



**Editors: Nouras Barbu Lupulescu, Snejana Yordanova, Valeri Mladenov**



# **Recent Researches in Neural Networks, Fuzzy Systems, Evolutionary Computing & Automation**

- ▷ 12<sup>th</sup> WSEAS International Conference on Neural Networks (NN '11)
- ▷ 12<sup>th</sup> WSEAS International Conference on Fuzzy Systems (FS '11)
- ▷ 12<sup>th</sup> WSEAS International Conference on Evolutionary Computing (EC '11)
- ▷ 12<sup>th</sup> WSEAS International Conference on Automation & Information (ICAI '11)

**Sponsor and Organizer**



**Transilvania University of Brasov, Romania, April 11-13, 2011**

**ISBN: 978-960-474-292-9**

**Recent Researches in Neural Networks, Fuzzy Systems, Evolutionary Computing & Automation**



# **RECENT RESEARCHES in NEURAL NETWORKS, FUZZY SYSTEMS, EVOLUTIONARY COMPUTING and AUTOMATION**

**12th WSEAS International Conference on NEURAL NETWORKS (NN '11)  
12th WSEAS International Conference on FUZZY SYSTEMS (FS '11)  
12th WSEAS International Conference on EVOLUTIONARY COMPUTING  
(EC '11)  
12th WSEAS International Conference on AUTOMATION &  
INFORMATION (ICAI '11)**

**Transilvania University of Brasov, Romania  
April 11-13, 2011**



# **RECENT RESEARCHES in NEURAL NETWORKS, FUZZY SYSTEMS, EVOLUTIONARY COMPUTING and AUTOMATION**

**12th WSEAS International Conference on NEURAL NETWORKS (NN '11)**

**12th WSEAS International Conference on FUZZY SYSTEMS (FS '11)**

**12th WSEAS International Conference on EVOLUTIONARY COMPUTING (EC '11)**

**12th WSEAS International Conference on AUTOMATION & INFORMATION (ICAI '11)**

**Transilvania University of Brasov, Romania  
April 11-13, 2011**

Published by WSEAS Press

[www.wseas.org](http://www.wseas.org)

**Copyright © 2011, by WSEAS Press**

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

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>

ISBN: 978-960-474-292-9



World Scientific and Engineering Academy and Society

# **RECENT RESEARCHES in NEURAL NETWORKS, FUZZY SYSTEMS, EVOLUTIONARY COMPUTING and AUTOMATION**

**12th WSEAS International Conference on NEURAL NETWORKS (NN '11)  
12th WSEAS International Conference on FUZZY SYSTEMS (FS '11)  
12th WSEAS International Conference on EVOLUTIONARY COMPUTING  
(EC '11)  
12th WSEAS International Conference on AUTOMATION &  
INFORMATION (ICAI '11)**

**Transilvania University of Brasov, Romania  
April 11-13, 2011**



**Editors:**

Prof. Nouras Barbu Lupulescu, Dean of Faculty of Technological Engineering and Industrial Management, Romania

Prof. Snejana Yordanova, Technical University of Sofia, Bulgaria

Prof. Valeri Mladenov, Technical University of Sofia, Bulgaria

**International Program Committee Members:**

Karol Velisek, SLOVAKIA

Peter Kostal, SLOVAKIA

A.M. Goncalves Coelho, PORTUGAL

Slobodan NAVALUSIC, SERBIA

Schlegel Daniel, FRANCE

Roman Adriana, FRANCE

Ciobanu Valentina, ROMANIA

Razvan Udrioiu, ROMANIA

Lubomir Dimitrov, BULGARIA

Tasho Tashev, BULGARIA

Gerardo Acosta, SPAIN

Ping An, CHINA

Kiyoshi Akama, JAPAN

Mehrdad Ardebilipour, IRAN

Carlos Aviles-Cruz, MEXICO

Yun Bai AUSTRALIA

Ana Madureira, PORTUGAL

Petr Ekel, BRAZIL

Yue-shan Chang, TAIWAN

Chip Hong Chang, SINGAPORE

Sheng-Gwo Chen, TAIWAN

George Antoniou, USA

Tanglong Chen, CHINA

Lotfi Zadeh, USA

Michael Wasfy, USA

Myeonggil Choi, KOREA

Yuk Ying Chung, AUSTRALIA

Metin Demiralp, TURKEY

Angelos Zachariadis, GREECE

Costas Polychronopoulos, GREECE

Toshio Eisaka, JAPAN

Alessandra Flammini, ITALY

Donata Francescato, ITALY

Tapio Frantti, FINLAND

Georges Fried, FRANCE

Rocco Furferi, ITALY

James Gao, UNITED KINGDOM

Gilson Giraldi, BRAZIL

Sungho Ha, KOREA

Nualsawat Hiransakolwong, THAILAND

A. Manikas, UK

Dil Hussain, DENMARK

Philippe Dondon, FRANCE,

Muhammad Ibrahimy, MALAYSIA

Michael Katchabaw, CANADA

Seong Baeg Kim, KOREA

Jin-tae Kim, KOREA

Mallikarjun Kodabagi, INDIA

M. I. Garcia-Planas, SPAIN

Xiaoyu Li, CHINA

Jie Li, CHINA

Jiang Liu, UNITED STATES

Afif Mghawish, JORDAN

Tetsushi Miki, JAPAN

Zhong Ming, CHINA

Hasnaoui Othman, TUNISIA

Zeljko Panian, CROATIA (HRVATSKA)

PooGyeon Park, KOREA

Vidyasagar Potdar, AUSTRALIA

Sangmun Shin, KOREA

Li Shuhong, CHINA

Yu Shunkun, CHINA

Andrzej Sluzek, SINGAPORE

Hokeun Song, KOREA

Paulo Sousa, PORTUGAL

Sarawut Sujitjorn, THAILAND

Yi Sun, CHINA

Guangzhong Sun, CHINA

Yoshihiro Tanada, JAPAN

Lixin Tao, USA

Nam Tran, AUSTRALIA

Argyrios Varonides, USA

Peter Trkman, SLOVENIA

Lamberto Tronchin, ITALY

Amritasu Sinha, INDIA

Ming-Jer Tsai, TAIWAN

Woei-Jiunn Tsaur, TAIWAN

Kuo-Hung Tseng, TAIWAN

Hiroshi Umeo, JAPAN

Ronald Yager, USA

Pragya Varshney, INDIA

Lusheng Wang, HONG KONG S.A.R.

Lei Wang, CHINA

Zhongfei Wang, CHINA

Hironori Washizaki, JAPAN

Wang Wen, CHINA

Kin Yeung Wong, MACAU S.A.R.

Jyh-Yang Wu, TAIWAN

Hsiaokuang Wu, TAIWAN

Yinshui Xia, CHINA

Yi Xie, CHINA

Xinli Xu, CHINA

Yong Xu, CHINA

Yinlong Xu, CHINA

Xinli Xu, CHINA

Bin Xu, CHINA

Hongwen Yan, CHINA

Hung-Jen Yang, TAIWAN

Thomas Yang, USA

Hung-Jen Yang, TAIWAN

Houjun Yang, CHINA

Hsieh-Hua Yang, CHINA

Wenrong Yang, CHINA  
Hung-Jen Yang, TAIWAN  
Sumanth Yenduri, USA  
Alimujiang Yiming, JAPAN  
Jianfei Yin, CHINA  
Liuguo Yin, CHINA  
Ren Yong Feng, CHINA  
Tetsuya Yoshida, JAPAN  
Hsiang-fu Yu, TAIWAN  
S.Y.Chen, GERMANY  
Adela-Eliza Dumitrascu, ROMANIA  
Adriana Fota, ROMANIA  
Dragoi Viorel Mircea, ROMANIA  
Oancea Gheorghe, ROMANIA  
Laurentiu Mihail, ROMANIA  
Camil Lancea, ROMANIA  
Lucia Chicos, ROMANIA  
Ionescu Mihai, ROMANIA  
Ditu Valentin, ROMANIA  
Popa Luminita, ROMANIA

**Preface**

This year the 12th WSEAS International Conference on NEURAL NETWORKS (NN '11), the 12th WSEAS International Conference on FUZZY SYSTEMS (FS '11), the 12th WSEAS International Conference on EVOLUTIONARY COMPUTING (EC '11) and the 12th WSEAS International Conference on AUTOMATION & INFORMATION (ICAI '11) were held at the Transilvania University of Brasov, Romania, April 11-13, 2011. The conferences provided a platform to discuss mathematical foundation of neural networks, neural network software, mathematical foundation of fuzzy logic, fuzziness and statistics, mathematical foundation of genetic algorithms and evolutionary computing, evolution strategies, differential evolution, artificial life, digital organisms, circuits and systems, network theory and applications, signal processing, automatic control and robotics, machine learning, numerical analysis, microprocessors, computer architecture etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: [www.worldses.org/indexes](http://www.worldses.org/indexes) as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





# Table of Contents

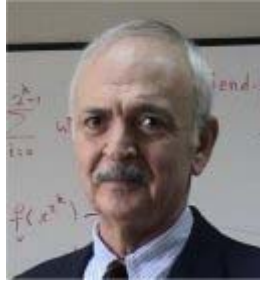
<b><u>Keynote Lecture: Fluctuation Free Matrix Representation in Expectation Value Dynamical Issues and their Applications</u></b>	12
<i>Metin Demiralp</i>	
<b><u>Plenary Lecture 1: Fault Detection and Isolation using Neuro-Fuzzy Systems</u></b>	14
<i>Francklin Rivas-Echeverria</i>	
<b><u>Plenary Lecture 2: Monitoring Distributed Parameter Systems Based on Expert Systems and Sensor Networks</u></b>	15
<i>Constantin Volosencu</i>	
<b><u>Prediction of Material Removal Rate for Ti-5Al-2.5Sn in EDM using Multi-Layered Perceptron Neural Network Technique</u></b>	17
<i>M. M. Rahman, Ashikur Rahman Khan, K. Kadirgama, Rosli A. Bakar</i>	
<b><u>Consumer Behaviour Fuzziness in the New Market Environments</u></b>	24
<i>Rawshan Basha, Jamal Ameen</i>	
<b><u>People, Automation, and Complexity Concerns Affecting Manufacturing Enterprise Information Integration</u></b>	29
<i>Ionel Botef</i>	
<b><u>On Fuzzy-Logic-Based Ontology Decision Support System for Government Sector</u></b>	34
<i>Sameera Al Shayji, Nahla El Zant El Kadhi, Zidong Wong</i>	
<b><u>Accessible Web-Based Educational System</u></b>	42
<i>Fatima AlDhaen, Nahla El Zant El Kadhi, Hadeel Al-Obaidy</i>	
<b><u>Modeling of Fuzzy-Neural Systems Using the Coevolutionary Algorithm</u></b>	49
<i>Samir Omanovic, Zikrija Avdagic</i>	
<b><u>The Development of Virtual Organizations in Romania</u></b>	54
<i>Larion Valentin, Tofan Dan Constantin, Dinca Lavinia Mihaela</i>	
<b><u>Detection of Objects in Moving Images and Implementation of the Purification Algorithm on Analog CNN and DSP Processors</u></b>	60
<i>Emel Arslan, Zeynep Orman, Sabri Arik</i>	
<b><u>Model of Biological ANN Based on Homeostatic Neurons</u></b>	66
<i>Martin Ruzek, Tomas Brandejsky</i>	
<b><u>Innovative Strategy of SOMA Control Parameter Setting</u></b>	70
<i>Pavel Varacha</i>	
<b><u>The Informatic System Architecture for Monitoring Anti-Hail Network</u></b>	76
<i>Constantin Sulea, Gheorghe Manolea, Laurentiu Alboteanu</i>	

<b><u>Information Technology Standards – A Viable Solution to Reach the Performance</u></b>	82
<i>Manole Velicanu, Iulia Surugiu, Daniela Litan, Ovidiu Raduta, Aura-Mihaela Mocanu (Virgolici)</i>	
<b><u>About L-Infinity Space for Fuzzy Measures</u></b>	88
<i>Alina Gavrilut, Anca Croitoru</i>	
<b><u>Neural Network Synthesis via Asynchronous Analytic Programming</u></b>	92
<i>Pavel Varacha</i>	
<b><u>Existence of Fuzzy Equilibria for Fuzzy Abstract Economies with Q'-Majorized Correspondences</u></b>	98
<i>Monica Patriche</i>	
<b><u>Pattern Recognition in Wireless Sensor Networks in Presence of Sensor Failures</u></b>	104
<i>Janos Csirik, Peter Bertholet, Horst Bunke</i>	
<b><u>About Fuzzy Integrals for Vector Valued Multifunctions</u></b>	110
<i>Cristina Stamate</i>	
<b><u>Monitoring Distributed Parameter Systems Based on Expert Systems and Sensor Networks</u></b>	114
<i>Constantin Volosencu</i>	
<b><u>A Design and Simulation of Fuzzy PID Controller for the Optimization of Temperature and Humidity in the Thermodynamic System</u></b>	119
<i>Stefan Koprda, Zoltan Balogh, Milan Turcani</i>	
<b><u>Experimental Researches of Fuelling Systems and Alcohol Blends on Combustion and Emissions in a Two Stroke Si Engine</u></b>	126
<i>Mihai Aleonte, Corneliu Cofaru, Radu Cosgarea, Maria Luminita Scutaru, Liviu Jelenschi, Gabriel Sandu</i>	
<b><u>An Approach for Modeling the Valve Train System to Control the Homogeneous Combustion in a Compression Ignition Engine</u></b>	131
<i>Radu Cosgarea, Corneliu Cofaru, Mihai Aleonte, Maria Luminita Scutaru, Liviu Jelenschi, Gabriel Sandu</i>	
<b><u>The Braking Process at the Stroke end of Linear Hydraulic Motors</u></b>	136
<i>Ioan Cristian</i>	
<b><u>The Absorbent's Solution Flow Process, Non-Parametric Identification into an Absorption Chiller for Air Conditioning</u></b>	140
<i>Adrian Danila</i>	
<b><u>Aspects Regarding the Monte-Carlo Simulation of Products Reliability</u></b>	145
<i>Dumitrascu Adela-Eliza, Duicu Simona</i>	
<b><u>On Some Multi-Attribute Decision Models Based on Fuzzy Techniques</u></b>	150
<i>Dorin Lixandroi</i>	
<b><u>Fuzzy Control Design for a Gas Absorber System</u></b>	155
<i>Mohamed Mas Mahmoud</i>	
<b><u>A New Approach to Fuzzy-Control Large Scale Systems</u></b>	161
<i>Mohamed Mas Mahmoud</i>	

<b><u>The Calculation of the Testing Period of the Reliability of Products by Using the Model of Exponential Distribution</u></b>	169
<i>Morariu Cristin-Olimpiu, Zaharia Sebastian Marian</i>	
<b><u>Single Cylinder Diesel Engine Performances Estimation Using AVL Boost software</u></b>	173
<i>Dumitrascu Dorin Ion, Nedelcu Anisor</i>	
<b><u>Mathematical Modeling of a Stochastic Branching Process</u></b>	177
<i>Stoian Nadia Mirela, Orman V. Gabriel, Crismaru Nicolae</i>	
<b><u>A New Concept of Intensifier for Double Acting Hydraulic Power Workholding Systems</u></b>	181
<i>Tudor Paunescu</i>	
<b><u>Kinematic Analysis of Three Bar Mechanism Linked with Rotation Joints</u></b>	185
<i>Ioana Petre, Tudor Deaconescu, Andrea Deaconescu, Dan Petre</i>	
<b><u>Automated Material Handling Systems (AMHS) in Libraries and Archives. Automated Storage/Retrieval and Return/Sorting Systems</u></b>	189
<i>Corina Pop, Gabriela Mailat</i>	
<b><u>Fuzzy Logic Based Approach to Optimal Hydraulic Cylinders Assembly</u></b>	195
<i>Snejana Yordanova, Lubomir Dimitrov</i>	
<b><u>Brownian Motion and Stochastic Models</u></b>	201
<i>Dana Damian, Sorina Stoian, Oana Rachieru, Alina Stoica</i>	
<b><u>Optimizing Protein Importance Assessment Through a Dijkstra-Based Sequential Optimization Technique</u></b>	207
<i>Razvan Bocu, Dorin Bocu</i>	
<b><u>Scene Text Extraction Using Modified Cylindrical Distance</u></b>	213
<i>Hrvoje Dujmic, Matko Saric, Josko Radic</i>	
<b><u>ISPRS: Intelligent Services for Poverty Reduction Schemes</u></b>	219
<i>Petar Solic, Matko Saric, Darko Stipanicev</i>	
<b><u>Authors Index</u></b>	225

## Keynote Lecture

### Fluctuation Free Matrix Representation in Expectation Value Dynamical Issues and their Applications



**Professor Metin Demiralp**  
Informatics Institute  
Istanbul Technical University  
TURKEY

E-mail: metin.demiralp@be.itu.edu.tr

**Abstract:** Parabolic partial differential equations are encountered in many diverse fields of science and engineering and even managerial sciences, like classical or quantum wave propagations, nonequilibrium statistical mechanics, probabilistic and stochastic issues. In these aspects, they are unignorable components of the modellings in research areas like chemistry, biology, and even business and economy. These types of equations are generally first order in one coordinate which may be regarded as time and second order in some other coordinates which may be called space coordinates by following the most frequently encountered cases of modelling. Their first order temporal nature enforces them to be accompanied by an initial condition while certain boundary conditions should be imposed on spatial coordinates because of the ellipticity in their operator structures on spatial coordinates. Ellipticity means boundary value problem nature and therefore the expansions on certain orthonormal basis functions in appropriately defined Hilbert spaces can be used as the basic mathematical tools to construct the solutions. To this end the unknown solution can be considered as an infinite linear combination of the basis function varying in spatial coordinates only, with temporally changing linear combination coefficients. A complete set of basis functions in Hilbert space enables us to use the linear combination coefficients of a function as its matrix (or vector in a better terminology) representation. The linear operators mapping from the considered Hilbert space to the same space can also be given via their matrix representations. Matrix representations are important because they convert the abstractness of the Hilbert spaces to the concreteness of the Cartesian spaces. A mapping from a Hilbert space to itself can be described by an appropriately defined linear operator while its matrix representation arises as a tool mapping from a corresponding Cartesian space to itself. Thus elliptic PDE nature mapping from an appropriately defined Hilbert space to itself becomes a transformation by a matrix from a corresponding Cartesian space to itself by removing PDE related problematic issues from the scene and leaving us with the pleasant environment of the theory of matrices and linear algebra.

A parabolic PDE describes an evolution in one coordinate we call time, and therefore, it somehow defines a dynamical change, or in mechanical terminology, motion. When we use the matrix representation for the solution and elliptic part of the PDE under consideration time derivative of the unknown function becomes the time derivative of the vector coming from the unknown function's matrix representation whereas the elliptic part of that PDE becomes a time variant matrix when its matrix representation is used. Therefore the PDE and the accompanying boundary conditions define an infinite set of ODEs accompanied by an initial condition whose given vector function value at the beginning of the time comes from the matrix representation of the initial value function of the PDE. This infinite set of ODEs can be solved under the initial vector condition. However this may be considered as a formidable task because of the infinite dimensionality and we intend to truncate those ODEs appropriately to get an approximation. The numerical efficiency of this truncation based methodology completely depends on how the basis functions are constructed. This issue depends on rather modelling nature of the PDE under consideration.

What we have mentioned above is basically for the case of linear elliptic operator including PDEs. When the nonlinearity comes to the scene the matrix representations may become complicated and the tools of linear space may not work. Although there are of course some possibilities for these cases, they will be kept out of the content of this presentation.

Even in the linear case of ODEs the dimensionality may become an unpleasant problem if it grows undesiredly. Those cases can be treated in a different way by using fluctuation free matrix representation and the dimensionality growth can be suppressed accordingly in many cases. The fluctuation free matrix representation is based on fluctuationlessness theorem conjectured and proven by the presenter. It states that the matrix representation of an algebraic function operator which multiplies its operand with the function under consideration in the operator definition, is equivalent to the image of the universal matrix which is the matrix representation of the independent variable operator multiplying its operand by the independent variable, under the abovementioned function, over the same basis function set. This equivalence holds when the set is complete to span entire Hilbert space whereas any

incompleteness coming from the usage of a subset of the complete basis function set destroys this equivalence. However, even in the case of incompleteness, the deviation from the equivalence come from the fluctuation terms which are related to the differences of the matrix representations of powers of the independent variable from the same power of the matrix representation of the independent variable alone. These fluctuation terms may tend to quite rapidly vanish when the considered set approaches or gets close to the whole basis set. Hence theorem dictates the equivalence for all cases when all fluctuations are ignored. This theorem enables us to simplify the matrix representation of the PDE's elliptic part at the threshold of fluctuation free representations and therefore to construct good quality approximations. Talk will be about these issues up to certain details which can be given as much as time allows.

**Brief Biography of the Speaker:**

Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS, and PhD from the same institution, Istanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of Istanbul Technical University (he is the founder of this institute). He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA) at summer and winter semester breaks during the period 1985–2003 after his 14 months long postdoctoral visit to the same group in 1979–1980. Metin Demiralp has more than 90 papers in well known and prestigious scientific journals, and, more than 170 contributions to the proceedings of various international conferences. He gave many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is one of the principal members of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society and the chief–editor of WSEAS Transactions on Computers currently. He has also two important awards of turkish scientific establishments. The important recent foci in research areas of Metin Demiralp can be roughly listed as follows: Fluctuation Free Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient Approaches, Matrix Decompositions, Multiway Array Decompositions, Enhanced Multivariate Product Representations, Quantum Optimal Control.



## Plenary Lecture 1

### Fault Detection and Isolation using Neuro-Fuzzy Systems



#### **Professor Francklin Rivas-Echeverria**

Universidad de Los Andes

Laboratorio de Sistemas Inteligentes

Merida, Venezuela

E-mail: rivas@ula.ve

**Abstract:** Intelligent systems have been widely used in many industrial applications such as: Control systems, Identification, Pattern recognition and fault detection and diagnosis; being fault detection one of the most developed area cause of it direct incidence on productivity and security. Artificial Neural Networks and Fuzzy systems have been some of the Artificial Intelligence techniques that have been used for these activities.

Some of the reasons for using Artificial Neural Networks are: Can "Learn" from historical data, so they can be used as associative memories. they have great generalization capabilities, so they can give accurate outputs for input patterns different that the used in the training phase. They can be used with corrupt or incomplete data, because the "knowledge" is spread over the networks interconnection weights. Can give input/output maps from data without apparent relation. They are easy for computer implantation. There exist a great number of learning algorithms that can be used for specific problems.

On the other hand, fuzzy logic emulates the human classification capabilities using multivaluated criteria instead of the classical binary logic used in computational environments. Fuzzy logic creates some fuzzy sets which are described using linguistic labels and a membership level with values between [0,1] according to the real partial belonging to each of the created fuzzy sets. In this plenary speech it will be presented fault detection schemes based on diverse Neuro-Fuzzy configurations. It will be also presented some industrial examples.

#### **Brief Biography of the Speaker:**

Francklin Rivas-Echeverria Systems Engineer, MSc. in Control Engineering and Applied Science Doctor. Full professor in Control Systems Department, at Universidad de Los Andes, Venezuela. He has been invited professor in the Laboratoire d'Architecture et d'Analyse des Systemes (LAAS, Toulouse-France) and some Venezuelan and international Universities. He has also been technical advisor for "Venezuelan Oil Company" (PDVSA), "Aluminum Venezuelan Company" (VENALUM), "Steel Venezuelan Company" (SIDOR), Trolleybus System in Venezuela (TROLMERIDA). He has created and is the Director of the Intelligent Systems Laboratory and is the head of the University consulting unit (UAPIT-ULA). Over 180 publications in high level conferences and journals: the main topics of his papers are: Artificial Intelligence, Intelligent Control, Automation Systems and Industrial Applications. He has applied his results to many fields: Processes Control and Supervision, Oil production, Steel production processes, among others. Also, has developed several tools for automatic control teaching. He is coauthor of two books concerning Artificial Intelligence and Nonlinear Systems.

## Plenary Lecture 2

### Monitoring Distributed Parameter Systems Based on Expert Systems and Sensor Networks



#### Professor Constantin Volosencu

Department of Automatics and Applied Informatics

Faculty of Automatics and Computers

"Politehnica" University of Timisoara

Bd. V. Parvan nr. 2

Timisoara, 300223

Romania

E-mail: constantin.volosencu@aut.upt.ro

**Abstract:** The paper presents an expert system developed for the monitoring process of the distributed parameter systems. The information from these systems is obtained using sensor networks and estimation techniques. The problem is formulated in the frame of the uncertainties of a specific distributed parameter system, as the heat transfer. A knowledge base is developed using human expertise on the distributed parameter system. The expert system is implemented in real time, using virtual instrumentation and it is placed in the real distributed parameter system, as a supplementary information system.

#### Brief Biography of the Speaker:

Constantin Volosencu is a professor at "Politehnica" University of Timisoara, Romania, Faculty of Automatics and Computers, Department of Automatics and Applied Informatics.

He graduated "Traian Vuia" Polytechnic Institute of Timisoara, Romania, in 1981, as an engineer in automatics and computers. He has a doctorate in automatics at "Politehnica" University of Timisoara, Romania.

Prof. Constantin Volosencu has researches in the field of linear control systems, fuzzy control, neural networks, control of electrical drives, system identification, sensor networks and distributed parameter systems.

Author of 10 books, over 130 scientific papers published in journals and conference proceedings and 27 patents. Manager of over 30 international and national research projects.

From 1982 to 1991 he worked as a research and design engineer at "Electrotimis" Enterprises Timisoara, Romania in the field of electrical drives. He developed electrical equipments for machine tools, spooling machines, high power ultrasonic installations and other.

Member of the Editorial Review Board for computer science, computer engineering, BCIS and MIS at Scientific Journals International SJI, member in the Authors Advisory Board at Journal of Biochemical Technology, member of the editorial board of Journal of Computer Science and Information Technology JCSIT.

Member in scientific committees and chair at international conferences.

Member of the following professional associations: S.R.A.I.T. and S.I.E.A.R Romania, IEEE Control System Society and Computational Intelligence Society, ACM.

In the frame of WSEAS prof. Constantin Volosencu is author of 18 papers published at WSEAS conferences and 8 papers published in WSEAS transactions. He was plenary speaker at the following WSEAS conferences: 9th Int. Conf. on Automatics & Information (ICAI'08), Bucharest, Romania, 2008, 8th Int. Conf. On Simulation, Modeling and Optimization (SMO '08), Santander, Spain, 2008, 8th Int. Conf. on Signal Processing, Robotics and Automation (ISPRA '09), Cambridge, U.K., 2009, 10th Int. Conf. on Automation & Information (ICAI'09), Prague, Czech Rep., 2009, 11th Int. Conf. on Automatic Control, Modeling and Simulation (ACMOS '09), Istanbul, Turkey, 2009, 9th Int. Conf. on Simulation, Modeling and Optimization, (SMO'09), Budapest Tech, Hungary, 2009, 1st Int. Conf. on Manufacturing Engineering, Quality and Production Systems, (MEQAPS'09), Brasov, 2009.