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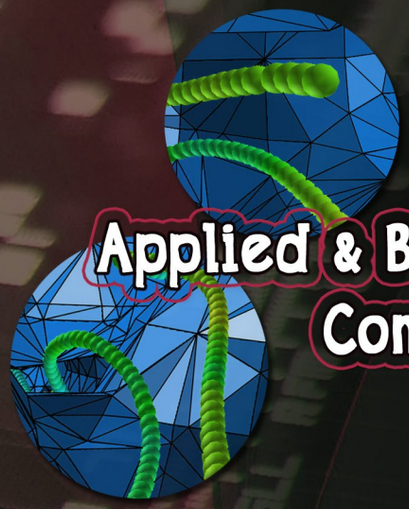

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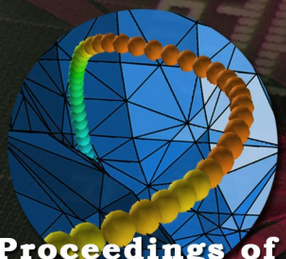

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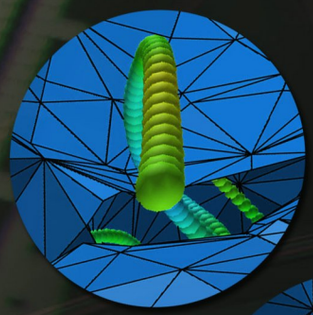

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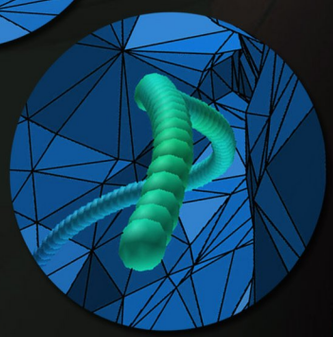

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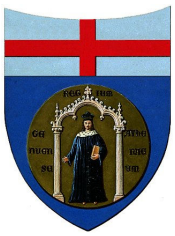

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Table of Contents

Plenary Lecture 1: On Formally Engineering Applications Software 16
Stefan Bruda

Plenary Lecture 2: The Electric PCR Microsystems based on LTCC Technology for Escherichia Coli Detection in Environmental Samples 17
Malodobra Malgorzata

Plenary Lecture 3: Biomedical Informatics a Creative Way in Health Education - An Ethical Approach 18
Liliana Rogozea

Plenary Lecture 4: Elaboration and Physicochemical Behaviour of Nano Hydroxyapatite / Silver Nanoparticles Biocompsite after "In Vitro" Assays 19
Hassane Oudadesse

Plenary Lecture 5: Possibilities of Applications of the Fuzzy Inference Systems and Probabilistic–Fuzzy Inference Systems for the Prediction and Diagnosis 20
Anna Walaszek-Babiszewska

Plenary Lecture 6: Digital Signal Processing and Softcomputing Methods Applied to ECG and PCG to Infer about Subject Physiological Status 21
Mario Malcangi

Plenary Lecture 7: The Use of Biomedical Imaging for Computer-Aided Diagnosis and Treatment Planning in Orthodontics and Dentofacial Orthopedics 22
Alexandru S. Ogodescu

Plenary Lecture 8: The Learning Content Management Systems in Medical Education: A New Wave Emerges 23
Sat Sharma

Plenary Lecture 9: Advances in 2-D Filter Design - New Algorithms for Notch, Fan and Cone Filters 24
Nikos E. Mastorakis

Plenary Lecture 10: Multi-criterion, Evolutionary and Quantum Decision Making in Complex Systems 25
Jerszy Balicki

On the Measurability of the Families in the Euclidean Plane 27
G. Caristi

A Laplace Type Problem for a Regular Lattice with Six Obstacles 30
D. Barilla, G. Caristi, A. Puglisi

ISBN: 978-1-61804-028-2

Automatic Disease Diagnosis Systems Using Pattern Recognition based Genetic Algorithm and Neural Networks 36
Mahdieh Adeli, Hassan Zarabadipour

Enrichment of Iron and Manganese in Zayanderoud River Sediments (Iran) 42
Javad Tabatabaei

Calibration Alternatives in Schema Matching 53
Balazs Villanyi, Peter Martinek, Bela Szikora

A Novel Approach to Add Semantics to Web Services 59
Susila, S. Vadivel

Probabilistic – Fuzzy Knowledge Bases for Diagnostic Systems 65
Anna Walaszek-Babiszewska

Elaboration and Physicochemical Behaviour of Nano Hydroxyapatite / Silver Nanoparticles Biocompsite after "In Vitro" Assays 71
Hassane Oudadesse, Amany Mostafa, Yann Legal, Guy Cathelineau

Planning "Logistics Information Systems" Course Content and its Promotion through Baltic Regional Competence Network 77
Andrejs Romanovs, Oksana Soshko, Yuri Merkuryev, Leonids Novickis

Performance of a Novel SUV Calculation Scheme for PET Study 83
Somphob Soongsathitanon, Malulee Tuntawiroon, Thonnapong Thongpraparn, Pawitra Masa-Ah

Sequential Recognition of EMG Signals Applied to the Control of Bioprosthetic Hand – Experimental Comparative Analysis of Methods 88
Marek Kurzynski, Andrzej Wolczowski

Classification of Cancer Cells Based on Morphological Features From Segmented MultiSpectral Bio-Images 92
A. Chaddad, C. Tanougast, A. Dandache, A. Bouridane

Pumping Visibly Pushdown Languages 98
Stefan D. Bruda

Constructing Optimal CAE Design Approach Model: Application of the Advanced TDS 104
Kakuro Amasaka

Assessment of Electrode-Based Spontaneous Eye Blink Analysis 113
Aylin Nuhoglu, Hakan Bozkurt, Ali Umit Keskin

Security as a Service Model in SOA 117
Juliana Georgieva, Mariana Goranova

ISBN: 978-1-61804-028-2

Dynamic Programming Matching for Detecting Abnormalities in Machines Emitting Intermittent Sounds 123
Teruji Sekozawa

Neural Network Face Identification 129
David Malanik, Roman Jasek

Access to the Solver of Functional Differential Equations through the Web Interface 135
Svyatoslav I. Solodushkin

Physical Therapy System for Children with Hemiplegia 138
V. Genis, W. Rosen, M. Mauk, J. Milbrandt, E. Carr, S. Gupta

A Neuronal Network Model with STDP for Tinnitus Management by Sound Therapy 143
Hirofumi Nagashino, Yohsuke Kinouchi, Ali A. Danesh, Abhijit S. Pandya

The Influences That Data Display Format has on Kindergarteners' and Adults' Judgment in VDT 148
Haruhisa Yamaguchi, Yumi Yamaguchi

A Software Testing Tool with the Facilities to Restore the State at Program Execution of a Program under Test 154
Yuhei Otani, Hiroaki Hashiura, Komiya Seiichi

Comparison of Technologies for Software Virtualization 160
Petr Suba, Josef Horalek, Martin Hatas

Automatic Creation of Countermeasure Plans against Process Delay: Creation of Countermeasures based on Holiday Work 166
Kazuki Mori, Daisuke Kinoshita, Seiichi Komiya

Decentralization and Real Time Overhead Cost Evaluation in Location Management 174
Jan Gajdorus

Quality Evaluation of Spatial Data in Raster Format 180
Jitka Komarkova, Pavel Sedlak, Petr Sramek, Jan Pitterle

Impact of Risk Management Features on Performance of Automated Trading System in GRAINS Futures Segment 186
Petr Tucnik

GeoWeb Application User-Interface Evaluation using Heatmaps 192
Oldrich Horak, Martin Novak, Vojtech Zakoutsky

Definition of Contributions of Geographic Information Systems for Solving Barrier-free Environment Issues 198
Pavel Sedlak, Jitka Komarkova, Marek Belohlavek, Veronika Koutnikova, Lucie Horakova, Katerina Havlickova, Karel Dlabal, Michal Caha, Tomas Berkovec, Bohumir Sterba

ISBN: 978-1-61804-028-2

Semantic Interoperability Architecture for the Distribution Smart Grid in Mexico 204
A. Espinosa-Reza, R.Garcia-Mendoza, B. Sierra-Rodriguez

An Overview of the Surrey Virtual Reality System in the Reha-bilitation of Gait for Children with Cerebral Palsy 210
Mohammad Al-Amri, Salim Ghoussayni, David Ewins

ERP and Assistance Systems 216
Carlos J. Costa, Manuela Aparicio

Multi-Criterion, Evolutionary and Quantum Decision Making in Complex Systems 222
Jerzy Balicki, Grzegorz Drozda, Jan Masiejczyk

Optical Properties and Enhanced Photothermal Conversion Efficiency of SiO2/Amorphous Diamond-Like Carbon Selective Absorber Films for a Solar Energy Collector 228
Fu-Der Laia, Kai-Cheih Chang, Wei-Yang Li, Jui- Ming Hua, Ting-Pin Cho, Yuen-Hsun Tsai

The Analysis of Different FTTH Architectures and Possibilities of their Implementation in Kosovo 233
Nebi Caka, Astrit Hulaj

Deterministic and Stochastic Internet-Style Networks with Delay 239
G. Mircea, M. Neamtu, M. Pirtea, D. Opris

Adaptive Stimulation Method Used to Improve the Auditory-Verbal Education Procedure 245
Ovidiu Grigore, Valentin Velican

Preliminary Detection of Periodic Perturbations using Speckle Imaging and Interframe Gradient 251
Jernej Skrabec, Boris Cigale, Dejan Lesnik, Denis Donlagic, Damjan Zazula

Discriminant Analysis in a Credit Scoring Model 257
G. Mircea, M. Pirtea, M. Neamtu, S. Bazavan

Energy Sector in European Union and its Impact to the Environment 263
Miroslava Smitkova, Frantisek Janicek, Zaneta Eleschova

Information Technology Human Interaction and Influence of Web 2.0 268
Amin Daneshmand Malayeri, Claude Ziad Bayeh, Nikos E.Mastorakis

The Formal Specification for Competency Requirements 278
Roslina Mohd Sidek, A. Noraziah

Inferring Polished Rod Position from Torque Current of the Motor 283
Emanuel Benicio de A. Cajueiro, Ricardo de Araujo Kalid, Leizer Schnitman

Ext4 File System Performance Analysis in Linux Environment 288
Borislav Djordjevic, Valentina Timcenko

Deterministic and Stochastic Dynamic Firm Model with Wealth and Human Capital Accumulation. Numerical Simulations 294
N. Sirghi, M. Neamtu, D. Opris

Finding Pareto Optimal Solutions in a Supplier-Buyer Channel 300
Prakash Abad

Strengthening the Role of Medical Informatics in Promoting a Successful Positive Aging 305
Marilena Ianculescu, Elena Lupeanu, Adriana Alexandru, Eleonora Tudora, Oana Andreia Coman, Laurentiu Coman

Regulatory Fees - Suitable Way for Czech Health Care Management? 311
Zuzana Tuckova, Sarka Fialova, Boris Popesko

Using Radio Frequency Identification Technology in Supply Chain Management 317
Eleonora Tudora, Adriana Alexandru, Marilena Ianculescu

***Escherichia Coli* Detection using the Ceramic PCR Microsystem – First Report** 323
Malgorzata Malodobra, Pawel Bembnowicz, Anna Jonkisz, Anna Karpiewska, Patrycja Sniadek, Anna Gorecka-Drzazga, Leszek Golonka, Tadeusz Dobosz

The Specificity, Sensitivity and Efficiency of the PCR Microsystem based on LTCC Technology 327
Malgorzata Malodobra, Pawel Bembnowicz, Anna Jonkisz, Anna Karpiewska, Patrycja Sniadek, Anna Gorecka-Drzazga, Leszek Golonka, Tadeusz Dobosz

Student Profile Ergonomically Adapted to e-Learning. A Data Clustering and Statistical Analysis based Survey 332
Liana Stanca, Ramona Lacurezeanu, Vasile Paul Bresfelean, Ioana Pop

Corporate Performance Evaluation and Reporting 338
Jiri Hrebicek, Michael Stencl, Oldrich Trenz, Jana Soukopova

Detection of Single Nucleotide Polymorphisms Associated with Venous Thrombosis Using Multiplex Miniseqencing Reaction 344
Matylda Czosnykowska, Anna Jonkisz, Malgorzata Malodobra, Tadeusz Dobosz

Some Aspects and Applications of Implicit Stabilization Method for Solving Fluid Dynamics Problems 349
V. K. Artemyev

Stress Distribution in Premolars with MOD Cast Metal Restorations 356
Liliana Sandu, Florin Topala, Sorin Porojan

Integrated Medical Information System in Romanian GP Activities - A Study Case 361
Liliana Rogozea, Florin Leasu, Codruta Nemet

e-Informed Consent in Clinical Trials – Ethical Considerations 366
Daniel Purcaru, Lazar Onisai, Anca Purcaru, Liliana Rogozea

ISBN: 978-1-61804-028-2

Comparative Study Regarding Biological Adaptation in Sports Games 372
Dana Badau, George Cosac, Liliana Rogozea, Adela Badau

Computer-Tomographic Aspect of Space Replacing Formations at Mediastinal Level 376
Andreea Fleancu, Liliana Rogozea, Gabriela Sechel

Mathematical Algorithm for Heart Rate Variability Analysis 381
Alberts Aldersons, Andris Buikis

Learning/Curriculum Management Systems (LCMS): Emergence of a New Wave in Medical Education 387
Sat Sharma, Aarti Paul, David Gillies, Charles Conway, Steve Nesbitt, Ira Ripstein, Ilana Simon, Keith Mcconnell

Comparing Medical Students' Learning via Paper-based versus Electronic Curriculum 393
Sat Sharma, Aarti Paul, Malathi Raghavan, Jocelyn Advent, Carol Ann Northcott, Bruce Martin, Steve Nesbitt, Ira Ripstein, Ilana Simon, Keith Mcconnell

Data Mining and Model Trees Study on GDP and its Influence Factors 401
Vasile Paul Bresfelean

Adaptation Accuracy of Cast Metallic Single Tooth Restorations 407
Liliana Sandu, Florin Topala, Sorin Porojan

Evidence of Improvement in Neural-Network Based Predictability of Stock Market Indexes through Co-Movement Entries 412
Vasile Georgescu, Elena Claudia Dinuca

The Use of Biomedical Imaging for Computer-Aided Diagnosis and Treatment Planning in Orthodontics and Dentofacial Orthopedics 418
Alexandru Ogodescu, Irina Zetu, Krisztina Martha, Cosmin Sinescu, Emanuela Petrescu, Meda Negrutiu, Serban Talpos, Emilia Ogodescu

Data Management for Mobile Healthcare Monitoring 424
Sadegh M. Astaneh, Mario N. Malcangi

OCT and SEM Imagistic Investigations of Composite Resin-IPS Empress Ceramic Interfaces 431
Emanuela Petrescu, Lavinia Meda Negrutiu, Cosmin Sinescu, Daniela Maria Pop, Mihai Rominu, Alexandru Ogodescu, Florin Topala, A. Gh. Podoleanu

Education of Economics with Maple 435
Zuzana Chvatalova, Jiri Hrebicek

En face OCT Imagistic Evaluation and Laser Microspectral Analysis for Assessing Microleakage at the Prosthetic Interfaces 441
Meda-Lavinia Negrutiu, Alexandru Ogodescu, Emanuela-Lidia Petrescu, Cosmin Sinescu, Florin Ionel Topala, Daniela Maria Pop, Mihai Rominu, Gheorghe Draganescu, Adrian Gh. Podoleanu

ISBN: 978-1-61804-028-2

Biomedical Imaging for Tooth Size Measurements in a Sample of Romanian Subjects 446
Emilia Ogodescu, Irina Zetu, Krisztina Martha, Elisabeta Bratu, Emanuela Petrescu, Alexandru Ogodescu

Design of a New Electromechanical Platform for Ankle Sprain Simulation and Measurement of the Muscle Reaction Time through Electromyography 453
Felipe Pfrimer, Jose A. Siqueira Dias, Elnatan C. Ferreira

Fiscal Policy, the Main Tool to Influence the Capital Markets' Strength 458
Mihaela Gondor, Vasile Paul Bresfelean

Flocking of Mobile Agents using Influence Functions 464
D. P. Iracleous, S. F. Chandakas

Authors Index 469

ISBN: 978-1-61804-028-2

Plenary Lecture 1

On Formally Engineering Applications Software

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Abstract: Formal methods--be they logical (such as model checking) or algebraic (such as model-based testing)--have established themselves as mainstream tools for verification and validation. Hardware, device drivers, and network protocol have all been formally validated in various contexts. Recent Turing prizes have recognized this success. When it comes to specifying and verifying complex application software, formal methods have hit however a stumbling block. Indeed, conformance testing is traditionally based on finite-state formalisms: a system is at any time in one of the multitude of named states. Such an approach fails for complex software because of the sheer number of necessarily distinct states (already happening in simpler systems, but becoming simply unmanageable for complex applications such as word processors or operating systems). Bringing conformance testing to complex application software is an emerging area. Typical programming languages (and thus the control flow of software programmed using them) feature nested, recursive invocations of program modules. These features are modelled naturally by context-free languages. Many non-regular properties are therefore required for software verification. Such properties generate an finite state space, which cannot be handled by finite-state process algebrae or by standard verification techniques such as model checking. Context-free process algebrae such as BPA can specify context-free properties. However, concurrency cannot be provided by context-free process algebrae since context-free languages are not closed under intersection. This talk focuses on the quest of finding a formalism that is expressive enough to model the context-free phenomenae from complex software yet allows for a compositional approach to conformance testing. We start with visibly pushdown languages (VPL), a promising construct which unfortunately is not suitable for compositional specification and verification. We extend VPL to multiple stacks, obtaining multi-stack visibly pushdown languages (MVPL). These languages model concurrency naturally, but their standard definition does not allow compositional approaches. We then present an alternate set of operations over MVPL that are natural and also permit compositional specification and verification. The subsequent tools for specifying and verifying complex, recursive application software will also be discussed, mostly in the context of functional programming languages (such as Haskell or Erlang).

Brief Biography of the Speaker:
Dr. Stefan D. Bruda is Associate Professor of Computer Science with Bishop's University in Sherbrooke, Quebec. He obtained his PhD from Queen's University at Kingston for his work in the area of computational models for parallel and real-time computations. His current research interests remains mostly in the theoretical realm, though they are now closer to practice being focused primarily on formal software engineering (but also on models of computation and formal languages). Since the start of his career as faculty Dr. Bruda's research has been continuously financed by the Natural Sciences and Engineering Research Council of Canada. Other financing institutions included the Fond quebecois de la recherche sur la nature et les technologies and Bishop's University. Dr. Bruda is the co-author of the book "Reconfiguration is Shared Memory: Collapsing the Hierarchy of Parallel Models with Reconfigurable Buses and Shared Memory" (LAP Publishing, 2010) and over 40 journal and conference papers. He is an editor of Parallel Processing Letters.

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Plenary Lecture 2

The Electric PCR Microsystems based on LTCC Technology for Escherichia Coli Detection in Environmental Samples

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Abstract: Escherichia coli (E.coli) is a common bacteria that colonize digestive truck of many organisms including humans and is a important source of Vitamin K and B12. However, numerous strains of E.coli are pathogenic and cause severe infections and alimentary toxemia. Eight toxic strains of E.coli are known till now. The main source of E.coli infections is water. That is why monitoring the purity level of water sources is extremely important for public health. Commonly used methods for E.coli detection are time-consuming and rely on E.coli culturing and cells differentiation. Noticeably faster and more sensitive method for E.coli detection is a PCR where even small copy of E.coli genome might be detected. What is more, the analysis can be done in about one hour, what accelerate the time of analysis.
PCR (Polymerase Chain Reaction) is sensitive and specific tool for DNA fragments amplification and utility of this technique is still growing. Here we are presenting a device dedicated for DNA fragments amplification based on Real-Time PCR approach. We designed the system for E.coli DNA fragment amplification and detection and at the same time for E.coli quantification. The LTCC technology was used for structure fabrication. We successfully performed PCR, where we were able to amplify region of E.coli DNA. The miniaturized PCR system based on the LTCC technology might provides the possibility for faster and cheaper E.coli detection in a different source of environmental samples even by small laboratories or the one created in a place of potentially E.coli contamination.

Brief Biography of the Speaker:
Malgorzata Malodobra graduated from the Wroclaw Medical University in Poland in 2006. In the 2010 she received the Ph.D. title at Wroclaw Medical University in Molecular Technique Unit. From 2010 she works as a Assistance of Professor in Molecular Technique Unit at Wroclaw Medical University. In 2009 she performed an internship in Joslin Diabetes Center at Harvard Medical School, MA, USA. She is interested in the molecular basis of metabolism syndrome, insulin resistance and type 2 diabetes. She is also involved in many research project performed in Molecular Techniques Unit. From 2008 she works also as a specialist in research project dedicated to Electronic Microsystem development standing for a single used thermalcycler for PCR in a wide range of use, especially for medicine and environmental hazardous factors detection. She is also performing a diagnostic research of genetic disorders or a pathogens detection. She is an author or co-author of eight full text publication and an author or co-author of 13 conference abstracts in a wide field of molecular medicine research.

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Plenary Lecture 3

Biomedical Informatics a Creative Way in Health Education - An Ethical Approach

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Abstract: Developing the medicine in our days is not possible without clinical informatics and biomedical informatics. Biomedical informatics and its development is connected with computer science, medicine, biomedicine, public health and is more and more a practical discipline which need a permanently evaluation of ethical standards.
Bioethics is, in this context, a powerful tool for evaluating the impact of biomedical informatics in health care activities and is connected with medical student education.
Understanding and studying the medicine using a biomedical informatics way could be also a modality to replace traditional instruction based by dissection and patients. Biomedical informatics programme could also avoid experimenting skills on the patients or use autoexperiment before having enough abilities to do that.
Biomedical informatics is a modality to improve health care, to develop public health policy and, in the same time to assure a support for medical and nursing student education. Clinical decision support assured by biomedical informatics is also an area of research and education.
The challenge is to integrate different fields of biomedical informatics in medical, pharmaceutical or nursing education, even if it is graduate or post-graduate programme.
Biomedical informatics specialists are involved more and more in health system in management, administration, security or medical decision.
Biomedical informatics specialist in our days could be medical doctors, nurses, computer specialists, biomedical engineers or medical librarians. Also, pharmacists, or pharmaceutical representatives, academic researchers or educators and students are interested and involved in biomedical informatics activities.
They could be structured on 3 levels of interest and competencies: academic (educators and researchers designates for evaluate and develop special software), applicative (for managers, information officers or persons designated for adapt special software for medical practice) and applicants of biomedical informatics programme in their daily professional activities.
According to this, bioethics is a practical discipline which must integrate the moral rules in the society's development and could assure high standards for respecting the human being rights and individuality.

Brief Biography of the Speaker:
Professor-chief of Health Promotion, Human Behaviour, Ethics and History of
Medicine Department, General Chancellor at the University Transylvania Brasov.
She is member in International Society of Biometrics, member in International Society of Clinical Biostatistics, member in International Society of History of Medicine and editor coordinator of 2 Medical Journal.
She published 21 books like author or co-authors, published in Romania, at the HIMSS, i-technonline
She participates at more than 50 conferences and published 38 papers in extensor at the conference and 72 articles in journals, in the ethics, human behaviour, health promotion and history of medicine.
She was involved in 15 projects like coordinator and member.

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Plenary Lecture 4

Elaboration and Physicochemical Behaviour of Nano Hydroxyapatite / Silver Nanoparticles Biocompsite after "In Vitro" Assays

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Abstract: Silver nanoparticles induce many beneficiate effects in biomedical materials when it is used in good dose. Silver is generally recognized by its inhibitory effect towards many bacterial strains and microorganisms commonly present in medical and industrial processes. In this work, hydroxyapatite/polyvinylpyrrolidone was doped with two different concentrations of silver nanoparticles prepared by reduction method.
Physicochemical characterization of compounds was carried out by using TEM, SEM and XRD methods. They permit to highlight the structural and morphological behavior of nano biomaterials after addition of Silver. The chemical reactivity and kinetic of bioactivity were studied. Ionic exchanges between compounds and SBF were achieved by using ICP-OES method. It is demonstrated that silver doped nanohydroxyapatite obviously improve the bioactivity of the apatite at the early stages of immersion. Hydroxyapatite was elaborated in the presence of plyvinylpyrrolidone (HA/PVP).
Obtained results show that the particles seemed to be like fibers with at least more than 100 nm in length and 10-20 nm in diameter.

Brief Biography of the Speaker:
Hassane Oudadesse graduated from the University Blaise Pascal of Clermont-Ferrand France. He obtained his PhD in 1989 and worked as associate Professor and obtained his HDR (Habilitation a Diriger des recherches) in 1998. Since 2001, he works in the University of Rennes 1 as Full Professor in the "Sciences Chimiques de Rennes", UMR CNRS 6226.
His works concern the conception, synthesis and physicochemical studies of new biomaterials for applications in orthopaedic surgery. Biocompatibility, kinetic of bioactivity, kinetic of bio consolidation in the interface bone-Implants, cells enhancement and other properties of biomaterials present the research filed of Professor Hassane Oudadesse.
He is author of more than 80 articles published in international journals and 50 international conferences.
Professor Hassane Oudadesse is a Head of the research unit on Biomaterials since 2001, Vice-President of University of Rennes 1, human resources since 2008, Director of Master 2 Solid State Chemistry and Materials since 2006. He was the President of the Chemical Department from 2002 to 2004 and the President of the specialists commission CNU 33 (Materials Chemistry) from 2003 to 2008.

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Plenary Lecture 5

Possibilities of Applications of the Fuzzy Inference Systems and Probabilistic–Fuzzy Inference Systems for the Prediction and Diagnosis

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Abstract: Probabilistic methods have a long history of applications to data analysis and statistical inference in many fields of human activities, also for prediction and diagnosis. Zadeh's theory of fuzzy systems, especially theory of approximate reasoning, gave the grounds for creating the knowledge based systems, where human knowledge and experiences expressed in linguistic categories are prepared and used for the prediction, diagnosis or control.
According to many authors, uncertainty is the central, critical fact in medical reasoning. Many applications of knowledge based medical systems confirm, that fuzzy set theory is very suitable for expressing uncertainty of symptoms, reasons, and for creating the inference, diagnostic procedure.
In this work we present the methods of applications both, the sets of numerical data collected in real systems, as well as, expert's experiences to modelling knowledge bases, by using linguistic fuzzy models and the probability theory of fuzzy events. A structure of the reason-result fuzzy model is predefined at the beginning of the task. Collected data are used to compute empirical probability distributions of linguistic variables. The calculated probabilities of fuzzy events have been included into inference procedures. The exemplary calculations are presented.

Brief Biography of the Speaker:
Anna Walaszek-Babiszewska was born in Wroclaw, Poland. She received M. Sc. degree (1970) in Control Engineering from the Technical University of Wroclaw, Poland. Since 1970 she has been with the Silesia University of Technology, Gliwice, Poland, where she received Ph. D. and D. Sc. (Habilitation) degrees in 1980 and 1994, respectively. At present, she is a professor at the Opole University of Technology, Department of Control and Computer Engineering, Opole, Poland.
Her research interests include: stochastic and fuzzy modeling, knowledge-based systems, systems identification, data analysis, and applications in technological and managerial situations.
She has supervised 4 and reviewed 5 Ph.D dissertations in engineering and economic sciences. She has published 4 monographic books on stochastic and fuzzy modeling and over 90 scientific papers (the book on 'Fuzzy modeling in stochastic environment' is just publishing by LAP LAMBERT Academic Publishing).
She was a member of the Management Editorial Board (2000-2005) and the Lecture Notes in Control and Computer Science Editorial Board (2003) of the Zielona Gora University Press, Zielona Gora, Poland. She was a member of the Section of Cybernetics in Mining, Mining Committee of the Polish Academy of Sciences (1999-2011).

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Plenary Lecture 6

Digital Signal Processing and Softcomputing Methods Applied to ECG and PCG to Infer about Subject Physiological Status

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Abstract: Electrocardiogram (ECG) and Phonocardiogram (PCG) signals embed key information about subject physiological status. Physicians use such information to diagnose the general physiological status of the patient and also to diagnose incoming pathologies. The automatic extraction of such information enables the implementation of systems that could monitor subjects and infer about some physiological and pathological condition, so that efficient prevention strategies could be enabled. ECG and PCG features extraction is a set of Digital Signal Processing-based (DSP-based) application-specific algorithms (ASA) to execute crisp measurements to be inputted to a fuzzy logic engine that infers about a physiological and/or pathological status of the subject. Fuzzy logic engine is a data driven inferential process, so most of the design efforts need to be addressed to the features extraction process and to the rule set and membership functions definition and tuning. Low level and high level signal features can be extracted, so that a very effective inference could be applied at fuzzy logic engine level. Heart rate variability (HRV) is one of the high level signal features that embeds veri significant information about physiological and pathological condition of the subject.

Brief Biography of the Speaker:
Prof. Mario Malcangireceived his undergraduate and graduate degrees inElectronic Engineering and Computer Sciencefrom the Politecnico di Milano in 1981. He ismember of the International Neural NetworkSociety and among the founders of theEngineering Applications of Neural NetworksSpecial Interest Group (SIG). His research is inthe areas of multimedia communications, digitalsignal processing, embedded/real-timesystems, biometrics, and biomedical. His research efforts are mainly targetedat speech- and audio-information processing,with special attention to applying soft-computing methodologies (neuralnetworks and fuzzy logic) to speech synthesis, speech recognition, andspeaker identification for implementation on deeply embedded systems. Heteaches digital signal processing and digital audio processing at the UniversitadegliStudi di Milano. He has published several papers on topics in digitalaudio and speech processing.

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Plenary Lecture 7

The Use of Biomedical Imaging for Computer-Aided Diagnosis and Treatment Planning in Orthodontics and Dentofacial Orthopedics

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Abstract: Orthodontics and Dentofacial Orthopedics, the most complex branch of dentistry, assume a careful acquisition and interpretation of a large amount of information to achieve a correct diagnosis and treatment planning. Medical imaging has become a major tool in almost every aspect of orthodontic practice, research and education. Three-dimensional imaging had a great evolution in recent years and has found various applications in orthodontics as well as in oral and maxillofacial surgery. The paper will present the most recent uses of biomedical imaging in the orthodontic practice. Digital photographs, digital models, digital radiology and cone beam computed tomography will be presented and evaluated. We outlined the specific clinical problems where this digital technology can best help the orthodontist in providing improved diagnosis and treatment planning. The specialists from dental medicine are encouraged to exploit the potential of this technology and to contribute to the development of these powerful diagnostic tools.

Brief Biography of the Speaker:
Alexandru S. Ogodescu graduated in 1993 the "Grigore Moisil" Computer Science High School in Timisoara, specializing in computers, getting the degree of programmer. In 1999 he graduated the School of Dentistry form the University of Medicine and Pharmacy "Victor Babes" Timisoara, Romania obtaining the degree of doctor-medical-doctor (DMD) in dentistry. After 3 years of postgraduate specialization (2000-2003) in the same University he obtained the title of Specialist in Orthodontics and Dento-Facial Orthopedics. In 2001 he graduated the postgraduate course about "Computer Science for Dentists". In 2006 he presented his PhD Thesis about "The Interdisciplinary of Modern Orthodontics" and received the degree of PhD in dental science. The author's major fields of study are interdisciplinary orthodontics, orthodontic treatment of adult patients, biomechanics, computer science in orthodontics, digital tools, and management of dental surfaces during the orthodontic treatment. He works now as Ass. Prof. in the Department of Orthodontics, University of Medicine and Pharmacy "Victor Babes" Timisoara, Romania and also in his own private dental practice (1999-present). In 2008 he published the first monograph about adult orthodontics in Romania : "Tratamentul orthodontic la adult", Timisoara, Romania, Ed.Eubeea, 2008. He presented and published together with his wife, Dr. Emilia Ogodescu, also orthodontist, a lot of papers in the fields of orthodontics and received awards. Dr. Ogodescu is member of the Romanian Society of Straight-Wire, European Orthodontic Society, World Federation of Orthodontics, International Association of Dental Research and Association for Computing Machinery.

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Plenary Lecture 8

The Learning Content Management Systems in Medical Education: A New Wave Emerges

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Abstract: For millennia, the paradigm of learning ? classroom teaching prevailed! The formal learning was scarce; resources were concentrated around and centered on the availability of the educator, rather than the learner. The first applications of eLearning were therefore paralleled with the old classroom model and its associated characteristics. While understandable, this does not achieve the true potential of the new paradigm: the Internet as a learning medium. The first wave of e-learning was focused on solutions associated with administering classroom training, i.e. the Learning Management System (LMS). However, the discipline has developed and evolved into a second wave of a more sophisticated e-learning solution. This new wave requires an e-Learning Content Management System (LCMS) to fulfill the needs of personalized and adaptive e-learning. Web based LCMS are increasingly utilized across the medical universities internationally. LCMS can facilitate the delivery of medical education and broadens the capacity for tracking and reporting of teaching & learning across an institution, simplify and automate administrative and supervisory tasks, and facilitate institutional accreditation. These systems are equipped with business intelligence tools to analyze data and create reports to foster curriculum governance and education delivery. The most sophisticated systems incorporate version control, multiple authors, and project management as well. LCMS is a multi-user environment where developers may create, store, reuse, manage, and deliver digital learning content from a central object repository. LCMS solutions are ideally suited to create content-centric learning strategies, supporting multiple methods for gathering and organizing content, leveraging content for multiple purposes, and achieving educational goals and objectives. The LCMS in medical education, with its focus on the learner, may be the real breakthrough in eLearning. Thus, it is greatly anticipated that this new wave of eLearning in medicine will change the landscape of learning forever in favor of the learner and their dynamically changing needs.

Brief Biography of the Speaker:
Professor Sat Sharma, MD, FRCPC, FCCP, FACP, FAASM is a Professor and Head of Respirology for the Department of Internal Medicine at the University of Manitoba in Winnipeg, Canada. He also works within the Critical Care Section and Sleep Disorders Centre, served as program director of post graduate education in respirology at the University of Manitoba, and is the site director of respiratory medicine at St. Boniface General Hospital and Health Sciences Centre. Dr. Sharma's research interests include epidemiology of respiratory diseases, perioperative respiratory care, exercise induced hypoxemia, medical education, and medical informatics. Dr. Sharma is presently Director of Medical Informatics at Faculty of Medicine, University of Manitoba. In this position he was instrumental in creating a Learning Content Management System for the medical faculty. He is a longstanding board member of the Canadian Thoracic Society, chair of the Specialty Committee of Respirology for the Royal College of Physicians and Surgeons of Canada, governor of the Manitoba chapter of the American College of Chest Physicians, and a member of the Health and Science Policy Committee for the ACCP. Dr. Sharma maintains an active agenda of philanthropic undertakings and supports UNICEF, the Red Cross, and numerous other voluntary organizations. In his spare time, he enjoys competitive running, bicycling, travel, fiction writing, and community work.

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Plenary Lecture 9

Advances in 2-D Filter Design - New Algorithms for Notch, Fan and Cone Filters

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Abstract: In the first part of the Plenary Lecture, new general transformations for designing 2-D (Two-Dimensional) FIR and IIR filters are provided. The present methodology can be viewed as an extension of the McClellan Transformations and can be applied in several cases of 2-D FIR and IIR filter design. Numerical examples illustrate the validity and the efficiency of the method.
In the Second part, general transformations for designing 2-D (Two-Dimensional) IIR filters are provided. The present approach can be viewed as an extension of the classical method of magnitude approximation and can be applied in several cases of 2-D filter design. Numerical examples illustrate the validity and the efficiency of the method.

Brief Biography of the Speaker:
Prof. Dr. Nikos E. Mastorakis received his B.Sc. and M.Sc. (Diploma) in Electrical Engineering from the National Technical University of Athens (Greece) and the Ph.D. in Electrical Engineering and Computer Science from the same university. He also received the B.Sc. (Ptychion) in Pure Mathematics from the National University of Athens, Greece. He have served as special scientist on Computers and Electronics in the Hellenic (Greek) Army General Staff (1993-1994) and taught several courses in the Electrical and Computer Engineering Department of the National Technical University of Athens (1998-1994). He has also served as Visiting Professor at the University of Exeter, School of Engineering (UK, 1998), Visiting Professor in the Technical University of Sofia (Bulgaria, 2003-2004) while he is now Professor in the Technical University of Sofia (Bulgaria, http://elfe.tu-sofia.bg/elfe/staff.htm, http://elfe.tu-sofia.bg/elfe/curriculum4.htm and http://elfe.tu-sofia.bg/elfe/curriculum3.htm) and also Professor in the department of Computer Science at the Military Institutions of University Education (MIUE) -Hellenic Naval Academy, Greece.
CV: http://www.wseas.org/mastorakis/CV_Mastorakis.doc

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Plenary Lecture 10

Multi-criterion, Evolutionary and Quantum Decision Making in Complex Systems

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Abstract:

Designing of the general complex systems like the semantic Web, computer networks, production scheduling or robot path planning require some extremely efficient optimization techniques that support decision making process [7]. Decision making for complex systems is based on multi-criterion-optimisation. We use several criteria to identification the sensitive preferences of a decision maker. For instance, a task assignment in a distributed computer system may reduce both the total cost of a program run and a workload of the bottleneck computer [2]. The probability that all computers remain fault-free during the execution of the modules assigned to computers is another criterion of evaluation task assignments. Some crucial multi-criterion evolutionary algorithms have been described in [3].

However, multi-criteria evolutionary algorithms consume a lot of time to calculate the set of efficient solutions. To avoid this disadvantage, we introduce some quantum-based algorithms. Because there are not accessible quantum computers we simulate the quantum computers on classical ones. In such a way quantum-inspired algorithms can be used for a computer decision aid, too.

Decision making by the AQMEA (Adaptive Quantum-based Multi-criterion Evolutionary Algorithm) has been considered for distributed computer systems [1]. Evolutionary computing with Q-bit chromosomes has been proofed to characterize by the enhanced population diversity than other representations, since individuals represent a linear superposition of states probabilistically.

In AQMEA, a quantum representation is applied for the probabilistic representation that is based on the concept of qubits [6]. *Bra-ket* (Dirac) notation is used for describing quantum states by development of angle brackets and vertical bars. A qubit is a two-layer quantum bit that can be modeled as the Hilbert space H_2 with the given base $B = \{|0\rangle, |1\rangle\}$ [5]. The Bloch sphere is a geometrical demonstration of the state space for a qubit and it may also refer to the space of an n-level quantum system [4].

The state x_m of the mth qubit in the Q-chromosome can be written, as follow:

$$Q_m = \alpha_m |0\rangle \oplus \beta_m |0\rangle, \qquad (1)$$

where

α_m and β_m – complex numbers that specify the probability amplitudes of the corresponding states,

$\oplus$ – a superposition operation,

m – the index of the gene in the chromosome, $m = \overline{1,M}$.

The chromosome can be represented by the chromosome matrix, as follows [1]:

$$Q = \begin{bmatrix} |\alpha_1|^2 & \dots & |\alpha_m|^2 & \dots & |\alpha_M|^2 \\ |\beta_1|^2 & \dots & |\beta_m|^2 & \dots & |\beta_M|^2 \end{bmatrix} \qquad (2)$$

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Moreover, the procedure of random selection of decision values is involved with a chromosome matrix. If the decision variable x_m is characterized by a complex pair (α_m, β_m), then is equal to 0 with the probability $|\alpha_m|^2$ and it is equal to 1 with $|\beta_m|^2$ [1].

AQMEA is working on a digital computer and collapsing into a single state does not occur. So, we simulate the process of observation.

A standard n-bit state and a quantum n-qubit state are 2^n-dimensional elements that are processed differently for standard or quantum computation.

In randomized computation, the application of stochastic matrices preserves that the sum of probabilities has to be equal to one. On the other hand, in quantum computation, allowed operations are unitary matrices. Those matrices are effectively rotations and preserve that the sum of the squares is equal to one [5].

Finally, we present how a path of an underwater vehicle is determined by AQMEA solving a multiobjective optimization problem. For evaluation of a vehicle trajectory three main criteria are used: a total length of a path, a measure of safety, and a smoothness of a trajectory.

References

[1] Balicki J.: *An Adaptive Quantum-based Multi-objective Evolutionary Algorithm for Efficient Task Assignment in Distributed Systems,* Proc. of *The WSEAS Int. Conf. on Computers, July 22-26, 2009, Rodos Island, Greece*, WSEAS Press, pp. 417-422

[2] Balicki J.: *Some Numerical Experiments on Multi-criterion Tabu Programming for Finding Pareto-optimal Solutions*, WSEAS Transactions on Systems, Vol. 8, 2009, pp. 241-250.

[3] Coello Coello C. A.: *A Comprehensive Survey of Evolutionary-Based Multiobjective Optimisation Techniques*. Knowledge and Information Systems. An International Journal, Vol. 1, 1999, pp. 269-308.

[4] Deutsch, D.: *Quantum Theory, the Church-Turing principle and the universal quantum* computer, in Proceedings of the Royal Society of London A, vol. 400, 97-117 (1985)

[5] Dicarlo, L, *et al.*: Demonstration of two-qubit algorithms with a superconducting quantum processor. *Nature*, 460 (7252): 240–4, (2009)

[6] Han K.–H. and Kim J.–H., *Genetic quantum algorithm and its application to combinatorial optimization problem*, in Proc. Congress on Evolutionary Computation, vol. 2, La Jolla, CA, July 2000, 1354-1360 (2000)

[7] Weglarz J., Mika M., Waligora G.: *Modelling and Solving Grid Resource Allocation Problem with Network Resources for Workflow Applications*, Journal of Scheduling, Vol. 14, Issue 3, 2011, pp. 291-306.

Brief Biography of the Speaker:

Jerzy M. Balicki is an associative professor at the Faculty of Electronics, Telecommunications and Informatics, Gdansk University of Technology 11/12 G. Narutowicza Street, 80-233 Gdansk, Poland (e-mail: Balicki@eti.pg.gda.pl, http://www.eti.pg.gda.pl/katedry/kask/pracownicy/Jerzy.Balicki/). He received the M. Sc. and Ph. D. degrees in Computer Science from University of Military Technology, Warsaw, Poland in 1982 and 1987, respectively. Then, he achieved habilitation D.Sc. from Technical University of Poznan in 2001. He was as a university professor at Naval University of Gdynia from 2002 to 2010, and then at Gdansk University of Technology, Poland. He is an author of three books and more than 150 scientific papers related to artificial intelligence, distributed computer systems, quantum computations and decision support systems. Especially, he in an author over 10 papers presented at WSEAS journals and conferences. Also, he addressed two plenary lectures and was a chair of several sessions during WSEAS meetings.

Authors Index

Aarti, P. 387, 393
Abad, P. 300
Adeli, M. 36
Advent, J. 393
Al-Amri, M. 210
Aldersons, A. 381
Alexandru, A. 305, 317
Amasaka, K. 104
Aparicio, M. 216
Artemyev, V. K. 349
Astaneh, S. M. 424
Badau, A. 372
Badau, D. 372
Balicki, J. 222
Barilla, D. 30
Bayeh, C. Z. 268
Bazavan, S. 257
Belohlavek, M. 198
Bembnowicz, P. 323, 327
Berkovec, T. 198
Bouridane, A. 92
Bozkurt, H. 113
Bratu, E. 446
Bresfelean, V. P. 332, 401, 458
Bruda, S. D. 98
Buikis, A. 381
Caha, M. 198
Caka, N. 233
Caristi, G. 27, 30
Carr, E. 138
Cathelineau, G. 71
Chaddad, A. 92
Chandakas, S. F. 464
Chang, K.-C. 228
Cho, T.-P. 228
Chvatalova, Z. 435
Cigale, B. 251
Coman, L. 305
Coman, O. A. 305
Conway, C. 387
Cosac, G. 372
Costa, C. J. 216
Czosnykowska, M. 344
Dandache, A. 92
Danesh, A. A. 143
De A. Cajueiro, E. B. 283
De Araujo Kalid, R. 283
Dinuca, E. C. 412
Djordjevic, B. 288
Dlabal, K. 198
Dobosz, T. 323, 327, 344
Donlagic, D. 251
Draganescu, G. 441
Drozda, G. 222
Eleschova, Z. 263
Espinosa-Reza, A. 204
Ewins, D. 210
Ferreira, E. C. 453
Fialova, S. 311
Fleancu, A. 376
Gajdorus, J. 174
Garcia-Mendoza, R. 204
Genis, V. 138
Georgescu, V. 412
Georgieva, J. 117
Ghoussayni, S. 210
Gillies, D. 387
Golonka, L. 323, 327
Gondor, M. 458
Goranova, M. 117
Gorecka-Drzazga, A. 323, 327
Grigore, O. 245
Gupta, S. 138
Hashiura, H. 154
Hatas, M. 160
Havlickova, K. 198
Horak, O. 192
Horakova, L. 198
Horalek, J. 160
Hrebicek, J. 338, 435
Hua, J.-M. 228
Hulaj, A. 233
Ianculescu, M. 305, 317
Iracleous, D. P. 464
Janicek, F. 263
Jasek, R. 129
Jonkisz, A. 323, 327, 344
Karpiewska, A. 323, 327
Keskin, A. U. 113
Kinoshita, D. 166
Kinouchi, Y. 143
Komarkova, J. 180, 198
Komiya, S. 166
Koutnikova, V. 198
Kurzynski, M. 88
Lacurezeanu, R. 332
Laia, F.-D. 228
Leasu, F. 361
Legal, Y. 71
Li, W.-Y. 228
Lupeanu, E. 305
Malanik, D. 129
Malayeri, A. D. 268
Malcangi, M. N. 424
Malodobra, M. 323, 327, 344
Martha, K. 418, 446
Martin, B. 393
Martinek, P. 53
Masa-Ah, P. 83
Masiejczyk, J. 222
Mastorakis, N. E. 268
Mauk, M. 138
Mcconnell, K. 387, 393
Merkuryev, Y. 77
Milbrandt, J. 138
Mircea, G. 239, 257
Mori, K. 166
Mostafa, A. 71
Nagashino, H. 143
Neamtu, M. 239, 257, 294

ISBN: 978-1-61804-028-2

Negrutiu, L. M. 431
Negrutiu, M. 418, 441
Nemet, C. 361
Nesbitt, S. 387, 393
Noraziah, A. 278
Northcott, C. A. 393
Novak, M. 192
Novickis, L. 77
Nuhoglu, A. 113
Ogodescu, A. 418, 431
Ogodescu, A. 441, 446
Ogodescu, E. 418, 446
Onisai, L. 366
Opris, D. 239, 294
Otani, Y. 154
Oudadesse, H. 71
Pandya, A. S. 143
Petrescu, E. 418, 431
Petrescu, E. 441, 446
Pfrimer, F. 453
Pirtea, M. 239, 257
Pitterle, J. 180
Podoleanu, A. Gh. 431, 441
Pop, D. M. 431, 441
Pop, I. 332
Popesko, B. 311
Porojan, S. 356, 407
Puglisi, A. 30
Purcaru, A. 366
Purcaru, D. 366
Raghavan, M. 393
Ripstein, I. 387, 393
Rogozea, L. 361, 366
Rogozea, L. 372, 376
Romanovs, A. 77
Rominu, M. 431, 441
Rosen, W. 138
Sandu, L. 356, 407
Schnitman, L. 283
Sechel, G. 376
Sedlak, P. 180, 198
Seiichi, K. 154
Sekozawa, T. 123
Sharma, S. 387, 393
Sidek, R. M. 278
Sierra-Rodriguez, B. 204
Simon, I. 387, 393
Sinescu, C. 418, 431, 441
Siqueira Dias, J. A. 453
Sirghi, N. 294
Skrabec, J. 251
Smitkova, M. 263
Sniadek, P. 323, 327
Solodushkin, S. I. 135
Soongsathitanon, S. 83
Soshko, O. 77
Soukopova, J. 338
Sramek, P. 180
Stanca, L. 332
Stencl, M. 338
Sterba, B. 198
Suba, P. 160
Susila 59
Szikora, B. 53
Tabatabaei, J. 42
Talpos, S. 418
Tanougast, C. 92
Thongpraparn, T. 83
Timcenko, V. 288
Topala, F. 356, 407, 431
Topala, F. I. 441
Trenz, O. 338
Tsai, Y.-H. 228
Tuckova, Z. 311
Tucnik, P. 186
Tudora, E. 305, 317
Tuntawiroon, M. 83
Vadivel, S. 59
Velican, V. 245
Villanyi, B. 53
Walaszek-Babiszewska, A. 65
Wolczowski, A. 88
Yamaguchi, H. 148
Yamaguchi, Y. 148
Zakoutsky, V. 192
Zarabadipour, H. 36
Zazula, D. 251
Zesnik, D. 251
Zetu, I. 418, 446

ISBN: 978-1-61804-028-2