Poland

Xiaokang Yang

Shanghai Jiao Tong University, China

Tianyuan Xiao Lin Zhang
Minrui Fei (Eds.)

AsiaSim 2012

Asia Simulation Conference 2012
Shanghai, China, October 27-30, 2012
Proceedings, Part III



Springer

Volume Editors

Tianyuan Xiao
Tsinghua University
Department of Automation
National CIMS Engineering Research Center
Beijing 100084, China
E-mail: xty-dau@tsinghua.edu.cn

Lin Zhang
Beihang University
School of Automation Science and Electrical Engineering
Beijing 100191, China
E-mail: johnlin9999@163.com

Minrui Fei
Shanghai University
School of Mechatronics Engineering and Automation
Shanghai 200072, China
E-mail: mrfei@staff.shu.edu.cn

ISSN 1865-0929	e-ISSN 1865-0937
ISBN 978-3-642-34386-5	e-ISBN 978-3-642-34387-2
DOI 10.1007/978-3-642-34387-2	
Springer Heidelberg Dordrecht London New York	

Library of Congress Control Number: 2012949581

CR Subject Classification (1998): I.6, I.2, H.4, H.3, C.2, D.2, I.4

© Springer-Verlag Berlin Heidelberg 2012

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

The Asia Simulation Conference and the International Conference on System Simulation and Scientific Computing 2012 (AsiaSim & ICSC 2012) was formed to bring together outstanding researchers and practitioners in the field of modeling and simulation and scientific computing areas from all over the world to share their expertise and experience.

AsiaSim & ICSC 2012 was held in Shanghai, China, during October 27–30, 2012. It was constituted by AsiaSim and ICSC. AsiaSim is an annual international conference organized by three Asia Simulation Societies: CASS, JSST, and KSS since 1999. It has now become a conference series of the Federation of Asia Simulation Societies (ASIASIM) that was established in 2011. ICSC is a prolongation of the Beijing International Conference on System Simulation and Scientific Computing (BICSC) sponsored by CASS since 1989. AsiaSim & ICSC 2012 was organized by the Chinese Association for System Simulation (CASS) and Shanghai University. In the AsiaSim & ICSC 2012 conference, technical exchanges between the research community were carried out in the forms of keynote speeches, panel discussions, as well as special sessions. In addition, participants were also treated to a series of social functions, receptions, and networking sessions, which served as a vital channel to establish new connections, foster everlasting friendships, and forge collaborations among fellow researchers.

AsiaSim & ICSC 2012 received 906 paper submissions from eight countries. All papers went through a rigorous peer-review procedure including pre-review and formal review. Based on the review reports, the Program Committee finally selected 298 good-quality papers for presentation at AsiaSim & ICSC 2012, from which 267 high-quality papers were then sub-selected for inclusion in five volumes published in the Springer *Communications in Computer and Information Science* (CCIS) series.

This proceedings volume includes 63 papers covering five relevant topics including modeling theory and technology, M&S technology on synthesized environments and virtual reality environments, pervasive computing and simulation technology, embedded computing and simulation technology, and verification/validation/accreditation technology. All of these offer us plenty of valuable information and would be of great benefit to the technical exchange among scientists and engineers in modeling and simulation fields.

The organizers of AsiaSim & ICSC 2012, including the Chinese Association for System Simulation and Shanghai University, made enormous efforts to ensure the success of AsiaSim & ICSC 2012. We hereby would like to thank all the members of the AsiaSim & ICSC 2012 Advisory Committee for their guidance and advice, the members of the Program Committee and Technical Committee and the referees for their effort in reviewing and soliciting the papers, and the members of the Publication Committee for their significant editorial work. In

particular, we would like to thank all the authors for preparing, contributing, and presenting their excellent research works. Without the high-quality submissions and presentations from the authors, the success of the conference would not have been possible.

Finally, we would like to express our gratitude to the National Natural Science Foundation of China, the Japanese Society for Simulation Technology, Korea Society for Simulation, the Society for Modeling and Simulation International, International Association for Mathematics and Computer in Simulation, Federation of European Simulation Societies, Science and Technology on Space System Simulation Laboratory, Beijing Electro-Mechanical Engineering Institute, Shanghai Electro-mechanical Engineering Institute, and Shanghai Dianji University for their support in making this conference a success.

July 2012

Bo Hu Li
Qinping Zhao

AisaSim & ICSC 2012 Organization

Honorary Chairs

Chuan yuan Wen, China	Robert M. Howe, USA	Osamu Ono, Japan
Sung-Joo Park, Korea	Myoung-Hee Kim, Korea	Mahammad Obaidat, USA
Sadao Takaba, Japan	Xingren Wang, China	Zongji Chen, China

General Chairs

Bo Hu Li, China
Qinping Zhao, China

General Co-chairs

Koyamada Koji, Japan	Jonghyun Kim, Korea	Axel Lehmann, Germany
Qidi Wu, China	Song Wu, China	Zicai Wang, China
Xianxiang Huang, China	Khalid Al-Begain, UK	

International Program Committee

Chairs

Tianyuan Xiao, China
Lin Zhang, China

Co-chairs

Bernard Zeigler, USA	Tuncer Ören, Canada	Ralph C. Huntsinger, USA
Xiaofeng Hu, China	Fengju Kang, China	Soo-Hyun Park, Korea
Satoshi Tanaka, Japan	Zaozhen Liu, China	H.J. Halin, Switzerland
Xudong Pan, China	Kaj Juslin, Finland	Roy E. Crosbie, USA
Ming Yang, China	Xiaogang Qiu, China	Satoshi Tanaka, Japan
Jin Liu, China	Min Zhao, China	Shiwei Ma, China

Technical Committee

Agostino Bruzzone, Italy	Anxiang Huang, China	Yoonbae Kim, Korea
Yu Yao, China	Fei Xie, USA	Toshiharu Kagawa, Japan

Giuseppe Iazeolla, Italy	Mhamed Itmi, France	Haixiang Lin, The Netherlands
Henri Pierreval, France	Hugh HT Liu, Canada	Shengen Zhou, China
Wolfgang Borutzky, Germany	Jong Sik Lee, Korea	Xiaolin Hu, USA
Yifa Tang, China	Wenhui Fan, China	Mingduan Tang, China
Long Wang, China	Doo-Kwon Baik, Korea	Shinsuke Tamura, Japan
Pierre Borne, France	Ratan Guha, USA	Reinhold Meisinger, Germany
Richard Fujimoto, USA	Ge Li, China	Jinhai Sun, China
Xinping Xiong, China	Gary S.H. Tan, Singapore	Francesco Longo, Italy
Hong Zhou, China	Shin'ichi Oishi, Japan	Zhenhao Zhou, China
Beike Zhang, China	Alain Cardon, France	Xukun Shen, China
Yangsheng Wang, China	Marzuki Khalid, Malaysia	Sergio Junco, Argentina
Tieqiao Wen, China	Xingsheng Gu, China	Zhijian Song, China
Yue Yang, China	Yongsheng Ding, China	Huimin Fan, China
Ming Chen, China		

Secretaries

Ping Zhang, China
Li Jia, China

Publication Chairs

Huosheng Hu, UK
Fei Tao, China

Special Session Chair

Shiwei Ma, China

Organizing Committee

Chairs

Minrui Fei, China
Yunjie Wu, China

Co-chairs

Ping Zhang, China
Linxuan Zhang, China
Noriyuki Komine, Japan
Kang Sun Lee, Korea

Members

Shixuan Liu, China	Xiao Song, China	Ni Li, China
Baiwei Guo, China	Gang Zhao, China	Yanxia Gao, China
Yulin Xu, China	Tingzhang Liu, China	Shaohua Zhang, China
Xin Li, China	Li Jia, China	Xin Sun, China
Qun Niu, China	Min Zheng, China	Ling Wang, China
Shouwei Gao, China		

Awards Committee**Chair**

Zongji Chen (China)

Co-chairs

Axel Lehmann (Germany)
Soo-Hyun Park (Korea)
Wakae Kozukue (Japan)

Members

Satoshi Tanaka (Japan)
Sung-Yong Jang (Korea)
Wenhui Fan (China)
Yifa Yang (China)
Xiao Song (China)

Table of Contents – Part III

The First Section: Modeling and Simulation Technology of Complex System and Open, Complex, Huge System

Towards a Course of Action Probability Ontology for Logistic Supply Destruction Operation	1
<i>Xinye Zhao, Zhongchen Fan, Shanliang Yang, and Kedi Huang</i>	
Research on System of Systems Complexity and Decision Making	10
<i>Yingchao Zhang, Xiao Sun, Lili Chen, Jing Zhang, and Yi Liang</i>	
Degree Dependence Entropy: A New Descriptor for Complex Networks	19
<i>Xiangli Xu and Xiaofeng Hu</i>	
Runtime Reconstruction of Simulation Models for Dynamic Structure Systems	27
<i>Fa Zhang and Qiaoxia Zhao</i>	
A Data-Based Fuzzy Cognitive Map Mining Method Using DE-SQP Algorithm	37
<i>Wenhui Shou, Wenhui Fan, and Boyuan Liu</i>	
Study on Modeling and Simulation of Agent-Based Agricultural Economic System	44
<i>Yongtao Zhang, Kedi Huang, and Ge Li</i>	
Methods to Improve Accuracy and Speed for the Quasi-3D Electromagnetic Environment Simulation	53
<i>Yuewei Shen, Lin Zhang, Yingnian Wu, Lan Mu, and Yandong Lv</i>	
A Comparison of Multi-objective Evolutionary Algorithms for Simulation-Based Optimization	60
<i>Wen Jun Tan, Stephen John Turner, and Heiko Ayt</i>	

The Second Section: Simulation Based Acquisition and Virtual Prototyping Engineering Technology

OpenGL Simulation System for ICF Target-Positioning	73
<i>Xiaolei Li, Wei Song, Yanan Zhang, and Xu Liu</i>	
The Design of Shock Test System Based on C#	81
<i>Xiaohua Wang, Wenzhong Luo, and Peng Zan</i>	

Simulation Research on Unit Element Calibration Method Based Geometry Discretization	89
<i>Yulin Jiang and Bin Li</i>	
Research and Application on SBA Life-Cycle Management Technology of Complex Products System	96
<i>Tan Li, Xudong Chai, Baocun Hou, Shuai Fan, Wenhai Zhu, Shan Feng, Deyu Kong, Yuan Li, and Weijing Wang</i>	
CANoe-Based Modeling and Simulation for Heavy Lorry CAN Bus Network	107
<i>Xinyan Li, Min Huang, Jie Zhan, Yongliang Ni, and Fengying Pang</i>	
Finite Difference Method for Solving the Time Fractional Diffusion Equation.....	115
<i>Yu-xin Zhang and Hengfei Ding</i>	

The Third Section: Simulator

The Application of Modeling for Irregular Objects in the Heavy Driving Simulation System	124
<i>Yi Tang, Jie Liu, and Lihua Li</i>	
Modeling and Visualizing of the Mooring System of Anchor Handling Simulator	132
<i>Zhongxian Zhu and Yong Yin</i>	
Dynamic Simulation of Fishing Net Based on Cubic B-Spline Surface ...	141
<i>Shuai Gao, Yong Yin, Xiaofeng Sun, and Yuhao Sun</i>	
Research on the Sea Ice Modeling and Collision Detection in Ice Navigation Scene	149
<i>Yuhao Sun, Yong Yin, and Shuai Gao</i>	
Research on Simulation of Low Altitude Penetration Technologies for Target of Radar Training Simulator	159
<i>Zhansheng Li, Chenggang Xie, Xiaohong Shi, and Cong Zhang</i>	
The Vector View-Up in Computer Graphics	167
<i>Yicheng Jin, Lining Chen, Yong Yin, Hongxiang Ren, and Meng Zhao</i>	
Research on Coroutine-Based Process Interaction Simulation Mechanism in C++	178
<i>Xiao Xu and Ge Li</i>	
Successive Visualization of High Frequency Electromagnetic Wave Propagation Using Multi-thread on CAVE System	188
<i>Hua Xie and Mitsunori Makino</i>	

Compound Disturbance Observer for Flight Simulator	197
<i>Youmin Liu, Yong Deng, and Dapeng Tian</i>	

The Fourth Section: Simulation Language and Intelligent Simulation System

Design for Home Robot Simulation Based on DFS	206
<i>Lanchao Zheng and Wanmi Chen</i>	
Working Process Simulation Analysis on an Diesel Injector with Different Needle Valve Parameters	213
<i>Yulan Li, Xiangbi An, and Dahai Jiang</i>	
Research on SDEM and Its Transformation in the Gateway Design	222
<i>Xu Xie, Xiaocheng Liu, Ying Cai, and Kedi Huang</i>	
P-HASE: An Efficient Synchronous PDES Tool for Creating Scalable Simulations	231
<i>Yanyong Mongkolsin and Worawan Marurngsith</i>	

The Fifth Section: Parallel and Distributed Software

Clock Synchronization Method for Distributed Real-Time Simulation Based on Multilayer Network Architecture	246
<i>Xinbo Wang and Jiangyun Wang</i>	

The Sixth Section: CAD, CAE, CAM, CIMS, VP, VM, and VR

Seismic Analysis and Fatigue Life Analysis of Slat-Leg Rigid-Frame Bridge	255
<i>Haipan Zhou, Chunping Zeng, and Guangmin Wu</i>	
Research on the Rapid Slicing Algorithm for NC Milling Based on STL Model	263
<i>Xiaohu Huang, Yuan Yao, and Qingxi Hu</i>	
Study on Behavior Simulation of Virtual Object Based Physically Attribute	272
<i>Yunbin Yang, Liangli He, Huaiyu Zhang, and Lifan Wei</i>	
Research on Automatic Large Scale Terrain Modeling	280
<i>Bo Liu, Ying Ding, and Jin Yan</i>	
The 3D Model Conversion Tool for OGRE System	288
<i>Jiayu Liu and Liang Han</i>	

Real-Time Rendering and Animating of Grass	296
<i>Feng Li, Ying Ding, and Jin Yan</i>	
Study on the Method of Assembly Sequence Evaluation Oriented to Virtual Assembly	304
<i>Xinghui Dong, Yuanyuan Li, Xue Tian, and Yuwei Zhao</i>	
Phased Array Antenna Design Based on Kriging Meta-model	312
<i>Yajun Yang, Ying Liao, and Xingxing He</i>	
Pseudo-Coloring Occlusion Culling	323
<i>Jin Yan and Guanghong Gong</i>	

The Seventh Section: Visualization

The Research on Visual Flight Simulation for Unmanned Helicopter	332
<i>Jianbin Ye, Hongwu Guo, Shuai Tang, and Qi Wang</i>	
Research of Large Terrain Multithreading Fast Scheduling Based on the OSG	342
<i>Xiyang Huang, Wei Shao, and Dinghai Zhao</i>	
Semi-transparent and Fused Visualization of Tetrahedral Simulation Volume Data	350
<i>Asuka Sugiyama, Kyoko Hasegawa, Susumu Nakata, and Satoshi Tanaka</i>	
Intelligent Optimization of an Anti-torpedo Counterplan Based on Particle Swarm Optimization Algorithm	358
<i>Yanyang Zeng, Fengju Kang, Huizhen Yang, Hongtao Liang, and Jianhua Xu</i>	
Realistic Simulation of Tomato Garden Based on GPU	365
<i>Weilong Ding, Hujun Jin, Lifeng Xu, and Zhijun Cheng</i>	
A Volume Compression Scheme Based on Block Division with Fast Cubic B-spline Evaluation	373
<i>Kun Zhao, Naohisa Sakamoto, and Koji Koyamada</i>	
Visualization of Slice Image with Opacity Based on Particle-Based Renderer	388
<i>Kyoko Hasegawa, Saori Ojima, Kozaburo Hachimura, and Satoshi Tanaka</i>	
Building an Inverted Pyramid Display for Group Learning	394
<i>Shuhong Xu, Bin Wu, Dongyun Ge, Lei Chen, and Hongyan Yang</i>	
Particle-Based Transparent Texture Mapping for Implicit Surfaces	406
<i>Takehiko Kitagawa, Satoshi Tanaka, Susumu Nakata, and Kyoko Hasegawa</i>	

Design and Research of Visual Simulation System Based on HLA 412
 Hei Lin

Summarization of Virtual Battlefield Environment Technology 420
 Yong Long, Qinhe Gao, Zhili Zhang, Jing Yuan, and Yumiao Wei

UAVs Formation Flight Control Based on Behavior and Virtual
Structure 429
 Da Cai, Jian Sun, and Sentang Wu

Author Index 439