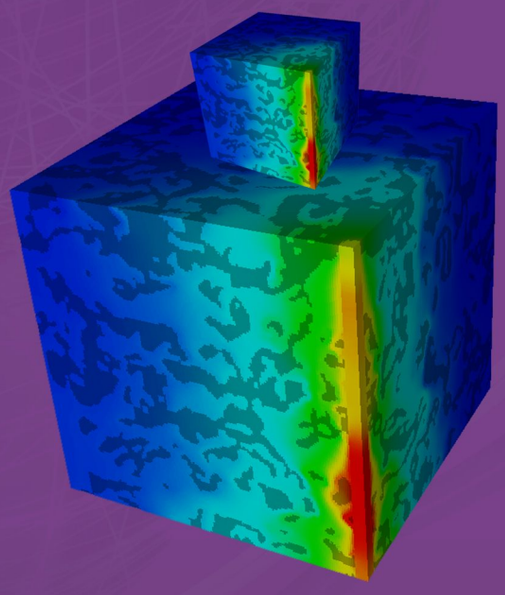
Editors: Nikos Mastorakis, Valeri Mladenov, Zoran Bojkovic, Fragkiskos Topalis, Kleanthis Psarris, Alina Barbulescu, Hamid Reza Karimi, George J. Tsekouras, Abdel-Badeeh M. Salem, Luige Vladareanu, Aleksandar Nikolic, Dana Simian, Berenika Hausnerova, Stevan Berber, Nikolaos Bardis, Azami Zaharim, Chandrasekaran Subramaniam

Recent Researches in Applied Mathematics, Simulation and Modelling

Recent Researches in Applied Mathematics, Simulation and Modelling

Proceedings of the 5th International Conference on Applied Mathematics, Simulation, Modelling (ASM '11)

Corfu Island, Greece, July 14-16, 2011



ISSN: 1792-4332
ISBN: 978-1-61804-016-9

RECENT RESEARCHES in APPLIED MATHEMATICS, SIMULATION and MODELLING

Proceedings of the 5th International Conference on Applied Mathematics, Simulation, Modelling (ASM '11)

Corfu Island, Greece
July 14-16, 2011

Published by WSEAS Press
www.wseas.org

ISSN: 1792-4332
ISBN: 978-1-61804-016-9

RECENT RESEARCHES in APPLIED MATHEMATICS, SIMULATION and MODELLING

Proceedings of the 5th International Conference on Applied Mathematics, Simulation, Modelling (ASM '11)

Corfu Island, Greece
July 14-16, 2011

Published by WSEAS Press
www.wseas.org

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

ISSN: 1792-4332
ISBN: 978-1-61804-016-9

North Atlantic University Union

RECENT RESEARCHES in APPLIED MATHEMATICS, SIMULATION and MODELLING

Proceedings of the 5th International Conference on Applied Mathematics, Simulation, Modelling (ASM '11)

Corfu Island, Greece
July 14-16, 2011

Chunshien Li, TAIWAN
Ying Li, TAIWAN
Yiming Li, TAIWAN,
Wen-Yew Liang, TAIWAN
Ioan Lie, ROMANIA
S. S. Lin, TAIWAN
Wilfred Lin, HONG KONG S.A.R.
Lily Lin, TAIWAN
Hongbo Liu, CHINA
Ismael Lopez-Juarez, MEXICO
Ye Lu, CHINA
Xiaolin Lu, CHINA
Dan Macodiyo, JAPAN
Zaigham Mahmood, UNITED KINGDOM
Bang-on Makdee, THAILAND
Mrinal Manda,l CANADA
Umar Manzoor, PAKISTAN
Marius Marcu, ROMANIA
Yulin Mei, CHINA
Elisabeth Metais, FRANCE
Liying Mi, JAPAN
Hannah Michalska, CANADA
Wasfy Mikhael, UNITED STATES
Manki Min, UNITED STATES
Huang Minhuan, CHINA
Mihai Mitrea, FRANCE
Payman Moallem, IRAN
Nermin Mohamed, EGYPT
Bouhdai Mohamed, MOROCCO
Farah Mohammadi, CANADA
S. Amirhassan Monadjemi, IRAN
Bartolomeo Montrucchio, ITALY
Eduardo Mosqueira-rey, SPAIN
FRANCEsco Muzi, ITALY
Ibtissem Nafkha, TUNISIA
Benedek Nagy, HUNGARY
Sang-Won Nam, KOREA
Hamed Nassar, EGYPT
Pavel Nevriva, CZECH REPUBLIC
Cat Ho Nguyen, VIETNAM
Elena Niculescu, ROMANIA
Vincenzo Niola, ITALY
Javad Nourinia, IRAN
Juan Jesus Ocampo-Hidalgo, MEXICO
Koji Ohashi, JAPAN
Roland Olsson, NORWAY
Igor Ozimek, SLOVENIA
Ant nio Pacheco, PORTUGAL
Zeljko Panian, CROATIA (HRVATSKA)
Eunkwang Park ,SINGAPORE
Jin Park, UNITED STATES
Federico Perez, SPAIN
Anna Perez, VENEZUELA
Sakthivel Periyasamy, INDIA
Pisit Phokharatkul, THAILAND
Olivier Ponsini, FRANCE
Mircea Popa, ROMANIA
Dan Popescu, ROMANIA
Mihaela Popescu, ROMANIA
Nenad Popovich NEW ZEALAND
Ali Pouyan, IRAN
Marius Preda, FRANCE
Sorapak Pukdesri, THAILAND
Mohammadreza Rafiei, IRAN
Dejan Rancic, YUGOSLAVIA
Nicolas Ratier, FRANCE
Rabin Raut, CANADA
Fuji Ren, JAPAN
Dimitrios Rigas, UNITED KINGDOM
Addison Rios-Bolivar, VENEZUELA
Francklin Rivas, VENEZUELA
Mercedes Ruiz, SPAIN
Jean Saade, LEBANON
Raafat Saade, CANADA
Mohammad Ali Sadrnia, IRAN
Ma Sadrnia, IRAN
Iwata Sakagami, JAPAN
Bouhouche Salah, ALGERIA
Enrique San Mill n, SPAIN
Usiel Sandler, ISRAEL
Oscar SanJuan, SPAIN
Michael Schwarz, GERMANY
Milos Seda, CZECH REPUBLIC
Tsang-Ling Sheu, TAIWAN
Chao-Cheng Shih, TAIWAN
Khalil Shihab, OMAN
YUE Shihong, CHINA
JeongYon Shim, KOREA
Young-chul Shim, KOREA
Jungpil Shin, JAPAN
Vairis Shtrauss, LATVIA
Carmen Simion, ROMANIA
Dharmender Singh Kushwaha, INDIA
Efstratios Skafidas, AUSTRALIA
Suripon Somkuarnpanit, THAILAND
Hua Song, CHINA
Arnd Steinmetz, GERMANY
Rodica Stoian, ROMANIA
Mu-Chun Su, TAIWAN
Pushpa Suri, INDIA
Miroslav Sv tek, CZECH REPUBLIC
Feruglio Sylvain, FREANCE
Sabin Tabirca, IRELAND
Razvan Tanasie, ROMANIA
Shaohua Tang, CHINA
Wang Tao, CHINA
Stanislaw Tarasiewicz, CANADA
Domenico Tegolo, ITALY
Kah leng Ter, SINGAPORE
Spyros Tragoudas, UNITED STATES
Issa Traore, CANADA
Tsung-Han Tsai, TAIWAN
Ruey-Chyn Tsaur, TAIWAN
Shian-Shyong Tseng, TAIWAN

John Tsiligaridis, UNITED STATES
Kazuhiko Tsuda, JAPAN
Hassan Ugail, UNITED KINGDOM
Hans Vandierendonck, BELGIUM
Francisco Vasques, PORTUGAL
Carlos Velez, COLOMBIA
Fernando Vidal, SPAIN
Luige Vladareanu, ROMANIA
Mirela-Catrinel Voicu, ROMANIA
Toshio Wakabayashi, JAPAN
Shuming Wang, TAIWAN
Yi-shun Wang, TAIWAN
Ruye Wang, UNITED STATES
Lin Wilfred, HONG KONG S.A.R.
Lai Wuxing, CHINA
Tianbing Xia, AUSTRALIA
Weiwen Xu, FRANCE
Koichi Yamada, JAPAN
Kiyotaka Yamamura, JAPAN
Thomas Yang, UNITED STATES
Hung-Jen Yang, TAIWAN
Sheng-Yuan Yang, TAIWAN
Kapseung Yang, KOREA
Shun-Ren Yang, TAIWAN
Hung-Jen Yang, TAIWAN
Ping-Jer Yeh, TAIWAN
Jyh-Yeh, UNITED STATES
Hsu-Chun Yen, TAIWAN
Eng-Thiam Yeoh, MALAYSIA
Huifen Ying, CHINA
Tetsuya Yoshida, JAPAN
Enhai Yu, CHINA
Jian Yu ,CHINA
Eugen Zaharescu, ROMANIA
Nadia Zanzouri, TUNISIA
Daniel Zapico, SPAIN
Malika Zazi, MOROCCO
Wenyu Zhang, CHINA
Hong Zheng, CHINA
Hong Zhu, UNITED KINGDOM
Blaz Zmazek, SLOVENIA

Table of Contents

Plenary Lecture 1: Shock Reflection Problems and Gas Dynamics Equations 12
Katarina Jegdic

Plenary Lecture 2: Language for Exact Description of Systems with Complex Control 13
Eugene Kindler

Plenary Lecture 3: Stochastic Delay Lotka-Volterra System to Interacting Population Dynamics 15
Andre A. Keller

Investigation of Multiple-Attribute Decision Making Model Based on Uncertainty 17
Bai Hanbin, Wei Jicai

Study of Application of Reciprocal Scale in Quantitative Analysis 21
Bai Hanbin, Wei Jicai

The Design and Realization of Data Accessing Service in the Meta-Synthetic Integrated Environment of Stratagem Research 24
Wei Jicai, Bai Hanbin, Zhao Wei, Ren Tingguang, Li Junmei

The Design and Realization of Comprehensive Evaluation in the Meta-Synthetic Integrated Environment of Stratagem Research 30
Chu Juntian, Wei Jicai, Cui Hao, Lv Shao-Qing, Zhao Wei, Dong Jie

A Mathematical Model of Bone Formation and Resorption: Effect of Calcitonin 36
Chontita Rattanakul, Sahattaya Rattanamongkonkul

A Mathematical Model of Bone Remodeling Process: Effects of Parathyroid Hormone and Calcitonin 42
Inthira Chaiya, Sahattaya Rattanamongkonkul, Chontita Rattanakul

Effect of Vitamin D on Bone Formation and Resorption: Mathematical Modeling Approach 48
Sahattaya Rattanamongkonkul, Pakawadee Sripraphot, Chontita Rattanakul

Mathematical Modeling of Bone Formation and Resorption: Effects of Parathyroid Hormone and Vitamin D 54
Chontita Rattanakul, Sahattaya Rattanamongkonkul, Saowaros Srisuk

Offset C60 Fullerene Encapsulated inside Goldberg Type I Fullerenes 60
Duangkamon Baowan, Noraphon Bunkluarb

A Delay-Differential Equations Model of Bone Remodeling Process 64
Suchanan Thongmak, Wannapa Kunpasuruang, Chontita Rattanakul

Multi-Treatment Regression Analysis: The Unbalanced Case 69
Elsa Estevo Moreira, Joao Tiago Mexia

On Markovian Extensions and Reductions of a Family of Hilbert Spaces 75
Ljiljana Petrovic

Emulation Models for Testing of Process Control Systems 80
Victor Okolnishnikov

Orthogonal Fixed Effects ANOVA with Random Sample Sizes 84
Joao T. Mexia, Celia Nunes, Dario Ferreira, Sandra S. Ferreira, Elsa Moreira

The Efficient Frontier for a Portfolio that Includes One Risk-Free Asset 91
Florentin Serban, Maria Viorica Stefanescu, Silvia Dedu

The Role of Labor Productivity in the Evolution of Romanian Employment 96
Larisa Aparaschivei, Denisa Vasilescu, Speranta Pirciog

The Causal Relationship between Unemployment Rate and U.S. Shadow Economy. A Toda-Yamamoto Approach 100
Adriana AnaMaria Alexandru, Ion Dobre, Catalin Corneliu Ghinararu

Earnings Analysis: A Panel Data Approach for the E.U. Members 106
Denisa Vasilescu, Madalina E. Andreica, Larisa Aparaschivei, Nicolae Cataniciu

Modeling of the Interaction between a Turbulent Flow and an Ablatable Material 110
T. Harribey, N-T-H. Nguyen-Bui, P. Chassaing

Analysis of Environment - DFB-FL Sensors Interaction by Using Coupled-Mode Equations 116
Dan Savastru, Ion Lancranjan, Sorin Miclos

Theoretical Analysis of a High Power Fiber Laser 121
Sorin Miclos, Dan Savastru, Ion Lancranjan

Expansion of the Basic EOQ Model with Inclusion of Trim-Loss Costs 126
Jure Erjavec, Luka Tomat, Miro Gradisar

Modelling and Simulation in Non-Life Insurance 129
Viera Pacakova

A Liquidity-Weighted GARCH Model for Empirical Equity Series 134
Cristiana Tudor

On Spatial Estimation of Wind Energy Potential in Malaysia 140
Nurulkamal Masseran, Ahmad Mahir Razali, Kamarulzaman Ibrahim, Wan Zawiah Wan Zin, Azami Zaharim

Daily Rainfall Disaggregation Using HYETOS Model for Peninsular Malaysia 146
Ibrahim Suliman Hanaish, Kamarulzaman Ibrahim, Abdul Aziz Jemain

Estimating Wind Energy Using Extrapolated Data of Cameron Highlands 151
Siti Khadijah Najid, Ahmad Mahir Razali, Kamaruzaman Ibrahim, Kamaruzzaman Sopian, Azami Zaharim

Optimization of Renewable Power System for Small Scale Seawater Reverse Osmosis Desalination Unit in Mrair-Gabis Village, Libya 155
Kh. Abulqasem, M. A. Alghoul, M. N. Mohammed, Alshrif Mustafa, Kh. Glaisa, Nowshad Amin, A.Zaharim, K. Sopian

Simulation Model and the Dynamics of Relative Poverty Rates in the Presence of Some Social Benefits in Romania 161
Cristina Stroe, Andreea Cambir, Cornelia Barti, Eva Militaru, Silvia Cojanu, Eliza Lungu, Codruta Dragoiu, Isadora Lazar

The Value of Demand Postponement under Demand Uncertainty 167
Rawee Suwandechochai

Kinematic Analysis of Howitzer Feeding Device 172
Jiri Balla, Van Yen Duong

Localized Resonant States and Transmission in a Two-Dimensional Photonic Quasicrystal 178
Yair Neve-Oz, Therese Pollok, Sven Burger, Michael Golosovsky, Dan Davidov

An Investigation of DEA Estimators Performance 183
Monica Mihaela Matei

Econometric Modeling of Return Migration Intentions 187
Gabriela Predosanu, Ana Maria Zamfir, Eva Militaru, Cristina Mocanu, Gabriela Vasile

Stochastic Delay Lotka-Volterra System to Interacting Population Dynamics 191
Andre A. Keller

Autoregressive Models with Stochastic Design Variables and Nonnormal Innovations 197
Ozlem Turker Bayrak, Aysen Dener Akkaya

Authors Index 202

Plenary Lecture 1

Shock Reflection Problems and Gas Dynamics Equations

Assistant Professor Katarina Jegdic
Computer and Mathematical Sciences
University of Houston – Downtown
USA
E-mail: JegdicK@uhd.edu

Abstract: We present mathematical analysis of shock reflection phenomenon using two-dimensional systems of conservation laws. Depending on the initial data, various types of shock reflection are possible, such as regular reflection (either supersonic or transonic) or Mach. We present proof of existence of regular reflection for the system of isentropic gas dynamics equations. The main idea in our approach is to rewrite the system using the self-similar coordinates. This leads to a free boundary problem for the subsonic state and the reflected shock. Existence of a solution is proved using the Holder estimates for the second order elliptic equations and various fixed point arguments. This work is joint with Barbara Lee Keyfitz (Ohio State University) and Suncica Canic (University of Houston).

Brief Biography of the Speaker:
Katarina Jegdic received B. Sc. degree in Mathematics from the University of Novi Sad, Serbia, in 1997. She obtained M.S. degree and Ph.D. degree in Mathematics from the University of Illinois at Urbana-Champaign, USA, in 2000 and 2004, respectively, after which she held a postdoctoral position at the University of Houston, USA. She is an assistant professor at the University of Houston - Downtown since 2006. Her research interests are in mathematical and numerical analysis of systems of conservation laws with applications to aerodynamics.

Plenary Lecture 2

Language for Exact Description of Systems with Complex Control

Professor Eugene Kindler
Department of Informatics and Computers
University of Ostrava, CZECH REPUBLIC
E-mail: ekindler@centrum.cz

Abstract: To have a language for an exact description of systems is an advantage not only for a communication among people (systems designers, investigators, reviewers, implementers, users etc.) but also among an investigator and computer (for modeling, tests of completeness and/or consistency of the description etc.). The start point how to realize that way consisted in some process-oriented simulation languages designed and implemented in the 60-ies of the last century. Note that the process orientation covers an offer to use so called quasi-parallel sequencing (further QPS) that permits a separate formulation of "lives" of system elements, that mutually switch in the common time flow. Nevertheless, beside the limits of each of those languages (implying that descriptions of some systems in a given language were either very difficult or even impossible), another difficulty rose during the development of our civilization: the inner control and relating communication in the systems became more and more complex and sometimes even rather contradictory (in the systems influenced by antagonistic and/or mutually competing entities) decisions rise and are implemented inside the systems.
The first obstacle (limitation) was surmounted by advent of the object-oriented programming (classes, subclasses and procedures/methods/functions), but, unfortunately, soon after the spread of that programming method further from its original simulation stimulus incorporated in Simula, QPS disappeared from may be every object-oriented programming language designed since 1980, although that sort of sequencing existed even in some simulation languages designed before 1960.
The second obstacle can be illustrated as follows: when one starts to describe a system he needs to prepare and order general notions used then by the description, but when one exists as a component in the system (a human or a computer) and influences it he needs to express something similar – namely general notions semantically ordered – and than to use them. The antagonistic views practiced by influencing components show that may express general notions mutually in a different way but also differently from the way in that they were considered by the author of the description of the system, i.e. by a person existing outside the system. More exactly, such an author, describing the system, must express not only the contents of the general notions how he recognizes them, but also that of notions how the inner components of the described system consider them. Moreover, he has to separate different interpretations of the notions, although they carry the same names and often pay role in a common way.
The obstacles may be surmounted very well by using programming languages that are not only object-oriented and, naturally, process-oriented (permitting QPS) but permit local classes, too. The number of such languages is very small and, unfortunately, with the exception of the above mentioned "old" Simula, they do not allow QPS. The users of some of them (like Java) offer subrogating QPS with help of threads, i.e. by something that does not concern the described system but only its computer model. It should be respected that the suitable language should strictly separate between what should exist in the described systems and what in its computer model.
The presentation will contain some existing applications in transport, machine production, health care and computer systems.

Brief Biography of the Speaker:
Eugene Kindler was born in 1935, studied mathematics at Charles University in Prague, (Czechoslovakia) and then computer science at the Research Institute of Mathematical Machines in Prague. He is the author of the first Czechoslovak ALGOL 60 compiler and the first Czechoslovak simulation language and compiler (COSMO, Compartmental System Modeling). Charles University granted him PhDr in logic and RNDr (Rerum Naturalium Doctor) in the theory of programming, Czechoslovak Academy of Science granted him CSc (Candidate of Sciences) in mathematics and physics. During 1958-1966 he worked with the Research Institute of Mathematical Machines, then with the Institute of Biophysics of the Faculty of General Medicine of Charles University (until 1973) and then with the Faculty of Mathematics and Physics of the same University (until 2006). In parallel, he engaged as professor of applied mathematics at a new University of Ostrava (Czech Republic) and was guest professor at the universities of Italian Pisa, American Morgantown and French Clermont-Ferrand and Lorient. Since 2006 he has been pensioned,

collaborating with the same Ostrava University as external specialist in various research projects, in doctoral studies and with a rather new Faculty of art.
Beside his official work in computer science, he applied exact techniques (applied in programming language analysis) to formulate the rhythmical laws of music in free rhythm and is a director and soloist of singing group Musica Poetica specialized to the chant originated during the first millennium A.D. in Europe and certain Near East Asian countries.

Plenary Lecture 3

Stochastic Delay Lotka-Volterra System to Interacting Population Dynamics

Professor Andre A. Keller
Universite de Lille 1 Science et Technologies
CLERSE UMR 8019 (CNRS)
59655 Villeneuve d'Ascq FRANCE
E-mail: andre-keller@orange.fr

Abstract: This presentation introduces to the modeling process and reviews the essential features of the well-known Lotka-Volterra multispecies system in ecological modelling. The interacting population dynamics may be competitive or cooperative in the noisy environment of real world situations. In this stochastic context, the conditions for positive non exploding solutions are given. The computations have been carried out by using the software Wolfram Mathematica ® 8.

Brief Biography of the Speaker:
Andre A. Keller (Prof.) is at present an associated researcher in mathematical economics at CLERSE a research unit UMR8019 of the French Centre National de la Recherche Scientifique (CNRS) by the Universite de Lille 1, Sciences et Technologies. He is also participating to the group 'Dynamique et Complexite' which is supported by the Federation de Physique et Interfaces. He received a PhD in Economics (Operations Research) in 1977 from the Universite de Paris Pantheon-Sorbonne. He is a WSEAS Member since 2010 and a Rewiever for the journals Ecological Modelling (Elsevier) and WSEAS Transactions on Information Science and Applications.
He taught applied mathematics (optimization techniques) and econometric modelling, microeconomics , theory of games and dynamic macroeconomic analysis. His experience centers are on building and analyzing large scale macro-economic models, as well as forecasting. His research interest has concentrated on: high frequency time-series modeling with application to the foreign exchange market, on discrete mathematics (graph theory), stochastic differential games and tournaments, circuit analysis, optimal control under uncertainties. His publications consist in writing articles, books and book chapters. The book chapters are e.g. on semi-reduced forms (Martinus Nijhoff, 1984), econometrics of technical change (Springer and IISA, 1989), advanced time-series analysis (Woodhead Faulkner, 1989), stochastic differential games (Nova Science, 2009), optimal fuzzy control (InTech, 2009). One book is on time-delay systems (LAP, 2010). One another book is on nonconvex optimization techniques (WSEAS Press, forthcoming 2011).