Editors
Valentina E. Balas
Muhammet Koksal

Associate Editor
Vladimir Vasek

Recent Researches in Circuits & Systems

Recent Researches in Circuits & Systems

Scientific Sponsors

TU - Sofia

UNIVERSITÀ DEGLI STUDI DI GENOVA

- Proceedings of the 16th WSEAS International Conference on Circuits
- Proceedings of the 16th WSEAS International Conference on Systems

(Part of CSCC '12)

Kos Island, Greece, July 14-17, 2012

RECENT RESEARCHES in CIRCUITS and SYSTEMS

Proceedings of the 16th WSEAS International Conference on Circuits (part of CSCC '12)

Proceedings of the 16th WSEAS International Conference on Systems (part of CSCC '12)

Scientific Sponsors:

TU - Sofia

UNIVERSITÀ DEGLI STUDI DI GENOVA

Kos Island, Greece
July 14-17, 2012

Recent Advances in Electrical Engineering Series | 3

Published by WSEAS Press
www.wseas.org

ISSN: 1790-5117
ISBN: 978-1-61804-108-1

RECENT RESEARCHES in CIRCUITS and SYSTEMS

Proceedings of the 16th WSEAS International Conference on Circuits (part of CSCC '12)

Proceedings of the 16th WSEAS International Conference on Systems (part of CSCC '12)

Kos Island, Greece
July 14-17, 2012

Published by WSEAS Press
www.wseas.org

All papers of the present volume were peer reviewed by no less that two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

ISSN: 1790-5117
ISBN: 978-1-61804-108-1

World Scientific and Engineering Academy and Society

RECENT RESEARCHES in CIRCUITS and SYSTEMS

Proceedings of the 16th WSEAS International Conference on Circuits (part of CSCC '12)

Proceedings of the 16th WSEAS International Conference on Systems (part of CSCC '12)

Kos Island, Greece
July 14-17, 2012

Jiri Hrebicek
Haider Ali Biswas
Al Emran Ismail
Larion Alin
Philippe Dondon
Thaweesak Yingthawornsuk
Elena Bautu
Eleazar Jimenez Serrano
Carla Pinto
Moussaoui Mohamed
Yu Zhang
Andreea Zamfir
Vignesh Subbian
Diego Pinto Roa
Julian Pucheta
Kevin Kam Fung Yuen
Satish Kumar Duraiswamy
Lungu Mihai Aureliu
Md. Jakir Hossen
Catalin Popescu
Rodica Badescu
Claudia-Georgeta Carstea
Cristian Fosalau
Mutamed Khatib
Radha Gupta
Mahdi Faraji
Stratis Kanarachos
Amjad Mahmood
Takuya Yamano
Ionel Botef
Nikhil Raj
Suzana Yusup
Pavel Varacha
Valentina E. Balas
Jiri Hosek
Kumaravel
Miguel Carriegos
Gillich Gilbert-Rainer
Guoxiang Liu
Yang Zhang
Claudio Guarnaccia
Sorin Gherghinescu
Muhammet Koksal
Hamed Ziaeipoor
Cristina Barbu
Adamou-Mitiche Amel B.H.
Michaela Stanickova
Mohammed El-Abd

Preface

This year the 16th WSEAS International Conference on Circuits (part of CSCC '12) and the 16th WSEAS International Conference on Systems (part of CSCC '12) were held in Kos Island, Greece, July 14-17, 2012. The conferences provided a platform to discuss network theory and applications, nanostructures and nanotechnologies, molecular electronics, optoelectronic devices, nonlinear circuits, sensors, semiconductors, superconductivity circuits, circuits in power technology, logic synthesis, systems theory, dynamical systems, modelling, non-linear systems, remote sensing, wavelets, optimization, finite elements etc. with participants from all over the world, both from academia and from industry.

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

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

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

The Editors

Table of Contents

Keynote Lecture 1: Energy, Environment and Importance of Power Electronics 16
Bimal K. Bose

Keynote Lecture 2: Current Video Coding Standards: H.264/AVC, Dirac, AVS China and VC-1 17
K. R. Rao, Do Nyeon Kim

Keynote Lecture 3: Program Analysis beyond Closed-form Expressions for Maximum Parallelization 18
Kleanthis Psarris

Keynote Lecture 4: Folding and Unfolding Related Issues, Especially Decompositions, in Data Processing 19
Metin Demiralp

Keynote Lecture 5: Human Control Strategies for Multi-Robot Teams 20
Katia Sycara

Plenary Lecture 1: Lightning Protection for Power Apparatuses 21
Hitoshi Kijima

Plenary Lecture 2: On Description of Continuous and Discrete Systems by Means of State Space Energy Approach, Theory and Results 22
Milan Stork

Plenary Lecture 3: On Partial Differential Equations to Diffusion-Based Population and Innovation Models 23
Andre A. Keller

Plenary Lecture 4: On Grids of the Future-Transition to Smart Grids 24
Shahram Javadi

Plenary Lecture 5: A Concept on Thermal Equilibrium Establishment and Its Use in Heat Treating Industry 25
Nikolai Kobasko

Plenary Lecture 6: Method for Determining the Residual Stress-Strain State of Welded Structures through the Wavelet Transform 26
Vincenzo Niola

Plenary Lecture 7: Dual Rotor Single Inverter and Single Stator PMSM for HEVs 28
Sorin Ioan Deaconu

Plenary Lecture 8: A General Fuzzy Framework for Representing a System and Measuring its Performance 29
Michael Gr. Voskoglou

ISBN: 978-1-61804-108-1

Plenary Lecture 9: A System of Systems Approach for Improved Autonomy of Unmanned Systems 30
George Vachtsevanos

Applications of Artificial Neural Networks in Control Systems 33
Silviya Kachulkova

Design A STATCOM Supplementary Controller for Stability Studies using Various State Feedback Algorithm 38
N. Magaji, A. U. Lawan, Ado Dan-Isa, M. W. Mustafa

The Simplest Formulas for Self inductance, Mutual Inductance and Magnetic Force of Coaxial Cylindrical Magnets and Thin Coils 44
Slobodan Babic, Cevdet Akyel, Nazim Boudjada

The Electrostatic Discharge Handling Capability of Flip-Chip AlGaN/GaN High Electron Mobility Transistors 49
L. B. Chang, S. L. Lin, S. T. Chou, Atanu Das

An Ultra-Low Power Dry-Electrode ECG Amplifier Having Optimized Low-Frequency Response and CMRR 54
M. J. Burke, C. Assambo

High Step-Up Ratio DC-to-DC Converter with Recuperation of the Leakage Energy 60
K. H. Edelmoser, F. A. Himmelstoss

Software Implementation of Higher-Order Elements 66
Viera Biolková, Dalibor Biolek, Zdeněk Kolka

Graphical Analytical Method to Estimate Energy Coordination of Two Varistors connected in Parallel 72
Hitoshi Kijima, Koreyuki Taketani

Energy based State Space Approach of Nonlinear Systems Simulation and Construction by Means of Electronic Circuits 78
Milan Stork, Josef Hrusak, Daniel Mayer

Symbolic Analysis of Complex Circuit Models 85
Zdenek Kolka, Dalibor Biolek, Viera Biolkova

Solution to Eliminate Vibrations of Mechatronic Device used in Filming Effects for DSLR Camcoders 89
Mihai-Eugen Manescu, Luciana Cristea, Daniel-Calin Ola, Marius Hodirnau, Mihaela Ioana Baritz

Lightning Surge Response Improvement by Combinations of Varistors and Gas Discharge Tubes 95
Hitoshi Kijima

Circuit Breaker Type Disconnector for Overvoltage Protector 105
Hitoshi Kijima

Information Codification in Neural Networks with Ensemble Structures 111
Ernst Kussul, Tatiana Baidyk

New Application of LIRA Neural Network 115
Tetyana Baydyk, Ernst Kussul, Miguel Hernández Acosta

Properties and the Use of Capacitive Diodes and Experimental Verification of the Technical Parameters of the Diode 120
Karol Radocha, Josef Sedivy

Unusual Involvement of Operational Amplifiers for Measurement Purposes: Non-Inverting Amplifier Integral and Derivative 125
Jaroslav Lokvenc, Rene Drtina, Josef Sedivy

Unusual Involvement of Operational Amplifiers for Measuring Purposes, Low Frequency and DC Applications 131
Jaroslav Lokvenc, Rene Drtina, Josef Sedivy

Control Charts and Models Predicting Cement Strength: A Strong Tool Improving Quality Control of Cement Production 136
Dimitris Tsamatsoulis

Towards a Theory of Hybrid Intelligent Autonomous Systems 146
Ouarda Hachour

Investigation of Some Basic Parameters Affecting the Optimum Sulfates Content of Cement 152
Dimitris Tsamatsoulis, Nikos Nikolakakos

A Concept on Thermal Equilibrium Establishment and Its Use in Heat Treating Industry 158
Nikolai Kobasko

An Explanation of the Nature of Thermal Waves "a Poker Effect" on the Basis of Hyperbolic Heat Conductivity Equation Analysis and Existence of Free Electrons in Metals 167
N. I. Kobasko, Sh. E. Guseynov

Commissioning, Monitoring and Control of a Low-Power Hydroelectric Power Plant 173
Sorin Ioan Deaconu, Gabriel Nicolae Popa, Răzvan Deaconu

Application of LABVIEW and MATLAB Software Products for Infrared Objects Detections 179
Liljana Docheva, Snejana Pleshkova, Aleksander Bekiarski

Spiking Neural Networks for Real-Time Infrared Images Processing in Thermo Vision Systems 183
Snejana Pleshkova

Hilbert-Huang Transform and Its Applications in Engineering and Biomedical Signal Analysis 188
Milan Stork

Optimal Pole Placement for LTI-TDS via Some Advanced Iterative Algorithms - Part I: Theory 196
Libor Pekar, Roman Prokop

Optimal Pole Placement for LTI-TDS via Some Advanced Iterative Algorithms - Part II: Application 202
Libor Pekar, Roman Prokop

Combined Production of Heat and Electric Energy - Linear Mathematical Model 207
Pavel Navratil, Libor Pekar

ISBN: 978-1-61804-108-1

Representing a System in Terms of Fuzzy Logic 213
Michael Gr. Voskoglou

Harmonic Analysis of a High Speed Automatic Reclosing on a 400 kV Overhead Transmission Line 219
Angela Iagar, Sorin Ioan Deaconu, Corina Daniela Cuntan, Ioan Baciu

Intelligent System for the Production of Biodiesel 225
Stanislav Plšek, Vladimír Vašek

Robust Control Toolbox for Time Delay Systems 229
Marek Dlapa

Robust Control Toolbox for Time Delay Systems with Time Delay in Numerator and Denominator 233
Marek Dlapa

School Operating System for Freescale HCS08 Microcontrollers RTMON2 238
J. Dolinay, V. Vašek, P. Dostálek

Graphical Analysis of Robust Stability for Polynomials with Uncertain Coefficients in Matlab Environment 242
Radek Matušů, Roman Prokop

Intelligent Sensor Design for Audio Source Localization Implementing Digital Beamforming 248
P. Dostálek, V. Vašek, J. Dolinay

Robust Stabilization of First-Order Time-Delay Systems with Parametric Uncertainty 252
Radek Matušů, Roman Prokop

Modeling of Mobile Processes 258
Tomas Kozel, Antonin Slaby

Fluidity of Polymer Influenced by the Amount of Filler 264
Michal Stanek, David Manas, Miroslav Manas, Kamil Kyas, Vojtech Senkerik, Adam Skrobak, Jan Navratil

Rapid Prototyping Methods Comparison 269
Michal Stanek, David Manas, Miroslav Manas, Jan Navratil, Kamil Kyas, Vojtech Senkerik, Adam Skrobak

Utilization of Direct Metal Laser Sintering in Injection Mold Design 273
Jan Navratil, Michal Stanek, Stepan Sanda, Miroslav Manas, David Manas, Ales Mizera, Martin Bednarik

An Overview of Current-Voltage Characteristics Estimation from Plate-Type Electrostatic Precipitator with Three Sections 279
Gabriel Nicolae Popa, Iosif Popa, Sorin Ioan Deaconu, Corina Maria Diniş

Effect of Beta Irradiation on the Microhardness of HDPE 285
Martin Ovsik, David Manas, Miroslav Manas, Michal Stanek, Kamil Kyas, Martin Bednarik, Ales Mizera

ISBN: 978-1-61804-108-1

Effect of Beta Low Irradiation Doses on the Microhardness of PA6 289
Martin Ovsik, David Manas, Miroslav Manas, Michal Stanek, Stepan Sanda, Kamil Kyas, Martin Reznicek

Optimization of Gate Location and Cooling System 294
Vojtech Senkerik, Michal Stanek, Miroslav Manas, David Manas, Adam Skrobak, Jan Navratil

Modification of Polymer Properties by Irradiation Properties of HDPE after Radiation Cross-Linking 299
A. Mizera, M. Manas, D. Manas, M. Stanek, J. Cerny, M. Bednarik, M. Ovsik

Properties of Polymers after Radiation Cross-Linking 303
A. Mizera, M. Manas, D. Manas, M. Stanek, J. Cerny, M. Bednarik, M. Ovsik

Utilization of Temperature and Pressure Sensors in Injection Mold 307
Kamil Kyas, Jakub Cerny, Michal Stanek, Miroslav Manas, David Manas, Vojtech Senkerik, Adam Skrobak

Identification of Quadrature Inductance by Combination of Two Methods 311
Ivo Vesely, Michal Sir, Dusan Zamecnik

Influence of Runners Trajectory on Rubber Product Properties 317
Kamil Kyas, Michal Stanek, Jan Navratil, Miroslav Manas, David Manas, Vojtech Senkerik, Adam Skrobak

Modern Methods of Design of Ergonomics Parts 321
Jakub Cerny, Martin Ovsik, Martin Bednarik, Ales Mizera, David Manas, Miroslav Manas, Michal Stanek

Tire Wear of Technical Vehicles 325
Jakub Cerny, Martin Ovsik, Martin Bednarik, Ales Mizera, David Manas, Miroslav Manas, Michal Stanek

Instrumented Microhardness Test and Raman Spectroscopy Analyses of Beta-Irradiated Polyamide 12 329
Hana Vaskova, David Manas, Martin Ovsik, Miroslav Manas, Michal Stanek

Logistic Control of the Serial Rearrangeable Manufacturing System 333
Robert Bucki, Bronislav Chramcov

Simulation Optimization of the Short Barrel of the Gun Production Line 339
Bronislav Chramcov

Electrochemical Sensors for Gas Mix Analysis 345
Hruska Frantisek, Plšek Stanislav

Adaptive Learning Rate for RBFNN 351
Syed Saad Azhar Ali, Muhammad Moinuddin

Multilayer Neural Network in Differential Diagnosis of Balance Disorders 356
Lucie Pivnickova, Viliam Dolinay, Vladimir Vasek

ISBN: 978-1-61804-108-1

Organizational Structure New Concept for the Czech Artillery 362
Martin Blaha, Milan Kalina, Ladislav Potužák

Identification and Modeling of Nonlinear Servo Motor 368
Petr Chalup, Jakub Novak

Active Elements of Heat Accummulation in Laboratory of Intelligent Building - Thermal Accumulative Panels 374
Martin Zalesak

The Impact of Mobile Phones on the Accuracy of Magnetic Azimuth Measuring Using Digital Magnetic Compass 378
Karel Šilinger, Martin Blaha

Predictive Control of a Boiler-Turbine System 383
Jakub Novak, Petr Chalupa

Supervisory Control and Data Acquisition Systems in Virtual Architecture Built via VMware vSphere Platform 389
Milos Pavlik, Roman Mihal, Lukas Lacinak, Iveta Zolotova

Fuzzy Measures for a System's Performance 394
Michael Gr. Voskoglou

OpenCL-based Algorithm for Heat Load Modelling of District Heating System 400
Erik Král, Petr Čápek, Lubomír Vašek

A Redundant Bi-Dimensional Inertial Navigator in Vertical Plane 405
Teodor Lucian Grigorie, Ruxandra Mihaela Botez, Dragos George Sandu, Radu Obreja

The Cutting Stock Problem and Excessive Accumulation of Usable Leftovers 411
Mirko Gradišar, Luka Tomat

Analysis of Regional Road Safety Evaluation Model in the Czech Republic 415
Tomáš Kořínek, Jiří Křupka, Radovan Soušek

Performance Evaluation of the Self-Organizing Migration Algorithm Parallel Implementation 421
Jan Kolek, Pavel Vařacha, Ivo Motýl

A Method of Improvement of the Low-Cost Rectifiers Performance in Wideband AC Voltmeters and Amperemeters 426
Martin Pospisilik, Pavel Varacha, Milan Adamek

Comparison of Evolutionary Algorithms SOMA, DE, PSO 431
Pavel Vařacha, Martin Pospíšilík, Ivo Motýl, Michal Bližňák, Dalibor Slovák, Jakub Krampl, Kolek Jan

Evolutionary Algorithm Aided Biquad Design 436
Martin Pospisilik, Pavel Varacha

Time Series Prediction Using Artificial Neural Networks: Influence of the Input Vector Size 441
David Samek, Pavel Varacha

ISBN: 978-1-61804-108-1

The Accuracy of Chemical Reactors Models - A Case Study 447
Lubomír Macků

Prediction of Semi-Batch Reactor Using Multilayered Feed-Forward Neural Networks 453
Lubomir Macku, David Samek

Heating Curve Corrections based on Behavior in the Consumption of the Heat 459
V. Dolinay, L. Vasek

Correction in Heat Prediction Depending on the Deviation of Forecasts and a Historical Data with Similar Pattern of Outside Temperature 463
L. Vasek, V. Dolinay

An Application of the "Centroid" Method in Measuring a System's Effectiveness 467
Michael Gr. Voskoglou

The Color Relative Potential Field for Color Image Segmentation 472
Xiaodong Zhuang, N. E. Mastorakis

Vexflow APIin Music Learning Management System 480
Dalibor Slovak, Petr Latal, Pavel Varacha

Non-Linear Convolution Applied to Acoustic Signals 485
Lamberto Tronchin

Partial Differential Equations to Diffusion-Based Population and Innovation Models 491
Andre A. Keller

Merging the Internet of Things and Robotics 499
Cristina Turcu, Cornel Turcu, Vasile Gaitan

On a Scale Invariant Model of Statistical Mechanics, Kinetic Theory of Ideal Gas, and Riemann Hypothesis 505
Siavash H. Sohrab

Audio Transformers Simulation 547
Martin Pospisilik, Milan Adamek

Determining the Audio Transformer Manufacturability 553
Martin Pospisilik, Milan Adamek

Software-Based Audio Signal Dynamics Expander 559
Martin Pospisilik, Milan Adamek

Proposal on Intelligent Wearable Sensor Suit 564
Martin Pospisilik, Lukas Kouril, Jiri Otahal, Milan Adamek

Authors Index 568

ISBN: 978-1-61804-108-1

Keynote Lecture 1

Energy, Environment and Importance of Power Electronics

Professor Bimal K. Bose
Department of Electrical Engineering and Computer Science
The University of Tennessee
USA
E-mail: bbose@utk.edu

Abstract: Power electronics technology has gained significant maturity after several decades of dynamic evolution of power semiconductor devices, converters, PWM techniques, electrical machines, motor drives, advanced control, and computer simulation techniques. With the maturing trend of the technology, 21st century will find tremendous emphasis on power electronics applications in every corner of industrial, residential, commercial, transportation, aerospace , military and electric utility systems. There will be increasing emphasis on application-oriented R&D in modularization, modeling, analysis, simulation, design, and experimental evaluations. Power electronics has now established as a major discipline in electrical engineering, and is gradually tending to merge as a high tech frontier technology with power engineering. In the 21st century, we expect to see the tremendous impact of power electronics not only in global industrialization and efficient energy systems, but also in energy conservation, renewable energy systems, and electric/hybrid vehicles. The resulting impact in mitigating climate change problems due to man-made environmental problems is expected to be considerable. There are ambitious predictions that renewable energy alone with adequate energy storage can supply all the energy needs of the world, and 90% of the automobiles will be electric by the end of the century. It appears that the role of power electronics in our society will tend to be as important and versatile as computers and information technology today. In fact, there is trend of merger of power electronics with computers, information technology and power engineering in the future “Smart Grid” to emerge as a complex interdisciplinary technology. The presentation will begin with the discussion of global energy scenario, climate change problems due to burning of fossil fuels, and the consequences and remedial measures of global warming problems. The importance of power electronics relating to energy saving, renewable energy systems (wind, photovoltaic and fuel cells), bulk energy storage and electric/hybrid vehicles will be discussed in detail. The fuel cell and battery EVs will be compared, and the concept of Smart Grid will be discussed. Several example applications on HVDC wind park, FACT system, DTC drive system, axial flux PM machine EV drive, fuzzy control of wind generation system and neural network based feedback signal estimation will be discussed before coming to conclusion and future scenario of the technology.

Brief Biography of the Speaker: Bimal K. Bose held the Condra Chair of Excellence (Endowed Chair Professor) in Power Electronics at the University of Tennessee, Knoxville since 1987, where he was responsible for teaching and research program in power electronics and motor drives. Concurrently, he was Distinguished Scientist (1989-2000) and Chief Scientist (1987-1989) of EPRI (Electric Power Research Institute)-Power Electronics Applications Center for promoting power electronics in USA. Prior to this, he was a Research Engineer in the GE Corporate Research and Development (now GE Global Research Center), Schenectady, NY for 11 years (1976-1987), an Associate Professor of Electrical Engineering, Rensselaer Polytechnic Institute, Troy, NY for five years (1971-1976), and a faculty member of Bengal Engineering and Science University for 11 years (1960-1971). He is specialized in power electronics and motor drives, specially including power converters, ac drives, PWM techniques, digital control, electric/hybrid vehicle drives, renewable energy systems, A-I applications, and has made many pioneering research contributions in these areas. He has been a power electronics consultant in large number of industries. He authored/edited 7 books in power electronics, holds 21 U.S. Patents for his inventions, and large number of research publications. He has given advanced tutorials, keynote addresses and invited seminars extensively throughout the world. He is a recipient of IEEE Power Electronics Society Newell Award (2005), IEEE Millennium Medal (2000), IEEE Meritorious Achievement Award (1997), IEEE Lamme Medal (1996), IEEE IAS Outstanding Achievement Award (1993), IEEE IES Mittelmann Award (1994), IEEE Region 3 Outstanding Engineer Award (1994), GE Silver Patent Medal (1986), Calcutta University Mouat Gold Medal (1970), IEEE Fellow (1989) and Life Fellow (1996), and many other awards for his research accomplishments. The IEEE Industrial Electronics Society Magazine published a special issue (June 2009) “Honoring Dr. Bimal Bose and Celebrating His Contributions in Power Electronics” with his photo on the cover page. He received B.E. degree in 1956, M.S. degree in 1960 and Ph.D. degree in 1966.

ISBN: 978-1-61804-108-1

Keynote Lecture 2

Current Video Coding Standards: H.264/AVC, Dirac, AVS China and VC-1

Professor K. R. Rao
Dept. of Electrical Engineering
University of Texas at Arlington
Texas, USA
E-mail: rao@uta.edu

Dr. Do Nyeon Kim
Barun Technologies, Corp.
Anyang
South Korea
E-mail: cooldnk@yahoo.com

Abstract: Video coding standards: H.264/AVC, DIRAC, AVS China and VC-1 are presented. These are the latest standards and are adopted by ITU-T/ISO-IEC, BBC, China standards organization and SMPTE respectively. Besides presenting these standards, research potential and as well projects (both at UG and grad levels) are emphasized. These are available by accessing the database for research and projects in [18]. Web/ftp sites for accessing standards documents, software, test sequences, conformance bit streams, industry activities etc are provided.

Brief Biography of the Speaker: K. R. Rao received the Ph. D. degree in electrical engineering from The University of New Mexico, Albuquerque in 1966. He received B.S. E.E from the college of engineering, Guindy, India in 1952.Since 1966, he has been with the University of Texas at Arlington where he is currently a professor of electrical engineering. He, along with two other researchers, introduced the Discrete Cosine Transform (DCT) in 1975 which has since become very popular in digital signal processing. DCT, INTDCT and MDCT (modified DCT) have been adopted in several international video/image/audio coding standards such as JPEG/MPEG/H.26X series and also by SMPTE (VC-1)and by AVS China.He is the co-author of the books “Orthogonal Transforms for Digital Signal Processing” (Springer-Verlag, 1975), Also recorded for the blind in Braille by the Royal National Institute for the blind. “Fast Transforms: Analyses and Applications”(Academic Press, 1982), “Discrete Cosine Transform-Algorithms, Advantages, Applications” (Academic Press, 1990). He has edited a benchmark volume, “Discrete Transforms and Their Applications” (Van Nostrand Reinhold, 1985). He has co edited a benchmark volume, “Teleconferencing” (Van Nostrand Reinhold, 1985). He is co-author of the books, “Techniques and standards for Image/Video/Audio Coding” (Prentice Hall) 1996 “Packet video communications over ATM networks(Prentice Hall) 2000 and “Multimedia communication systems” (Prentice Hall) 2002. He has co edited a handbook “The transform and data compression handbook,” (CRC Press, 2001). Digital video image quality and perceptual coding, (with H.R. Wu)(Taylor and Francis 2006). Introduction to multimedia communications: applications, middleware, networking, (with Z.S. Bojkovic and D.A. Milovanovic), Wiley, (2006). He has also published a book, “Discrete cosine and sine transforms”, with V. Britanak and P. Yip (Elsevier 2007). Wireless Multimedia Communications (publisher: Taylor and Francis) Nov. 2008. “Fast Fourier Transform: algorithms and Applications”, with D. Kim and J.J. Hwang (publisher: Springer) 2010. (Also e-book). Also into Chinese by China Machine Press. Also Asian edition by Springer India. Also into Korean by A-Jin publishing company. Some of his books have been translated into Japanese, Chinese, Korean and Russian and also published as Asian (paperback)editions(also as e-books). He has been an external examiner for graduate students from universities in Australia, Canada, Hong Kong, India, Malaysia, Singapore, Thailand, Taiwan and USA. He was a visiting professor in several Universities -3 weeks to 7 and 1/2 months- (Australia, Japan, Korea, Singapore and Thailand). He has conducted workshops/tutorials on video/audio coding/standards worldwide. He has supervised several students at the Masters (77) and Doctoral (31) levels. He has published extensively in refereed journals and has been a consultant to industry, research institutes, law firms and academia. He has reviewed 23 book manuscripts for book publishers. He is a Fellow of the IEEE (Member # 03911617). He is a member of the Academy of Distinguished Scholars, UTA. He was invited to be a panelist for the 2011 NSF Graduate Research Fellowship Program (GRFP), with service on the following panel: PANEL NAME: Electrical Engineering Panel MEETING DATES: Friday Feb 11, 2011 to Sunday Feb 13, 2011 Do Nyeon Kim received the Ph.D. degree in electrical and electronic engineering from Yonsei University in Seoul, South Korea in 2004. From 1989 to 2003, he was with the Electronics and Telecommunications Research Institute (ETRI), South Korea, where he was a senior researcher. From 2005 to 2010, he was with the University of Texas at Arlington where he was a visiting scholar of electrical engineering. Since 2010, he has been with Barun Technologies, Corp., South Korea, where he is currently a senior engineer. He has published "Fast Fourier Transform - Algorithms and Applications (with K.R. Rao and J.J. Hwang, Springer, 2010).

ISBN: 978-1-61804-108-1

Keynote Lecture 3

Program Analysis beyond Closed-form Expressions for Maximum Parallelization

Dean Kleanthis Psarris
School of Natural and Behavioral Sciences
City University of New York-Brooklyn College
Brooklyn, NY 11201
USA
E-mail: kpsarris@brooklyn.cuny.edu

Abstract: Program analysis techniques and accurate data dependence testing enable a compiler to perform safe automatic code optimization and parallelization. It has been shown that factors, such as loop variants and nonlinear expressions, limit program analysis, dependence testing, and parallelization. The NLVI-Test and the PLATO library have been introduced as a new tool to enable exact data dependence testing on nonlinear expressions. Apart from this work, analyses that utilize the Chains of Recurrences formalism have been shown to improve a dependence test's ability to analyze expressions. In this work we present techniques for applying the NLVI-Test ideas in conjunction with Chains of Recurrences analysis, to couple the benefits of both. In addition, we develop a "Parallelization Index" which describes the upper bound of the total parallelization obtainable in a compiler infrastructure. We perform an experimental evaluation of our techniques on several scientific benchmarks. Our experiments show that our techniques result in higher numbers of total parallel loops discovered, and moreover, that we consistently expose a majority of the obtainable parallelism.

Brief Biography of the Speaker: Kleanthis Psarris is a Professor of Computer and Information Science and the Dean of the School of Natural and Behavioral Sciences at City University of New York - Brooklyn College. He received his B.S. degree in Mathematics from the National University of Athens, Greece in 1984. He received his M.S. degree in Computer Science in 1987, his M.Eng. degree in Electrical Engineering in 1989 and his Ph.D. degree in Computer Science in 1991, all from Stevens Institute of Technology in Hoboken, New Jersey. His research interests are in the areas of Parallel and Distributed Systems, Programming Languages and Compilers, and High Performance Computing. He has designed and implemented state of the art program analysis and compiler optimization techniques and he developed compiler tools to increase program parallelization and improve execution performance on advanced computer architectures. He has published extensively in top journals and conferences in the field and his research has been funded by the National Science Foundation and the Department of Defense. He is an Editor of the Parallel Computing journal. He has served on the Program Committees of several international conferences including the ACM International Conference on Supercomputing (ICS) in 1995, 2000, 2006 and 2008, the IEEE International Conference on High Performance Computing and Communications (HPCC) in 2008, 2009 and 2010, and the ACM Symposium on Applied Computing (SAC) in 2003, 2004, 2005 and 2006.

ISBN: 978-1-61804-108-1

Keynote Lecture 4

Folding and Unfolding Related Issues, Especially Decompositions, in Data Processing

Professor Metin Demiralp
Principal Member of Turkish Academy of Sciences
Istanbul Technical University, Informatics Institute
Turkey
E-mail: metin.demiralp@be.itu.edu.tr

Abstract: Many branches in science and engineering deal with data composed of huge number of elements. Neuroscience, signal processing and similar issues are amongst these types of applications where each data vector contains hundreds of thousands or millions of elements. These types of data vectors can be partitioned to sets having rather small number of elements at the expense of dimensionality increase. Thus certain arrays having more than two indices appear after this partitioning. Their processing is generally based on the expressing of those arrays in terms of rather simple arrays which can be processed more easily. This is somehow decomposition of the arrays to rather simple arrays. This issue is one of the core topics of multilinear algebra. There have been many attempts to get efficient decomposition methods by using folding and unfolding operations.
The general tendency is to use the tensor concept to consider the multilinear algebraic entities. However, a multiindex entity need not be adjacently considered to a tensor even though a tensor can be characterized by a multiindex array depending on the coordinate system in which the considered tensor is represented. We prefer to use the folded arrays to this end. Folded arrays (folarrs) and especially their specific forms, folded vectors (folvecs) and folded matrices (folmats) are very harmonious to the conceptual structure of the ordinary linear algebra. Thus the decomposition of folmats becomes the basic issue.
One way is the use of spectral representation for the decompositions of the folmats. To this end the eigenvalue problems of the folmats should be brought to the scene. On the other hand a complete analogy to the singular value decomposition of ordinary matrices is possible for the singular value decompositions of the folmats. What we need is to consider a folmat as a transforming agent from a specific type folmat to another type folmat even though type conservation is possible.
Spectral decomposition, singular value decomposition, reductive array decomposition, high dimensional model representation, enhanced multivariance product representation will be the main foci for folmat decompositions in the presentation.

Brief Biography of the Speaker: Metin Demiralp was born in Turkiye (Turkey) on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS degrees and PhD from the same institution, ÿIstanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of ÿIstanbul Technical University (he is the founder of this institute).
He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA) at summer and winter semester breaks during the period 1985–2003 after his 14 month long postdoctoral visit to the same group in 1979–1980. He was also (and still is) in collaboration with a neuroscience group at the Psychology Department in the University of Michigan at Ann Arbour in last three years (with certain publications in journals and proceedings).
Metin Demiralp has more than 90 papers in well known and prestigious scientific journals, and, more than 200 contributions to the proceedings of various international conferences. He gave many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is one of the principal members of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society. He has also two important awards of turkish scientific establishments.
The important recent foci in research areas of Metin Demiralp can be roughly listed as follows: Probabilistic Evolution Method in Explicit ODE Solutions and in Quantum and Liouville Mechanics, Fluctuation Expansions in Matrix Representations, High Dimensional Model Representations, Space Extension Methods, Data Processing via Multivariate Analytical Tools, Multivariate Numerical Integration via New Efficient Approaches, Matrix Decompositions, Multiway Array Decompositions, Enhanced Multivariate Product Representations, Quantum Optimal Control.

ISBN: 978-1-61804-108-1

Keynote Lecture 5

Human Control Strategies for Multi-Robot Teams

Professor Katia Sycara
Robotics Institute
Carnegie Mellon University
Pittsburgh, PA
USA
E-mail: katia@cs.cmu.edu

Abstract: Expanding human span of control over teams of robots presents an obstacle to the wider deployment of robots for practical tasks in a variety of areas. One difficulty is that many different types of human interactions may be necessary to maintain and control a robot team. We have developed a characterization of human-robot tasks, and appropriate human robot interaction models, based on complexity of control that helps explicate the forms of control likely to be needed and the demands they pose to human operators. In this paper we use research from two of these areas to illustrate our taxonomy and its utility in characterizing and improving human-robot interaction.

Brief Biography of the Speaker: Katia Sycara is a Professor in Robotics in the School of Computer Science at Carnegie Mellon University and holds the Sixth Century Chair in Computing at the University of Aberdeen, UK. She is the Director of the Laboratory for Advance Agents and Robot Technology & Semantic Technologies. She holds a B.S in Applied Mathematics from Brown University, M.S. in Electrical Engineering from the University of Wisconsin & PhD in Computer Science from Georgia Institute of Technology. She holds an Honorary Doctorate from the University of the Aegean (2004). Dr. Sycara is a Fellow of the Association for Advancement of Artificial Intelligence (AAAI), Fellow of the Institute of Electrical & Electronic Engineers (IEEE), & the recipient of the 2002 ACM/SIGART Agents Research Award. She has served as member of the Scientific Advisory Board of France Telecom, panel evaluation for Siemens, Sandia Labs and others. Dr. Sycara has given numerous invited talks, & has authored or co-authored more than 400 technical papers dealing with Multi-Agent and Multi-Robot Systems, Game Theory, Agents Supporting Human Teams, Human-Agent Interaction, Negotiation, Web Services, Machine Learning & the application of these techniques to crisis action planning, scheduling, manufacturing & e-commerce. Her students have won multiple best paper awards (AAMAS, 2005, 2006, ACHI 2008, BRIMS, 2004, 2005). Her robot team has won various awards in the Robocup Rescue competitions. Dr. Sycara has led successful multimillion dollar research effort funded by DARPA, DDR&E, NASA, AFOSR, ONR, ARO, AFRL, NSF & industry. She is a founding member & served as member of the Board of Directors of the International Foundation of Multiagent Systems (IFMAS). She is a founding member of the Semantic Web Science Association, & serves as the US co-chair of the US-Europe Semantic Web Services Initiative. She has founded the journal “Autonomous Agents & Multiagent Systems” and served as Editor in Chief (1998-2008); she is on the Editorial Board of six additional journals.

Plenary Lecture 1

Lightning Protection for Power Apparatuses

Professor Hitoshi Kijima
Polytechnic University
Japan
E-mail: hkijima@uitec.ac.jp

Abstract: This paper proposes a new technology for protecting power apparatuses against overvoltage or overcurrent caused by lightning surge. Surge Protective Devices (SPDs) are used for protecting apparatuses against overvoltage or overcurrent caused by lightning surge. SPDs are mainly divided into two categories. One is clamping type and the other is switching type. Typical clamping type SPD is a variable resitor (varistor). Typical switching type SPD is a Gas-filled Discharge Tube (GDT). Both varistors and GDTs have problems when using them alone. This paper proposes a lightning surge response improvement by combinations of both varistors and GDTs in order to solve the problems of them. It is that three or more GDTs are connected in series and two or more varistors are connected in parallel. Problems of both them can simultaneously be solved by reducing the operating voltage with high response time. A disconnector for an overvoltage protector is equipment that disconnects a circuit when the overvoltage protector may fail in a short circuit mode. The disconnector and the overvoltage protector are connected in series. A fuse or a circuit breaker is normally used as a disconnector. However there are problems with both methods. A fuse is not recyclable once it goes out. Even a circuit breaker is resettable, a lightning surge current causes switchgear of circuit breaker to open unnecessary. This malfunction spoils the overvoltage protective function which eliminates a lightning surge current into an instrument. If the problem which a switchgear of circuit breaker comes floating can be solved, even when a lightning surge current flows through it, an instrument can be protected by the overvoltage protector. This paper presents several approaches preventing circuit breaker type disconnectors from the malfunction.

Brief Biography of the Speaker: He was born in Yamanashi; Japan in 1952. He received his BS in Electrical engineering from Yamanashi University (1975), his MS in Electrical engineering from Yamanashi University (1977), and his Ph.D. from Tokyo University (1999).. His field is all EMC aspects such as lightning protection, noise reduction, earthing systems. He served 20 years in R&D center of NTT (Nihon Telegraph and Telephone public corporation). He was leader of EMC Department. Then He became professor of Polytechnic University. He published many books such as Recent Lightning Protection (ISBN4-542-30397-7) 2006, Electrical Engineering (ISBN4-87563-022-0) 2003, Earthing & Lightning Protection (ISBN4-88552-147-5) 2002. He obtained the best paper award for the 9th WSEAS International Conference (EHAC '10) University of Cambridge, UK, February 20-22, 2010, Electromagnetic Force Analyzed Results on Switchgear of Disconnector for Overevoltage Protector, pp.135-140 Hitoshi Kijima, Tomooki Hasegawa. Recent papers are as follows. [1] H. Kijima, K. Takato, K. Murakawa, Lightning protection for gas-pipelines installed under the ground, International Journal of systems and applications, engineering & development, Issue 1, vol. 5, pp117-126, 2011 [2] H. Kijima, T. Hasegawa, Electrical force analyzed results on switchgear of disconnector for overvoltage protector, WSEAS Transactions on power systems, Issue 1, vol. 5, pp32-41, 2010 [3] H. Kijima, M. Shibayama, Circuit breaker type disconnector for overvoltage protector, WSEAS Transactions on power systems, Issue 5, vol. 4, pp167-176, 2009 [4] H. Kijima, A Development of Earthing-Resistance-Estimation Instrument International Journal of geology, Issue 4, vol. 4, pp112-116, 2009.

Plenary Lecture 2

Description of Continuous and Discrete Systems by Means of State Space Energy Approach, Theory and Results

Professor Milan Stork
Department of Applied Electronics and Telecommunications
and
Regional Innovation Centre for Electrical Engineering
University of West Bohemia Plzen
Czech Republic
E-mail: stork@kae.zcu.cz

Abstract: It is familiar that there are two basic approaches to system modeling. The first one consists in using mathematical formulas and physical principles (a causality principle, different forms of conservation laws, power balance relations, etc.) in order to describe appropriate system behavior. It has successfully been used in many fields of science and engineering so far. However, there are also situations where physical laws are not known or cannot be expressed in a proper mathematically exact form. In that case the second basic so called cybernetic approach to system modeling can be turned. It is based on identification methods working in terms of experimentally gained data. It is possible to divide the identification methods into two groups: parametric and non-parametric, respectively. If any prior information about a system structure is not available then one of non-parametric procedures has to be chosen for system identification. On the other hand, imagine that a physical structure of an investigated system would be known. In such cases some of available parametric methods can be used and consequently more adequate results from the physical correctness point of view should be obtained. Unfortunately, any reliable explicit knowledge about a physical system structure is more likely an exception than a rule. Therefore, a system structure is mostly chosen ad hoc only behalf of heuristic arguments. Subsequently it has to be verified whether obtained quantitative results are not in conflict with obvious qualitative expectations concerning regular system behavior and/or results of additional experiments performed on a real system. The lecture is organized as follows: The first part is devoted to the problem of physical correctness of systems models and new concept of the state space energy is introduced and a generalized form of the theorem called the Lyapunov-Tellegen/s principle is presented. In the second part there are demonstrated some of application concerning problem of the state space energy including continuous and discrete-time systems and also chaotic systems. The nonlinear stability analysis by means of the proposed state space energy based method is also discussed. Results of simulation examples will also presented.

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. He specialized in electronics systems and control in research institute in Prague. Since 1977 he worked as lecturer on University of West Bohemia in Plzen. He received Ph.D. degree in automatic control systems at the Czech Technical University in Prague in 1985. In 1997, he became as Associate Professor. From 2007 he is full 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, nonlinear and chaotic systems, control systems, signal processing and biomedical engineering, especially cardiopulmonary exercise systems.

ISBN: 978-1-61804-108-1

Plenary Lecture 3

On Partial Differential Equations to Diffusion-Based Population and Innovation Models

Professor Andre A. Keller
Laboratoire d'Informatique Fondamentale de Lille/SMAC, UMR 8019/CNRS
Université de Lille Nord de France
France
E-mail: Andre.Keller@univ-lille1.fr

Abstract: Multiple circumstances and diffusion mechanisms in biological and economic modeling involve partial differential equations (PDEs). Functional PDEs (with discrete delays) may be even more adapted to real world problems. Some PDEs are already attached to basic concepts such as a marginal rate of substitution or an elasticity of substitution, from which we can infer the form of utility or production functions. Other PDEs are inherent to the resolution process of a problem, such as the Hamilton-Jacobi-Bellman PDE for solving continuous-time control problems (e.g. Stackelberg differential games) , and the Fokker-Planck PDE of parabolic type to obtain the probability density function of solutions in an uncertain random environment (e.g. to determine the probability that a particle will be found in a given region). In the modeling process, PDEs (with even more complications) may also formalize behaviors, such as the logistic growth of populations with migrations, and the adopters' dynamics of new products in innovation models. In biology, these events are then related to the variations in the environment, the population densities and overcrowding, the migrations and spreading of humans, animals, plants and other cells and organisms. In economics and management science, the diffusion processes of technological innovations in the. Marketplace (e.g. the mobile phone) is a major subject. Moreover, these innovation diffusion models refer mainly to epidemic models. This contribution introduces to this powerful modeling process with PDEs and reviews the essential features of the dynamics in ecological and economic modeling. The computations are carried out by using the software Wolfram Mathematica ® 8.

Brief Biography of the Speaker: Andre A. Keller (Prof.) is at present an associated researcher in mathematical economics at CLERSE a research unit UMR8019 of the French Centre National de la Recherche Scientifique (CNRS) by the Universite de Lille 1, Sciences et Technologies. He is also participating to the group 'Dynamique et Complexite' which is supported by the Federation de Physique et Interfaces. He received a PhD in Economics (Operations Research) in 1977 from the Universite de Paris Pantheon-Sorbonne. He is a WSEAS Member since 2010 and a Reviewer for the journals Ecological Modelling (Elsevier) and WSEAS Transactions on Information Science and Applications. He taught applied mathematics (optimization techniques) and econometric modeling, microeconomics, theory of games and dynamic macroeconomic analysis. His experience centers are on building and analyzing large scale macro-economic models, as well as forecasting. His research interest has concentrated on: high frequency time-series modeling with application to the foreign exchange market, on discrete mathematics (graph theory), stochastic differential games and tournaments, circuit analysis, optimal control under uncertainties. His publications consist in writing articles, books and book chapters. The book chapters are e.g. on semi-reduced forms (Martinus Nijhoff, 1984), econometrics of technical change (Springer and IISA, 1989), advanced time-series analysis (Woodhead Faulkner, 1989), stochastic differential games (Nova Science, 2009), optimal fuzzy control (InTech, 2009). One book is on time-delay systems (LAP, 2010). One another book is on nonconvex optimization techniques (WSEAS Press, forthcoming 2012).

ISBN: 978-1-61804-108-1

Plenary Lecture 4

Grids of the Future-Transition to Smart Grids

Professor Shahram Javadi
Department of Electrical Engineering,
I.A.U., Central Tehran Branch
Tehran, Iran
E-mail: sh.javadi@iauctb.ac.ir

Abstract: Believe the electric power system is undergoing a profound change driven by a number of needs. there's the need for environmental compliance and energy conservation. we need better grid reliability while dealing with an aging infrastructure and we need improved operational efficiencies and customer service. the changes that are happening are particularly significant for the electricity distribution grid, where "blind" and manual operations, along with the electromechanical components, will need to be transformed into a "smart grid." this transformation will be necessary to meet environmental targets, to accommodate a greater emphasis on demand response, and to support plug-in hybrid electric vehicles as well as distributed generation and storage capabilities.
It is safe to say that these needs and changes present the power industry with the biggest challenge it has ever faced. on one hand, the transition to a smart grid has to be evolutionary to keep the lights on; on the other hand, the issues surrounding the smart grid are significant enough to demand major changes in power systems operating philosophy.
With emerging requirements for renewable portfolio standards (RPS), limits on greenhouse gases, and demand response and energy conservation measures, environmental issues have moved to the forefront of the utility business. The RPS mechanism generally places an obligation on electricity supply companies to provide a minimum percentage of their electricity from approved renewable energy sources.

Brief Biography of the Speaker: Dr. Shahram Javadi received his B.Sc. from Amirkabir University, M.Sc. from K.N.T. University of Technology and Ph.D. from I.A.U., Science and Research Branch in Electrical Engineering. He has been in charge of faculty member at Technical and Engineering Faculty in I.A.U., Central Tehran Branch (1996-Now) and has taught courses in the Electrical Engineering Department. He has also served as Visiting Professor at the ISEL, Institute /Superior of Engineering of Lisbon since 2008 while he is currently Professor and Director Research of I.A.U., Central Tehran Branch, IRAN.
He is an active researcher in Artificial Intelligence, Smart Grids, Power Electronic and Control Systems. He is author of 2 books and has published over than 30 papers in international books, journals and conferences.
He is director general of international journal of electrical engineering smart systems (ISEE) and editorial board of international conference on mechanical engineering (IASEM) and one of the active members of WSEAS, World Scientific and Engineering Academy and Society. Dr. Javadi is the member of International & Technical Committee of WSEAS, IEEE, Cigre, Academic board for International Power System conference PSC, Academic board for Power System Protection & Control conference PSPC, Member of Scientific Committee of Power Systems Protection & Control conference PSPC, Member of IAEEE (Iranian Association of Electrical & Electronics Engineers), Member of Scientific Committee of Iranian Wind Energy Society and Member of Iranian Fuzzy Systems Society.

ISBN: 978-1-61804-108-1

Plenary Lecture 5

A Concept on Thermal Equilibrium Establishment and Its Use in Heat Treating Industry

Dr. Nikolai Kobasko
Fellow of ASM
IQ Technologies Inc
Akron, USA
&
Intensive Technologies Ltd
Kyiv, Ukraine
E-mail: NKobasko@aol.com

Abstract: Heat treating of materials is connected with two or three thermal equilibrium establishment and evaluation of transition time from an initial thermal equilibrium to another one. For example, a system of steel components during batch quenching first is heated to austenitizing temperature T0 (800oC – 900oC) and then is transferred to liquid medium with temperature Tm . After cooling in liquid is finished, the third equilibrium establishment follows when system is subjected to deep cryogenic treatment. In both cases transition time is the main technological parameter which should be properly determined to be a right recipe. In the plenary lecture the equations for cooling time evaluation of steel parts of any configuration are proposed. Also, a new idea on thermal equilibrium establishment is discussed which is based on analyzing parabolic and hyperbolic heat conductivity equations. According to the main postulate of thermodynamics, the thermal equilibrium is always realized and its time of appearing is a finite value. According to classic parabolic heat conductivity equation, the thermal equilibrium is established when time is infinity. The contradiction can be solved by taking into account thermal fluctuations which destroy exponential law of cooling (heating) and lead to finite time of equilibrium establishing. In the presentation, it is shown that thermal equilibrium is realized in certain (finite) time which depends very slightly on initial temperature and in many cases is almost the same. However, transition time considerably depends on size of system, its configuration, thermal properties of material, properties of liquid, and its agitation. The correlations on this subject are provided to calculate system's transition time from one thermal equilibrium to another. The results of investigations are used for the new technologies development which increase wear resistance of tools and service life of machine components.

Brief Biography of the Speaker: Dr. Kobasko received his Ph.D. from the National Academy of Sciences of Ukraine. He is a leading expert on quenching and heat transfer during the hardening of steels. He was the Head of the laboratory of the Thermal Science Institute of the National Academy of Sciences of Ukraine. He is Director of Technology and Research and Development for IQ Technologies, Inc., Akron, Ohio and supervisor of Intensive Technologies, Ltd, Kyiv, Ukraine. The aim of both companies is material savings, ecological problem-solving, and increasing service life of steel parts. He is an ASM International Fellow (FASM). Dr. Kobasko is the author and coauthor of more than 270 scientific and technical papers, several books and more than 30 patents and certificates. He received the Da Vinci Diamond Award and Certificate in recognition of an outstanding contribution to thermal science.
Dr. Nikolai Kobasko was Editor-in-Chief and Co-Editor of the WSEAS Transactions on Heat and Mass Transfer; and is currently a member of the Editorial Board for the International Journal of Mechanics (NAUN) and the Journal of ASTM International (JAI).

ISBN: 978-1-61804-108-1

Plenary Lecture 6

Method for Determining the Residual Stress-Strain State of Welded Structures through the Wavelet Transform

Professor Vincenzo Niola
Department of Mechanics and Energetics
Faculty of Engineering
University of Naples Federico II
Italy
E-mail: vincenzo.niola@unina.it

Abstract: The method refers to the technical field relating to the use of technology and non-destructive methods for the determination of residual stress-strain state induced in the welded structures.
Currently, for the determination of residual stress-strain state induced in the welded products, different methodologies are used which are distinguished in two main categories: destructive and nondestructive methods.
It has been developed a non-destructive method for determining the stress-strain state of welded structures which allows to identify and then point-out the areas (cluster) of the welded skin showing frequency bands emissivity related to the different thermal conductivity of the material that, due to thermoplastic important variations during the welding step, modify the morphology of its grains, and, consequently, the surface emissivity.
The proposed methodology allows to evaluate in real time, by means of non-destructive technique, the residual stress-strain state in the welded structures, using the wavelet transform.

Brief Biography of the Speaker: Vincenzo Niola is professor of Applied Mechanics at Naples University Federico II since 31 march 1987. After he got an Univerisity Degree in Mechanical Engineering, he started in january 1978 didactics activity as helper at course of Applied Mechanics and Machines et as member of their committee of examination. Since september 1979 he carried on that collaboration as owner of a scholarship from C.N.R. (National Research Council). Since december 1981 to march 1987 he was a researcher carrying on the practice course for Applied Mechanics, taking a part at examination meeting and working as proposer in many degree thesis. Since 1981 to 1984 he carried on his didactics activity as university teacher for Bioengineering course of locomotive apparatus at Orthopaedy and Traumathology specialization school of 2th Department of Medicine and Surgery of Naples University. Since 31 march 1987 is professor of Applied Mechanics at Naples University Federico II, and since A.A. 86/87 to A.A. 92/93 he carried on the Applied Mechanics and Machines course for electronic engineers, and since A.A. 93/94 to today carry on the Applied Mechanics course for computer science engineers. Since A.A. 88/89 to 89/90 he carried on as supply teacher the Applied Mechanics course for building engineers at Salerno Engineering University. By A.A. 94/95 to A.A. 97/98 he carried on as supply professor Tribology course at Naples University Federico II. By A.A. 2001/2002 he holds the chair of Applied Mechanics for University Degree of “Orthopaedic Technician” at 2th Department of Medicine and Surgery of Naples University. Since A.A. 2005/2006 is professor of Tribology and of Complements of Mechanics. During this years Prof. Vincenzo Niola has been the chairman of his courses examination meetings, and was proposer of many degree thesis.. During his activity Prof. Vincenzo Niola was owner of financings from MURST and (in past and present) cooperate scientifically with research corporation and national industries (MERISINTER, MONTEFLUOS, INDESIT, ALENIA, C.I.R.A.). He's scientific member of Naples research unit for PRIN 2003. He's fellow of Italian Association of Theoretical and Applied Mechanics (AIMETA). He's member of IFToMM Linkages on cams committee. He belongs to the International Scientific Committee of the "World Scientific and Engineering Academy and Society (WSEAS). He is President of the WSEAS Italy Chapter on the “Analysis of the Mechanical Systems”. He was been Chairman and "invited author" in some session of Internatinal Conferences. He's author of more than 150 national and international papers. Is author of two chapters in the international books. In the past he focused his research activity on:
• Applied Mechanics
• Tribology
• Robot dynamics

ISBN: 978-1-61804-108-1

• Funicular Railways
• Static and dynamic behaviour of rotors on lubricated journal bearings
• Industrial robot calibration
• Analysis of Mechanical systems by means Wavelet Transform.

The Prof. Niola is member of the “Editorial Board” of two International Journals. He is also Editor-in-Chief of a International Journal. During these years he has also been speaker of a lot of invited plenary lectures in the International Conferences.

ISBN: 978-1-61804-108-1

Plenary Lecture 7

Dual Rotor Single Inverter and Single Stator PMSM for HEVs

Associate Professor Sorin Ioan Deaconu
Department of Electrical Engineering and Industrial Informatics
Polytechnic University of Timisoara
Romania
E-mail: sorin.deaconu@fih.upt.ro

Abstract: Electric propulsion systems on HEVs (hybrid electric vehicles) are part of ICE vehicle electrification, to reduce fuel consumption and CO2 pollution and (or) increase human safety and comfort. The axial flux permanent magnet (AFPM) machine, also called the disc-type machine, is an attractive alternative due to its pancake shape, compact constructions and high power density. AFPM motors are particularly suitable for electrical vehicles, pumps, fans, valve control, centrifuges, machine tools, robots and industrial.
The present paper reviews in terms of topology and performance, what was done so far on electric propulsion systems for HEVs.
The actual e - continuously variable transmission (e-CVT) solution for the parallel Hybrid Electric Vehicle (HEV) requires two electric machines, two inverters, and a planetary gear. A distinct electric generator and a propulsion electric motor, both with full power converters, are typical for a series HEV.
In an effort to simplify the planetary-geared e-CVT for the parallel HEV or the series HEV we hereby propose to replace the basically two electric machines and their two power converters by a single, axial-air-gap, electric machine central stator, fed from a single PWM converter with dual frequency voltage output and two independent PM rotors.
The proposed topologies, main key design equations, the magneto-motive force analysis, optimal design and quasi 3D-FEM validation, vector control strategy and PWM independent control for two shaft are the core of the presentation.

Brief Biography of the Speaker: Sorin Ioan Deaconu, IEEE member from 2007, was born in Orastie, Romania, in 1965. He received the B. S. degree in electrical engineering in 1989 and Ph.D. degree in electrical machines in 1998 from Polytechnic University of Timisoara, Romania.
He is currently Associate Professor at the Department of Electrical Engineering and Industrial Informatics, Engineering Faculty of Hunedoara, Polytechnic University of Timisoara. His research interests focus on improvement of performances for classical and special electrical machines, generation of electrical energy with variable speed in micro hydro and wind power plant, improvement of performances for electrical variable speed drives, modern electrical traction systems in railway, electric and hybrid vehicles.
Since 1994, he has collaborated with Bee Speed Automation Ltd, Timisoara, where he is involved in several industry projects regarding industrial automation, machines and drives.
He has until now published over 180 research papers in international journals and conference proceedings, and invited book chapters and participate to 12 research projects.

ISBN: 978-1-61804-108-1

Plenary Lecture 8

A General Fuzzy Framework for Representing a System and Measuring its Performance

Professor Michael Gr. Voskoglou
School of Technological Applications
Graduate Technological Educational Institute (T. E. I.)
263 34 Patras, Greece
E-mail: voskoglou@teipat.gr

Abstract: We develop a general model for representing several processes in Mathematics Education, Artificial Intelligence and Management (e.g. learning, mathematical modelling, problem-solving, case-based reasoning, etc) involving fuzziness and uncertainty. To each of the main stages of these processes we correspond a fuzzy subset of the set of the linguistic labels of negligible, low intermediate, high and complete success respectively at this stage and we use the total possibilistic uncertainty, i.e. the sum of strife and non specificity, as a measure of the system's performance (e.g. students' capacities, CBR system's effectiveness, etc). Examples and classroom experiments are also presented illustrating the use of our model in practice. Other fuzzy measures of a system's performance are also mentioned and used. These measures include the Shannon's entropy - properly adapted in terms of the Dempster-Shafer mathematical theory of evidence for use in a fuzzy environment - connected to the system's probabilistic uncertainty and the associated information. They also include the "centroid" method, in which the centre of mass of the graph of the membership function involved provides an alternative measure of the system's efficiency.

Brief Biography of the Speaker: Michael Gr. Voskoglou (B.Sc., M.Sc., M.Phil. , Ph.D. in Mathematics) is currently Professor of Mathematical Sciences at the Graduate Technological Educational Institute of Patras, Greece. He is the author of 8 books (7 in Greek and 1 in English language) and of about 240 papers published in reputed journals and proceedings of conferences of 22 countries in 5 continents, with many references from other researchers. He is also a reviewer of the AMS and member of the Editorial Board or referee in several mathematical journals. His research interests include Algebra, Fuzzy Sets, Markov Chains and Mathematics Education.

ISBN: 978-1-61804-108-1

Plenary Lecture 9

A System of Systems Approach for Improved Autonomy of Unmanned Systems

Professor George Vachtsevanos
School of Electrical and Computer Engineering
Georgia Institute of Technology
Atlanta, Georgia
USA
E-mail: george.vachtsevanos@ece.gatech.edu

Abstract: There is an urgent need to improve the autonomy, safety, survivability and availability of such critical assets as unmanned systems that are subjected to internal and/or external threats in the execution of a mission. Design for autonomy is taking central stage in the operational needs process development and implementation by responding to significant and urgent safety situations. The industrial and commercial sectors are faced with such needs and challenges. We propose an intelligent strategy for the design of autonomous systems that builds upon concepts from Prognostics and Health Management (PHM) and Fault Tolerant Control (FTC) or reconfigurable control.
The "game changing" aspects of the proposed framework for improved autonomy and its constituent modules are summarized below:
- A rigorous methodology for on-line Remaining Useful Life (RUL) estimation of ailing components will be applied to health management for critical systems with performance guarantees.
- A decision-making module that assesses the integrity of the ailing components and enacts the proper mitigation methodology based on current mission objectives.
- A novel prognostics-based control methodology that utilizes Model Predictive Control and an optimization scheme to trade off system performance for increased RUL, in an attempt to extend the useful life of a degrading asset until its mission is completed.
- Performance and effectiveness metrics to support the optimum design and validation of design for autonomy algorithms.
- A rigorous treatment of trust, risk, confidence and uncertainty management to resolve possible human-automation conflicts and assist the decision making process.
- The integrated integrity management architecture may be implemented on-platform and run in real time. Generic aspects of the approach will be readily applied to other air systems.
We will discuss in this presentation the design for autonomy framework with emphasis on system requirements to monitor their own performance, detect and predict the evolution of fault modes and reconfigure the available control authority in order to safeguard the system integrity in the execution of a mission.

Brief Biography of the Speaker: Dr. George Vachtsevanos is Professor Emeritus at the Georgia Institute of Technology Dr. Vachtsevanos directs the Intelligent Control Systems laboratory at Georgia Tech where faculty and students conduct research in intelligent control of complex manufacturing, industrial and aerospace systems, reliability and safety of large-scale systems/processes and unmanned systems. Faculty and students in the laboratory began research in diagnostics in 1985 with a series of projects in collaboration with Boeing Aerospace Company funded by NASA and aimed at the development of fuzzy logic based algorithms for fault diagnosis and control of major space station subsystems. Dr. Vachtsevanos and his research team were involved in a series of programs since 1985 in diagnostics and more recently in prognostics funded by government and industry. His research has been supported over the years by ONR, NSWC, the MURI Integrated Diagnostics program at Georgia Tech, the U.S. Army's Advanced Diagnostic program, General Dynamics, General Motors Corporation, the Academic Consortium for Aging Aircraft program, the U.S. Air Force Space Command, Bell Helicopter, Fairchild Controls, among others. The innovative technologies have relied on both data-driven and model-based algorithms from the domains of soft computing, Dempster-Shafer theory, Bayesian estimation techniques and physics-based modeling architectures. He has been developing innovative diagnostic and prognostic technologies for NASA, ONR, DARPA, and other government agencies. The application domains range from automotive electrical storage and distribution systems, to high power amplifiers, environmental control systems, and critical engine and drive system aircraft components. Of

special note are two programs in prognosis of critical aircraft components sponsored by DARPA, the first one in collaboration with Northrop Grumman and other participants and the second with Pratt and Whitney. Dr. Vachtsevanos has developed and has been administering an intensive four-day short course on “Fault Diagnostics/Prognostics for Equipment Reliability and Health Maintenance.” The group’s research activities in intelligent control and CBM/PHM have been recognized by the community for establishing the foundation for these emerging technologies. More recently, Dr. Vachtsevanos has been investigating the coupling between control and CBM/PHM technologies. Under sponsorship by government and industry his research group is developing innovative fault-tolerant control methodologies aimed to utilize prognostic information and improve the reliability and safety of critical systems.

He has published over 300 technical papers and is the recipient of the 2002-2003 Georgia Tech School of ECE Distinguished Professor Award and the 2003-2004 Georgia Institute of Technology Outstanding Interdisciplinary Activities Award. He is the lead author of a book on Intelligent Fault Diagnosis and Prognosis for Engineering Systems published by Wiley in 2006.

ISBN: 978-1-61804-108-1

Authors Index

Acosta, M. H. 115
Adamek, M. 426, 547, 553
Adamek, M. 559, 564
Akyel, C. 44
Ali, S. S. A. 351
Assambo, C. 54
Babic, S. 44
Baciu, I. 219
Baidyk, T. 111
Baritz, M. I. 89
Baydyk, T. 115
Bednarik, M. 273, 285, 299
Bednarik, M. 303, 321, 325
Biolek, D. 66, 85
Biolková, V. 66, 85
Blaha, M. 362, 378
Bližňák, M. 431
Botez, R. M. 405
Boudjada, N. 44
Bucki, R. 333
Burke, M. J. 54
Čápek, P. 400
Cerny, J. 299, 303, 307
Cerny, J. 321, 325
Chalupa, P. 368, 383
Chang, L. B. 49
Chou, S. T. 49
Chramcov, B. 333, 339
Cristea, L. 89
Cuntan, C. D. 219
Dan-Isa, A. 38
Das, A. 49
Deaconu, R. 173
Deaconu, S. I. 173, 219, 279
Diniş, C. M. 279
Dlapa, M. 229, 233
Docheva, L. 179
Dolinay, J. 238, 248
Dolinay, V. 356, 459, 463
Dostálek, P. 238, 248
Drtina, R. 125, 131
Edelmoser, K. H. 60
Frantisek, H. 345
Gaitan, V. 499
Gradišar, M. 411
Grigorie, T. L. 405
Guseynov, Sh. E. 167
Hachour, O. 146
Himmelstoss, F. A. 60
Hodirnau, M. 89
Hrusak, J. 78
Iagar, A. 219
Kachulkova, S. 33
Kalina, M. 362
Keller, A. A. 491
Kijima, H. 72, 95, 105
Kobasko, N. I. 158, 167
Kolek, J. 421, 431
Kolka, Z. 66, 85
Kořínek, T. 415
Kouril, L. 564
Kozel, T. 258
Král, E. 400
Krampl, J. 431
Křupka, J. 415
Kussul, E. 111, 115
Kyas, K. 264, 269, 285
Kyas, K. 289, 307, 317
Lacinak, L. 389
Latal, P. 480
Lawan, A. U. 38
Lin, S. L. 49
Lokvenc, J. 125, 131
Macku, L. 453, 447
Magaji, N. 38
Manas, D. 264, 269, 273
Manas, D. 285, 289, 294
Manas, D. 299, 303, 307
Manas, D. 317, 321, 325
Manas, D. 329
Manas, M. 264, 269, 273
Manas, M. 285, 289, 294
Manas, M. 299, 303, 307
Manas, M. 317, 321, 325
Manas, M. 329
Manescu, M.-E. 89
Mastorakis, N. E. 472
Matušů, R. 242, 252
Mayer, D. 78
Mihal, R. 389
Mizera, A. 273, 285, 299
Mizera, A. 303, 321, 325
Moinuddin, M. 351
Motýl, I. 421, 431
Mustafa, M. W. 38
Navratil, J. 264, 269, 273
Navratil, J. 294, 317
Navratil, P. 207
Nikolakakos, N. 152
Novak, J. 368, 383
Obreja, R. 405
Ola. D.-C. 89
Otahal, J. 564
Ovsik, M. 285, 289, 299
Ovsik, M. 303, 321, 325
Ovsik, M. 329
Pavlik, M. 389
Pekar, L. 196, 202, 207
Pivnickova, L. 356
Pleshkova, S. 179, 183
Plšek, S. 225
Popa, G. N. 173, 279
Popa, I. 279
Pospíšilík, M. 426, 431, 436
Pospíšilík, M. 547, 553, 559
Pospíšilík, M. 564
Potužák, L. 362
Prokop, R. 196, 202, 242
Prokop, R. 252
Radocha, K. 120

ISBN: 978-1-61804-108-1

Reznicek, M. 289
Samek, D. 441, 453
Sanda, S. 273, 289
Sandu, D. G. 405
Sedivy, J. 120, 125, 131
Senkerik, V. 264, 269, 294
Senkerik, V. 307, 317
Šilinger, K. 378
Sir, M. 311
Skrobak, A. 264, 269, 294
Skrobak, A. 307, 317
Slaby, A. 258
Slovák, D. 431, 480
Sohrab, S. H. 505
Soušek, R. 415
Stanek, M. 264, 269, 273
Stanek, M. 285, 289, 294
Stanek, M. 299, 303, 307
Stanek, M. 317, 321, 325
Stanek, M. 329
Stanislav, P. 345
Stork, M. 78, 188
Taketani, K. 72
Tomat, L. 411
Tronchin, L. 485
Tsamatsoulis, D. 136, 152
Turcu, Co. 499
Turcu, Cr. 499
Varacha, P. 426, 436, 441
Varacha, P. 480, 421, 431
Vašek, L. 400, 459, 463
Vašek, V. 225, 238, 248
Vašek, V. 356
Vaskova, H. 329
Vesely, I. 311
Voskoglou, M. G. 213, 394, 467
Zalesak, M. 374
Zamecnik, D. 311
Zhuang, X. 472
Zolotova, I. 389

ISBN: 978-1-61804-108-1