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in Heraklion, Greece, July 23-25, 2008

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Computational Engineering in Systems Applications

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Preface

This book contains selected papers from the WSEAS Conferences in Heraklion, Greece, July 22-25, 2008. These conferences aim to disseminate the latest research and applications in Circuit Modelling with Applications in Science and Engineering, Control Systems, Signal Processing for Wireless Communication, Computer Applications, New Technologies in Engineering Education, Mechanics of Structural Materials, Urban Planning Strategy and Development, Sustainable Tourism, and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

Table of Contents

CEREMONY for Prof. SIFAKIS : Opening by the Deputy Minister of National Defence of GREECE **17**
Ioannis Plakiotakis

KEYNOTE SPEAKER – TURING AWARD 2007 **18**
Joseph Sifakis

Keynote Lecture I: Distributed Estimation Using Wireless Sensor Networks **20**
Georgios B. Giannakis

Keynote Lecture II: Tyflos : A Wearable System-Prototype for Assisting Visually Impaired **21**
Nikolaos G. Bourbakis

Keynote Lecture III: Algorithms for Rendering Depth of Field Effects for Synthetic Image Generation and Computational Photography **22**
Brian A. Barsky

Plenary Lecture I: Sliding Mode Technique in the Task of the Drive Control **24**
Sergey Ryvkin

Plenary Lecture II: Advances in Semiconductor Devices and Their Growing Use in Electrical Circuits and Systems **25**
Noel Y. A. Shammas

Plenary Lecture III: Vibro-acoustic Techniques to Diagnose Complex Electromechanical Structures **26**
Francesco Muzi

Plenary Lecture IV: Electromagnetic Low Frequency Radiation from Natural Phenomena - Data Analysis and Modelling **27**
Ernst D. Schmitter

Plenary Lecture V: Application of Adaptive Cerebellar Model Articulation Controller in Control Problem **28**
Chih-Min Lin

Plenary LectureVI: On Dynamical Systems Describing Tumor Growth under Novel Therapies **29**
Urszula Ledzewicz

Plenary LectureVII: Dissipation Normal Forms and Further Applications of Lyapunov-Tellegen's Principle **30**
Milan Stork

Plenary Lecture VIII: Controllability and Observability of Multi-time Linear PDE Systems **31**
Professor Constantin Udriste

Plenary Lecture IX: Advances in Brain Research through Systems Science and Engineering Methods **32**
George Vachtsevanos

Plenary Lecture X: Metamaterial Antennas and Finlines Using Full Wave Analysis **33**
Humberto Cesar Chaves Fernandes

Plenary Lecture XI: Queuing and Loss Network Models: Computational Algorithms and Asymptotic Analysis **35**
Hisashi Kobayashi

Plenary Lecture XII: Intrusion Detection in Modern Optical Networks and Countermeasures **36**
Stamatios Kartalopoulos

Plenary Lecture XIII: Video and Audio Compressions and Human Perception Mechanism **37**
Michael Bank

Plenary Lecture XIV: New Directions in the Design of Secure Wireless Systems Using Chaotic Signals and Interference Mitigation Techniques **38**
Peter Stavroulakis

Plenary Lecture XV: Computational Intelligence Solutions for Biometrics **40**
Victor-Emil Neagoe

Plenary Lecture XVI: Post Modern Ubiquitous Information Society - Bridging the gap between human and computer - **41**
Norio Shiratori

Plenary Lecture XVII: Symbolic Computing in Engineering Simulations and Education **42**
Marcin Kaminski

Plenary Lecture XVIII: Intelligent Techniques for Medical e-Learning Systems **43**
Abdel-Badeeh M. Salem

Plenary Lecture XIX: Super-Object-Oriented Programming and Simulation **44**
Eugene Kindler

Plenary Lecture XX: Heterogeneous Reconfigurable Chip Multiprocessors for Embedded Systems **45**
Sotirios G. Ziavras

Plenary Lecture XXI: Collaborative Learning in the University Education: from the Theory to the Practice **46**
Jaime Lloret Mauri

Plenary Lecture XXII: Science Teachers' Collaborating Learning for Scientific Literacy: from Practice to the Practice **47**
Michail Kalogiannakis

Plenary Lecture XXIII: Measuring and Evaluating Perception and Expectation of Engineering Graduates in Malaysia **48**
Azami Zaharim

Plenary Lecture XXIV: Case Study as a Teaching Tool for Analysis of Real-World Problems: Applications of Mathematics in Engineering and Business Education **49**
Andrei Kolyshkin

Plenary Lecture XXV: From The Real World To Models And Paradigms In Parallel Scientific Computing **50**
Ion Carstea

Plenary Lecture XXVI: A Combination of Computer Aided Learning and Real time Experiments to Support Engineering Training **51**
M. Hatziprokopiou

Plenary Lecture XXVII: Simulating Real-Life IT Project Environments by Integrating Course Modules of Different Student Levels **52**
Nicholas Harkiolakis

Plenary Lecture XXVIII: Modeling Muddy Flash Floods and Debris Flows **53**
Blaise Nsom

Plenary Lecture XXIX: The Use of Integral Transforms for Analytic Solution of Pre-stressed Thin Plate on Elastic Foundation under Axisymmetric Loading **54**
Dimitrios G. Pavlou

Plenary Lecture XXX: On the Eigenvalues Optimization of Beams with Damping Patches **55**
Veturia Chiroiu

Plenary Lecture XXXI: In Depth Analysis of the Analogies among Entropy, Information and Sensation. The Concept of Time in Thermodynamics **56**
Vassilis Gekas

Plenary Lecture XXXII: 100 Years of Highway Transportation Research **57**
Manoj K. Jha

Plenary Lecture XXXIII: The Exploitation of the Most Recent Historical Cultural Heritage for Tourism Development. The Case of Preserved Buildings and Grounds in Greece **58**
Eleni Stamatiou

Plenary Lecture XXXIV: The Role of Music Festivals in Creating Community **59**
Michelle Duffy

Special Session I: Advanced Computational Techniques, Algorithms and Numerical Methods for Modelling, Simulation and Optimization **60**
Dana Simian

Special Session II: Information Technology and Decision Support in Engineering and Business Applications **61**
S. Narayanan

Special Session III: Object-oriented Simulation of Intelligent Systems **62**
Eugene Kindler

Air Flow Control by Adaptive LQ Controller with Identification Based on Neural Networks **63**
Petr Malounek and Petr Pivonka

Direct Implementation of Predictive Controller **67**
Vojtech Miksanek and Petr Pivonka

A General Representation for Modeling and Benchmarking Off-line Signature Verifiers **72**
Bence Kovari, Istvan Albert and Hassan Charaf

Environmental Science Applied to the Engineering Educational System **77**
Cristian Predescu, Ecaterina Matei, Mirela Sohaciu, Andra Stoica, Andrei Predescu and Avram Nicolae

Architecture Design of an Intelligent Agent for Information Retrieval **81**
Kaveh Kavousi and Behzad Moshiri

Static Transfer Switch: Performance Evaluation of Detection Scheme **89**
Ramesh Pachar, Harpal Tiwari and Ramesh.C.Bansal

Researches Regarding the Virtual Manufacturing of the Technological Processes in Order to Combate the Industrial Accidents **95**
Valeriu Avramescu

Technologies and Equipments for Complex Surfaces Nanofinishing by Abrasive Flowing with Reopectic Work Mediums **98**
Valeriu Avramescu, Roxana Grejdanescu, Catalin Horia Orasanu, Loredana Paun, Gheorghe Orasanu, Daniel Bobe and Norvegia Elena Avramescu

3D Dimensional Chains **103**
Valeriu Avramescu, Cristian Nicolau, Stefan Tudorel Craciunoiu, Ana-Maria Constantinescu, Catalin Orasanu and Mariana Craciunoiu

Intelligent Multifunctional Surgical Devices and Accessories **109**
Stefan Tudorel Craciunoiu, Valeriu Avramescu, Cristian Nicolau, Ana-Maria Constantinescu and Catalin Orasanu

Medical Web Application for the Evaluation of Changes in Retinal Microcirculation **113**
C.Marino, M.G.Penedo, J.Rouco, M.Ortega and A. Pose-Reino

Configurable Digital Fractional Order Hold Device for Hybrid Control Systems **120**
Koldo Basterretxea and Rafael Barcena

Knowledge Extraction fromWeb Pages with an Auto-Adaptive System **126**
Camille Havas, Othalia Larue and Mickael Camus

Reengineering The Spare Parts Procurement System at SAUDIA Special Flight Services Division **132**
Seraj Yousef Abed

Efficient Processing for the Boundary Neighborhood Problem in Spatial Databases **139**
Azzam Sleit

Intelligent Management for Higher Education **146**
Lidia Niculita, Cristian Morarescu and Mihaela Ghidurus

Development and Application of an Expert System with Real Time Learning Operability for Automated Industrial and Portuary Systems **150**
Alexandre Acacio De Andrade, Sergio Luiz Pereira, Eduardo Mario Dias and Caio Fernando Fontana

Carbon Dioxide Storage Techniques on Thermoelectric Power Plants, Environmental Impacts, Technical and Economical Feasibility and Global Estimates Storage Capacities **156**
Tiago Fontes Asprino, Eduardo Mario Dias and Marco Antonio Saidel

Selecting a Biometric Technology for Application in Access Control **161**
Ricardo Janes, Augusto Ferreira Brandao Jr., Eduardo Mario Dias and Valencio Garcia

Customs Security System Model **169**
Antonio Russo Filho, Eduardo Mario Dias, Caio Fernando Fontana and Fabio Hideo Mori

VLSI Design, Implementation and Analysis of Low Power Montgomery Multiplier **176**
Attif A. Ibrahim, Hamed A. Elsimary and Amin M. Nassar

Information Technologies Introduction at Agriculture Engineering Education **183**
Recio, B. Morato, M.C. Castellanos, M.T., Garcia, J.L. and Garcia Mouton E.

A Design Method of Narrow Band FIR Filters Based on Fluency Sampling Function **188**
Masakazu Higuchi, Shuji Kawasaki, Kazuki Katagishi, Mitsuteru Nakamura, Yasuhiro Ohmiya, Kazuo Toraichi and Hitmoi Murakami

The Impact of Electronic Invoice in the Safe Supply Chain **197**
Marcelo Vieira, Eduardo Mario Dias and Caio Fontana

Visibly Pushdown Languages are Closed under Prefix, Shuffle, and Hiding **204**
Stefan D. Bruda and Tawhid Bin Waez

Automation Model to Increase Efficiency in the Supply Chain Management Processes **210**
Valencio Garcia, Eduardo Mario Dias, Caio Fernando Fontana and Fabio Hideo Mori

Access Control Systems Integration Model targeting Public Security in Ports **218**
Fabio Tsuzuki, Eduardo Mario Dias, Caio Fernando Fontana, Robson Barbosa and Valencio Garcia

A Comparison between AI Algorithms for Weeds Classification **224**
Ahmed M. Tobal, Sahar AbdelHamid, Nora Y. Ibrahim and Ashraf H. Abdelwahab

Predictive Models to Monitor Feedwater Boiler in SteamTurbines **230**
Alicia Tinnirello, Mónica Dadamo, Sara De Federico and Eduardo Gago

End-to-End Quality of Services Issues in 4G Mobile Networks **236**
Charles M. Sarraf and Firas Ousta

Advanced Power Monitoring of an ARM Processor **243**
Orest Oltu, Valentin Voiculescu, Valeriu Popescu, Monica Dascalu and Adrian Barbilian

Analysis of Electromagnetic Radiation Via a Slot of Arbitrary Shape in a Rectangular Enclosure Homogeneously-Filled with Dielectric Material **247**
Dominic B. O. Konditi, Edwin K. Kipyegon and Vasant V. Dharmadhikary

Modeling and Analysis of a Bolted Flanged Pipe Joint Subjected to Bending **256**
Mahbuboor Rahman Choudhury, Shahriar Quayyum and Khan Mahmud Amanat

Behavior of Columns of RC Framed Buildings with Soft Ground Floor Subjected to Earthquake Load **262**
Sharany Haque and Khan Mahmud Amanat

Face Biometric Using Multiple Neural Networks **268**
K. Sundaraj

Project and Implementation of an Object Oriented Open-source Framework for Genome Sequencing Projects **273**
Rodrigo C. M. Coimbra, Shana S. Santos, Alex V. Barbosa, Anderson G. F. Pereira, Fernando A. A. C. de Albuquerque and Maria Emılia M. T. Walter

Author Index **283**

CEREMONY for Prof. SIFAKIS

Opening by the Deputy Minister of National Defence of GREECE
Ioannis Plakiotakis
(Biochemical Engineer, M.Sc and Economics, M.Sc.)

http://www.plakiotakis.gr

Born in 1968 in Sitia, in the prefecture of Lasithi on the island of Crete. Plakiotakis studied chemical engineering at the University of Wales and obtained a Master's degree in biochemical engineering at London University with an MBA from the City University Business School of London. He worked at Eurocontrol, an inter-country Organisation that regulates Air Circulation and the flight safety in Europe. He is a member of the New Democracy Party since 1987. He was an active member of New Democracy's Student Movement (DAP) and in 1999 became Vice-president of the Local Committee of N.D. in Sitia (Crete). From 1998 to 2002 he acted as Municipal Advisor in Sitia. On January 2001 he was appointed as a permanent member of the Committee of Tourism by the President of the Hellenic Republic. He is a member of the Association of graduates of Biochemical Engineering at the University of London, as well as at the City University Business School.

Parliamentary- Governmental Activity:

- Member of Parliament's Special Permanent Committee of Protection of the Environment.
- New Democracy's Assistant Supervisor of Tourism and member of the Parliamentary Delegates of Production and Trade, Protection of Environment and Orthodoxy.
- He was elected MP of Lasithi with the N.D. in 2004 and in 2007.
- On 19 October 2007 he was appointed Deputy Minister of Defense.

KEYNOTE SPEAKER – TURING AWARD 2007

Embedded Systems – Scientific Challenges and Work Directions

Professor Joseph Sifakis
Turing Award 2007,
http://www.acm.org/press-room/news-releases/turing-award-07/
1 hour Keynote Lecture (CONFERENCE ROOM 1),
Wednesday, July 23, 16:00-17:00

Nobel of Computing:
http://www.cmu.edu/homepage/practical/2008/winter/nobel-of-computing.shtml
Also: http://www-verimag.imag.fr/~sifakis/

Abstract: Embedded systems are components integrating software and hardware that are jointly and specifically designed to provide given functionalities, which are often critical. They are used in a very wide array of application areas - including transport, consumer electronics / electrical appliances, energy distribution, manufacturing systems, etc. Designing embedded systems requires techniques taking into account extra-functional requirements regarding optimal use of resources such as time, memory and energy while ensuring autonomy, reactivity and robustness. Jointly taking into account these requirements raises a grand scientific and technical challenge: extending Computer Science with paradigms and methods from Control Theory and Electrical Engineering. Computer Science is based on discrete computation models, which are by their nature are very different from the analytic models used in other engineering disciplines, because they do not encompass physical time and resources. We discuss the main aspects of this challenge and their associated research directions for different areas such as modelling, programming, compilers, operating systems and networks.

Biography: Joseph Sifakis is CNRS researcher and the Founder of Verimag laboratory (http://www-verimag.imag.fr/), in Grenoble, France. He studied Electrical Engineering at the Technical University of Athens and Computer Science at the University of Grenoble.

Verimag is a leading research laboratory in the area of critical embedded systems. It developed the underlying theory and technology for the SCADE tool, used by Airbus for the design and validation of its critical real-time systems, and is becoming a de facto standard for aeronautics. Verimag has a lasting and strategic collaboration with ST Microelectronics, France Telecom R&D, and Airbus, through which numerous results on validation and testing have been transferred.

Joseph Sifakis is recognized for his pioneering work on both theoretical and practical aspects of Concurrent Systems Specification and Verification. He contributed to emergence of the area of model-checking, currently the most widely-used method for the verification of industrial applications. His current research activities include component-based design, modeling, and analysis of real-time systems with focus on correct-by-construction techniques (http://wwwverimag.imag.fr/~sifakis/).

Joseph Sifakis has broad experience with industry, notably though joint projects with partners such as Astrium, the European Space Agency, France Telecom, ST Microelectronics and he has also been active for many years in consulting.

Joseph Sifakis is the Scientific Coordinator of the European Network of Excellence ARTIST2 on Embedded Systems Design. (http://www.artist-embedded.org/). This network gathers 35 of the best European teams in the area, and aims to produce innovative results for cost-effective design of dependable embedded systems. It will also promote innovative methods safe and secure systems, notably through cooperation with key European industrial partners such as Thalès, Airbus, Ericsson, Philips, and ST Microelectronics.

Joseph Sifakis is the chair of "Chamber B" (Public Research Organisations) of ARTEMISIA, which is the Industrial Association within the ARTEMIS European Technology Platform on Embedded Systems (http://www.cordis.lu/ist/artemis/).

Joseph Sifakis is the director of the CARNOT Institute "Intelligent Software and Systems" in Grenoble. Joseph Sifakis is a member of the editorial board of several journals, co-founder of the International Conference on Computer Aided Verification (CAV) and a member of the Steering Committee of the EMSOFT (Embedded Software) conference.

Joseph Sifakis has received with Ed Clark and Allen Emerson for their contribution to Model Checking, the Turing Award for 2007 (http://awards.acm.org/homepage.cfm?srt=all&awd=140). He is also the recipient of the CNRS Silver Medal in 2001.

Keynote Lecture I

Distributed Estimation Using Wireless Sensor Networks

Professor Georgios B. Giannakis
University of Minnesota
USA

E-mail: georgios@ece.umn.edu

Abstract: Envisioned applications of wireless sensor networks (WSNs) include surveillance, monitoring and tracking tasks. These motivate well decentralized estimation and smoothing of deterministic and (non)stationary random signals using (possibly correlated) observations collected across distributed sensors. In this talk we present state-of-the-art algorithms for consensus-based distributed estimation using ad hoc WSNs where sensors communicate over single-hop noisy links. The novel framework reformulates basic estimation criteria such as least-squares, maximum-likelihood, maximum a posteriori, and linear mean-square error, as decomposable, constrained, convex optimization problems that are amenable to distributed solutions. The resultant distributed estimators are provably convergent to their centralized counterparts and robust to communication noise. Besides stationary, the framework encompasses adaptive filtering and smoothing of non-stationary signals through distributed LMS and Kalman filtering.

Brief Biography of the Speaker: G. B. Giannakis received his B.Sc. in 1981 from the Ntl. Tech. Univ. of Athens, Greece and his M.Sc. and Ph.D. in Electrical Engineering in 1983 and 1986 from the Univ. of Southern California. Since 1999 he has been a professor with the Department of Electrical and Computer Engineering at the University of Minnesota, where he now holds an Endowed ADC Chair in Wireless Telecommunications. His general interests span the areas of communications, networking, signal processing, estimation and detection theory -- subjects on which he has published more than 270 journal papers, 450 conference papers, two research monographs and two edited books. Current research focuses on wireless networks, complex-field and space-time coding, ultra-wideband and cognitive radios, cross-layer designs and wireless sensor networks. He is the (co-) recipient of six best paper awards from the IEEE Signal Processing (SP) and Communications Societies (1992, 1998, 2000, 2001, 2003, 2004) and also received the SP Society's Technical Achievement Award in 2000 as well as the EURASIP Technical Achievement Award in 2005. He is an IEEE Fellow since 1997, a Distinguished Lecturer for 2007-08, and has served the IEEE in various editorial and organizational posts

Keynote Lecture II
Tyflos : A Wearable System-Prototype for Assisting Visually Impaired

Dr. Nikolaos G. Bourbakis
Director, Information Technology Research Institute
Wright State University,College of Engineering and Computer Science
OBR Distinguished Professor of Information Technology
Department of Computer Science and Engineering
3640 Colonel Glenn Highway
Dayton, Ohio 45435-0001
United States of America

Phone: (937) 775-5138 Fax: (937) 775-5127
E-mail: nikolaos.bourbakis@wright.edu
URL: http://www.cs.wright.edu/itri/bourbakis/

Abstract: *Human eyes receive more than 75% of the total information accessible to the human senses.* "There are approximately 45 million blind individuals world-wide according to the World Health Report. Vision loss can be very traumatic, leading to frustration and depression. According to the American Foundation for the Blind (AFB), the rate of unemployment among legally blind individuals of working age residing in the United States (58%) is much greater than that of individuals with no functional limitations (18%). Employment opportunities and independence are scarce for visually impaired individuals. This is unfortunate in view of the fact that ingenious devices [IEEE Spectrum] and information technology (IT) strategies can be developed to help people overcome these barriers and to pursue educational opportunities that will allow them to become productive members of society." In this talk technological efforts are presented that have the same goal assisting and increasing the visual impaired people's independence in their working and living environment, and reducing their social neglect ness. In particular, the research effort (called Tyflos) is presented here that is an IT- based wearable system-prototype. It consists of a pair of dark glasses on which two tiny vision cameras, an ear speaker and a microphone are attached. The cameras are connected with a portable computer that carries intelligent software programs. The cameras, under the user's command, capture images from the surrounding and convert them via software programs into audio or vibrations. The current versions of Tyflos is used as 1) a reader by reading books or the blind user via audio conversion and 2) a navigation by converting 3D images into vibrations for navigation.

Brief Biography of the Speaker: Nikolaos G. BOURBAKIS (IEEE Fellow) received his PhD in computer engineering and informatics in 1983. He currently is the Associate Dean for Engineering Research, a Distinguished Professor of Informatics and the Director of the ATR Center at WSU. He has directed several research projects (Applied AI, Image Processing & Machine Vision, Visual Autonomous Navigation, Information Security, Bio-Informatics, Biomedical Engineering) funded by government and industry, and he has published near 300 papers in International refereed Journals, Conference proceedings and book-chapters. Previous working places: SUNY, IBM, UP, GMU. He is actively involved as an Associate Editor in several IEEE and International Journals and General Chair in numerous International IEEE Conferences. He is the EIC of the Artificial Intelligence Tools Int. Journal (WSP) and the new upcoming Bioinformatics Engineering Journal. He is an IEEE Computer Society Distinguished Speaker, and NSF University Research Programs Evaluator, an IEEE Computer Society Golden Core Member. He has received several high prestigious awards, some of them are: IBM Author recognition Award 1991, IEEE Computer Society Outstanding Contribution Award 1992, IEEE Outstanding Paper Award ATC 1994, IEEE Computer Society Technical Research Achievement Award 1998, IEEE I&S Outstanding Leadership Award 1998, IEEE ICTAI 10 years Research Contribution Award 1999, IEEE BIBE Leadership Award 2003, ASC Recognition Award 2005.

Keynote Lecture III

Algorithms for Rendering Depth of Field Effects for Synthetic Image Generation and Computational Photography

Dr. Brian A. Barsky
Professor of Computer Science
Affiliate Professor of Optometry and Vision Science
Member of Joint Graduate Group in Bioengeering, UCSF/UCB
Affiliate of Berkeley Center for New Media
Member of Berkeley Institute of Design
University of California, Berkeley
tel +1 (510) 642-9838
E-mail: barsky@cs.berkeley.edu
Web Page: http://www.cs.berkeley.edu/~barsky/

Abstract: Depth of field refers to the swath through a 3D scene that is imaged in acceptable focus through an optics system, such as a camera lens. It is a vitally important component of real photographs, and is useful as a tool for drawing the viewer's eye to the important part of the image. Depth of field is equally important for computer-generated images. This talk will provide an explanation of the phenomenon of depth of field and a survey of a variety of techniques to render depth of field effects in computer graphics, with particular attention devoted to the trade-offs between image quality and algorithm efficiency. Algorithms to render highly accurate depth of field effects, such as distributed ray tracing or the accumulation buffer, are sampling methods that use large numbers of samples, with high computational cost. Sampling is inherently slow because it effectively requires rendering the scene many times, which multiplies the render time by a potentially large factor. Faster algorithms are based on a post processing approach, which operates in image space. Post process methods operate on 2D images along with depth information, rather than working with a full 3D object representation as the sampling methods do. Consequently, post process methods struggle to accurately simulate the underlying optical process, and tend to suffer from artifacts or avoid those artifacts at a large cost. The talk will include an analysis of the nature of these artifacts.

Brief Biography of the Speaker: Brian A. Barsky is Professor of Computer Science and Affiliate Professor of Optometry and Vision Science at the University of California at Berkeley. He is a member of the Joint Graduate Group in Bioengineering, an interdisciplinary and inter-campus program, between UC Berkeley and UC San Francisco. He was a Directeur de Recherches at the Laboratoire d'Informatique Fondamentale de Lille (LIFL) of l'Université des Sciences et Technologies de Lille (USTL). He has been a Visiting Professor of Computer Science at The Hong Kong University of Science and Technology in Hong Kong, at the University of Otago in Dunedin, New Zealand, in the Modélisation Géométrique et Infographie Interactive group at l'Institut de Recherche en Informatique de Nantes and l'Ecole Centrale de Nantes, in Nantes, and at the University of Toronto in Toronto. Prof. Barsky was a Distinguished Visitor at the School of Computing at the National University of Singapore in Singapore, an Attaché de Recherche Invité at the Laboratoire Image of l'Ecole Nationale Supérieure des Télécommunications in Paris, and a visiting researcher with the Computer Aided Design and Manufacturing Group at the Sentralinsitutt for Industriell Forskning (Central Institute for Industrial Research) in Oslo. He attended McGill University in Montréal, where he received a D.C.S. in engineering and a B.Sc. in mathematics and computer science. He studied computer graphics and computer science at Cornell University in Ithaca, where he earned an M.S. degree. His Ph.D. degree is in computer science from the University of Utah in Salt Lake City. He is a Fellow of the American Academy of Optometry (F.A.A.O.). He is a co-author of the book An Introduction to Splines for Use in Computer Graphics and Geometric Modeling, co-editor of the book Making Them Move: Mechanics, Control, and Animation of Articulated Figures, and author of the book Computer Graphics and

Geometric Modeling Using Beta-splines. He has published 120 technical articles in this field and has been a speaker at many international meetings. Dr. Barsky was a recipient of an IBM Faculty Development Award and a National Science Foundation Presidential Young Investigator Award. He is an area editor for the journal Graphical Models. He is the Computer Graphics Editor of the Synthesis digital library of engineering and computer science, published by Morgan & Claypool Publishers, and the Series Editor for Computer Science for Course Technology, part of Cengage Learning. He was the editor of the Computer Graphics and Geometric Modeling series of Morgan Kaufmann Publishers, Inc. from December 1988 to September 2004. He was the Technical Program Committee Chair for the Association for Computing Machinery / SIGGRAPH '85 conference. His research interests include computer aided geometric design and modeling, interactive three-dimensional computer graphics, visualization in scientific computing, computer aided cornea modeling and visualization, medical imaging, and virtual environments for surgical simulation. He has been working in spline curve/surface representation and their applications in computer graphics and geometric modeling for many years. He is applying his knowledge of curve/surface representations as well as his computer graphics experience to improving videokeratography and corneal topographic mapping, forming a mathematical model of the cornea, and providing computer visualization of patients' corneas to clinicians. This has applications in the design and fabrication of contact lenses, and in laser vision correction surgery. His current research, called Vision-Realistic Rendering is developing new three-dimensional rendering techniques for the computer generation of synthetic images that will simulate the vision of specific individuals based on their actual patient data using measurements from a instrument a Shack-Hartmann wavefront aberrometery device. This research forms the OPTICAL (OPtics and Topography Involving Cornea and Lens) project.

Plenary Lecture I

Sliding Mode Technique in the Task of the Drive Control

Professor Sergey Ryvkin
Leading Researcher
Trapeznikov Institute of Control Sciences of Russian Academy of Sciences
Profsoyuznaya ul. 65,
117997, Moscow/ Russia
Phone.: +7-495-3342310
Fax: +7-495-4202016
Email: rivkin@ipu.rssi.ru

Abstract: The paper aims to explain the basic ideas related to the use of sliding-mode technique for the control design for an electromechanic drive system containing an AC motor and a converter. three-level voltage-source inverter. A comprehensive investigation of possible AC motors, converters and control plant structures was carried out. Based on this analysis different original design procedures for control design and observer design are presented. It's show the possibility to use the "classical" result of sliding-mode theory for the real drive systems with more then 2m switched structures (m is the control space order). The performance of the considered control and observer structure has been examined by simulation.

Brief Biography of the Speaker: Sergey Ryvkin (IEEE - M'06, SM'07), born 1951, graduated from Moscow Institute for Aviation Engineering (Dipl.-Eng.), Moscow, Russia, in 1974, received the Ph.D Degree from the Institute of Control Sciences of USSR Academy of Sciences, Moscow, Russia, in 1986 and the Dr. Sci. (Eng.) from the Supreme Certifying Commission of Ministry of Education and Science, Moscow, Russia, in 2006. He is a Corresponding Member of the Russian Academy of Electrotechnical Sciences (2008). Today he works as leading researcher in the Trapeznikov Institute of Control Sciences of Russian Academy of Sciences and as part-time professor at the Russian State University for the Humanities, Moscow, Russia. His research interest center in Nonlinear System Control and Variable Structure Systems with Sliding Mode as applied to electrical drives and power systems control and observation, robotic control. Since 1986 he was in change of the industrial projects between his Institute and different large Russian plants. He was granted MacArthur Foundation as an individual research (January 1994 to June 1995), German Academic Exchange Service as a visiting research (November 2006 to January 2007), Russian Foundation for Basic Research (2008) as a book writer. He has published more than 90 technical papers in international journals and conferences and has 6 invention certificates and has served as reviewer for different international journals and conferences.

Plenary Lecture II

Advances in Semiconductor Devices and Their Growing Use in Electrical Circuits and Systems

Professor Noel Y. A. Shammas
Staffordshire University
Faculty of Computing, Engineering and Advanced Technology
UK
N.Y.A.Shammas@staffs.ac.uk

Abstract: The main aim of this investigation is to asses the suitability of modern power semiconductor devices for pulse power applications. Pulse power system involves the storage of energy, which is released in form of high power pulse to the load by means of a switching device. Hence the basic components of pulse power system are an energy storage element, a switch, and a load circuit. The energy storage is usually either an inductive or capacitive nature. The limiting device in a pulse power system is often the switch, which limits the pulse peak power and the repetition rate. The switch element in this case is very special and falls into two basic categories: 1-Vacuum and gas filled switching tubes, 2- Solid-state (semiconductor) switches. The conventional approach in pulsed power designs is to use spark gap and gas filled switches such as thyratron and ignitron, because they truly possess the required characteristics for high power application. However, these devices have limited lifetime, high cost, low repetition rate and high losses. On the other hand high power semiconductor devices have under gone continued improvement in switching speed, voltage and current ratings and thus are replacing the conventional gas filled devices in some applications. Solid state devices are considered environmental friendly since they do not contain nasty gases and have perceived higher reliability than gas filled devices. In this paper, a complete overview of vacuum and gas filled switches and solid-state switches will be given. Very rarely these types of power semiconductor devices are characterised for pulse power applications and so the task of dimensioning a device simply from the datasheets is somewhat difficult and time consuming. Different methods for assessing their suitability will be described and a new technique to rapidly dimension the semiconductor device for pulse power application will be presented.

Brief Biography of the Speaker: Noel Shammas is currently a Professor in Microelectronics and Solid-State Power Semiconductor Devices in the faculty of Computing, Engineering and Advanced Technology, Staffordshire University. He received the M.Sc and Ph.D degrees from Salford University in 1972 and 1975 respectively. Since then he lectured and researched at different universities and industry. Research work is primarily focused on Power Semiconductor Devices which includes mainly Power diodes, Light Emitting Diodes (LED's), Insulated Gate Bipolar Transistors and Thyristors. Other related areas of research work includes Power Module Packaging technologies (Both Conventional Press- pack and Smart pack designs) and Series/Parallel operation of high power semiconductor devices and their interaction with external circuits. Professor Shammas has extensive experience in both experimental and theoretical research work and is recognised internationally for his significant contribution to research in the field of Power Semiconductor Devices. He has published over 120 journal and conference research papers as well as several invited Keynote Lectures, and has held several research grants from funding councils, Advantage West Midland (AWM), as well as from industry. He is a regular reviewer for many journals (including IEE Proceeding Electronic devices and systems, IEEE Transactions on power electronics, and Microelectronic Reliability) and international conferences (including the European Power Electronic conference - EPE, Microelectronic conference - MIEL, Universities Power Engineering Conference-UPEC, International Symposium Power Semiconductors-ISPS, etc…). He is a member of scientific committee for many international conferences (including MIEL, EPE, WCE, WSEAS, and Microtherm) and a steering committee member for EPE, UPEC, and ISPS international conferences. He is also a book reviewer for Prentice Hall International and McGraw Hill

Plenary Lecture III

Vibro-acoustic Techniques to Diagnose Complex Electromechanical Structures

Professor Francesco Muzi
Department of Electrical Engineering and Computer Science
University of L'Aquila
ITALY
E-mail: muzi@ing.univaq.it
Web site: http://www.diel.univaq.it/people/muzi/

Abstract: A diagnostics procedure based on signal processing of acoustic emissions aimed at investigating complex electromechanical structures is presented. Acquired signals emitted by a structure can be activated by either natural or artificial stimuli; when using artificial and known stimuli, that is to say, stimuli linked to a set of parameters representing "state vectors", the diagnostic method may prove to be very accurate. Signals are processed through the following stages: acquisition, segmentation, parameterization, classification and recognition. An a priori definition of the possible classes to which the system under investigation might belong is required. By means of a consultation of a predefined digital vocabulary of possible anomalies, the analysis process establishes the statistical "closeness" of the case examined to a reference model in the vocabulary and subsequently identifies the belonging class of the apparatus under checking. If the involved physical phenomena are well known, the classification can be performed using knowledge-based techniques, otherwise statistical procedures are recommended. In the past, diagnostic processes allowed to define only the object state at the moment of the investigation; nowadays, thanks to the availability of low-cost, huge digital memories and relevant power computation, the diagnostics processes allow also to predict the residual life expectation of complex jointed structures. The proposed monitoring and diagnostic method allows a time-by-time assessment of the evolution of power system components from the installation to their life end. The normal operating apparatuses can be monitored and checked from a remote, dedicated diagnostic center where information is received directly from the field. The suggested monitoring and diagnostic system allows one to usefully schedule preventative maintenance, reduce costs, and improve the quality of electric power systems. Many complex structures were examined, and some relevant real diagnostics cases concerning power transformers, power circuit breakers, and transiting electric trains are illustrated and discussed.

Brief Biography of the Speaker: Francesco Muzi is a professor of Power Systems at the University of L'Aquila, Italy, where he has also the scientific responsibility for the Power System Group. His main research interests concern Power systems transients and dynamics, Power quality in distribution systems, Power system reliability, Electromagnetic analysis, and Power systems diagnostics and protection. In these fields, he authored or co-authored over 100 scientific papers published in reviewed journals or presented at international conferences. For his contribution on Lightning Induced Overvoltages, he received mentions in books edited by John Wiley & Sons, New York and participated to the outline of the "IEEE Guide for improving the lightning performance of electric lines", IEEE Standards Department, New York. He has also a patent for an industrial invention, namely "Power system controlled by a microprocessor". He is a regional chairman of the Italian National Lighting Society and was a chairman or keynote lecturer in a number of international conferences organized by ISSAT (International Society of Science and Applied Technologies) and WSEAS. He is a technical reviewer for the following international journals: IEEE Transactions on Power Delivery, Electric Power Systems Research by Elsevier Science, IET Generation, Transmission & Distribution.

Plenary Lecture IV
Electromagnetic Low Frequency Radiation from Natural Phenomena - Data Analysis and Modelling

Professor Ernst D. Schmitter
University of Applied Sciences
Department of Engineering and Computer Sciences
Albrechtstr. 30, 49076 Osnabrueck
GERMANY

Abstract: Can severe weather conditions, volcanic eruptions or even earthquakes be predicted from monitoring and analyzing electromagnetic radiation especially in very and ultra low frequency ranges? What signatures in this frequency range leave solar wind, solar flare eruptions or gamma ray bursts from distant stars within the earths magnetosphere and ionosphere? The propagation properties of very low, extremeley low and ultra low frequency radiation (VLF/ELF/ULF, i.e. 30 kHz down to some milliHz) within the earths magnetosphere, ionosphere and lithosphere allow to deal with these questions and a lot of research has been done during the last decades. In some cases the generating physical process is obvious – as for example VLF sferic signals from lightnings. In other cases reliable modelling and confirmation is due yet - as with electromagnetic earthquake precursor signals. This survey will try to mediate some aspects of the advanced data analysis and data modelling procedures used to gain information out of the received signals despite of a usually very noisy background. Fourier- and wavelet transform based as well as statistically based features are used as input to neuro-fuzzy classifiers together with physical process models to form hybrid approaches to these complex systems.

Brief Biography of the Speaker: Dr. Schmitter is professor for mathematics and software technology at the University of Applied Sciences Osnabrueck, Germany since 1990. He is a member of the faculty of Engineering and Computer Sciences and teaches courses on applied mathematics, simulation (for example Finite-Element-Methods) and data analysis. He wrote several books in the computational intelligence area and published papers on data and signal analysis and modelling topics applied to material sciences and geophysics.

Plenary Lecture V

Application of Adaptive Cerebellar Model Articulation Controller in Control Problem

Prof. Chih-Min Lin
Chairman and Professor
Department of Electrical Engineering, Yuan-Ze University
Chung-Li, Tao-Yuan, 320, Taiwan
Tel: 886-3-4638800 ext 2418
Fax: 886-3-4639355
E-mail:cml@saturn.yzu.edu.tw

Abstract: Based on biological prototype of human brain and improved understanding of the functionality of the neurons and the pattern of their interconnections in the brain, a theoretical model used to explain the information-processing characteristics of the cerebellum was developed independently by Marr (1969) and Albus (1971). Cerebellar model articulation controller (CMAC) was first proposed by Albus. CMAC is a learning structure that imitates the organization and functionality of the cerebellum of the human brain. That model revealed the structure and functionality of the various cells and fibers in the cerebellum. The core of CMAC is an associative memory which has the ability to approach complex nonlinear functions. CMAC takes advantage of the input-redundancy by using distributed storage and can learn nonlinear functions extremely quickly due to the on-line adjustment of its system parameters. CMAC is classified as a non-fully connected perceptron-like associative memory network with overlapping receptive-fields. It has good generalization capability and fast learning property and is suitable for on-line application of control systems. This talk introduces several CMAC-based adaptive control systems; these control systems combine the advantages of CMAC identification, adaptive control and robust control techniques. In these systems, the on-line parameter training methodology, using the gradient descent method and the Lyapunov stability theorem, is proposed to increase the learning capability. Moreover, the applications of these systems in control problems are demonstrated. Simulation results illustrate that the introduced CMAC-based control systems can achieve favorable control performance.

Brief Biography of the Speaker: Prof. Chih-Min Lin is currently a Professor and the Chairman of the Department of Electrical Engineering, Yuan-Ze University, Taiwan. He also serves as the Committee Member of National Science Council, Control Branch; Chinese Automatic Control Society; Taiwan Fuzzy System and Science Society; and Taiwan Systems Engineering Society. During 1986-1992, he was with the Chung Shan Institute of Science and Technology as a Deputy Director of system engineering. He joined the faculty of the Department of Electrical Engineering, Yuan-Ze University, Taiwan, in 1993. During 1997-1998, he was the honor research fellow in the University of Auckland, New Zealand. He has served as the Deputy Chairman of IEEE Control Systems Society, Taipei Chapter in 1999-2000, now he is an IEEE Senior Member. Prof. Lin's research interests include fuzzy neural network, cerebellar model articulation controller, control system and systems engineering. He has published 84 journal papers and 120 conference papers. He has been awarded with the outstanding research professor and chair professor. He has given several plenary lectures and invited talks and served as the committee member in several international conferences. Now he also serves as the editorial board of 4 international journals.

Plenary LectureVI

On Dynamical Systems Describing Tumor Growth under Novel Therapies

Professor Urszula Ledzewicz
Department of Mathematics and Statistics,
Southern Illinois University Edwardsville,
Edwardsville, Illinois, USA

E-mail: uledzew@siue.edu

Co-Author

Professor Heinz Schattler
Department of Electrical and Systems Engineering,
Washington University,
St. Louis, Missouri, USA

Abstract: In this talk dynamical systems arising in biomedicine describing various treatments of cancer will be discussed. Mathematical models for cancer treatments have a long history, but with the development of medicine new challenges in modeling and the analysis of these models are appearing. Here novel cancer treatments and the mathematical models that describe their dynamics as systems of nonlinear ordinary differential equations will be presented. The focus primarily will be on mathematical models for tumor anti-angiogenesis. The importance of this novel treatment is that by targeting the cells of the vascularization of the tumor rather then the tumor itself, it is not prone to drug resistance and as such has been a topic of active research both in medicine and mathematical biology. In the talk a class of mathematical models for anti-angiogenesis will be analyzed. The nonlinear dynamics in these models illustrates the growth of the primary tumor volume and its corresponding vasculature as well as the effect of the control functions representing anti-angiogenic treatment on this growth. Following the analysis of this system with constant doses of the drug, the optimal control problem of how to schedule an a priori given amount of angiogenic inhibitors so as to minimize the primary tumor volume will be considered. Examples of optimal protocols resulting from the analysis will be given. Then, following medical research on so-called combination therapies, the model will be augmented to include the effect of traditional chemotherapy on the system. Due to the multi-control aspect, even with simplified dynamical equations, this becomes a challenging problem mathematically and some initial results about the structure of optimal controls will be presented.

Brief Biography of the Speaker: Urszula Ledzewicz received her Ph. D in 1984 from the University of Lodz, Poland. Since 1986 she has been holding academic positions in the United States, first as a visiting faculty at Louisiana State University, Baton Rouge, and then at Southern Illinois University, as a tenured faculty in the rank of the Full Professor since 1995. Her research area is primarily control theory and optimization, but in more recent years she became interested in applications of the methods of optimal control and systems theory to biomedicine. Currently her main direction of research includes analysis of systems describing dynamics of cancer growth under various treatments like chemotherapy or anti-angiogenesis. She is a member of five editorial boards including Discrete and Continuous Dynamical Systems, Series B, and Mathematical Biosciences and Engineering and author or co-author of close to 100 publications in refereed journals and proceedings of international conferences. She was invited to present lectures at various mathematical and engineering oriented conferences as well as was a member of the organizing committees or co-organized sessions or mini-symposia at several of them like IEEE Conferences on Decision and Control (CDC), Mathematical Theory of Network and Systems (MTNS) or World Congress of Nonlinear Analysts (WCNA). For her research she was awarded several grants from the National Science Foundation, NATO and her university.

Plenary LectureVII

Dissipation Normal Forms and Further Applications of Lyapunov-Tellegen's Principle

Professor Milan Stork
Department of Applied Electronics and Telecommunications
Faculty of Electrical Engineering
University of West Bohemia
P.O. Box 314
30614 Plzen, Czech Republic
Email: stork@kae.zcu.cz

Abstract: Almost in any field of science and technology some sort of stability problem can appear. Instability and chaos are certainly the most important phenomena which should be treated before any other aspect of reality will be attacked. Hence it is not very surprising that a broad variety of approaches to the problem of stability, instability and analysis of chaotic phenomena exists. Many of the most popular techniques in the field of stability and chaos are in a certain sense related to the work of A.M.Lyapunov and can be seen as energy oriented. The Tellegen's theorem is one of the well known forms of energy conservation statement in the field of electrical engineering. The most important feature of Tellegen's approach is the fact that the energy conservation principle holds without any regard to physical nature of constituent network elements. This is the key idea of the proposed approach to problems of dissipativity and chaos. The first situation arises if an energy function E[x(t)] of a given system is known in a mathematical form. In such example the time evolution of internal energy along any system motion can be described, and an energy monotonicity test can be used. In the proposed lecture a physically motivated signal-system-theoretic approach, based on a generalisation of the well known Tellegen's principle of electrical circuits will be presented. Two fundamental concepts are of crucial importance in the proposed approach. The first one is the concept of strongly non-linear power-informational interactions, and the second one is the notion of state space energy vector, inducing the system state-space topology. All computations, including numerical solutions of differential equations, were done using MATLAB.

Brief Biography of the Speaker: Milan Stork received the M.Sc. degree in electrical engineering from the Technical University of Plzen, Czech Republic at the department of Applied electronics in 1974 and Ph.D. degree in automatic control systems at the Czech Technical University in Prague in 1985. In 1997, he became as Associate Professor and in 2007 professor at the Department of Applied Electronics and Telecommunication, faculty of electrical engineering on University of West Bohemia in Plzen, Czech Republic. He has numerous journal and conference publications. He is member of editorial board magazine "Physician and Technology". His research interest includes analog/digital linear and nonlinear systems, control systems, signal processing and biomedical engineering, especially cardiopulmonary stress tests systems.

Plenary Lecture VIII

Controllability and Observability of Multi-time Linear PDE Systems

Professor Constantin Udriste
University Politehnica of Bucharest
Faculty of Applied Sciences
Department of Mathematics
Splaiul Independentei 313
060042, Bucharest, ROMANIA
Email: udriste@mathem.pub.ro,
c_udriste@yahoo.com

Abstract: Since the obstruction of complete integrability conditions (path independent curvilinear integrals) is very strong, the control problems for multi-time first order PDEs were studied only in the discrete context. Now, to preserve the geometrical character of the problem, we present a continuous approach for the controllability and observability properties of multi-time completely integrable linear PDEs systems (holonomic evolution), overcoming the extant mathematical prejudices regarding the importance of a multi-time evolution. Our geometrical arguments show that each basic theorem has a correspondent in the case of single-time linear controlled ODEs system. The main results include controllability criteria and the equivalence between controllability of a PDEs system and the observability of the dual PDEs system. All of these show that the passing from controlled single-time evolution to the controlled multi-time evolution is not trivial. Changing the geometrical language, the case of nonholonomic evolution can be recovered easily from our theory.

Brief Biography of the Speaker: Constantin Udriste was born in Turceni, Gorj, Romania on January 22, 1940. He earned his professor title from University of Timisoara in 1963 and his PhD from University Babes-Bolyai from Cluj-Napoca in 1971. Now he is Full Professor of Mathematics and Dean of the Faculty of Applied Sciences at University Politehnica of Bucharest. Also it is President of Balkan Society of Geometers. Udriste has served on many advisory committees and editorial boards, and was the main organizer of over 10 International Mathematical Meetings. He is author and contributor of over 40 books, over 200 articles to mathematical journals and over 200 papers to mathematical meetings. Topics: group of motion, properties of the tangent bundle, almost coquaternion metric manifolds, variational calculus on Riemannian manifolds, Finsler-Lagrange-Hamilton manifolds, Riemannian convexity and optimization, magnetic dynamical systems, geometric dynamics and optimal control, the theory of spatial mechanisms, solar tower concentrator. A person of incredible energy and entusiasm, Udriste has trained 12 PhD students, many of whom are now faculty members. Udriste has been the recipient of the following honors and awards: Dragomir Hurmuzescu Prize, Academy of Romania, 1985; Award for Distinguished Didactic and Scientific Activity, Ministry of Education and Instruction of Romania, 1988; Correspondent Member of the Academia Peloritana dei Pericolanti, 1997-; Member Research Board of Advisors, ABI, 1999-. Prize COPIRO - 2000 for Exact Sciences; Premio Anassilaos International 2002, Arte Cultura Scienze.

Plenary Lecture IX

Advances in Brain Research through Systems Science and Engineering Methods

Professor George Vachtsevanos
School of Electrical and Computer Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332-0250
Phone: (404) 894-6252
Fax: (404) 894-7583
Email: gjv@ece.gatech.edu,

Abstract: This plenary talk will present research advances in neurotechnology that are aiming to improve the quality of life of patients suffering from neurological disorders. We will focus on epilepsy as a typical severe disorder. Enabling technologies will be discussed that begin with intracranial monitoring techniques, such as IEEGs, and the analysis of signals to determine precursors to an epileptic seizure. The intent is to detect but primarily to predict in advance the seizure initiation. Upon detection/prediction, an electrical signal is transmitted to the areas of the brain suspected as the seizure source in order to terminate the seizure before is affects the patient. We will describe clinical results of an implantable device currently under development to implement the monitoring, signal analysis and intervention methods.

Brief Biography of the Speaker: George Vachtsevanos is a Professor Emeritus of Electrical and Computer Engineering at the Georgia Institute of Technology. He was awarded a B.E.E. degree from the City College of New York in 1962, a M.E.E. degree from New York University in 1963 and the Ph.D. degree in Electrical Engineering from the City University of New York in 1970. He directs the Intelligent Control Systems laboratory at Georgia Tech where faculty and students are conducting research in intelligent control, neurotechnology and cardiotechnology, fault diagnosis and prognosis of large-scale dynamical systems and control technologies for Unmanned Aerial Vehicles. His work is funded by government agencies and industry. He has published over 240 technical papers and is a senior member of IEEE. Dr. Vachtsevanos was awarded the IEEE Control Systems Magazine Outstanding Paper Award for the years 2002-2003 (with L. Wills and B. Heck). He was also awarded the 2002-2003 Georgia Tech School of Electrical and Computer Engineering Distinguished Professor Award and the 2003-2004 Georgia Institute of Technology Outstanding Interdisciplinary Activities Award.

Plenary Lecture X
Metamaterial Antennas and Finlines Using Full Wave Analysis

Professor Humberto César Chaves Fernandes
Department of Electrical Engineering,
Federal University of Rio Grande do Norte
77 Massachusetts Ave.
Lab. for Information and Decision Systems
Natal-RN, 59078-970, Brazil ,
P.O.Box 1583
Email: humberccf@ct.ufrn.br

Abstract: Metamaterials are been recently very used at telecommunications structures, and are defined as artificial effectively non-homogeneous electromagnetic materials with desired bi anisotropic dielectric and magnetic characteristics. In this paper the bilateral fin line and planar antennas with EBG – Electromagnetic Band Gap – metamaterial substrate is analyzed using the TTL - Transverse Transmission Line, concise full wave method. Fin lines are widely used as a millimeter wave component due to its various advantages such as reduced size, weight, and low cost and in addition because it interfaces easily with other millimeter wave circuits. This letter demonstrates an application of the EBG metamaterial: an efficient bilateral fin line and microstrip antennas. the analysis is made using the TTL method and the metamaterial substrates. This objective of this presentation is to show the effect of dielectric anisotropy on bilateral finlines shown in Fig. 1 and antennas. the paper discusses the effect of anisotropy, on effective dielectric constants, attenuation constant and the pattern E and H fields by applying the anisotropy one by one in all three directions. the EBG medium can not be characterized by assigning a single permittivity and permeability value for throughout the finite structure. In other words, the parameters depend on the spatial coordinates and this causes spatial dispersion. As a result of this, the medium will not be homogenous. for a non-homogeneous structure, the incident wave undergoes a process of multiple scattering. the substrate shown in region 2 of Fig.1 is modeled by utilizing bianisotropic tensor properties, which are expressed as:

To calculate the numerical results a computational program in Fortran PowerStation language, according to the theoretical analyses was developed. Compared to other full wave methods, the TTL is an efficient tool to determine the fin line and antennas characteristics, making possible a significant algebraic simplification of the equations involved in the process, and reducing the computational time.

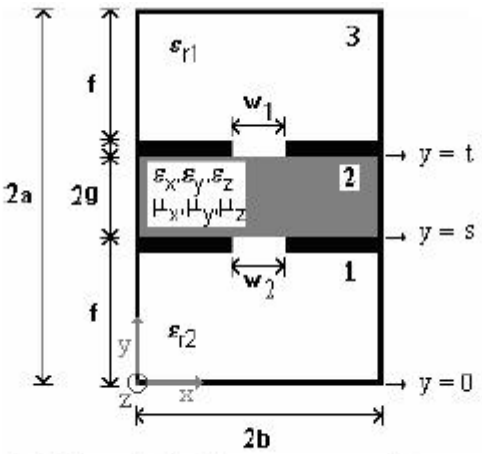


Fig. 1 – Transversal cut of a bilateral fin line structure with metamaterial EBG substrate.

the effective dielectric constant, the attenuation constant, and the pattern E and H fields are obtained. Comparison with the literature is presented. the new results obtained in 3D for these applications are presented at first time.

Brief Biography of the Speaker: Humberto Cesar Chaves Fernandes was born in Martins-RN, Brazil. He received with laude the B.S. in Electrical Engineering from the Federal University of Rio Grande do Norte-UFRN, Brazil in 1977, the M.S. (1980), PhD (1984) degrees and Postdoctoral program (1986) from the State University of Campinas-UNICAMP, San Paulo, Brazil. His current research interests are microwave, millimeter waves, smart antennas array, superconductivity, semiconductor, neural networks, electromagnetic, photonics, metamaterial, dynamic methods and applications. Prof. Fernandes has more then four hundred published works. Since 1978 he is at the Electrical Engineering Department from the UFRN, where he is a Senior Researcher and Titular Professor. Prof. Fernandes was General Chair of the ITS2002-SBrT/IEEE Consoc 2002, Natal-BR, SBT1993, Natal-BR, I,II, III and IV SPET, Natal-BR, TPC Chair of the IMOC/IEEE-MTT 1997, Natal-BR, SBMO2002, Recife-PE, BR, PIERS 2007, Beijing-China, PIERS 2007, Theca Republic, and member of various another National and International Committee Conferences, including WSEAS 2004, IMOC2001, IMOC2003, IMOC2005, IMOC2007, SBMO2000. Prof. Fernandes is member of the SBrT (Brazilian Telecommunications Society), IEEE CONSOC (USA), SBMO (Brazilian Microwave and Optoelectronics Society), SBPMat (Brazilian Materials Research Society) and Fellow of the Electromagnetics Academy (USA).

Plenary Lecture XI

Queuing and Loss Network Models: Computational Algorithms and Asymptotic Analysis

Professor Hisashi Kobayashi
Princeton University, USA
E-mail: hisashi@Princeton.edu

Abstract: Queueing network theory has been successfully applied by computer and communication system modelers to represent the inherent contention and congestion in multiple resource systems, to identify the system bottlenecks, and to assess the performance limits. A queueing network model provides a suitable framework for analyzing the performance of "connection-less services" in a packet switched network. the so-called "product-form" networks such as Jackson network and its generalizations, allow such performance metrics as throughput and the mean delay to be represented by a ratio of the "normalization constants" with different arguments. Connection-oriented services, such as the conventional circuit-switched telephone networks and end-to-end flow connections over the Internet can be properly represented by loss network models. the loss network theory is a relatively recent development, and can be viewed as an extension of the classical Erlang and Engset loss models. We will discuss interesting relations between queueing networks and loss networks, and show that the computational algorithms developed for queueing networks are equally applicable to the normalization constants and performance metrics in loss networks as well. Finally, we will discuss the case of large systems, where even most efficient algorithms for exact solutions are computationally infeasible. Recent development for approximation techniques and asymptotic performance limits will be reviewed.

Brief Biography of the Speaker: Hisashi Kobayashi is the Sherman Fairchild University Professor of Electrical Engineering and Computer Science at Princeton University since 1986, when he joined the Princeton Faculty as Dean of the School of Engineering and Applied Science (1986-91). Prior to joining Princeton he worked for the IBM Research Division for 19 years (1967-86). He was the founding director of IBM Tokyo Research Laboratory (1982-86). He received his BS (1961) and MS (1963) from Tokyo University and his MA (1966) and Ph.D.(1967) from Princeton. He was a radar engineer at Toshiba, Japan (1963-65). His principal fields of research are system modeling and analysis, queuing theory and signal processing algorithms. He has also worked on data transmission theory, digital magnetic recording, optical network architectures, wireless geolocation algorithms, and network security. He was a recipient of the 2005 Eduardo Rhein Technology Award of Germany for his 1969 invention of a high-density digital recording scheme, now widely known as PRML (partial response coding, maximum likelihood decoding). He is an IEEE Fellow (1977), IEEE Life Fellow (2003), and IEICE Fellow (2004). He received the Humboldt Prize of West Germany (1979) and IFIPS Silver Core (1980), and is a member of Japan's National Academy of engineering (1992). He published "Modeling and Analysis" (Addison Wesley, 1978) , coauthored with Brian Mark a textbook "System Modeling and Analysis" (Pearson-Prentice Hall, 2008) and is currently working on "Probability, Random Processes and Statistical Analysis," to be published by Cambridge University Press in 2009.

Plenary Lecture XII

Intrusion Detection in Modern Optical Networks and Countermeasures

Professor Stamatios Kartalopoulos
University of Oklahoma,
USA
E-mail: kartalopoulos@ou.edu

Abstract: Optical networks are considered to be intrusion-resistant by virtue of the fiber medium. the common belief is that the optical fiber is difficult to tap, as compared to copper wire and to wireless media. In fact, this is a simplistic view because stripping a cable and tapping a fiber with tools that are commercially available is a relatively simple task to the sophisticated intruder. Moreover, because the fiber link is many kilometers long, the fiber cannot be guarded; this presents a tremendous opportunity and flexibility to the intruder to select the point of intrusion unnoticed. Therefore, it is important that the network is sophisticated enough to monitor and detect intrusions, differentiate from possible component failure and degradation, and upon detection of fiber attacks, it executes automatic countermeasures, outsmarting the intruder. In this talk, we describe automatic intrusion detection methods and countermeasure strategies in modern optical networks.

Brief Biography of the Speaker: Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking at the University of Oklahoma. His research emphasis is on optical communication networks (FSO, long haul and FTTH), optical technology including optical metamaterials, and optical communications security including quantum cryptography and key distribution. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence. He holds nineteen patents in communications networks, and he has published more than hundred scientific papers, seven reference textbooks important in advanced fiber optic communications, and has also contributed chapters to other books. He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences,. He has been keynote speaker of major international conferences, has moderated executive forums, has been a panelist of interdisciplinary panels, and has organized symposia, workshops and sessions at major international communications conferences. Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, member at large of IEEE New Technologies Directions Committee, and he has served as editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine/Optical Communications, member of IEEE PSPB, and VP of IEEE Computational Intelligence Society.

Plenary Lecture XIII

Video and Audio Compressions and Human Perception Mechanism

Professor Michael Bank
Dept. of Communication Engineering,
HIT-Holon Institute of Technology
Israel
E-mail: michaelbank@bezeqint.net
Websites: http://www.hit.ac.il/staff/commEng/Michael_Bank/M_Bank.html
http://ofdma-manfred.websplanet.com/

Abstract: A proposal is put forward for a possible explanation of human perception algorithm. the main conclusion of different kinds of art perception examination is necessity of big part of signal redundancy. It turned out, that there are common methods of redundancy creation in different kinds of art like painting, architecture, music and speech. It is shown the common peculiarities of human processing of video and audio information. On the other hand, due to the limited bandwidth in communication channels, transmitted signals must be compressed. This begs the question – what should be transmitted in these types of signals, if a large part of them is removed by the system controlling the sensor-brain?

Brief Biography of the Speaker: Professor Michael Bank received the B.A and M.Sc. degrees in communicational engineering from the Leningrad Institute of Communications in 1960, received the Ph.D. degree in 1969 in the field of FM signal detection. He received Doctor of Science degree (Russian equivalent of professor) in 1990. Since 1992 he is a consultant in Israel communicational company Bezeq and a professor in the Holon Institute of Technology (HIT). His research interests include mobile communication systems theory and video and audio compression methods.

Plenary Lecture XIV

New Directions in the Design of Secure Wireless Systems Using Chaotic Signals and Interference Mitigation Techniques

Professor Peter Stavroulakis
Technical University of Crete,
Chania
GREECE
Telephone +30 28210 37333, +30 210 9651154
E-mail: pete_tsi@yahoo.gr

Abstract: One can say that the subject of security is as old as the subject of communications. In the area of wireless communications, Microwave radio from its introduction in the late 1940 to the present has become one of the primary media for transmitting information from point to point and from a point to a given area. the advent of Satellite communications technology in 1962 and consequent sharing of bands between satellite and radio relay coupled with the explosive growth of Microwave radio routes and mobile communications has led to increased sharing of frequency spectrum and to generation of increased mutual interference. This added interference is playing a dominant role in limiting the capacity, efficiency, reliability, security and cost of modern communication systems. Thus we now have an added problem in Wireless systems which for Satellite Communications has been coded as space security. Security is of major concern of the environment in which various communication systems coexist either in the same or adjacent frequency bands and is also caused by non-ideal mainly nonlinearity mechanisms utilized in the process of communication. the subject of interference has become again an important area of major concern in recent years related to Security due to the widespread use of mobile and wireless terrestrial systems for voice communication. Having studied and solved the problem of sending the information reliably, it was then necessary to study ways to transmit the information securely. for wireless mobile systems this problem was partially solved by using various encryption techniques. In this tutorial we shall present a review of the areas that require further study and we will show for the first time why the existing security mechanisms including cryptography do not necessarily solve the security problems in various wireless systems. We shall propose ways to move forward using as an example a new methodology based on Chaotic techniques. This methodology is based on two recent books by the author and an International Patent by the author which what was thought as an impossible task i.e to make chaotic signal based secure communications robust is now proved possible. This Tutorial will benefit young researchers, designers of large scale Secure Telecom Systems such as those used in World class events as are the Olympic Games and University Instructors who are seeking to put together instruction material for new courses.

Brief Biography of the Speaker: Peter Stavroulakis received his BS and Ph.D. degrees from New York University in 1969 and 1973 respectively and his MS degree from California Institute of Technology in 1970. He joined Bell Laboratories in 1973 and worked until 1979 when he joined Oakland University in Rochester Michigan as an associate Professor of Engineering. He worked at Oakland University until 1981 when he joined ATT International and subsequently NYNEX International until 1990. From 1990 to present he has been at Technical University of Crete. He joined the Technical University of Crete (TUC) Greece as a full Professor of Electrical Engineering in may 1990. His work at Bell Labs and Oakland University resulted in the publication of an IEEE reprint book on Interference Analysis of Communication Systems and the publication of a number papers in the general area of telecom systems. He is also the Author/Editor of twelve other Books in the general Area of Telecommunication Systems. He has presented many Tutorials in International Conferences on security Applications in Telecommunications the second. While at ATT and NYNEX he worked as a Technical Director whose

responsibility was to lead a team dealing with techno-economic studies on various large National and International Telephone Systems and Data Networks. When he joined TUC, he led the team for the development of the Technology Park of Chania and has had various administrative duties besides his teaching and research responsibilities. Prof. Stavroulakis is the founder of the Telecommunication Systems Institute of Crete, a research center for the training of Ph.D. students in Telecommunications, associated with and in close collaboration with various research centers and Universities in Europe and U.S.A. He now has a very large research team, the work of which is funded by various public and private sources including European Union. He is a member of the Editorial Board of the International Journal of Communications, International Journal of Satellite Systems and Networking and has been a reviewer for many Technical International Journals. His current research interests are focused on the application of various heuristic methods on Telecommunications, including Neural Networks, Fuzzy Systems and Genetic Algorithms and Chaos also in the development of new schemes to increase security in Mobile and Wireless Systems. Recently he has become Member of the Editorial Board of CHINA COMMUNICATIONS and a Leading Turkish Electronics Journal

Plenary Lecture XV
Computational Intelligence Solutions for Biometrics

Professor Victor-Emil Neagoe
Depart. of Electronics, Telecommnunications and Information Technology,
Polytechnic University of Bucharest,
Splaiul Independentei 313, Bucharest, Romania

Abstract: The word **biometrics** is a combination of the Greek words **bio** and **metric**. When combined, it means "life measurement." Biometrics concerns the study of automated methods for identifying an individual by measuring one or more physical or behavioral features of him. Certain physical human features or behaviors are characteristics that are specific and can be uniquely associated to one person. Common physiological biometric traits include: fingerprints, hand geometry, retina, iris, DNA and facial images. Whereas, common behavioral biometric traits include: handwriting, voice print, gait, and keystroke rhythms. Nowadays biometrics is rapidly evolving; it becomes more and more attractive and effective in critical applications, such as to create safe personal IDs, to control the access to personal information or physical areas, to recognize terrorists or criminals, to study the movements of people, and to monitor the human behavior. Several governments are now using or will soon be using biometric technology. The U.S. INSPASS immigration card and the Hong Kong ID card, for example, both store biometric features for authentication. Computational intelligence (CI) is a fastmoving research field with approaches primarily based on neural networks, machine learning, fuzzy logic, genetic algorithms and evolutionary computing. Computational intelligence (CI) technologies are robust, can be successfully applied to complex problems, are efficiently adaptive, and usually have a parallel computational architecture. For those reasons they have been proved to be effective and efficient in biometric feature extraction and biometric matching tasks, sometimes used in combination with traditional methods. In this lecture we survey two kinds of major applications of CI in biometric technologies: CI-based feature extraction and CI-based biometric matching. We also present the original contribution of the author regarding some CI solutions for facial image recognition and iris identification.

Brief Biography of the Speaker: Dr. Victor-Emil Neagoe is a Professor of the Department of Electronics, Telecommunications, and Information Technology at the Polytechnic University of Bucharest, Romania. He teaches the following courses : Pattern Recognition and Artificial Intelligence; Digital Signal Processing; Computational Intelligence ; Detection and Estimation for Information Processing. He co-ordinates 12 Ph.D. candidates. His research interest corresponds to the fields of pattern recognition, computational intelligence, biometric technology, satellite image analysis and sampling theory. Prof. Neagoe is author of more than 110 published papers. His has internationally recognized results concerning concurrent self-organized maps, face recognition, optimum color conversion, syntactical self-organized maps, nonuniform sampling theorems, inversion of the Van der Monde matrix, predictive ordering and linear approximation for image data compression, Legendre descriptors for classification of polygonal closed curves. He has been included in Who's Who in the World and Europe 500 and he has been nominated by the American Biographical Institute for American Medal of Honor and for World Medal of Honor. He has been a Member IEEE since 1978 and a Senior Member IEEE since 1984.

Plenary Lecture XVI
Post Modern Ubiquitous Information Society
- Bridging the gap between human and computer -

Professor Norio Shiratori
Research Institute of Electrical Communication (RIEC)
Tohoku University,
JAPAN

Abstract: Famous Russian economist, Nicolai Kondratiev envisioned a long term (50 to 60 years) economic cycles of boom followed by depression, known as "Kondratiev waves", or grand supercycles. These cycles are closely related to the innovation of new technologies and its wide spread applications. The last boom was in 1960s with the invention of semiconductors and subsequently the introduction of computer. According to Kondratiev time-cycle, new technology and the consequent next economic peak would appear around year 2025. By that time, with the advancement of computer and communication technologies we can perceive a transformation from the present Information society to a new society, that we named as Symbiosis society. We have already witnessed that, invention of new technologies has made a huge impact on our life style and the society itself. Though it may provide various advantages and convenience, at the same time many social problems have also arisen. For some particular group of people, this technological development may not be as helpful as the rest. As they will be unable to take the full advantage of the benefits of information and facilities available. Actually it may pose anxiety and inconvenience to various layers of the society in different ways. To overcome these problems and to close the expected gap between human and computer a new information and communication paradigm is proposed, named as Symbiotic Computing. To overcome the above mentioned shortcomings and the subsequent problems, at the same time strengthening the power of advance ubiquitous computing environment, a new paradigm, called Symbiotic Computing is created. Based on this novel idea of Symbiotic Computing, Symbiosis Society can be realized, where human and ubiquitous information environment can coexist providing necessary cooperation to each other and close the gap between these two entities. We construct a symbiotic computing model and an architecture of symbiotic space for achieving the concept of symbiotic computing. Basic technologies for realizing the model and architecture are also developed. Moreover, we evaluated our proposal through developing a few applications and performing trial experiments in prototype system.

Brief Biography of the Speaker: Norio Shiratori is currently a Professor at Research Institute of Electrical Communication (RIEC), Tohoku University, Japan. Before moving to RIEC in 1993, he was the Professor of Information Engineering at Tohoku University from 1990 to 1993. Prior to that, he served as an Associate Professor and Research Associate at RIEC, Tohoku University, after receiving his Doctoral degree from Tohoku University in 1977. He was also served as the vice Director of RIEC, Tohoku University, vice President of IPSJ (Information Processing Society of Japan) and IFIP representative of Japan. He is a fellow of IEEE, IPSJ and IEICE. Professor Shiratori also contributes through serving as various capacities, such as: General Chair of the 9th IEEE ICOIN-9(1994), 1997 IFIP Joint International conference FORTE/PSTV'97, and 12th IEEE ICOIN-12 (1997); Program Chair of ICPADS'96 and ICPP-99 (1999). Dr. Shiratori was one of the leaders in Japan Gigabit Network (JGN) national project as is leading two other projects: SCOPE - funded by Ministry of Internal Affairs and Communications and JSPS sponsored "Mirai-kaitaku" project. In 2006, the proposed idea of his research group on Mobile IPv6MIB was approved and standardized by IETF. He has been engaged in research related to symbiotic computing paradigms between human and information technology and distributed processing systems and flexible intelligent networks. He has proposed a new concept of Flexible Computing and still working in this direction. His recent research interest is in Ubiquitous and Symbiosis computing. He has published more than 15 books and over 400 referred paper in computer science. He was the recipient of IPSJ Memorial Prize Wining paper award in 1985, Telecommunication Advancement Foundation Incorporation award in 1991, best paper award of ICOIN-9 in 1994, IPSJ best paper award in 1997, and many others, including the most recent Outstanding Paper Award of UIC-07 in 2007.

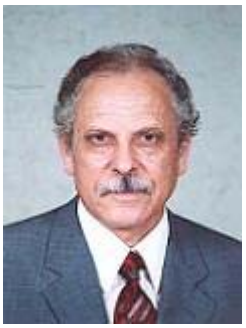
Plenary Lecture XVII
Symbolic Computing in Engineering Simulations and Education

Professor Marcin Kaminski
Chair of Mechanics of Materials, Technical University of Łódź
Faculty of Civil Engineering, Architecture and Environmental Engineering
Al. Politechniki 6, 93-590 Łódź, tel/fax 48-42-6313551
POLAND,
E-mail: marcin.kaminski@p.lodz.pl

Abstract: Symbolic computations nowadays still extend the area of potential applications in a variety of the fundamental and applied sciences and, especially, in different branches of the modern engineering. Now, using such computer systems as MAPLE, MATHEMATICA, MATLAB or MATHCAD for instance, it is possible to solve the complex systems of partial differential, make precise visualizations of the observed dynamical systems or to perform some statistic or stochastic simulations of the non-deterministic systems. The quality of those computer environments in terms of interoperability with the other programs (like the Finite or Boundary Element as well as Finite Difference Methods source codes), computer time cost, visualization tools and the number of ready-to-use available applications still dramatically increases. Relatively simple differentiation methods, both symbolic and numerical, frequently leed the users to apply symbolic computations programs to sensitivity and optimization studies, whereas a wide range of statistical tools enables uncertainty inclusion and estimation in various unstable systems computations finished with the reliability prognoses. At the same time symbolic computer systems are very valuable educational tools for mathematicians, physicians and the engineers because the students after primary demonstration of some problem solution may easily follow the teacher, whereas the powerful visualization may help to understand the methods not only by numbers and symbols but also using the graphs and animations. Therefore, the main aim of the lecture is to make a review of the recent advances in designing, capabilities, implementation, various machines and operating systems performance as well as the applications for the symbolic computer programs using, as the example, the system MAPLE. The recent research applications in composite materials modeling and stochastic analysis will be shown together with the case studies used in the civil and mechanical engineering practice and some examples used in undergraduate, graduate and doctoral courses. Some new ideas concerning the symbolic computations packages and their general ideas will be also discussed.

Brief Biography of the Speaker: Marcin Kaminski, born in Torun, Poland, 17.02.1969. M.Sc. in Civil Engineering (1994) at the Technical University of Lodz, Poland, Ph.D. in Civil Engineering (1997) at the Technical University of Lodz,Poland, postdoctoral study at Rice University, Houston, TX, USA, 1999-2000, D.Sc. in Civil Engineering (mechanics of materials and structures) at the University of Technology Wrocław, Poland; university professor since 2007. Author of more than 140 papers in international conference proceedings and scientific journals, a monograph 'Computational Mechanics of Composite Materials' printed by Springer London-New York, 2005. Recipient of the prizes of the Foundation of Polish Science in 1996 and 1999, John Argyris Award in computational mechanics in 2001 and J.T. Oden Faculty Fellowship at ICES, UT, Austin in 2004. A member of many international scientific associations - IACM, IASS, GAMM, SIAM & USACM.

Plenary Lecture XVIII
Intelligent Techniques for Medical e-Learning Systems



Professor Abdel-Badeeh M. Salem
Faculty of Computer & Information Sciences
Ain Shams University, Abbassia, Cairo,
Egypt
Telephone: +202 2903906 – Mob. +2 012 218 2645
Email: absalem@asunet.shams.edu.eg
Web site: http://net.shams.edu.eg/27.htm

Abstract: Medical Intelligent e-Learning Systems (MILSs) are concerned with the construction of intelligent software that performs diagnosis and make therapy recommendations. Unlike other medical applications abased on other programming methods such as purely statistical methods, MILSs are based on symbolic models of disease and their relationship to patient factors. Many types of MILSs are in existence today and are applies to different medical tasks, e.g. generation alerts and remainders, diagnosis assistant, therapy critiquing and education . This talk presents some of the intelligent technologies used in developing intelligent medical learning systems at Ain Shams University, Cairo, are discussed as well.

Brief Biography of the Speaker: Prof. Dr. Abdel-Badeh M Salem He is a professor of Computer Science and Vice Dean of Faculty of Computer and Information Sciences at Ain Shams University, Cairo-Egypt, from 1996 to present. He was a professor of Computer Science at Faculty of Science, Ain Shams University from 1989 to 1996. He was a Director of Scientific Computing Center at Ain Shams University (1984-1990). His research includes intelligent computing, expert systems, medical informatics, and intelligent e-learning technologies. He has published around 170 papers in refereed journals and conference proceedings in these areas. He has been involved in more than 120 conferences and workshops as an Int. Program Committee and Session Chair. He is author and co-author of 15 Books in English and Arabic Languages. He was one of the founders of the following events, First Egyptian Workshop on Expert Systems 1987, Int. Cairo Conference on Artificial Intelligence Applications in 1992 and Int. Conf. on Intelligent Computing and Information Systems 2002, and one of the main sustainers of annual Int. Romanian Internet Learning Workshop Project (RILW), 1997. In addition he was Secretary of Egyptian Computer Society (1984-1990), Member of National Committee in Informatics – Academy of Scientific Research and Technology (1992-200), Member of Egyptian Committee in the Inter-Governmental Informatics Program, IIP-UNISCO, Paris (1988-1990) and Coordinator of the Annual International Conference for Statistics, Scientific Computing, and Social and Demographic Research (1983-1990). In addition he was a partner of a MEDCAMPUS Projects on Methodologies and Technologies for Distance Education in Mediterranean (1993-1995). He is a Member of the Editorial Board of the follwing Journals: Int. Journal of Computing and Information Sciences(IJCIS), Canada; Egyptian Computer Science Journal, EC Newsletter, Education in Computing and Computers in Education, Italy; Scientific Journal of Studia Universitatis Babes-Bolyai, Series Informatica, Cluj – Napoca, Romania; International Journal of intelligent computing in medical sciences and image processing (IC-MED), Japan; Egyptian Journal for Specialized Studies, Faculty of Specific Education,Ain Shams University,Egypt; Int. Journal of Intelligent Computing & Information Science",IJICIS, Egypt; Enformatika Transactions on Engineering, Computing and Technology, World Enformatika Society, Turkey; and Int. Journal of Soft Computing Approaches (IJSCA), Eurojournals. He is a Membership of Int. Scientific Societies: American Association of Artificial Intelligence (AAAI), USA; British Computer Society, Expert Systems Specialist Group (SGES), Int. Neural Network Society (INNS), USA; Association for the Advancement of Computing Education (AACE), USA; Int. Society for Computers and their Applications ((ISCA), NC, USA, Dec. 95); Int. Society for Telemedicine & eHealth ISfTeH,, Switzerland; Member of Int. Federation for Information Processing (IFIP) Technical Committee WG 12.5, Knowledge-Oriented Development of Applications, Austria (2000 till now), Member of Int. Association for Science and Technology for Development (IASTED), TC on AI and Expert Systems, Int. Association for Science and Technology for Development, Canada, (2000 till now).

Plenary Lecture XIX
Super-Object-Oriented Programming and Simulation

Professor Eugene Kindler
Profesor of applied mathematics, University of Ostrava,
Faculty of Science, Dept. of Computers and Informatics,
CZ - 701 03 Ostrava, 30. dubna no. 22,
Czech Republic
E-mail: ekindler@centrum.cz

Abstract: One applies simulation namely in studying complex systems and for that purpose special programming techniques were developed, among which the object-oriented programming (OOP) passed the domain of simulation over and became a universal technique of programming and of representation of concepts. A man-made system ***S*** designed in a modern way often uses a computer ***C*** for controlling its operation and – in case the controlling is complex – it uses also simulation and/or OOP. If such a man-made system ***S*** is simulated during its design phase, ***C*** should be reflected in the used simulation model ***M***, together with its operation, namely with the (simulation) model ***m*** and/or the represented concepts used by it; this statement can be exactly proved. So the "internal" model ***m*** should be "nested" in the "external" model ***M*** and often the system ***r*** of concepts represented for the purpose of ***m*** should be "nested" into the system ***R*** of concepts represented for the purpose of ***M***. The psychology demands the authors of the models to introduce the same names of concepts, of functions and of elements for both the models ***M*** and ***m***, although they essentially differ by their own relation to the simulated reality; for example, they have their own (mutually different) time flows; moreover, a danger of a fatal error called transplantation exists, consisting in assigning a name qualified in one of the models to an element belonging to the other one. There is a technique called super-object-oriented programming (SOOP) that allows secure and decipherable producing of such "nesting" models. It consists in enlarging the OOP by "life rules", i.e. algorithms according the instances of the concepts should behave, and local classes, that enable an instance ***E*** of a class to carry classes "nested" in it. In ***M***, ***E*** can simply model a modeling/simulating computer (or even a formalized human "manager" existing inside the system reflected by ***M***, who time to time anticipates possible future consequences of his own decisions). Surprisingly, SOOP was discovered already 41 years ago together with the OOP. The principles of solving obstacles in the nesting simulation models will be presented. The author led some works oriented to simulation of the sea harbors (especially container terminals), of the production halls equipped with auto-routed vehicles, and of the hospital sections, and in the Czech Republic and France such techniques were followed, namely in developing special "quasi-parallel" methods of optimizing and of nested simulation models of public transport, of circular conveyors and of systems of demographic development. Their details will be presented in special papers of their authors.

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 worked with a new University of Ostrava. Since 2006 he has been pensioned, collaborating with the same Ostrava University as external specialist in various research projects and in doctoral studies. During 1967-1973 he was responsible for special projects on information processing in radiation security and during 1973-1989 he was head of teams oriented to the fundamental research of modeling techniques. During 1995-2000 he represented Czech Republic activities at two COPERNICUS projects sponsored by the European Commission and oriented to sea harbor modernizing with use of modern information technology. Beside many shorter professional stays at foreign institutions, he worked as visiting professor with the University of Pisa (Italy, one year around 1969) and with West Virginia University (Morgantown, USA, one year around 1993), as invited professor and then as holder of French government professor scholarship with Blaise Pascal University (Clermont-Ferrand, 9 moths, around 1995 and 1998) and with the University of South Brittany (Lorient, France, 3 times one months in 2002-2004), and as a hosting lecturer with Humboldt University (Berlin, 3 months in 1983). His main professional interest is object-oriented simulation of discrete event systems, namely of those using their own private models for anticipating their future states. His private hobby is the chant originated during the first millennium A.D. in Europe and certain Near East Asian countries.

Plenary Lecture XX
Heterogeneous Reconfigurable Chip Multiprocessors for Embedded Systems

Professor Sotirios G. Ziavras
Associate Chair of ECE (in charge of Graduate Programs)
Director of the Computer Architecture and Parallel Processing Laboratory (CAPPL)
Department of Electrical and Computer Engineering (ECE)
New Jersey Institute of Technology
Newark, New Jersey
U.S.A.
E-mail: ziavras@adm.njit.edu

Abstract: Chip multiprocessing has recently become a common practice in processor design. With ever increasing concerns for energy consumption, performance-energy trade-offs are often necessary, especially in the design of real-time embedded systems. Multiprocessor heterogeneity is a successful design paradigm for high performance and energy conservation with embedded systems. Performance and energy analyses will be presented for an in-house developed FPGA*- based mixed-mode heterogeneous chip multiprocessor, where the SIMD (Single-Instruction, Multiple-Data) and MIMD (Multiple-Instruction, Multiple-Data) parallel computing modes can be realized simultaneously or distinctly. The presented performance-energy trade-off techniques are based on the observation that SIMD and MIMD tasks involve substantially different amounts of computation and communication with different execution time and energy behaviors. Experimental results on Xilinx FPGAs demonstrate the effectiveness of the proposed approach. To conserve space and power as well as to incorporate dynamic adaptability in embedded systems, it is important to utilize hardware components as best as possible. The hardware customization of application kernels reduces the execution time and potentially the power consumption. Reconfiguring the same hardware to facilitate various customized kernels as execution proceeds greatly reduces the space requirements. When the kernel execution is carefully scheduled considering also the reconfiguration overheads, the obtained performance gain can offset such overheads. A policy and experiments will be presented of customizing and reconfiguring multiprocessor hardware for embedded benchmark kernels implemented on FPGAs. The results reveal substantial performance improvement and resource conservation. * FPGA: Field-Programmable Gate Array

Brief Biography of the Speaker: Dr. Sotirios G. Ziavras received the Diploma in Electrical Engineering from the National Technical University of Athens, Greece, in 1984, the M.Sc. in Computer Engineering from Ohio University in 1985, and the Ph.D. in Computer Science from George Washington University (GWU) in 1990. He was a Distinguished Graduate Teaching Assistant and Research Assistant at GWU, and also received the Richard Merwin Ph.D. Fellowship. He was with the Center for Automation Research at the University of Maryland, College Park, from 1988 to 1989 focusing on supercomputing. He was a visiting Professor at George Mason University in Spring 1990. He joined in Fall 1990 the Electrical and Computer Engineering Department at NJIT as an Assistant Professor. He is currently a Professor at NJIT, with joint appointments in the Electrical and Computer Engineering, and Computer Science Departments. He also serves as the Associate Chair for Graduate Studies in ECE. He received the National Science Foundation (NSF) Research Initiation Award in 1991. In 1996 he lead an NSF/DARPA/NASA-funded New Millennium Computing Point Design project for PetaFLOPS computing. He has received research grants in excess of $2.5M. He has served as an Associate Editor of the Pattern Recognition journal and serves regularly as a member of Conference Program Committees. He is the author of about 140 scientific papers. He is listed, among others, in Who's Who in Science and Engineering, Who's Who in America, Who's Who in the World, and Who's Who in the East. His main research interests are reconfigurable computing, high-performance computing (architectures and applications), computer architecture and embedded systems.

Plenary Lecture XXI

Collaborative Learning in the University Education: from the Theory to the Practice

Professor Jaime Lloret Mauri
Department of Communications,
Polytechnic University of Valencia
Camino de Vera 46022,
Valencia - SPAIN
E-mail: jlloret@dcom.upv.es

Abstract: Collaborative learning an educational strategies that should be incorpored in all plan of studies in the university careers. It is considered as one of the main learning strategies in the Bologna process. In collaborative practices students are divided in groups to do their activities and they are evaluated by their productivity. The fact of doing a common task in which each one of them depends on and is accountable to each other, prepare the students personal and socially for the enterprise environment. It is demonstrated that this educational strategy improves students' communication habilities, enhances the students responsability and shows them how they should organize for any enterprise. This talk will review some practical examples and several study cases, and how they have been set up in order to obtain the best result. Collaborative learning basic elements such as objetives, environment, motivation, kind of process, individual contribution and group process steps, will be discussed. Examples and cases reviewed will show their benefits and the students results given when it is used.

Brief Biography of the Speaker: Jaime Lloret received his M.Sc. in Physics in 1997 at University of Valencia and he finished a postgraduate Master in Corporative networks and Systems Integration from the Department of Communications in 1999. Later, he received his M.Sc. in Electronic Engineering in 2003 at University of Valencia and his Ph.D. in telecommunication engineering (Dr. Ing.) at the Polytechnic University of Valencia in 2006. He is a Cisco Certified Network Professional Instructor of the regional academy "Universidad Politécnica de Valencia" in the Cisco Networking Academy Program (CNAP) and he is the Legal Main Contact of UPV-ADIF (local academy of the CNAP). He teaches at the "Escuela Politecnica Superior de Gandia" from the Polytechnic University of Valencia. He has been co-editor in several international conference proceedings, he is a editorial Board Member of several international journals and he has been a guest editor in several WSEAS journals. Dr. Lloret is a TPC member of WSEAS, IIS, IASTED, IARIA, and he has been involved in more than 20 IPCs of international conferences till 2007. He is the chairman of SENSORCOMM 2007 and Ubicomm 2008, both proceedings published by IEEE Computer Society Press. One of his main research interests are educational approaches and strategies.

Plenary Lecture XXII

Science Teachers' Collaborating Learning for Scientific Literacy: from Practice to the Practice

Dr. Michail Kalogiannakis
Researcher University Paris 5 - René Descartes
Laboratory: Education et Apprentissages
Web site: http://labo.eda.free.fr/article.php3?id_article=11
E-mail: mkalogian@hotmail.com

Abstract: In the information society, the ability to collect, develop, exchange, store and manage information from various and dispersed data along with the ability to generate additional information is essential. Distance learning is not a new phenomenon. The term distance learning is extensively used by colleges and universities to describe remote delivery of course contents. In the last three decades a rapid development of information and communication technology (ICT) has opened new horizons for distance learning providing new magnificent opportunities for mankind in the area of education. The traditional organisation of education creates often practical difficulties in using new technologies in class. The limited impact of ICT has as much to do with science teachers' attitudes and skills as with access to equipment. Science teachers should prepare their students for a multiplicity of roles that will be called to play in the future. We argue that there is a great need to restructure science teachers' education if we wish school science to serve the purpose of scientific literacy. The mailing lists can be used as collaborative work tools for interaction and dialogue creating educational communities. Generally speaking, online communities can offer a lot of opportunities to teachers which are comparable with face to face meetings. Those who communicate on-line maintain a variety of links, exchanging information, emotional aid creating complex relationships. Subscription to and participation in mailing lists could be a part of science teacher's on-going professional development. This particular individual commitment follows the logics of action of a social experience: integration, strategy and subjectivation. Science teachers belonging to mailing lists have specific interests in professional training, ICT and knowledge. Science and technology are two of the most important areas of the modern human culture. If science and technology education is meant to have any functional role to play in the future lives of the students, then a holistic reorientation of both its content and the association with that pedagogical approach is required. Although we can not predict how virtual learning environments will influence learning effectiveness, an important point to consider is that, for sciences teachers, a virtual space is an open space, a space where they can try new approaches. Teaching has always been an individual work: teachers do not collaborate a lot; they rarely attend to each others lectures, and they rarely exchange teaching material. The challenge here is to turn teaching into a collective performance using the paradigm of the mailing lists.

Brief Biography of the Speaker: Michail Kalogiannakis received his Bachelor in Physics in 1993 at the University of Crete and he acquired two postgraduate Masters in didactic of sciences and technology at the University Paris 7-Denis Diderot in 1994 and in sciences education at the University Paris 5-René Descartes in 2000. Later, he received his Ph.D in sciences education at the University Paris 5 in 2004. Michail Kalogiannakis is currently a researcher at the University Paris 5 (Laboratory: Education et Apprentissages) and he is working at the Hellenic Open University, at ASPETE (School of Pedagogical and Technological Education) and at TEI (Technological Educational Institute) of Crete. He is the author of a book in French concerning science teachers' education, distant education and pedagogy and co-editor of a book (in Greek) about distance-learning approaches in institutions of tertiary education. He has participated in several international conferences and has published a considerable number of research papers in journals, books and conference proceedings in English, French, Greek and Russian. His research interests concern science teaching and learning, ICT and science teacher's education and pedagogy.

Plenary Lecture XXIII

Measuring and Evaluating Perception and Expectation of Engineering Graduates in Malaysia

Assoc Prof Dr Azami Zaharim
Coordinator Fundamental Engineering Unit,
Head of Engineering Education Research Group,
Head of Engineering Mathematics Research Group
The Faculty of Engineering,
National University of Malaysia (UKM), Bangi, MALAYSIA
Phone Number: 03-89216843 Fax Number: 03-89216960
E-mail: azami@vlsi.eng.ukm.my

Abstract: This paper discusses a comprehensive study of employers' perception and expectation of Malaysian engineering graduates towards assessing measurable qualities. To have better overview in this issue, a survey on the needs, perception and expectation of Malaysian industries towards graduate engineers is conducted. In order to create a smoother transition from education to practice, some argue that engineering education should put more emphasis on the engineering-based knowledge. Thus, this study investigates also the gap analysis which is defined as the difference between expectation and perception among majority of Malaysian industries towards existing engineering graduates. For the purpose of this paper, both technical and generic attributes are analyzed and discussed. A total of 422 companies from various industries in Malaysia were chosen for the face-to-face interview sessions using a set of questionnaires. The respondents were mainly come from high ranking personnel in their firm. The outcomes of this study will later be considered as a revision guideline for the engineering education curricula of Malaysian Institutions of Higher Learning.

Brief Biography of the Speaker: Dr Azami Zaharim worked first 13 years .as a lecturer in the University of MARA Technology (UiTM) before joining the National University of Malaysia (UKM) in the year 2003. He has published more than 50 papers in Journal and proceeding at the national and international conferences. He is currently active involve in outcome based education approach at the national level. He is also involved in the research for the future of engineering education in Malaysia 2006 under the Ministry of Higher Education of Malaysia.

Plenary Lecture XXIV

Case Study as a Teaching Tool for Analysis of Real-World Problems: Applications of Mathematics in Engineering and Business Education

Professor Andrei Kolyshkin
Department of Engineering Mathematics and Riga Business School
Riga Technical University
LATVIA
andrejs.koliskins@rbs.lv

Abstract: Case study method is widely used in many business and law schools around the world to teach students about their fields using real-world business situations known as cases. The case method develops students' analytic and problem-solving skills. It is usually focused on an interest-arousing situation and stimulates students' active learning and participation. However, the case study method is not so widely used in engineering education. In the present paper we discuss some issues related to the use of mathematics as a tool for analysis of real-world problems through case studies. First, a brief history of case study method is presented. Second, advantages and disadvantages of case study methodology are discussed. Our experience in teaching mathematics to engineers shows that in order to be useful for engineering students, a case study should satisfy the following conditions: (1) The case should be based on a real-world problem; (2) Relatively simple mathematical models should be used to analyze the case; (3) Solution of complex, real-world problem requires knowledge of several mathematical methods (both analytical and numerical); (4) The results should be compared with experimental data. Several examples of real-world problems which can be solved with relatively simple mathematical methods are discussed in the paper such as leak and blockage detection in pipelines and bacteria regrowth in water distribution systems. Managerial statistics course is one of the core courses in many MBA programs. However, many students consider this course as one of the most difficult courses. There are several reasons for that: (1) many students have a negative impression about statistics course at undergraduate level; (2) some of them do not consider statistics as a useful tool in managerial decision making; (3) not all the students have solid background in mathematics and related areas. Case study as a teaching tool in these situations can help to overcome psychological barriers and stimulate students' active participation and develop necessary problem solving skills. Examples of real-world business situations which can be analyzed by means of statistical methods are given in the paper. Advantages and limitations of case study method are discussed.

Brief Biography of the Speaker: Andrei Kolyshkin received his undergraduate degree in Applied Mathematics in 1976 at the Riga Technical University. In 1981 he received a Ph.D in differential equations and mathematical physics at the University of St. Petersburg. Andrei Kolyshkin is currently a full professor at the Department of Engineering Mathematics at the Riga Technical University. His current research interests include investigation of stability problems in fluid mechanics with applications to open-channel flows and transient flows in hydraulic systems. He is the co-author of three monographs published by Academic Press and CRM. Andrei Kolyshkin has participated in more than 30 international conferences and has published amore than 50 papers in refereed journals since 1990. As a visiting professor and visiting researcher he spent a few years at the University of Ottawa and Hong Kong University of Science and Technology.

Plenary Lecture XXV

From The Real World To Models And Paradigms In Parallel Scientific Computing

Assoc. Prof. Ion Cârstea
University of Craiova,
ROMANIA
incrst@yahoo.com

Abstract: The people are not isolated actors on the world scene. They enter in competition and co-operation. This real scenario is the basis of the parallel computing and finally, the basis of the parallel computers. The work in the team with the principal characteristics, the co-operation and the collaborative competition, is an education model. Cooperation and collaborative competition must be the basis of the educational process from universities, aspects that are often ignored in educational politics from Romania. The nature models are the starting points in many human projects like the parallel processing of data. The nature models must be the starting points of the educational process with emphasis on the inter-human relations. The real world offers a lot of models and paradigms for engineers in the area of the computer science and engineering. In a high- performance education we can not ignore the large computing power of the advanced computers as the parallel computers. To ignore the high-level information technology is an anti-social act in any university. Unfortunately, many professors are the slaves of an old-fashioned mode of understanding the education in engineering. It is not a good practice to solve a problem in any way; we must solve a problem with a good performance in terms of the limited physical and abstract resources of the world. An extrapolation of this idea can be done for computers where the physical resources and the abstract resource (as the processing time) are of the great importance for the engineers. We shall present some models and paradigms in parallel scientific computing starting from the real world models. The old Latin concept divide et impera is a good approach for the development of large engineering projects, for analysis and synthesis of the large-scale systems. The manager-workers paradigm is another paradigm for many parallel algorithms in engineering and business and the performance evaluation of the programs based on this paradigm is developed and presented. Engineering education from Romanian universities is analysed in context of the reconstruction process of the Romanian school. Some aspects of the politics in the area of human resources and infrastructure from universities are presented using target examples. The effects of the reform in engineering education are analysed in the context of the last decades and educational reform from Romania.

Brief Biography of the Speaker: The speaker is an Assoc. Professor at the Computer Engineering and Communications Department, Faculty of Automatics, Computers and Electronics, University of Craiova, Romania. He has a BSc and MSc in Automatics from the University of Craiova, Romania. He has a Ph.D. in Automatics from the University of Ploiesti, Romania. Also, he has a BSc and MSc in Mathematics from the Natural Sciences Faculty, University of Craiova, Romania. He was director of the research projects supported by international grants at University of Houston (USA)- 6 months (Fulbright Grant), at the University of Coimbra, Portugal – 9 months (NATO grant), at the Polytechnics of Milano, Italy- 4 months (a CNR-NATO grant). In 2004 he was invited at the Mathematics Department, University of Trento, Italy, for 2 months. Ion Cârstea published 10 books in the area of programming languages, advanced computers and CAD of the electromagnetic devices. He is the co-author of the book FINITE ELEMENTS in WSEAS Press, 2007. He is the author of more than 130 papers in revues, scientific journals and international conference proceedings. He is a reviewer for several WSEAS International Conferences and was a member in many international scientific committees. In the year 2007, he was plenary speaker and chair at the WSEAS Conferences from Arcachon (France) and Venice (Italy). His research interests include parallel algorithms and parallel programs for numerical simulation of the distributed-parameter systems, software products for coupled and inverse problems in engineering, domain decomposition method in the context of the finite element method.

Plenary Lecture XXVI

A Combination of Computer Aided Learning and Real time Experiments to Support Engineering Training

Professor M. Hatziprokopiou
Department of Electrical Engineering,
Technical and Educational University of Patras,
Greece
Phone: 30-2610-369 452
FAX: 30-2610-369 088
E-mail: mxatzi@teipat.gr
URL: power.teipat.gr

Abstract: Laboratory training as a means for comprehending taught in-class course material is faced with problems including large student numbers, excessive cost of experimental apparatus, and lack of multiple experimental setups, especially in cases where the use of instrumental prototypes providing realistic simulations are needed. Nowadays sensors, especially those operating in real-time, play an important role in edge-technology systems. Such systems collect information from the outside world, through multi-channel USB type data loggers. The outputs from these sensors are connected to the data logger channels for digitization, and entered for further processing to a computer system. The development of appropriate software is needed for data handling and display of results in a graphic oriented user friendly environment, so that all parameters and control signals are well comprehended. In this type of training we have to develope a prototype, aiming to simulate real incidents.

E-learning CAL software can be developed using Keithley's "Test Point" (versatile authoring tool) or other ways (i.e. visual basic) for training large audiences, simultaneously having visual contact of the real prototype. Students have the choice to collect experimental or software generated data for simulation.

Brief Biography of the Speaker: Name: M. Hatziprokopiou, Citizen of Greece & USA, 62 years old. Married. Education: Bachelor, Master, PhD Electrical and Computer Engineering from State University of N.Y. at Buffalo, USA. Academic Professional Position at USA (Past): Research Assistant Professor, at State University of N.Y. at Buffalo, USA. Academic Professional Position at Greece (Present): Vice President and President of the Research Foundation, T.E.I. Patras, Greece Affiliated at L.A.P.E.S. (Laboratories for Power and Environmental Studies), Image Processing Lab, Super Conductivity Institute. Fields of Interest: Data Acquisition and Control. Line Production Control. Educational Software Development. Multimedia, Distance Learning. Vocational training. Author of numerous books and publications.

Plenary Lecture XXVII

Simulating Real-Life IT Project Environments by Integrating Course Modules of Different Student Levels

Professor Nicholas Harkiolakis
Professor, Information Technology,
Chair, Master of Science in Information Technology,
Director of Research,
Hellenic American University,
Athens Campus,
GREECE
Phone: +30 210 3680941
FAX: +30 210 3633174
E-mail: nharkiolakis@hau.gr
URL: http://www.hau.edu.gr

Abstract: There is an increasing need for university graduates entering today's job market to be skillful in adapting to novel work situations while sustaining a competitive advantage. To fulfill this requirement, students must adapt life long learning abilities in order to work successfully throughout their career development. In this paper I will argue that lifelong learning abilities can be enhanced by having curriculum activities structured in such a way as to allow students of varied expertise levels to participate in joint course projects. These courses ideally will all belong to the same prerequisite "ladder" allowing the students to be exposed to this unique teamwork experience throughout a student's academic years/semesters.

Brief Biography of the Speaker: Dr. Nicholas Harkiolakis holds a Ph.D degree in Computer Science from the Agricultural University of Athens. He also has a BSc in Physics from the Kapodistrian University of Athens and he received a graduate studies certificate in Aerodynamics from Cranfield Institute of Technology, England. He served as an Associate Professor and Chair of the Computer Science Department of the University of LaVerne - Athens Campus where he developed the Master's in Business Information Technology and the MBA - IT concentration, chairing both. Professionally he has20 years experience in development and implementation of business information systems and he continues to consult in that area. His research interests extend to the areas of distributed and web applications, bioinformatics and artificial intelligence. Currently he is Professor of Information Technology and Director of Research at the Hellenic American University in Athens, Greece. His research interests are in the areas of IT Strategy and Management, Numerical Analysis, Artificial Intelligence and Bioinformatics.

Plenary Lecture XXVIII

Modeling Muddy Flash Floods and Debris Flows

Professor Blaise Nsom
Université Européenne de Bretagne
Université de Brest
LIME/LBMS/IUT de Brest. BP 93169. Rue de Kergoat. 29231. BREST CEDEX 3
France
E-mail: Blaise.nsom@univ-brest.fr

Abstract: After long and intense rains in a mountainous region, large quantities of water flow in the torrents. For some reason, this flow can be obstructed by cross-linked branches and debris (natural dam). When the hydrostatic pressure exerted by the fluid exceeds a given yield value, the dam collapses and the fluid is released inside and outside the torrent bed, as well. Such scenario known as a dam-break flow can describe the initiation of certain geological flows, (debris flows, mudflows, etc.). As for any gravity current, the flow description depends on the time scale. Immediately after the dam collapse, the inertial forces are the dominant ones and this configuration can model a flah flood. Flash floods develop at time and space scales that conventional observation systems are not able to monitor, so reliable modelling remains a crucial step. At larger time scale, a viscous regime takes place where the viscous forces become the dominant ones and this configuration can model a classical debris flow. Debris floods develop in a long domain, i.e. a domain of space that is much longer than it is wide. They generally erode their bed and transport much energy and can move rocks and boulders upon very long distances. Both, the flash floods and the debris floods constitute dangerous phenomena for public safety and quality of life. The originality of the present approach is to consider these two flood waves as special cases of a single global model of a dam-break flow of a muddy fluid; depending on the time scale. The study was experimental, analytical and numerical, as well. The experimental study consisted in designing model fluids to be used in the laboratory experiments, characterizing these synthetic muds and monitoring the corresponding dam-break flows in the laboratory. While the theoretical study consisted in stating the equations of motion governing the different flows studied, and solving them in their non dimensional form, both analytically and numerically.

Brief Biography of the Speaker: Professor of Mechanics at the University of Brest (France). Obtained one Ph.D. in Aerothermics at the University of Toulouse in 1981 and another Ph.D. in Hydrodynamics at the University of Metz in 1987. He obtained the “Prix des Sciences de l’Académie Nationale de Metz” in 1988. Nsom has been Assistant Professor at Metz and Associate Professor at Chambéry/Grenoble in 1994 and became Professor in 2000 at Brest. He is Director of Laboratory of Mechanical and Electrical Engineering, Member of the University Senate, Member of the Steering Committee of the Technopôle Brest Iroise in charge of the “Mechanics and Materials” panel. Nsom is presently the President of the Commission charged to appoint the Assistant Professors and the Professors in Mechanics, Engineering Mechanics and Civil Engineering at University of Brest. Nsom has been Expert Evaluator of EU projects, he is presently Coordinator of the EU sub-project “Coatal Risks” in the “InterMareC” programme. He also coordinated a Report to the EU Commission on “Rheology of Debris Flows” and he is participant in national projects as well. He has supervised 7 Ph.D. theses and he has chaired national conferences and co-organized a IUTAM symposium. His field of research concerns modelling and experimental investigations in complex fluid flows, with application to natural hazards and process. He is author or co-author of about 90 publications and communications in national and international conferences. His 2 last papers were published this year (2007) in Physics of Fluids (Stability of Couette Flow of a Stratified Fluid) and in Applied Rheology (Physical and Mechanical Characterization of Soya, Colza and Rye Seeds).

Plenary Lecture XXIX

The Use of Integral Transforms for Analytic Solution of Pre-stressed Thin Plate on Elastic Foundation under Axisymmetric Loading

Professor Dimitrios G. Pavlou
Technological Institute of Halkida (TEI-Halkida)
Faculty of Mechanical Engineering
34 400 Psahna, Halkida, Evoia
GREECE
E-mail: dpavlou@teihal.gr

Abstract: In the past, the model of a thin plate on an elastic foundation was mainly used in structural applications. Currently, thin plates or films of metal, ceramic or synthetic materials are bonded in the surface of machine structural parts or electronic devices to improve their mechanical, thermal, electronic or tribological properties. At these applications, the sub-grade of the thin plate can be simulated as a Winkler-type foundation, which reacts with pressure proportional to the deflection of the plate at each point. The plates in the above applications are loaded by vertical (distributed or concentrated) loads or bending moments, as well as by in-plane forces (compressed or stretched) due to e.g. temperature effects. A large number of analytical or numerical research works have been published to solve several boundary value problems of a classical thin plate or a thin plate on an elastic foundation. However, few research works have been published concerning the differential equation of a pre-stressed thin plate on an elastic foundation, due to its complexity. In the present work, an exact solution of the problem of an infinite circular thin plate on an elastic foundation under combined axisymmetric vertical and radial in-plane forces is attempted. For this purpose, the Hankel's integral transforms and generalized functions properties are used. Numerical examples are included.

Brief Biography of the Speaker: Dimitrios G. Pavlou is Professor of Metallic Structures and Applied Mechanics in the Faculty of Mechanical Engineering of the Technological Institute of Halkida –TEI Halkidas– Greece (website: www.teihal.gr). Undergraduate degree in Mechanical Engineering and PhD in Fracture Mechanics at the University of Patras. He has extensive industrial experience in engineering design and many years of experience in teaching Strength of Materials (theory and experimental exercises), Fracture Mechanics, Metallic Structures, Structural Analysis and Material Science at the Hellenic Air-Force Academy, University of Piraeus, University of Patras and Technological Institute of Halkida. He has been the General Manager of the VIOTE S.A. (Viotia's Prefecture Company for Industrial Development), Head of the Secretary of the Research Centre of the University of Piraeus and Chair of the Faculty of Mechanical Engineering of the Technological Institute of Halkida. Pavlou has been on the Faculty of the TEI of Halkida since 1999 and is currently Visiting Professor in the "Polytechnic" University of Timisoara, Romania. He is (a) author of numerous research articles in referee journals and international conferences, (b) author of national and international books covering fracture mechanics, metallic structures, damage mechanics and strength of materials, and (c) referee of numerous research works submitted in international journals and conferences. His research interests are (a) Analytical and Numerical methods in Fracture Mechanics with special emphasis in solution of Boundary Integral Equations (BIE) using Green's functions and BEM, (b) Damage Mechanics with special emphasis in Fatigue and Creep Damage Accumulation under variable loading as well as life-time prediction of structural parts in service conditions, and (c) Analysis of elastostatic problems using Integral Transforms with special emphasis on Hankel Transforms.

Plenary Lecture XXX

On the Eigenvalues Optimization of Beams with Damping Patches

Professor Veturia Chiroiu
Department of Deformable Media
Institute of Solid Mechanics
Ctin Mille 15, P O Box 1-863, Bucharest 010141
ROMANIA
E-mail: veturiachiroiu@yahoo.com
Web site: http://www.imsar.ro

Abstract: The paper discusses the behavior of beams with external nonlocal damping patches. Unlike ordinary local damping models, the nonlocal damping force is modeled as a weighted average of the velocity field over the spatial domain, determined by a kernel function based on distance measures. The performance with respect to eigenvalues is discussed in order to avoid resonance. The optimization is performed by determining the location of patches from maximizing eigenvalues or gap between them.

Brief Biography of the Speaker: Veturia Chiroiu (born in 1942) received the PhD degree in Mathematics from University of Bucharest in 1981. Since 1966 she is a senior scientific researcher at the Institute of Solid Mechanics of the Romanian Academy, head of Department of Deformable Media (www.imsar.ro). She received a Fulbright Fellowship to work at the Princeton University, Dept. of Aerospace and Mechanical Science (1972–1973), and has led various research projects (Copernicus, NATO) and lectured in foreign institutes and universities. She is author of numerous research articles in referee journals and international conferences, covering dynamics of deformable media, acoustics, intelligent structures and materials, and inverse problems. She is the winner of the prize Aurel Vlaicu of the Romanian Academy in 1997. Since 2000 she is a PhD advisor in the field of mechanical engineering at the Romanian Academy. Since 2004 she is an Honorific Member of the Technical Sciences Academy of Romania (ASTR).

Plenary Lecture XXXI

In Depth Analysis of the Analogies among Entropy, Information and Sensation. The Concept of Time in Thermodynamics

Professor Vassilis Gekas
Department of Environmental Engineering
Technical University of Crete
GR 731 00 University Campus, Chania
GREECE
E-mail: vassilis.gekas@enveng.tuc.gr
Web site: http://www.enveng.tuc.gr/Labs/efmtfd_lab_en.htm

Abstract: In teaching Thermodynamics, to analyse the analogies of Entropy, Information, Sensation it might be proven very useful in helping the overall understanding of the students of those difficult concepts. Indeed all those three properties are expressed by similar equations, essentially the same one famous S=klnW equation , the only "epitymbion" equation (that is the equation which is engraved in the tomb of a Human, Ludwig Boltzmann). The teacher , to our opinion, should highlight and analyze the similarities and the differences of the various forms of this equation when applied to Entropy (Boltzmann) Information (Shannon) and Sensation (Heffner-Weber) respectively. The chemical and geometrical aspects of Sensation will be discussed, too. This lecture is based on the main idea that an additative accumulation in the W variable produces an increased Intensity of a feeling in the S variable which is logarithmically related to W. Beyond these three forms mentioned above an extension in to the concept of Time, a rather obscure and mysterious variable in the field of Thermodynamics, both the objective Time and the perceived Time (the "temps vaicu" in french, the Time as it is felt by Man.

Brief Biography of the Speaker: MSc Chemical Engineer NTUA Athens 1971, PhD Food Engineering, Lund , 1987, Sweden. Vassilis Gekas is Professor of Transport Phenomena and Director of the Transport Phenomena & Environmental Thermodynamics at the Technical University of Crete.

He gained international reputation in the Membrane Technology both the synthetic and biological membranes. Author of the CRC edited book of "Transport Phenomena of Foods and Biological Materials " , boca Ratomn FL, 1992. Author of several books in Greek. He was the first to be chairman of the Environmental Engineering dpt , 1984- 2003. He deals with teaching and research in the following fields: Renewal energy sources, desertification, unit operations with developing of Greek raw materials , recovery of high added value constituents from agro-food wastes, enzymatic conversion of starch, thermal treatment of solid wastes, solar cooling. His approximately 50 publications in international journals gained the attention of approximately 1000 colleagues (CI=1000).

Plenary Lecture XXXII
100 Years of Highway Transportation Research

Dr. Manoj K. Jha
Associate Professor and Director
Center for Advanced Transportation and Infrastructure Engineering Research
Department of Civil Engineering,Morgan State University,1700 East Cold Spring Lane
Baltimore, MD 21251
U.S.A.
Phone: (443) 885-1446, Fax: (443) 885-8218
E-mail: mkjha@eng.morgan.edu
Web: http://www.eng.morgan.edu/~mkjha

Abstract: Since the advent of automobile, and design and construction of paved roads in the early 1900's there has been a significant contribution made in highway related transportation research. While in the earlier decades bulk of highway transportation research revolved around planning, design and construction of roads, right-of-way acquisition, and highway financing issues, the focus has somewhat shifted in the last three decades. Recent research has revolved around issues related to traffic congestion and environmental impact. This presentation reviews the changing trend in highway transportation research over the last 100 years and presents some views for future research. Specifically, it emphasizes the need for a closer examination of the three-way interaction among vehicle, roadway, and driver for better planning, design, and traffic management. There is a considerable trade-off among these three entities when planning, designing, operating, and maintaining highways as well as highway traffic. The presentation concludes with some discussion on effects of globalization and sustainability in highway transportation research.

Brief Biography of the Speaker: Dr. Manoj K. Jha is Associate Professor of Civil Engineering at the Morgan State University where he oversees the transportation engineering graduate program and also serves as the Director of the Center for Advanced Transportation and Infrastructure Engineering Research. He obtained a Ph.D. in Civil Engineering with transportation specialization from the University of Maryland, College Park in 2000; a M.S. degree in Mechanical Engineering from the Old Dominion University in 1993; and a B.E. degree in Mechanical Engineering from the National Institute of Technology, Durgapur, India in 1991. He also attended the Rensselaer Polytechnic Institute during 1993-94 as a Ph.D. student in Mechanical Engineering and Virginia Tech,'s National Capital campus as a post doctoral fellow during 2000-2001. Dr. Jha's research interests are in Highway Design Optimization and Visualization, Highway Maintenance, Geographic Information Systems, and Bayesian Network Application for assessing impacts of extreme events under uncertainty. For his scholastic and research achievements Dr. Jha has received several awards, among which are the 2005 and 2006 United Negro College Funds Special Program/Department of Defense (UNCFSP/DoD) Faculty Development Award, 2005 Department of Homeland Security (DHS) Summer Faculty Research award by the Study of Terrorism and Responses to Terrorism (START) Center of Excellence, University of Maryland, College Park, and 2005 NSF-PASI-TS (National Science Foundation's Pan-American Advanced Study Institute on Transportation Sciences) award by the Rensselaer Polytechnic Institute. He is a registered Professional Engineer in the State of Maryland since 1997. Dr. Jha has served as a PI, Co-PI, or collaborator with other researchers on numerous research projects totaling over $4 million. The key sponsoring agencies of his research projects include Army Research Lab., Maryland State Highway Administration, Federal Highway Administration, National Science Foundation, and several Baltimore area consulting firms. Dr. Jha has authored (or co-authored) more than 80 articles in journals, books, and conference proceedings in the highway design, optimization, and transportation literature. He has also co-authored 2 text-books on road design entitled "Intelligent Road Design" and "Fundamentals of Road Design."

Plenary Lecture XXXIII

The Exploitation of the Most Recent Historical Cultural Heritage for Tourism Development. The Case of Preserved Buildings and Grounds in Greece

Professor Eleni Stamatiou
Professor-Consultant at the Hellenic Open University
Greece
E-mail: rlacroix@otenet.gr

Abstract: The preserved buildings play an important part in cultural and architectural heritage and have their contribution in the preservation of historical memory and in the improving of the modern quality of life, in the aesthetics and the attractiveness of a location. The elaboration of an integrated strategy with efficient administrative and financial motivations for the protection of preserved buildings must be a priority in the frame of a country's modern cultural management. The reuse and accessibility of preserved buildings and their grounds by the public have for purpose the improvement of the indices for employment and economic and tourism development and the rise of the standard of living especially for socio-economically degraded areas. Through the removal of regional inequalities and of local financial vigor sustainable development becomes an achievable goal. Greece and all other countries whishing to preserve better their rich cultural heritage could adopt the latest best practices and through the creation of an integrated policy of preservation, protection, assurance, exploitation and promoting of cultural value of their assets contribute furthermore to tourism development.

Brief Biography of the Speaker: Dr Eleni N. Stamatiou, Architect-Engineer NTUA, MSc Regional Development, Dr. in Town & Spatial Planning (PHD, PPHD). Completed her studies with Scholarships of the Greek State (IKY). Professional Experience (since 1989), Scientific, Teaching and Research Experience (since 1997) from overseas and in Greece (Assoc Professor at the University of Thessaly, Professor (ΣΕΠ) at the Hellenic Open University / Post Graduate program, National School of Public Administration, etc.), Vice President of the Greek Regionalists Association(ΣΕΠ). She has lectured at several Greek Universities (NTUA, Harokopeio University, National School of Public Administration, etc.) and was invited to speak in several overseas Universities (in France, Russia, U.K. and USA) has been and continues to oversea Masters and Doctors degrees in addition to being a member of the professors exams committee (National School of Public Administration, Hellenic Open University, etc.). She has taught numbers of training seminars to adults with a degree, for higher company and Ministerial executives etc. She has overseen and published several books and published articles in Greek, English, Russian and French. Member of the Editorial Board of scientific publications and journals. Participation and co-authorship in the creation of university graduate study programs. Member of Greek, French, European and International Associations (UIA, SFA, ECTP, ERSA, etc.). Fundamental and instrumental active participation in International scientific committees in Europe and the USA (INRECON, ENVIRON, etc.). Member of Scientific organizations and representative for Greece in International forums and programs (with the Russian Research Institute of Land Planning, The Russian Academy of Social Sciences, etc.). Co-editor and session-chief in International conferences of the Greek Regionalists Association. National Representative for Greece of ΣΑΔΑΣ (Association of Greek Architects) at the European Council of Architects (ACE) / ''Urban issues''. Participation as principal member of scientific organizations and committees (Evaluation of European town-planning awards ECTP, etc.). Member of work groups, Member of the Permanent Arbitration Committee (2006-2007) and Domain Expert of the Technical Chamber of Greece (TEE). Her Scientific and professional Interests concern subjects of architecture, spatial and regional planning and related legislation, regional development, environmental management, cultural and built environment, sustainable development, etc., these principles she applied and promoted successfully throughout her professional career through her many held managerial positions (as member of the board, senior scientist, etc.). She is married to the IT Consultant / International Researcher Richard-Nicolas LACROIX and they have a 6 year old son.

Plenary Lecture XXXIV

The Role of Music Festivals in Creating Community

Professor Michelle Duffy
The Australian Centre
School of Historical Studies
University of Melbourne,
AUSTRALIA
E-mail: med@unimelb.edu.au

Abstract: Held in parks, city centres, heritage sites, town halls, local pubs, or along main thoroughfares and streets closed specially for the occasion, festivals are a significant part of a community's annual calendar. The social and cultural values of festivals are recognised by UNESCO, which has identified these expressions of as part of humanity's intangible heritage. Maintaining such cultural practices is encouraged because it may help protect threatened cultural or ethnic groups, or be a means to give voice to those who have been in some ways muted or silenced. Although increasingly they have become a popular tool for initiating economic renewal—this is notable in cultural tourism literature and research, and are tactics readily taken up in local government policies and organisational strategies—these events are about adding value to our everyday lives. Festivals encourage community participation, enhance local creativity and foster community well being. One musician I interviewed in the course of my research pointed out that being part of a festival changes the nature of the place of our daily lives. This comment has always struck me, this connection between the festival and place, and in particular, the role of music in such a transformative relationship. Music elicits emotions. The emotions experienced through music are done so precisely because they cannot be expressed by any other medium, and this is one of music's strengths. The music performances of festivals can draw us in and arouse emotions in us that encourage opening up to others. We clap, sway, perhaps sing along, smile, talk, and get caught up in the moment. Or we may even feel quite alienated, rejecting the sorts of performances we come across, grimacing, covering our ears and hurrying past. Drawing on festival case studies from Australia, this paper contributes to the literature on festivals and cultural tourism, through a focus on the possibilities offered by music as a medium for sociality, on music's emotional effects as a means to explore how a community arises in the very acts of people engaging with the music of the festival.

Brief Biography of the Speaker: Michelle Duffy was educated at Royal Melbourne Institute of Technology (BAppSci) and the University of Melbourne (PhD, BA Honours, BMus Honours). She is a cultural geographer, with specific research interests in the ways non-representational processes such as performance, music, dance and sound can be used to articulate and understand notions of place, identity, belonging, community cohesion, alienation and social well-being. These interests have led to research exploring public space, events, emotion and affect, and performative aspects of identity formation. Michelle is currently working on a number of funded projects that examine the role of the festival in urban, rural and remote communities. These projects seek to understand and define the processes of creating communal identity and social cohesion, with a particular focus on the ways music and sound are significant to the experience of the festival. Michelle teaches Australian Studies subjects and co-ordinates a number of international programs, which reflect her research interests in various aspects of Australian studies including Australian Indigenous cultures and people, Australian performance practices, cultural diversity in contemporary Australia, rural and public culture, as well as broader issues in cultural geography.

Special Session I:
Advanced Computational Techniques, Algorithms and Numerical Methods for Modelling, Simulation and Optimization

Organizers: Assoc. Prof. Dana Simian, Department of Computer Science, Faculty of Science, University Lucian Blaga, Sibiu, Romania. Phone: 0040 - 269 - 216642, Fax: 0040 - 269 - 216617
E-mail: dana.simian@ulbsibiu.ro , d_simian@yahoo.com

Special Session II:
Information Technology and Decision Support in Engineering and Business Applications

Organizer: Professor S. Narayanan (Ph.D., Industrial & Systems Engineering, Georgia Tech, 1994) is Professor and Chair in the Department of Biomedical, Industrial, and Human Factors Engineering at WSU and is the executive director of the Wright State Research Institute. Prof. Narayanan directs the interactive systems modeling and simulation laboratory at WSU and his research interests are in modeling and simulation of complex systems, decision aiding, and interactive systems development. He has published over 85 technical articles in these areas and directed research efforts of over $6 million from federal, state, and industrial sources. He is a Fellow of the American Institute for Medical and Biological Engineering and is an associate editor of IEEE Transactions on Systems, Man, and Cybernetics, International Journal of Modelling and Simulation, and Transactions of the Society for Computer Simulation.

E-mail:s.narayanan@wright.edu

Special Session III:
Object-oriented Simulation of Intelligent Systems

Organizer: Professor Eugene Kindler
Profesor of applied mathematics,
University of Ostrava,
Faculty of Science,
Dept. of Computers and Informatics,
CZ - 701 03 Ostrava, 30. dubna no. 22,
Czech Republic
E-mail: ekindler@centrum.cz

Program Cometee:

Ivan Krivy, University of Ostrava, CZECH REPUBLIC
E-mail: ivan.krivy@osu.cz

Petr Bulava, The University of Ostrava, CZECH REPUBLIC
E-mail: petr.bulava@osu.cz

Karek Babcicky, Dateri, Dagaliveien 16D, 0776 Oslo, NORWAY
E-mail: babcicky@online.no

Petr Cenek, Universitz of Žilina, SLOVAKIA
E-mail: petr@frdsa.fri.uniza.sk

Author Index

Pose-Reino, A. 113
AbdelHamid, S. 224
Abdelwahab, A. H. 224
Abed, S. Y. 132
Albert, I. 72
Amanat, K. M. 256, 262
Asprino, T. F. 156
Avramescu, N. E. 98
Avramescu, V. 95, 98, 103, 109
Bansal, R. C. 89
Barbilian, A. 243
Barbosa, A. V. 273
Barbosa, R. 218
Barcena, R. 120
Basterretxea, K. 120
Bin Waez, T. 204
Bobe, D. 98
Brandao Jr., A. F. 161
Bruda, S. D. 204
Camus, M. 126
Castellanos, M.T. 183
Charaf, H. 72
Choudhury, M. R. 256
Coimbra, R. C. M. 273
Constantinescu, A.-M. 103, 109
Craciunoiu, M. 103
Craciunoiu, S. T. 103, 109
Dadamo, M. 230
Dascalu, M. 243
De Albuquerque, F. A. A. C. 273
De Andrade, A. A. 150
De Federico, S. 230
Dharmadhikary, V. V. 247
Dias, E. M. 150, 156, 161, 169, 197, 210, 218
Elsimary, H. A. 176
Filho, A. R. 169
Fontana, C. F. 150, 169, 197, 210, 218
Gago, E. 230
Garcia Mouton, E. 183
Garcia, J. L. 183
Garcia, V. 161, 210, 218
Ghidurus, M. 146
Grejdanescu, R. 98
Haque, S. 262
Havas, 126
Higuchi, M. 188
Ibrahim, A. A. 176
Ibrahim, N. Y. 224
Janes, R. 161
Katagishi, K. 188
Kavousi, K. 81
Kawasaki, S. 188
Kipyegon, E. K. 247
Konditi, D. B. O. 247
Kovari, B. 72
Larue, O. 126
Malounek, P. 63
Marino, C. 113
Matei, E. 77
Miksanek, V. 67
Morarescu, C. 146
Morato, M. C. 183
Mori, F. H. 169, 210
Moshiri, B. 81
Murakami, H. 188
Nakamura, M. 188
Nassar, A. M. 176
Nicolae, 77
Nicolau, C. 103, 109
Niculita, L. 146
Ohmiya, Y. 188
Oltu, O. 243
Orasanu, C. H. 98, 103, 109
Orasanu, G. 98
Ortega, M. 113
Ousta, F. 236
Pachar, R. 89
Paun, L. 98
Penedo, M. G. 113
Pereira, A. G. F. 273
Pereira, S. L. 150
Pivonka, P. 63, 67
Popescu, V. 243

Predescu, A.	77	Stoica, A.	77
Predescu, C.	77	Sundaraj, K.	268
Quayyum, S.	256	Tinnirello, A.	230
Recio, B.	183	Tiwari, H.	89
Rouco, J.	113	Tobal, A. M.	224
Saidel, M. A.	156	Toraichi, K.	188
Santos, S. S.	273	Tsuzuki, F.	218
Sarraf, C. M.	236	Vieira, M.	197
Sleit, A.	139	Voiculescu, V.	243
Sohaciu, M.	77	Walter, M. E. M. T.	273