MELECON 2010

The 15\textsuperscript{th} IEEE Mediterranean Electrotechnical Conference

25\textsuperscript{th} – 28\textsuperscript{th} April 2010

Grand Hotel Excelsior

MALTA

Book of Abstracts
Welcome from the MELECON 2010 General Chair

On behalf of the Organizing Committee it is my pleasure to welcome you to Malta for the 15th IEEE Mediterranean Electrotechnical Conference (MELECON 2010), being held at The Grand Hotel Excelsior on April 25th to 28th 2010.

I take this opportunity to thank all those who have made MELECON 2010 possible. First of all I thank the Organizing Committee for all their hard work and dedication, the Technical Program Committee and the Track Chairs who have prepared an excellent Technical Program, the reviewers who between them have reviewed more than 510 papers, and the authors who have come here to present the results of their scientific and technical research. Thanks are also due to the sponsors of the conference as well as IEEE Region 8 and the University of Malta for their support.

The Organizing Committee has also prepared a social program. A welcome reception is being organized on Monday 26th by the pool of the hotel and a gala dinner will be held on Tuesday 27th in the Ballroom. Furthermore tours around Malta can be booked through SMS Travel at their desk in the Hotel Lobby.

It is now time to wish you a memorable experience in Malta. The beauty of Maltese Islands and the warm, welcoming nature of the Maltese people will make MELECON 2010 also an unforgettable experience. I hope that you will find some time to visit Malta and enjoy the country, its history and its people.

Welcome to Malta!

Carl James Debono
Technical Program Chair’s Message

It is our great pleasure to inform you that in the response to the invitation of the IEEE Region 8 Mediterranean Electrotechnical Conference MELECON 2010 over 510 abstracts from over 50 countries have been submitted. After the review process only 318 papers have been accepted for the presentation giving, an acceptance level of 62 %. The presented papers will be published in the MELECON 2010 Proceedings and IEEE Xplore data base.

The final Technical Program includes 4 plenary sessions, 4 tutorials, 27 regular lecture sessions, 5 special sessions, 6 poster sessions and the IEEE Region 8 Student Paper Contest (SPC) session. Among our excellent Plenary Speakers are Professors: Frede Blaabjerg from Aalborg University, Denmark, Nadia Magnenat-Thalmann from the University of Geneva, Switzerland, Frank Ellinger from the Dresden University of Technology, Germany and Tadeusz Kaczorek from the Warsaw University of Technology, Poland.

We wish to thank all authors who submitted their work, the General Chair, the Technical Program Committee Members, the reviewers who supported the peer review process, and IEEE who were always at hand to see that the process ran as smoothly as possible.

Before the Conference Opening on Sunday, April 25th, 2010 four Tutorials by world-known professors will be offered for PhD-Students and participants from the industry.

We are looking forward to welcoming you in the beautiful Malta!

Marian P. Kazmierkowski

Paul Micallef
Organizing Committee

Honorary Chair
Jozef Modelski, Poland

General Chair
Carl James Debono, Malta

Technical Program Co-Chairs
Marian P. Kazmierkowski, Poland
Paul Micallef, Malta

Finance Chair
Ivan Grech, Malta

Publication Chair
Edward Gatt, Malta

Local Arrangements Chair
Keith Sacco, Malta
Organization

Organized by the
IEEE Malta Section

Technically Sponsored by
IEEE Region 8
University of Malta

Supported also by
Air Malta
Malta Council for Science and Technology
Vodafone, Malta
Technical Program Committee

Co-Chairs: Marian P. Kazmierkowski, Paul Micallef

Oreste Andrisano, Italy
Maurice Apap, Malta
Khaled Assaleh, UAE
Shmuel Auster, Israel
Adrijan Baric, Croatia
Sergio Benedetto, Italy
Khaled Boussetta, France
Uwe Bratzler, Switzerland
Giuseppe Buja, Italy
Kenneth Camilleri, Malta
Gérard-A. Capolino, France
Cedric Caruana Mifsud, Malta
Joao P. S. Catalao, Portugal
Gianfranco Chicco, Italy
Bernard Courtois, France
Haitham S. Cruickshank, UK
Marko Delimar, Croatia
Silvano Donati, Italy
Jean-Luc Dugelay, France
Said E. El-Khamy, Egypt
Ali H. El-Mousa, Jordan
Mohamed Essaaidi, Morocco
Reuben A. Farrugia, Malta
Chikara Fukunaga, Japan
Moncef Gabbouj, Finland
Laura Giarre', Italy
Christopher James, UK
Karel Jezernik, Slovenia
Athanasios P. Kakarountas, Greece
Okyay Kaynak, Turkey
Cornelis J. Kikkert, Australia
Horace L. King, Australia
Emil Levi, UK
David Limebeer, UK
Mourad Loulou, Tunisia
Peter Magyar, Germany
Piero Malcovati, Italy
Garik Markarian, UK
Vojin G. Oklobdzija, USA
Zdzislaw Papir, Poland
Djordje (George) Paunovic, Serbia
Branimir Pejcinovic, USA
H. Vincent Poor, USA
Sattar B. Sadkhan, Iraq
Francisco Sandoval, Spain
Andre Sopczak, UK
Cyril Spiteri Staines, Malta
Matej Zajc, Slovenia
MELECON 2010 Track Chairs

1. Wireless and Mobile Communications
Mohammad Essaaidi, Abdelmalek Essaadi University, Morocco

2. Sensor and Ad Hoc Networks
Khaled Boussetta, L2TI - University of Paris 13, France

3. Multimedia Transmission
Horace King, BioMed and Wireless Technologies (BWT), Australia

4. Communications Signal Processing
Zdzislaw Papir, AGH University of Science and Technology, Poland

5. Antennas, Microwave Theory & Techniques and Propagation
Shmuel Auster, Elta Systems Ltd., Israel

6. General Communications
Horace King, BioMed and WireLess Technologies (BWT), Australia

7. Analog and Digital Integrated Circuits
Piero Malcovati, University of Pavia, Italy

8. Systems on Chip
Mourad Loulou, LETI Laboratory, National Engineering School of Sfax, Tunisia

9. General Circuits and Systems
Mourad Loulou, LETI Laboratory, National Engineering School of Sfax, Tunisia

10. Control Applications
Simon Fabri, University of Malta, Malta

11. Biomedical Signal and Image Processing
Christopher James, University of Southampton, UK

12. Multimedia Signal Processing
Fernando Pereira, Instituto Superior Técnico - Instituto de Telecomunicações, Portugal
13. General Control Systems and Signal Processing
   No chair assigned

   Gianfranco Chicco, Politecnico di Torino, Italy

15. Electrical Machines Design and Monitoring
   Giuseppe Buja, University of Padova, Italy

16. Power Electronics and Multi-level Converters
   Fernando A. Silva, Instituto Superior Tecnico, TULisbon, Portugal

17. General Power Systems and Renewable Resources
   Marek Jasinski, Warsaw University of Technology, Poland

18. Special Session: Smartgrids – Electricity Networks of the Future
   Marko Delimar, University of Zagreb, Croatia

19. Special Session: New Applications over Emerging Wireless Broadband Networks
   Garik Markarian, Lancaster University, UK

20. Special Session: INTERMEDIA: Communicating Anywhere, Anytime Using Wearables
    Nadia Magnenat-Thalmann, University of Geneva, Switzerland

21. Special Session: Special Topics, Spin-Offs & Applications from Nuclear & Particle Physics Research
    Uwe Bratzler, CERN, Switzerland
    Chikara Fukunaga, Tokyo Metropolitan University, Japan
<table>
<thead>
<tr>
<th>MELECON 2010 Reviewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdellah Kouzou</td>
</tr>
<tr>
<td>Abuelma'atti Muhammad Taher</td>
</tr>
<tr>
<td>Ajhoun Rachida</td>
</tr>
<tr>
<td>Aksin Devrim Yilmaz</td>
</tr>
<tr>
<td>Albertos Pedro</td>
</tr>
<tr>
<td>Andriollo Mauro</td>
</tr>
<tr>
<td>Andrisano Oreste</td>
</tr>
<tr>
<td>Andujar Jose</td>
</tr>
<tr>
<td>Apap Maurice</td>
</tr>
<tr>
<td>Araújo Armando</td>
</tr>
<tr>
<td>Arapoyanni Angela</td>
</tr>
<tr>
<td>Arroyo Jose Manuel</td>
</tr>
<tr>
<td>Assaleh Khaled</td>
</tr>
<tr>
<td>Auster Shmuel</td>
</tr>
<tr>
<td>Bayford Richard</td>
</tr>
<tr>
<td>Begovic Miroslav</td>
</tr>
<tr>
<td>Benedetto Sergio</td>
</tr>
<tr>
<td>Bertoluzzo Manuele</td>
</tr>
<tr>
<td>Boag Amir</td>
</tr>
<tr>
<td>Bobrowska Malgorzata</td>
</tr>
<tr>
<td>Boglietti Aldo</td>
</tr>
<tr>
<td>Bojoi Radu</td>
</tr>
<tr>
<td>Bolognesi Paolo</td>
</tr>
<tr>
<td>Bonizzoni Edoardo</td>
</tr>
<tr>
<td>Borges Beatriz</td>
</tr>
<tr>
<td>Borghetti Alberto</td>
</tr>
<tr>
<td>Boussetta Khaled</td>
</tr>
<tr>
<td>Brandao Tomas</td>
</tr>
<tr>
<td>Bruun Erik</td>
</tr>
<tr>
<td>Bugeja Marvin</td>
</tr>
<tr>
<td>Buhagiar Julian</td>
</tr>
<tr>
<td>Buja Giuseppe</td>
</tr>
<tr>
<td>Buttigieg Victor</td>
</tr>
<tr>
<td>Cabrini Alessandro</td>
</tr>
<tr>
<td>Calderaro Vito</td>
</tr>
<tr>
<td>Calleja Juan Manuel Carrillo</td>
</tr>
</tbody>
</table>
Mnif Hassene
Mujcic Aljo
Muscat Adrian
Muscato Giovanni
Naccari Matteo
Nagy Istvan
Neviani Andrea
Nitu Puica
Nunes Paulo
Oboe Roberto
Oklobdzija Vojin G.
Pach Andrzej
Padilha-Feltrin Antonio
Palesi Maurizio
Palma João
Papadimitriou Georgios
Papir Zdzislaw
Pelacchi Paolo
Pennisi Salvatore
Pereira Fernando
Phulpin Yannick
Piasecki Szymon
Piglione Federico
Pillai Krish
Pinhasi Yosi
Pinho Armando
Pinnarelli Anna
Pinto Sonia
Pires Vitor
Pitto Andrea
Poikonen Jussi
Popescu Dan
Popovich Rafi
Postolache Petru
Prikryl Jan
Queluz Maria Paula
Radulescu Mircea
Rafal Krzysztof
Rancic Dejan
Rotman Ruth
Ruderman Alex
Russo Angela
Sajin Gheorghe
Salerno Nunzio
Saliba Michael A.
Sandoval Francisco
Scheri Kenneth
Sedlak Marcin
Shapir Itzhak
Sharir Victor
Siano Pierluigi
Silva Fernando A
Silvestro Federico
Sioshansi Ramteen
Siviero Ilaria
Soares Filipe J.
Sorrentino Nicola
Spertino Filippo
Spiteri Staines Tony
Sruk Vlado
Spiteri Staines Cyril
Stynski Sebastian
Sudnisson Alexander
Sumaili Akilimali Jean
Tagliasacchi Marco
Tatas Konstantinos
Teodorescu Remus
Tessarolo Alberto
Theodoridis George
Tortella Andrea
Ufanliski Bartlomiej
<table>
<thead>
<tr>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usaola Garcia Julio</td>
<td>Wszolek Jacek</td>
</tr>
<tr>
<td>Vaccaro Alfredo</td>
<td>Yi Yin</td>
</tr>
<tr>
<td>Van Cutsem Thierry</td>
<td>Zagar Mario</td>
</tr>
<tr>
<td>Van Hertem Dirk</td>
<td>Zajc Matej</td>
</tr>
<tr>
<td>Veljovic Zoran</td>
<td>Zammit Mangion Andrew</td>
</tr>
<tr>
<td>Velotto Giovanni</td>
<td>Zhou Di</td>
</tr>
<tr>
<td>Virjoghe Elena Otilia</td>
<td>Zielinski Tomasz</td>
</tr>
<tr>
<td>Wael Adi</td>
<td>Ziolko Mariusz</td>
</tr>
<tr>
<td>Wagrowski Michal</td>
<td>Zito Domenico</td>
</tr>
<tr>
<td>Wheeler Patrick</td>
<td>Zobaa Ahmed F.</td>
</tr>
</tbody>
</table>
Conference Highlights

Registration Desk

The on site Registration Desk is located in the Foyer in front of the Ballroom of the Grand Hotel Excelsior. The registration hours will be as follows:

- Sunday, April 25: 4:00 p.m. to 6:00 p.m.
- Monday, April 26: 8:00 a.m. to 5:00 p.m.
- Tuesday, April 27: 8:00 a.m. to 5:00 p.m.
- Wednesday, April 28: 8:00 a.m. to 12:00 a.m.

Monday Evening Reception

A Welcome Reception for conference participants will be held on Monday April 26th, from 7:30 p.m. to 8:15 p.m., by the Grand Hotel Excelsior Pool. One admission ticket to the reception is included in the registration fee. Extra tickets will be available for sale from the Registration desk at € 30 each.

Tuesday Evening Banquet

The MELECON 2010 Banquet will be held on Tuesday April 27th at 9:00 p.m. in the Ballroom of the Grand Hotel Excelsior. Extra tickets are available through Advance Registration or on-site at a cost of € 75.

Badges

Badges are required for admittance to all sessions and the reception. Please wear your badge at all times while attending the conference.
Technical Program

Tutorials
Sunday 25th April 2010
Time: 14:00 – 17:00

**Video Compression Technologies and Standards**
Prof. Fernando Pereira, *Instituto Superior Técnico - Instituto de Telecomunicações, Portugal*

**Methodology for Energy-Efficient Design of Digital Circuits**
Prof. V. G. Oklobdzij, *University of Texas, USA*

**Optimal Linear FIR Estimation of Discrete-Time State-Space Models**
Prof. Yuriy S. Shmaliy, *Guanajuato University, Mexico*

**Electrical Load Classification and Profiling**
Prof. Gianfranco Chicco, *Politecnico di Torino, Italy*

Opening Ceremony
Monday 26th April 2010
Time 8:30 – 9:00
Room: Ballroom

**PL01 – Plenary Session 1**
**Power Electronics and Control for Renewable Energy Systems**
Monday 26th April 2010
Time 9:00 – 9:45
Room: Ballroom
**Chair:** Jozef Modelski, *Warsaw University of Technology, Poland*

**PL02 – Plenary Session 2**
**From Scanned Data Towards Individual Simulation of Anatomy-based Hip Motion**
Tuesday 27th April 2010
Time 9:00 – 9:45
Room: Ballroom
**Chair:** Carl James Debono, *University of Malta, Malta*
PL03 – Plenary Session 3
Radio Frequency Integrated Circuits for Adaptive Beamforming
Tuesday 27th April 2010
Time 13:30 – 14:15
Room: Ballroom
Chair: Paul Micallef, University of Malta, Malta

PL04 – Plenary Session 4
Positive Fractional Linear Systems
Wednesday 28th April 2010
Time 9:00 – 9:45
Room: Ballroom
Chair: Marian P. Kazmierkowski, Warsaw University of Technology, Poland
# Session Table of Contents

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1P-E</td>
<td>Poster Session 1</td>
<td>1</td>
</tr>
<tr>
<td>A2L-A</td>
<td>Distribution Systems</td>
<td>12</td>
</tr>
<tr>
<td>A2L-B</td>
<td>Signal Processing &amp; Control</td>
<td>15</td>
</tr>
<tr>
<td>A2L-C</td>
<td>Multimedia Signal Processing</td>
<td>18</td>
</tr>
<tr>
<td>A3L-A</td>
<td>Transmission Systems &amp; Electricity Markets</td>
<td>21</td>
</tr>
<tr>
<td>A3L-B</td>
<td>Communication Signal Processing</td>
<td>23</td>
</tr>
<tr>
<td>A3L-C</td>
<td>Analog Circuits</td>
<td>26</td>
</tr>
<tr>
<td>A4P-E</td>
<td>Poster Session 2</td>
<td>29</td>
</tr>
<tr>
<td>A5L-A</td>
<td>SPECIAL SESSION: Smartgrids - Electricity Networks of the Future</td>
<td>40</td>
</tr>
<tr>
<td>A5L-B</td>
<td>Wireless Communications 1</td>
<td>44</td>
</tr>
<tr>
<td>A5L-C</td>
<td>IEEE Region 8 Student Paper Contest</td>
<td>47</td>
</tr>
<tr>
<td>B1P-E</td>
<td>Poster Session 3</td>
<td>50</td>
</tr>
<tr>
<td>B2L-A</td>
<td>General Power Systems</td>
<td>60</td>
</tr>
<tr>
<td>B2L-B</td>
<td>Microwave PA, EMI &amp; Antennas</td>
<td>63</td>
</tr>
<tr>
<td>B2L-C</td>
<td>SPECIAL SESSION: New Applications over Emerging Wireless Broadband Networks</td>
<td>66</td>
</tr>
<tr>
<td>B2L-D</td>
<td>Analog Techniques</td>
<td>68</td>
</tr>
<tr>
<td>B3L-A</td>
<td>Electrical Machines Monitoring</td>
<td>71</td>
</tr>
<tr>
<td>B3L-B</td>
<td>SPECIAL SESSION: INTERMEDIA: Communicating Anywhere, Anytime Using Wearables</td>
<td>73</td>
</tr>
<tr>
<td>B3L-C</td>
<td>Control Systems</td>
<td>75</td>
</tr>
<tr>
<td>B3L-D</td>
<td>SPECIAL SESSION: Special Topics, Spin-Offs &amp; Applications from Nuclear &amp; Particle Physics Research</td>
<td>77</td>
</tr>
<tr>
<td>B4P-E</td>
<td>Poster Session 4</td>
<td>79</td>
</tr>
<tr>
<td>B5L-A</td>
<td>Renewable Resources 1</td>
<td>89</td>
</tr>
<tr>
<td>B5L-B</td>
<td>Sensor Networks</td>
<td>92</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>B5L-C</td>
<td>Circuits &amp; Systems</td>
<td>95</td>
</tr>
<tr>
<td>B5L-D</td>
<td>SPECIAL SESSION: Special Topics, Spin-Offs &amp; Applications from Nuclear &amp; Particle Physics Research</td>
<td>98</td>
</tr>
<tr>
<td>C1P-E</td>
<td>Poster Session 5</td>
<td>100</td>
</tr>
<tr>
<td>C2L-A</td>
<td>Electrical Machines &amp; Industrial Applications</td>
<td>109</td>
</tr>
<tr>
<td>C2L-B</td>
<td>Multimedia &amp; QoS</td>
<td>111</td>
</tr>
<tr>
<td>C2L-C</td>
<td>Wireless Communications 2</td>
<td>114</td>
</tr>
<tr>
<td>C2L-D</td>
<td>Antennas</td>
<td>117</td>
</tr>
<tr>
<td>C3L-A</td>
<td>Power Electronics Converters</td>
<td>119</td>
</tr>
<tr>
<td>C3L-B</td>
<td>OFDM &amp; Coding</td>
<td>121</td>
</tr>
<tr>
<td>C3L-C</td>
<td>Biomedical Signal &amp; Image Processing</td>
<td>124</td>
</tr>
<tr>
<td>C3L-D</td>
<td>Analog &amp; Mixed-Signal Circuits</td>
<td>126</td>
</tr>
<tr>
<td>C4P-E</td>
<td>Poster Session 6</td>
<td>129</td>
</tr>
<tr>
<td>C5L-A</td>
<td>Renewable Resources 2</td>
<td>140</td>
</tr>
<tr>
<td>C5L-B</td>
<td>Control Applications</td>
<td>143</td>
</tr>
<tr>
<td>C5L-C</td>
<td>Communications</td>
<td>146</td>
</tr>
<tr>
<td>C5L-D</td>
<td>Protection, Power Quality &amp; Reliability</td>
<td>149</td>
</tr>
<tr>
<td>Author Index</td>
<td></td>
<td>153</td>
</tr>
<tr>
<td>Chair Index</td>
<td></td>
<td>163</td>
</tr>
</tbody>
</table>
**A1P-E1**

**Proposed Scheme for Plugging Three-Phase Induction Motor**

H. Hairik, R. Alabbasi, W. Kadhem  
*University of Basrah, Iraq*

The paper presents a proposed scheme for fast braking of induction motor drive system. The proposed braking strategy is based on the injection of an AC voltage to the rotor winding from three-phase SVPWM inverter during braking. The injected voltage must have the same frequency, same phase shift and opposite in direction to the rotor induced voltage. The purpose of this method is to reduce the rotor and stator high currents during reverse current braking (plugging), to an acceptable value.

**A1P-E2**

**Channel Coding and Carrier Recovery for Adaptive Modulation Microwave Radio Links**

S. Chinnici, C. Decanis  
*Ericsson Telecomunicazioni SpA, Italy*

This paper deals with channel coding and carrier recovery design for high-speed adaptive modulation microwave radio transmission systems. The challenges posed by the microwave channel are discussed and the design trade-offs are analyzed. The proposed flexible adaptive modulation solution employs M-QAM modulations from 4 QAM up to 512 QAM and a high rate LDPC code. The code-rate flexible LDPC code performs within 1 dB away from the pragmatic capacity in AWGN channel. Particular attention is paid to the design of the carrier synchronization algorithm working at the low SNR conditions imposed by the code and the relatively poor local oscillator behavior.
A1P-E3

Studies of Discrete-Time Unbiased FIR Filters of Polynomial State-Space Models
Y. Shmaliy, O. Ibarra-Manzano
Guanajuato University, Mexico

An unbiased finite impulse response (FIR) filter is addressed for discrete-time state space models with polynomial representation of the states. The unique l-degree polynomial FIR filter gain and the estimate variance are found for a general case. The noise power gain (NPG) is derived for white Gaussian noises in the model and in the measurement. The filter does not involve any knowledge about noise in the algorithm. It is unstable at short horizons, 2 <= N <= l, and inefficient (NPG exceeds unity) in the narrow range l < N <= Nb, where Nb is ascertained by the cross-components in the measurement matrix C. With N >> Nb, the filter NPG poorly depends on C and fits the asymptotic function (l+1)^2/N. With very large N >>> 1, the estimate noise becomes negligible and the filter thus optimal in the sense of zero bias and zero noise. An example is given for a two-state system.

A1P-E4

Synchronous Generator Load Angle Estimation
H. Cucek, D. Sumina, N. Svigir
Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia

In the paper is proposed a load angle estimation method for synchronous generators. The estimation method is based on synchronous generator corresponding voltage-current vector diagram and parameters of generator, transformer and transmission lines. In addition measurement of the load angle is presented. The estimation results were compared with the measured ones. The estimation method gives satisfactory accuracy for load angles less then 120 deg. el. Although the load angle is a key variable for generator stability, it is rarely used as a variable in excitation control system, because the measurement problems. Hence, this estimation method has a wide area of application in excitation systems for control algorithm and to provide stable work of synchronous generator in capacitive operating area.
A1P-E5

Specific Heat of a Ferroelectric PZT Ceramic at the Morphotropic Phase Boundary
S. Lang¹, J. Lashley², K. Modic², R. Fisher², W. Zhu³, Z. Ye³
¹Ben-Gurion University of the Negev, Israel; ²Los Alamos National Laboratory, United States; ³Simon Fraser University, Canada

In this study, the specific heats of a series of lead-zirconate-titanate (PZT) compositions in the vicinity of the morphotropic phase boundary (MPB) were measured. The temperature range was from 1.8 to 300 K. It is believed that these are the lowest temperature measurements ever made on PZT. Differences between the specific heats of the different compositions were very small. However, the calculated Debye temperatures were slightly different.

A1P-E6

Effects of the Facial and Racial Features on Gender Classification
O. Ozbudak, M. Kirci, Y. Cakir, E. Gunes
Istanbul Technical University, Turkey

This paper presents an experimental study on examining the effects of facial and racial features on gender classification. In order to show which facial feature is the most influential for gender classification, parts of several face images, such as, forehead, eyes, nose, lip and chin were masked. For dimension reduction, Principal Component Analysis (PCA) and for determination of gender, Fisher Linear Discriminant (FLD) algorithms were applied to masked face images. Moreover, the effects of racial features on gender classification were studied.

A1P-E7

Differential-Algebraic Model of Ring Electric Power Systems for Simulation of Both Transient and Steady-State Conditions
S. Al-Jufout
Tafila Technical University, Jordan

The paper presents a procedure for mathematical modelling of ring electric power systems for simulation of both transient and steady-state conditions. The idea of this procedure has been based on nodal voltages technique and on differentiation of Kirchhoff’s current law (KCL) applied to each non-
reference node of the system, the result of which a system of algebraic equations for nodal voltages has been obtained. Currents flowing through the electric power system components have been determined by solving their respective differential equations. The overall number of the algebraic and differential equations has been decreased by one third by transforming the three-phase coordinate system into Cartesian coordinate system, where the use of the latter does not ignore the DC component during transient conditions, but restricts the model's implementation for symmetrical modes of operation only. A numerical example for a four-bus ring electric power system with graphical results has been computed and illustrated.

A1P-E8

Improved Control Strategy to Mitigate Electromechanical Wave Propagation Using PSS
M. Ali², J. Buisson², Y. Phulpin¹
¹SUPELEC, France; ²SUPELEC/IETR, France

This paper addresses the problem of electromechanical wave propagation in power systems. To mitigate this type of disturbance, this paper proposes a remote control strategy that could be applied to power system stabilizers. This strategy is based on wide-area measurements, and exploits the disturbance propagation speed to introduce an extra damping torque simultaneously with the disturbance arrival. Simulation results show that the application of such strategy improves the power system dynamics.

A1P-E10

Image and Data Pre-Processing Model for Real-Time Communication Between Dedicated PC and PLC Neural Network Application in Marble Production
A. Tzokev, I. Topalova
Technical University of Sofia, Bulgaria

A model for image and data pre-processing and communication between a dedicated PC and a PLC with Neural Network (NN) application is proposed in this paper. The proposed model defines guidelines for creating a multithreaded application for receiving real-time data from several digital cameras, parallel image pre-processing based on predefined user algorithms, calculation of input data vector for NN and sending the input vector to the PLC NN application. The model was developed and verified in
the laboratory "Intelligent Manufacturing Systems" at the Technical University of Sofia.

A1P-E12

A Model-Based Fault Function Approximation Scheme for Robot Manipulators Using M-ANFIS
T. Yüksel, A. Sezgin
Ondokuz Mayis University, Turkey

Robots, as complex systems, must detect and isolate faults with high probabilities while doing their tasks with humans or other robots with high precision and they should tolerate the fault with the controller. This necessity forced researchers to design various fault detection and isolation (FDI) for robot manipulators, mobile robots and mobile manipulators. In addition to FDI, a scheme should approximate fault function to give exact information about the fault. In this study, a model-based fault function approximation scheme for robot manipulators using MANFIS is proposed.

A1P-E13

Virtual Active Network for Live Streaming Media Delivery
M. Bolic¹, Z. Begic¹, E. Secerbegovic²
¹BH Telecom d.d Sarajevo, Bosnia; ²Source Code d.o.o Tuzla, Bosnia

The large amount of bandwidth and other resources required to deliver streaming media limits the number of concurrent users. We propose a virtual active network (VAN) architecture for streaming media data delivery over wide area networks. In the proposed architecture, cooperating proxies support multiplexing and delivery of live streaming media. The hierarchical delivery structure is dynamically adjusted based on user population distribution, usage patterns, and network conditions. The proposed system architecture provides (1) reliable and high quality live streaming media delivery; (2) lower server resource requirements at the content provider sites; (3) reduced inter-ISP traffic; (4) application level routing for rapid deployment; and (5) cost-effective media data delivery. To deal with one characteristics of live broadcasting events, burst traffic at the beginning of the events, our system features a unique function that dynamically clusters multiple proxy servers to form a server farm to handle a large number of user login events when needed.
A1P-E14

Effect of the Diffuse Solar Radiation on Photovoltaic Inverter Output
C. Balafas, M. Athanassopoulou, T. Argyropoulos, P. Skafidas, C. Dervos
National Technical University of Athens, Greece

Solar global irradiance received at a horizontal level on the earth varies significantly over short intervals due to diffuse radiation changes. Experimental data on global irradiance profiles received by fast data recording systems show that the global irradiance may be enhanced for a few minute periods by as much as 40%. The diffuse radiation is intensified by dry air mass formations, airborne nanoparticles, and cloud formations at higher atmospheric levels. Evaluation factors for photovoltaic system design may also have to consider possible global irradiance surges. Power monitoring of a photovoltaic park has shown that the delivered AC output power by the inverters can be increased beyond their nominal limits due to diffuse radiation effects, thus rising component reliability issues.

A1P-E15

A New Approach to the Design of MAC Protocols for WDM-EPONs
P. Sarigiannidis¹, S. Petridou¹, G. Papadimitriou¹, M. Obaidat²
¹Aristotle University of Thessaloniki, Greece; ²Monmouth University, United States

Medium Access Control (MAC) protocols for WDM Ethernet passive optical networks (WDM-EPONs) suffer from low performance when the users' round trip times are different. In this paper a new MAC protocol for WDM-EPONs is introduced which overcomes the above limitation by filling the gaps in the scheduling program. Moreover, the proposed scheme favors the requests that present a burst-like behavior, by altering the nodes' service order in such a way that further eliminating the aforementioned gaps. The performance of the proposed scheme is being studied via simulation results which indicate that it achieves a significantly lower delay and packet loss ratio in relation to the well-known WDM IPACT protocol.
A1P-E16

The Implementation of LIFS in a Single Channel MAC Protocol
M. Velempini, M. Dlodlo
University of Cape Town, South Africa

The combination of RTS/CTS and EIFS enhancements has not adequately addressed the hidden terminal problem (HTP) in the receiver neighbourhood. The EIFS scheme protects ACK packets, while DATA packets are not shielded as the EIFS expires before they are delivered. Our proposed scheme is designed to address the shortcomings of the EIFS in protecting data packets. We propose a scheme which implements a Long Inter-Frame Space (LIFS) which protects DATA packets and calms HTPs within the receiver's carrier sensing range. The performance of the scheme was evaluated through NS-2 simulations. The simulation results show an improvement in network performance. The scheme reduces end to end delay in all the tagged flows.

A1P-E17

A Study on the Phase Errors Distributions in Phased Array Systems Based on a Behavioural Model of Radiation-Pattern Characteristics
G. Coviello, F. Cannone, G. Avitabile
Politecnico di Bari, Italy

A study on the impact of the phase errors distribution on the performances of the phased array systems has been produced using a complete and behavioral model for radiation-pattern characteristics. The study has shown how the phase errors distribution actually affects the performances demonstrating that the rms phase error is a valuable figure of merit of phased array systems but it is not sufficient to completely describe the behavior of a real system. The results of the study demonstrating the previous considerations have been reported.
**A1P-E18**

**Modeling of an EMC Test-Bench for Conducted Emissions in Solid State Applications**
A. Micallef, C. Spiteri Staines, M. Apap
*University of Malta, Malta*

A simulation model that considers the operation of solid state motor drives in an EMC conducted emission measurement laboratory environment was developed. The model was implemented in MATLAB® and Simulink® using a time domain approach. Models for the LISN, EMI receiver, power cables, thyristor power modules and induction motor load were developed and implemented. These models were developed so as to reflect the actual physics of the components and, where possible, model parameters were obtained through analysis of the geometry of the system through simplifications of the surrounding environment. The simulation was then used to gain insight on the EMI generation mechanisms of the solid state system.

**A1P-E19**

**Architecture for a Robot Learning by Imitation System**
J. Bandera, L. Molina-Tanco, J. Rodríguez, A. Bandera
*Universidad de Málaga, Spain*

Robot learning by imitation has become a key topic in robotics research in the last years, due to the increasing interest in social robots. While several architectures that deal with this topic have been proposed, few efforts have been done in finding united formats that may help in analyzing and comparing these architectures. This paper firstly proposes a set of components that can be identified in any of these architectures. Then, a novel architecture based on these components is proposed, that allows social robots to learn upper-body human gestures from imitation. This architecture uses as only input the information provided by a pair of stereo cameras. It is designed to work in uncontrolled environments, and does not impose the person to wear specific markers or color patches to be perceived. Experimental results show that the proposed architecture is able to effectively perceive, recognize and learn gestures in these real scenarios.
A1P-E20

Design and Implementation of a Low-Complexity RAKE Receiver and Channel Estimator for DS-UWB
C. Thomos, C. Papadopoulos, G. Kalivas
University of Patras, Greece

In this paper, the design and implementation of a low complexity Direct Sequence Ultra-Wideband (DS-UWB) receiver subsystem which incorporates a Channel Estimator (CE) and a novel hybrid Partial/Selective (HPS) RAKE Receiver (RR) using maximal ratio combining (MRC) is presented. The proposed architecture demonstrates the tradeoff between energy capture, performance and receiver complexity by combining the benefits of both partial and selective RAKE receiver algorithms. We focus our work on a highly parallel, modular, synthesizable design which is based on FPGA technology and it is optimized for high performance.

A1P-E21

Algorithms of Detection and Elimination of Interruptions in WiMAX
D. Zvikhachevsky², V. Eremenko¹
¹Orel State Technical University, Russia; ²Orel State Technican University, Russia

In this article the reasons of occurrence of extralegal interruptions and issues related to updating of algorithms of their elimination in wireless WiMAX broadband networks are considered.

A1P-E22

Realizing Undelayed N-Step TD Prediction with Neural Networks
J. Zuters
University of Latvia, Latvia

There exist various techniques to extend reinforcement learning algorithms, e.g., eligibility traces and planning. In this paper, an approach is proposed, which combines several extension techniques, such as using eligibility-like traces, using approximators as value functions and exploiting the model of the environment. The obtained method, 'Undelayed n-step TD prediction' (TD-P), has produced competitive results when put in conditions of not fully observable environment.
A1P-E24

Controller Optimization in Real Time for a Morphing Wing in a Wind Tunnel
A. Popov¹, L. Grigorie¹, R. Botez¹, M. Mamou², Y. Mebarki²
¹École de Technologie Supérieure, Canada; ²Institute for Aerospace Research, NRC, Canada

Wind Tunnel Test results of a real time optimization of a morphing wing in wind tunnel for delaying the transition towards the trailing edge are presented. A morphing rectangular finite aspect ratio wing, having a reference airfoil cross-section, was considered with its upper surface made of a flexible composite material and instrumented with Kulite pressure sensors, and two smart memory alloys actuators. Several wind tunnel tests runs for various Mach numbers, angles of attack and Reynolds numbers were performed in the 6'x9' wind tunnel at the Institute for Aerospace Research at the National Research Council Canada (IAR/NRC). Unsteady pressure signals were recorded and used as feedback in real time control while the morphing wing was requested to reproduce various optimized airfoils by changing automatically the two actuators strokes. The new optimization method was implemented into the control software code that allowed the morphing wing to adjust its shape to an optimum configuration under the wind tunnel airflow conditions.

A1P-E25

Direct AC/AC Power Converter for Wind Power Application
K. Astad, M. Molinas
Norwegian University of Technology and Science, Norway

The paper proposes a double input nine-switch converter for generation of a high-frequency AC output in wind power applications. Through an isolation transformer and rectification the output of the nacelle can output a high voltage DC. Through series connection with other nacelles a sufficiently high voltage for direct power transfer to shore will be achieved. The converter is expected to reduce the total number of switches and thus reduce cost and size.
A1P-E26

Buffer Length Impact to Crosspoint Queued Crossbar Switch Performance
M. Radonjic, I. Radusinovic
University of Montenegro, Montenegro

Performance analysis of two crosspoint queued switches, with four and sixteen ports, is presented in this paper. Crosspoint queued switch architecture has been recently actualized, since it is now not a problem to implement large buffers in crosspoints using modern technology any more. An advantage of this type of solution is the absence of control communication between linecards and schedulers. Four algorithms are used to implement a scheduler: longest queue first, round-robin, frame based round robin matching and random. Throughput, average cell latency and loss probability, are evaluated under uniform and various nonuniform traffic patterns. Results will show that the longest queue first algorithm has the best performance in most simulated cases. It will also be shown that an implemented algorithm does not have any influence on switch performance if the buffers are long enough.
A2L-A1  10:30

**Efficient Three-Phase Power-Flow Method for Unbalanced Radial Distribution Systems**

K. Mahmoud, M. Abdel-Akher

*South Valley University, Egypt*

This paper provides an efficient algorithm for three-phase power flow for unbalanced distribution networks. A new transformer model with various connections is implemented in the forward/backward sweep power flow method. The developed method provides an effective solution to the singularity problem of the nodal admittance submatrices appeared in some of transformer configuration type. Different load models and capacitor banks are also implanted with any number of phases and connection. The proposed load flow tested using the IEEE 34 node test feeder. The obtained results show that the proposed load flow is very efficient and the numerical solution is identical to that provided with the IEEE data.

A2L-A2  10:46

**An Improved Fuzzy Method for Energy Losses Evaluation in Distribution Networks**

G. Grigoras\(^1\), G. Cartina\(^1\), E. Bobric\(^2\)

\(^1\)Technical University of Iasi, Romania; \(^2\)University of Suceava, Romania

The reduction of energy losses in distribution systems is an important issue during planning and operation, with important technical and economical implications. The paper presents an improved fuzzy method, based on the clustering techniques, for energy losses estimation of distribution feeders. This method uses the installed power and loading level of transformers as fuzzy numbers, thing that reflects better the uncertainty from the distribution networks and it can be applied for different distribution network.
Increasing the Efficiency in Non-Technical Losses Detection in Utility Companies

J. Guerrero\textsuperscript{2}, C. León\textsuperscript{2}, F. Biscarri\textsuperscript{2}, I. Monedero\textsuperscript{2}, J. Biscarri\textsuperscript{1}, R. Millán\textsuperscript{1}

\textsuperscript{1}Endesa, Spain; \textsuperscript{2}University of Seville, Spain

Usually, the fraud detection method in utility companies uses the consumption information, the economic activity, the geographic location, the active/reactive ration and the contracted power. This paper proposes a combined text mining and neural networks to increase the efficiency in Non-Technical Losses (NTLs) detection methods which was previously applied. This proposed framework pretends to collect all the information that normally cannot be treated with traditional methods. This framework is part of a research project. This project is done in collaboration with Endesa, one of the most important power distribution companies of Europe. Currently, the proposed framework is in the test stage and it uses real cases.

A Rule-Based Expert System for Steady State Diagnosis of Electrical Distribution Networks


Politehnica University of Timisoara, Romania

The paper describes an expert system, named DiagRED, for the Electrical Distribution Network Steady State Diagnosis. It is divided in two parts. The 1st part presents the background theory and the software tool. After the introduction, the second section presents the theoretical background regarding the applying of the Model Based Diagnosis (MBD) to the power systems steady state operation. Basic concepts and the MBD models for the discussed case are given. The third section presents the fuzzy indices for steady state operation diagnosis. Within the fourth section, the DiagRED structure and its components are presented. Database, knowledge base and user interface are described. The main functors and rules implemented in the Prolog language are given. The 2nd part is focusing on presenting the case study, represented by a real 87 buses distribution network.
Bidirectional Impact Between Distributed RES and Small Island Grids
A. Armenakis
*Electricity Authority of Cyprus, Cyprus*

Due to the ongoing integration of Renewable Energy Sources (RES) at all levels, the structures of Electric Power Networks (EPN) are transforming from vertical to horizontal. System Developers and Operators have to reconsider the applied principles, keeping in mind the potential of distributed RES in affecting the quality, safety, and reliability of the grid. The paper investigates the bidirectional impact between distributed RES and the small Cyprus grid regarding the voltage stability as a function of RES penetration. For this purpose, a suitable simulation of voltage regulation with a typical distribution topology was set up, reflecting requirements for the grid voltage support. Furthermore it was shown, that the location of RES can have serious impact on transient stability. Especially when RES, located in particular areas of the grid with significant load profile, leads to bidirectional power flows.

Characterization of Unbalanced and Distorted Distribution Systems from Experimental Data
G. Chicco\textsuperscript{1}, R. Porumb\textsuperscript{2}, P. Postolache\textsuperscript{2}, C. Toader\textsuperscript{2}
\textsuperscript{1}Politecnico di Torino, Italy; \textsuperscript{2}Universitatea POLITEHNICA din Bucuresti, Romania

The basic concepts for assessing the characteristics of unbalance and harmonic distortion in the general case of a distribution system operating in unbalanced conditions and with distorted waveforms have been introduced by the authors in a specific symmetrical component-based (SCB) framework. The adoption of the indicators defined in the SCB framework allows obtaining effective results by measuring the electrical waveforms according to the measurement criteria indicated in the standard IEC 61000-4-7. In particular, starting from the waveforms measured on a real low-voltage distribution feeder, it is shown how the total phase distortion (TPD) indicator introduced in the SCB framework provides results equivalent to the use of weighted total harmonic distortion indicators assuming the squared RMS phase currents as weights.
A2L-B1  10:30

On Signal-to-Noise Ratio Estimation
V. Papic, Z. Djurovic, G. Kvascev, P. Tadic
School of Electrical Engineering, University of Belgrade, Serbia

A new simple algorithm for estimating signal-to-noise ratio (SNR) for a signal consisting of one sinusoid in white Gaussian noise is proposed in this paper. Algorithm is based on autocorrelation and modified covariance methods for AR (Autoregressive) spectral estimation. The validity of the algorithm is examined by comparing its SNR estimate with SNR estimate obtained by sinusoid magnitude estimation using Pisarenko harmonic decomposition method and noise variance estimation using modified covariance method. By a large number of simulations this algorithm has proven itself as a comparably precise even in case of significantly noise-contaminated sinusoidal signal.

A2L-B2  10:46

A Two-Stage Algorithm for Automatic Construction of RBF Neural Models
J. Deng, K. Li, G. Irwin
Queen's University Belfast, United Kingdom

This paper proposes a novel algorithm for automatic construction of radial basis function (RBF) neural models, combining a two-stage stepwise regression approach and the predicted-residual-sums-of-squares (PRESS) statistic. The main objective is to improve the generalization capability and compactness of the RBF neural models. This is achieved through a model refining procedure and the leave-one-out cross validation. At the first stage, the neural model is constructed automatically by selecting important RBF centres which minimize the PRESS error. Then the contribution of each selected term is reviewed at the second stage, and insignificant hidden neurons are replaced. In the latter step, the forward procedure is utilized
again to reorder the selected terms, leading to a reduction in the model size. The computation of PRESS statistic is simplified by introducing a residual matrix at the two-stage method. Simulation examples confirm the effectiveness of the proposed method.

A2L-B3  11:03

Soft Sensor for Faulty Measurements Detection and Reconstruction in Urban Traffic
J. Kocijan\textsuperscript{2}, J. Prikryl\textsuperscript{1}
\textsuperscript{1}Czech Technical University in Prague, Czech Rep.; \textsuperscript{2}Jozef Stefan Institute, Slovenia

Soft sensors are a valuable alternative to the traditional hardware sensors, which are indispensable in configuration of modern systems. They are often used in process industry, but other applications are possible. This paper describes a possible application of soft sensor for faulty measurement detection and reconstruction in urban traffic. One of the key indicators of traffic control quality in urban traffic control (UTC) systems is the queue length. With the exception of some expensive surveillance equipment, the queue length itself cannot be measured directly. Many methods that estimate the queue length from detector measurements are used in engineering practice, ranging from simple to elaborate ones. The proposed method is a soft sensor based on Gaussian process (GP) model of the traffic queue length in a traffic cross-section. The resultant soft sensor detects single measurement outliers as well as longer lasting faults and replaces the faulty measurements with model prediction.

A2L-B4  11:20

Cooperation of Autonomous Agents Based on Supervisory Control of DES
F. Capkovic
Institute of Informatics, Slovak Academy of Sciences, Slovakia

The alternative approach to the synthesis of agent cooperation in multi agent systems (MAS) is proposed and presented. It is based on knowledge in both the area of DES control and the area of agent-based intelligent control. The agents are modelled by place\slash transition Petri nets (P/T PN). DES control knowledge is based on the P/T PN invariants and the Parikh's vector. The autonomous agents are forced to cooperate in order to achieve a
goal prescribed for the whole group of agents. The theoretical introduction (mathematical description) of the approach is introduced and its applicability is illustrated on a case study and two simple examples. The approach seems to be suitable for material agents (inside of transport systems, manufacturing systems, etc.), social agents and so forth.

**A2L-B5  11:36**

**Buck DC-DC Converter Control Using Invariant Sets Techniques**  
A. Luca, P. Rodriguez-Ayerbe, D. Dumur, P. Lefranc  
*SUPELEC, France*

This paper presents an invariant sets technique for feedback law synthesis, design to control a Buck DC-DC converter. For the linear discrete-time system affected by perturbations and constraints, the proposed method gives the best feedback gain in terms of finding the maximal invariant ellipsoid. As a result of this technique, the maximal ellipsoid is derived but with degraded closed-loop performances. In order to assure satisfactory transients the concept of pole placement in LMI regions is introduced. This approach is finally validated in simulation considering the aforementioned converter.

**A2L-B6  11:53**

**Consensus Based Overlapping Decentralized Observer for Fault Detection and Isolation**  
N. Ilic$^3$, M. Stankovic$^1$, S. Stankovic$^2$  
$^1$Royal Institute of Technology, Stockholm, Sweden; $^2$School of Electrical Engineering, University of Belgrade, Serbia; $^3$University of Belgrade, Serbia

In this paper a new fault detection and isolation (FDI) observer is proposed in the form of a multi-agent network based on a combination of local optimal stochastic FDI observers and a dynamic consensus strategy. It is shown that the proposed algorithm can generate residuals which provide, under general conditions concerning local models and the network topology, a high efficiency, scalability and robustness of the whole estimation scheme. It is demonstrated that the consensus gains can be obtained by minimizing a suitably defined criterion function. A number of examples illustrate the applicability of the proposed methodology in practice.
A2L-C  Multimedia Signal Processing
Date: Monday, April, 26
Time: 10:30 - 12:10
Room: Provence
Chair: Fernando Pereira, Instituto de Telecomunicações

A2L-C1  10:30

SVM Based Transcription System with Short-Term Memory Oriented to Polyphonic Piano Music
G. Costantini², M. Todisco², R. Perfetti¹, R. Basili², D. Casali²
¹Università degli Studi di Perugia, Italy; ²Università degli Studi di Roma Tor Vergata, Italy

Automatic music transcription is a challenging topic in audio signal processing. It consists in transforming the musical content of audio data into a symbolic notation. The system discussed in this paper takes as input the sound of a recorded polyphonic piano music and it produces conventional musical representation as output. For each note event two main characteristics are considered: the attack instant and the pitch. Onset detection is obtained through a time-frequency representation of the audio signal.

A2L-C2  10:46

System for Automatic Collection, Annotation and Indexing of Czech Broadcast Speech with Full-Text Search
J. Nouza, J. Zdansky, P. Cerva
Technical University of Liberec, Czech Rep.

In the paper we describe a complex system we developed for automatic acquisition of a large corpus of spoken Czech. The system is capable of continuous monitoring of a selected Czech TV station and providing automatic transcription of its audio track. The transcription is performed by our own speech recognition engine that employs a vocabulary with 320 thousand most frequent Czech words (and word-forms). Transcription accuracy is fairly good for studio speech (above 90 per cent), but may drop significantly for noisy recordings and spontaneous speech. Anyway, the system runs without any human supervision and during its operation in 2007 it collected, transcribed, stored and indexed more than 1800 hours of
Czech spoken documents. Any word or word combination in this corpus can be easily searched by a full-text search engine with internet access.

A2L-C3  11:03

View Planning for Efficient Contour-Based 3D Object Recognition
C. Urdiales, C. de Trazegnies, J. Pacheco, F. Sandoval
University of Malaga, Spain

This paper presents a method for capture planning in view based 3D recognition. Views are represented by their contours, encoded into curvature functions, which are reduced into compact feature vectors by Principal Component Analysis. These vectors are very resistant against transformations, so they can be assumed to be distributed over the surface of a sphere with the object in its center. After clustering these vectors, 3D objects are represented via Hidden Markov Models where classes are states. To recognize an object in a minimum number of steps, we propose to align candidate cluster representations and then subtracting their cluster maps to decide in which locations they differ the most. Then, a TSP is used to decide in which order these distinctive locations are visited. The proposed approach has been successfully tested with several artificial 3D object databases, even though it still presents some errors in objects with strong symmetries.

A2L-C4  11:20

A Reversible Visible Watermarking Scheme for Compressed Images
R. Farrugia
University of Malta, Malta

Visible Digital watermarking is a technique that embeds copyright information perceptibly within the image to prevent illicit use of multimedia content. There are numerous applications that require user authentication to make the original image content available. However, the reversible visible watermarking schemes found in literature today are susceptible to quantization errors induced by lossy images and are therefore not applicable for high quality multimedia communications applications. This paper presents a novel reversible watermarking scheme suitable for lossy compressed images. The proposed mechanism reversibly embeds the residual information packet, required to restore the watermarked region, in the quantized transform coefficients. Furthermore, the residual information
packet is calculated based on the compressed image in order to suppress quantization errors. The experimental results clearly confirm the superiority of the proposed scheme for compressed images where Peak Signal-to-Noise Ratio (PSNR) gains of up to 3dB were registered relative to the other state-of-the-art reversible watermarking schemes found in literature.

**A2L-C5 11:36**

**Measurement of the Blocking Artefact in Video Frames**
L. Abate, G. Ramponi  
*Università degli Studi di Trieste, Italy*

A method to automatically quantify the blocking artefact in video frames is presented. Two peculiar problems of the video blockiness are addressed, namely the shift in position of the blocking discontinuities in predicted frames, due to encoding with motion compensation, and the degradation of the edges of moving objects. Original solutions are proposed to detect both aspects and quantify their seriousness, avoiding erroneous detection caused by active areas, aliasing and ringing. Experiments show that the proposed indices respond coherently to the increase in video compression as well as in the subjective perception of blockiness.

**A2L-C6 11:53**

**A Set of Features for Measuring Blurriness in Video Frames**
F. Dardi, L. Abate, G. Ramponi  
*Università degli Studi di Trieste, Italy*

A new method to assess the presence and the strength of the blurring artefact in video frames is presented. The estimation is performed first through a measure over the whole picture, then through a finer, local analysis of the sharpness of the objects borders. The subjective relevance of blurred image parts is estimated. Then a property which could attenuate the perception of blurriness, namely, the scene activity, or clutter, is measured. Finally human faces, relevant content for a human viewer, are found. The measurements respond coherently to changes in image quality due to different video encodings.
A3L-A1  14:00
Implementation of Coordinated Voltage Control for the Swiss Transmission System
M. Geidl
Swissgrid AG, Switzerland

This paper outlines the organization of the ancillary service "voltage control and provision of reactive power" for the deregulated Swiss electricity market environment. A central voltage/reactive power management concept was elaborated and introduced with the respective operational procedures, from day-ahead planning to ex-post monitoring and accounting. Economic incentives were defined for all involved parties within Switzerland. This article describes the main features of the concept and its implementation. A conclusion summarizes practical experience and possible future improvements.

A3L-A2  14:20
Optimal Response of a Hydroelectric Power Plant with Bilateral Contracts
S. Mariano², M. Calado², L. Ferreira¹
¹Instituto Superior Tecnico, Technical University of Lisbon, Portugal;
²University of Beira Interior, Portugal

Deregulation and liberalization of electric power industry, among other things, has created new requirements for the market participants. The power system engineer, operator, and, in general, the market participant is being faced with requirements for which he does not have adequate training and the proper software tools. In this framework, among others, a pure hydro-generation company has to operate its hydro units, throughout the operating day, trying to fulfill the market clearing schedule or a bilateral contract. This paper addresses the optimal response of a hydroelectric
power plant with bilateral contracts in order to maximize its profit from selling energy.

**A3L-A3  14:40**

**Price Definitions in Energy Contracts with Investor Owned Generation**
R. Bualoti\(^3\), M. Trovato\(^2\), M. Celo\(^1\)
\(^1\)Albanian Power Corporation, Albania; \(^2\)Politecnico di Bari, Italy; \(^3\)Polytechnic University of Tirana, Albania

Nowadays IPPs power plant construction is encouraged by the current deregulatory climate, and the financing technique employed to implement these projects is often the project financing formula. This means that an investor consortium, usually foreigner, plan, build, operate the power plant, and sell the generated electricity to the host utility. The sale price is determined from the expected IPPs production cost, enhanced of the expected welfare obtainable by selling electricity. This paper proposes a methodology based on a stochastic approach for linking the uncertainty of the future production cost with the price of the electricity generated by an IPP.

**A3L-A4  15:00**

**Application of Artificial Neural Networks for Electric Arc Extinction Modeling in High Voltage Circuit Breakers**
A. Ziani, H. Moulai
*University of Sciences and Technology Houari Bounediene, Algiers, Algeria*

The aim of this article is to introduce in a first time the neural networks in the mathematical modeling of arc quenching in high voltage breakers, and then to present a comparative survey between the different training algorithms in order to enable to select the feed-forward propagation neural network and the retro propagation algorithm the most adapted to simulation. This survey has been applied for a line breaker 245kV/50kA/50Hz, for which a default current of 90% of the breaking capacity has been applied.
A3L-B1 14:00

CDHMM Parameters Selection for Speaker-Independent Phone Recognition in Continuous Speech System
Z. Ben Messaoud, A. Ben Hamida
National Engineering School of Sfax, Tunisia

Pattern recognition has long been a topic of fundamental importance in a wide range of science and technology. Over the years there have been a range of several tasks developed for speech recognition. While in recent years speech recognizer evaluation has focused on LVCSR research, we believe that evaluating recognition at the phone level is important since the words are always represented by the concatenation of phones units. These phones are acoustically modeled by the predominant static model in automatic speech recognition remains the Hidden Markov Model (HMM). In this paper, we investigate the behavior of speaker-independent phone recognition in continuous speech based on the technique of HMM. This study focuses on the selection of an optimal model topology in order to achieve a robust phone recognition system which accomplishes the tradeoff between model size and data training. To evaluate and compare the performance of our conceived system to other previous works, we choose the standard TIMIT Database and the platform HTK. We obtain a phone recognition correct rate of 69.33 percent and accuracy rate of 63.05 percent which are comparable with others works.

A3L-B2 14:20

K-Best Paths in Fault Tolerant Bi-Directional Heterogeneous Wireless Sensor Networks
H. Fahmy¹, S. Ghoneim²
¹Ain Shams University, Egypt; ²Université Française d'Egypte, Egypt

WSN's gather a large number of small battery operated devices with sensing and communication capabilities. Sensors that perform environmental
monitoring and measuring (e.g. turn on water sprinklers to stop the fire) are of limited processing and storage capacity. Due to the limited transmission radius, the routes between two nodes are usually created through several hops. Connectivity is one of the most important properties of a large-scale wireless network. Fault tolerance in wireless ad-hoc and sensor networks increases with increasing k for which the network is k-connected. Survivability can be defined as network design and management procedures to minimize the impact of failures on the network. In this paper we propose a two phases procedure to find k-best paths in a bi-directional network. First, we introduce an algorithm that ensures bi-directionally connected network, then a second algorithm based on trellis graph transformation is applied on the obtained network to find out the k-best disjoint paths between any origin-destination pair.

**A3L-B3  14:40**

**Evaluating the Impact of the Signalling Delay on the Control Channel**  
M. Velempini, M. Dlodlo  
*University of Cape Town, South Africa*

Multi-channel wireless communication techniques have positioned wireless access networks as strong candidate for the next generation networks. They promise to offer high capacity and better network performance. Unfortunately, multi-channel schemes come with a number of challenges. They operate under some hardware constraints, such as transmit-receive and channel switching delay. A transceiver can only listen on one channel and can switch to other channels incurring a channel switching cost which degrades performance. The paper investigates the impact of the channel switching penalty on performance and discusses briefly our proposed model. The performance of the control channel is analyzed and its impact on performance evaluated. Simulations and network queuing model are employed in the analysis. The effect of channel switching delay is evaluated in different network sizes. We conclude that the performance of the network can be improved by improving the capacity of the control channel and reducing signalling delays.
A3L-B4  15:00

Dual Selection Diversity Over Rician Fading Channels in the Presence of Multiple Cochannel Nakagami-M Interferences
N. Sekulovic, A. Panajotovic, D. Draca, M. Stefanovic, C. Stefanovic
Faculty of Electronic Engineering, Serbia

In wireless communication systems, antenna diversity is used to mitigate the effects of fading and cochannel interference (CCI). Dual signal-to-interference ratio (SIR)-based selection diversity system over correlated Rician fading channels in the presence of arbitrary number of correlated Nakagami-m CCIs is studied in this paper. Useful analytical expressions for the probability density function (PDF) and cumulative distribution function (CDF) of SIR at the output of dual selection diversity receiver are derived. These expressions are used to study the outage probability and average bit error probability (ABEP) of the proposed system. Numerical results are also presented to support mathematical analysis.

A3L-B5  15:20

Implementation of a Radar Tester for Air Traffic Control Applications
T. Micskei¹, L. Dudás¹, R. Seller¹, J. Orbán²
¹Budapest University of Technology and Economics, Hungary; ²Hungarian Air Navigation Services Pte Ltd Co, Hungary

In this paper we present a method, and a fully implemented and tested hardware, for testing the operation of primary radars, may it be used in air traffic control or in military service. The realization of the radar tester was based on the theory of controlled radar cross section (CRCS), this way creating spurious targets or clutters, with known parameters, on the screen of the radar. According to the difference between the created and the measured parameters (e.g. velocity, fluctuation and distance), any minor or major degradation or failure can be detected. The tester is capable of scanning the radar system from the antenna, via microwave hardware elements, all through to the digital signal processor (DSP) unit, achieving great diagnostic properties. Emphasis was put on the realisation of the hardware. The produced equipment was tested in real life using a primary ATC radar in Hungary, with satisfying results.
A3L-C1 14:00

**A 8bit Two Stage Time-to-Digital Converter Using 16x Cascaded Time Difference Amplifier in 0.18um CMOS**

S. Mandai\(^1\), T. Nakura\(^2\), M. Ikeda\(^2\), K. Asada\(^2\)

\(^1\)University of Tokyo, Japan; \(^2\)University of Tokyo and VLSI Design and Education Center, Japan

We have designed a 8bit two stage time-to-digital converter (TDC) using a time difference amplifier in 0.18um CMOS process. The time resolution is 1.89ps, and DNL of 0.9 and INL of 1.0 are achieved in simulation. To amplify the time residue of the first stage, the 16x cascaded time difference amplifier (TDA) using differential logic delay cells is employed. By using differential logic cells for the delay chain instead of CMOS logic cells, the 16x cascaded TDA realizes stable time difference gain (TD gain) and fine time resolution. The TDA have been fabricated in 0.18um CMOS process. Measurement results show that our TDA achieves 4.4% TD gain offset at 30ps input range, the standard deviation and the maximum error of the difference between the ideal amplified value and measured value is 13.0ps and 30.0ps respectively. The maximum error corresponds to 0.99 LSB. Linearity of the two stage TDC depends on the specifications of a TDA greatly. The linearity of the proposed TDC improved by using the 16x cascaded TDA and using only one TDA in the two stage TDC instead of using a lot of TDAs.

A3L-C2 14:20

**Novel Ultra Low Voltage Semi Floating-Gate Passband Transconductance Amplifier**

Y. Berg

*University of Oslo, Norway*

An ultra low voltage differential transconductance amplifier based on clocked binary and analog inverters is presented. Supply voltages down to
250mV can be applied. Clocked semi-floating-gate binary inverters used for ultra low voltage digital logic are exploited to obtain analog inverting gates. The ultra low voltage amplifier perform a passband operation where the passband is dependent on the applied current level. The gates used resemble precharge CMOS logic where the current level is determined by offset voltages and the precharge level is determined by the supply voltage provided by the clock signals applied. Simulated data presented are valid for a 90nm STM CMOS process.

A3L-C3  14:40

Current Mode Low BW - Large Peaking Time CMOS S-G Shaper Using CA Building Cells
T. Noulis1, A. Voulkidou1, S. Siskos1, G. Sarrabayrouse2
1Aristotle University of Thessaloniki, Greece; 2CNRS LAAS, Université de Toulouse, France

Novel CMOS current mode shaper for front end electronics is developed. In particular, a semi-Gaussian shaper implementation based on current mode cells (current amplifiers) is designed using an advanced filter design technique. Although the shaper architecture is fully integrated, it satisfies a relatively large peaking time specification. An analysis is also performed regarding the optimum selection of an inductor element simulator - three respective structures are designed using CAs, CCIIs and OTAs. The topologies are analytically compared in terms of noise performance, power consumption, total harmonic distortion (THD) and dynamic range (DR) in order to examine which is the most preferable in the SG shaper configuration. Analysis is supported by simulations results in a 0.35 um process by Austria Mikro Systeme (AMS).

A3L-C4  15:00

Multiple Input Multiple Output Current-Mode Universal Biquad Filters
C. Laoudias, C. Psychalinos
University of Patras, Greece

Multiple-Input Multiple Output (MIMO) universal biquad filters are introduced in this paper. They are constructed from appropriately configured current mirrors in order to realize the required integration and summation/subtraction operations. Attractive characteristics of the proposed
topologies are the capability for low-voltage operation and electronic adjustment of the resonant frequency. The last one is achieved by utilizing the input resistance of the current mirrors in the employed integrators topology. The performance of the filters has been studied through simulation results.

**A3L-C5  15:20**

**Design and Analysis of a Highly Linear Fully Differential LNA for SOC**  
J. Jiang, D. Holburn  
*University of Cambridge, United Kingdom*

This paper presents the analysis and design of a highly linear fully differential LNA based on the modification of active post distortion method. The analysis focuses on both nonlinearity and noise performance. The linearisation mechanism is investigated in terms of low frequency and high frequency theory based on Power and Volterra series respectively. A prototype LNA has been designed and is to be implemented in UMC 0.18 µm CMOS technology. Simulation shows the LNA achieves 9.7 dBm IIP3 with 16.5 dB power gain, 1.97 dB noise figure and 15.84 mW power consumption.
A4P-E1

A Fast Carry Chain Adder for Virtex-5 FPGAs
P. Zicari, S. Perri
Portale Università della Calabria, Italy

This paper proposes a fast adder structure for Xilinx Virtex-5 FPGAs. The generic n-bit adder is split into two n/2-bit adders. The portion which computes the n/2 most significant sum bits receives the carry input signal from a purpose-designed fast carry generator instead of the n/2-bit adder generating the least significant sum bits. This allows outperforming the ripple carry adders implemented in the chosen FPGA family. The fast carry chain propagation is reached by optimizing the use of 6-input LUTs together with the dedicated MUXCY resources available in the Virtex-5 FPGA chip. A 64-bit adder designed as proposed here is ~11% and ~35% faster than the standard carry chain adder and the DSP implementation, respectively.

A4P-E2

Efficient Absolute Difference Circuits in Virtex-5 FPGAs
S. Perri, P. Zicari, P. Corsonello
Portale Università della Calabria, Italy

This paper presents a novel architecture optimized for realizing efficient absolute difference circuits in Virtex-5 FPGA devices. The proposed structure efficiently uses the 6-input look-up-tables available within the chosen devices family to maximize speed performance and to minimize the amount of occupied resources. In comparison with the DSP- and the LUT-based absolute difference circuits automatically synthesized and mapped by the ISE development tool the proposed structure is up to 40% cheaper and up to 61.5% faster.
A4P-E3

Improved Parallel PSO Solution to Economic Dispatch with Practical Generator Constraints
B. Mahdad, K. Srairi, T. Bouktir
Université Mohamed Khider de Biskra, Algeria

This paper presents an improved parallel particle swarm optimization approach (IPPSO) based decomposed network for economic power dispatch with consideration of practical generator constraints. The range of partial power demand corresponding to the partial output powers near the global optimal solution is determined by a flexible decomposed network strategy and then the final optimal solution is obtained by parallel particle swarm optimization. To validate the robustness of the proposed IPPSO approach, it is tested to two test systems having nonconvex solution spaces, 26-bus (6 generating units) with consideration of valve point effects, network and with 15 generating units. The simulation results compared with recent global optimization methods (GA, MTS, SA, and PSO). The outcome of the comparisons shows the effectiveness of the proposed IPPSO approach in terms of solution quality, consistency and reduced computational time compared to various methods available in the literature survey.

A4P-E4

Fractional-Order Control and Simulation of Wind Turbines with Full-Power Converters
R. Melício\textsuperscript{2}, J. Catalão\textsuperscript{2}, V. Mendes\textsuperscript{1}
\textsuperscript{1}Instituto Superior de Engenharia de Lisboa, Portugal; \textsuperscript{2}University of Beira Interior, Portugal

This paper is on wind energy conversion systems with full-power converter and permanent magnet synchronous generator. Different topologies for the power-electronic converters are considered, namely matrix and multilevel converters. Also, a new fractional-order control strategy is proposed for the variable-speed operation of the wind turbines. Simulation studies are carried out in order to adequately assess the quality of the energy injected into the electric grid. Conclusions are duly drawn.
A4P-E5

Automatic Selection of the Region of Interest in Ancient Scores
I. Barbancho, C. Segura, L. Tardon, A. Barbancho

Universidad de Málaga, Spain

In this paper, an automatic system for the extraction of the region of interest in ancient scores is presented. The system is able to separate the image into two pages, when needed, then, using images that contain one page of score, the method performs a correction of the rotation before estimating the region of interest. For the estimation of the region of interest, three different methods have been developed: eroded edges method, wavelet method and eroded image and edge method. The three methods obtain quite good performance, being the wavelet based method the one that achieves best performance regarding execution time and accuracy in the process of selection of the region of interest.

A4P-E6

Magnetic Field Measurements Near a Compact Kiosk Type Substation
A. Proios\textsuperscript{1}, S. Anagnostatos\textsuperscript{1}, A. Polikrati\textsuperscript{1}, P. Tsarabaris\textsuperscript{1}, E. Koufakis\textsuperscript{2}

\textsuperscript{1}National Technical University of Athens, Greece; \textsuperscript{2}Public Power Corporation SA, Greece

The last decades the concern of the public, regarding the possible affects from the exposure to magnetic and electric fields, has grown considerably. This is because the generation, transmission and distribution of electric power are accompanied with the presence of the above mentioned fields. This paper attempts to illustrate the values of the resultant magnetic field in the low frequency range, near a compact kiosk type substation. The measurements were performed in a park, in the city center of Chania, Greece, during summer time. All measured magnetic field values were lower in comparison to the international specified limits.
A4P-E7

Magnetic Scanning of the Radiation Characteristic of a CRLH CPW Antenna
G. Sajin, S. Simion, F. Craciunoiu, A. Muller, A. Bunea
IMT Bucharest, Romania

The paper presents the results concerning the radiation characteristic scanning of a ferrite supported resonating CPW antenna based on CRLH (Composite Right / Left-Handed) transmission lines. The scanning effect is obtained by magnetically polarizing the ferrite substrate. Data obtained by simulation with a suitable microwave software indicate an azimuthal characteristic deviation of $\pm 9.78$ at a working frequency $f = 13$ GHz for a variable magnetic biasing field between 0 T and 0.16 T. This result is in very good agreement with the experimental data showing a characteristic displacement of $+12 -10$.

A4P-E8

Quality of Service Aware Ant Colony Optimization Routing Algorithm
C. Saliba, R. Farrugia
University of Malta, Malta

The demand for Internet connectivity has grown exponentially in the past few years. Moreover, the advent of new services such as Voice over IP (VoIP), Video on Demand (VOD) and Videoconferencing applications have caused a severe increase in traffic, which makes it extremely hard to ensure an acceptable level of quality. This is mainly attributed to current routing strategies, such as Link State (LS) and Distance Vector (DV), which are not optimal in terms of Quality of Service (QoS). This paper presents a QoS-Aware routing strategy based on the Ant Colony Optimization (ACO) concept, where a set of artificial ants are used to determine the optimal path. The proposed method was compared to other state of the art ACO procedures and traditional routing schemes like LS and DV. Simulation results clearly demonstrate that the proposed scheme outperforms all the methods considered in this paper where throughput gains of 8% and a reduction in delay of 38% for time critical applications were achieved.
A4P-E9

**Effects of Envelope Tracking Technique on an L-Band Power Amplifier**

E. Cipriani, P. Colantonio, F. Giannini, R. Giofrè, L. Piazzon  
*Università degli Studi di Roma Tor Vergata, Italy*

This contribution presents the application of Envelope Tracking technique on a LDMOS 2nd harmonic tuned PA, designed to operate at 2.14 GHz. Accounting for the input dynamic signal, optimum drain and gate bias voltages are derived starting from a simplified model of the active device. Experimental results give an increase up to 40% in average efficiency, when bias tracking is applied. The application of Envelope Tracking does not impact on output power and gain performance, in the determined back-off region, comporting also an improvement of the second order spectral regrowth when complex signals are involved.

A4P-E10

**Modelling of the Power Factor for AC Linear Circuits Under Non-Sinusoidal Conditions**

H. Andrei, F. Spinei, C. Cepisca, P. Andrei, N. Vasile  
1Politehnica University of Bucharest, Romania; 2Valahia University of Targoviste, Romania

In this paper, a new algorithm to calculate the power factor of the linear circuits in non-sinusoidal regime by introducing the conditions between the relative values of considered harmonics is presented. The relative values which characterize the voltage and current harmonics have been used. The MATLAB example will verify the efficiency of this method.

A4P-E11

**Fast Algorithm for Broadband Macromodeling of High-Order Frequency Responses**

D. Deschrijver, B. Gustavsen, T. Dhaene  
1Ghent University - IBBT, Belgium; 2SINTEF Energy Research, Norway

The calculation of broadband macromodels from large tabulated frequency responses can be computationally demanding in terms of CPU time and memory, especially in the case of high-order frequency responses. To reduce the computational burden, a fast macromodeling technique is
proposed. It applies a piecewise fitting strategy that makes use of a fast rational interpolation scheme to identify a representative set of data samples and an appropriate model order. This information is exploited by the Vector Fitting algorithm to extract the poles of the macromodel in a reduced amount of time. The calculation of the residues is solved as a linear approximation problem, and standard model reduction techniques can be applied as an optional step to remove possible pole redundancies. A cable case example shows that substantial savings are obtained in terms of computation time and memory requirements.

A4P-E12

**Improving the Automatic Measurement of Plant Root Growth**

P. Blanchfield, X. Chen  
*University of Nottingham, United Kingdom*

An improved technique for measuring the growth of plant roots is presented. Such measurements are important in evaluating the success of experiments to improve plant growth. The previously accepted method is shown to involve systematic errors which are removed by the use of a scale space optical flow measurement in setting the search space of a subsequent region correspondence measure.

A4P-E13

**Dielectric Elastomers and Compliant Metal Electrode Technology**

R. Jones\(^2\), P. Wang\(^2\), B. Lassen\(^2\), R. Sarban\(^1\)  
\(^1\)Danfoss PolyPower, Denmark; \(^2\)Mads Clausen Institute, Denmark

Dielectric elastomers have demonstrated most potential as muscle-like actuators because they can undergo large deformation, have a high energy density and a relatively fast response. The basic structure of a dielectric elastomer (DE) is simple - an elastomer film sandwiched between two electrodes. The electrodes that sandwich the elastomer play a key role in the electromechanical performance. The electrodes must be highly compliant, have low mechanical stiffness and remain conductive for large area strains. Much research emphasis is being placed on the design of more sophisticated compliant electrodes that combine very good conductivity with improved robustness in the face of electrical breakdown. This contribution discusses compliant metal electrode technology and reviews some of the research being carried out in this area at the Mads Clausen Institute.
A4P-E14

Formation and Characterization of CdSe Thin Films on Ni Substrate
M. Athanassopoulou, T. Argyropoulos, J. Mergos, J. Novakovic, C. Dervos
National Technical University of Athens, Greece

Preparation and characterization of CdSe thin film semiconductors, prepared by cathodic electrodeposition from an acid sulfate solution (CdSO4 - SeO2), were investigated. The effect of the bath temperature and how it affects the CdSe deposits was studied. The formation of compact barrier layers of zinc blende CdSe was attained. X-ray diffraction (XRD) and scanning electron microscopy (SEM) tests present a remarkably intense cubic structure, without any post-thermal treatment. The Ni/CdSe/Au structure may exhibit rectifying properties depending on the temperature during the electrodeposition. High temperature baths make the deposits to obtain ohmic properties.

A4P-E15

Packet Loss Concealment Using Adaptive Lattice Modeling
N. Linenberg, I. Shallom, D. Wulich
Ben-Gurion University of the Negev, Israel

A new Packet Loss Concealment (PLC) algorithm which is based on an adaptive lattice filter is presented in this paper. The new approach generates the lost packets by using lattice structure synthesis model and its excitation. The model parameters estimation relies on packets received, preceding and succeeding to the lost one. The algorithm is compared to ITU and ANSI recommendations for G.711 PLC, and to the zero stuffing approach as a lower bound. The algorithm evaluation consists of objective methods and an informal subjective test. The objective measure used is the MOS-LQO measured by the Perceptual Evaluation of Speech Quality (PESQ) algorithm. The test vectors used in the proposed PLC evaluation are the ITU P-Series Sup.23 database and the TIMIT database. The proposed lattice based algorithm outperforms in comparison with the other PLCs evaluated in the paper, especially in high loss rates.
A4P-E16

Force Directed Module Placement with Pin Consideration
M. Samaranayake, H. Ji
Manchester Metropolitan University, United Kingdom

This paper looks at developing a module placement algorithm by combining two well known force-directed graph drawing algorithms. It is in answer to the current gap of module placement tools within the electronic design automation community that this research is carried out. Whilst previous work has provided an introduction to the basis of the module placement flow followed by the authors, in this work, the additional feature of using pins to determine the placement has been looked into. Experimentation has shown that introduction of pins helps to generate better placements than without.

A4P-E17

A New Implantable Wireless Microsystem to Induce Mictrition in Spinal Injury Patients
Universidade do Minho, Portugal

This paper presents a new wireless microsystem for use in urology. This microsystem is composed by two parts: the electrostimulation and the radio-frequency (RF) subsystems. The electrostimulation part is a silicon box with groves to pass the nerves to be stimulated. Above the stimulation box is putted a cover containing electrodes to do the electrical contacts with the nerves. Using wafer-level packaging (WLP) techniques the RF and the electrostimulation parts are joined together. This implantable microsystem allows the reception of RF signals with user commands to activate the micturition function and the penian erection (on males) patients. The microsystem has an expected area of 5x5 mm²
A4P-E18

A Numerical Model of Investigating the Electric Field in Dielectric Liquid
A. El-Zein, M. Talaat
Zagazig University, Egypt

The initial filamentary streamers in liquid dielectrics drastically changes by the tip curvature of the electrode and the applied voltage. In this paper to get the non uniform field a sphere-to-plane electrodes configuration is used. Also, an immersed air bubble adjacent to the sphere electrode is presented, to obtain the sharp tip, after the air bubble compressed against the sphere electrode i.e., sharp conducting protrusion tip, which considered as a source of high non-uniform field and streamer initiation. A simulation model for field distribution in the dielectric medium is presented by using Finite Element Method. An experimental technique was used to investigate the accuracy of the field simulation. Also an analytical equation for field calculation was used to investigate the percentage field error.

A4P-E19

Magnetization Performance of BP-Based Algorithm
M. Abdelhedi, O. Hamdi, A. Bouallegue
1ENIT, Tunisia; 2ISITV, Tunisia; 3SysCOM Laboratory, ENIT, Tunisia

Low-density parity-check (LDPC) codes are based on random construction. Because of this randomness, it is not easy to analyze them with the traditional methods of information theory. N.Sourlas was the first to point out that LDPC codes have a similarity with Ising spin systems of statistical physics. Besides, it has been shown that the Belief Propagation algorithm, the LDPC codes decoding algorithm, is equivalent to the Thouless-Anderson-Palmer(TAP) Approach. In this paper, we develop the log-likelihood ratios-Belief Propagation (LLR-BP) algorithm and its simplification, BP-Based algorithm, with the TAP approach.
A4P-E20

Unbounded Electromagnetic Field Problem Solution by Means of Virtual GMRES
S. Alfonzetti¹, G. Borzi², N. Salerno³
¹Università di Catania, Italy; ²Università di Messina, Italy; ³Università di Catania, Italy

This paper reviews some solving procedures for unbounded electromagnetic field problems. Three problems are considered: electrostatic, time-harmonic skin effect, and time-harmonic scattering in unbounded domains. These problems are formulated, respectively, by means of the hybrid FEM-BEM, FEM-DBCI and FEM-RBCI methods, which in all cases lead to global algebraic systems which are partly sparse and partly dense. The paper shows that a very good solving strategy is based on the use of the GMRES solver, virtually applied to a suitably reduced algebraic system.

A4P-E22

Image Transmission Quality Analysis Over Adaptive Reed-Solomon Coding
L. Chaari¹, M. Fourati³, L. Kamoun²
¹Electronic and Information Technology Laboratory at Sfax National Engineering School Tunisia, Tunisia; ²Institut supérieur d’électronique et de communication de Sfax, Tunisia; ³ISIMS, Tunisia

Image compression standard are sensitive to channel noise, so for noisy channels it is necessary to investigate in order to select the appropriate channel coding method as a trade-off between the image quality and the ability to control errors. Reed-Solomon (RS) codes which are described by Reed and Solomon in 1960[1] are powerful error correcting codes and are becoming more frequently used due to the availability of VLSI components. RS codes have a powerful random and burst correcting ability. The Reed-Solomon code can be adapted towards the burst error correcting capabilities and this will be shown in the contribution. This paper investigates the effects of noise on the performance of Reed-Solomon coding methods for different errors correction capability. First, the relations among the BER, SNR, and code lengths are analysed. Further, the transmission performance of RS codes association with different modem schemes are analysed. The results listed in this article denote the effects of the using RS codes in a selected method. Based on this analysis an adaptive
RS scheme is proposed to decide on the correcting capabilities that offers the best reconstructed image quality.

A4P-E23

A New Approach for Classification of Calorific Coal Properties in Boiler Systems
V. Papic¹, R. Puche-Panadero², P. Todorov¹, Z. Djurovic¹
¹School of Electrical Engineering, University of Belgrade, Serbia;
²Universidad Politecnica de Valencia, Spain

In this paper a new approach for obtaining the coal quality classification is proposed. The main goal is to classify the coal into three classes: "good", "medium" and "bad" coal based on its calorific value. Instead of having chemical analysis the classification is obtained by using only two electrical signals available from SCADA system, which are the speed of the belt feeder and the current of the mill motor. Two parameters of the cross-correlation function between these signals with mean values of these two signals from SCADA are used to form training set patterns for designing a classifier. The procedure of classifying the coal characterizing pattern has been introduced.

A4P-E25

Enhancing Service Portability in Upcoming 3G UMTS Networks & Security Aspects
C. Chrysoulas², N. Sklavos², A. Kakarountas¹
¹Technological & Educational Institute of Ionian Islands, Greece;
²Technological Educational Institute of Patras, Greece

Compared to other wired networks, like internet, complexity in the 3G UMTS is due its interactions with different entities. Within the UMTS, services have to deal with a great number of different QoS, small user display, variant bandwidth and small battery power. Most of the services are generally bind to the particular systems or APIs. In this article, we look at the evolution of different technologies on which such service are build and apply the Web services framework to achieve the portability of the such services We take the example scenario and build the Web services model which can be implemented and deployed in the UMTS network.
A5L-A1  16:20

Impact-Analysis of the Charging of Plug-in Hybrid Vehicles on the Production Park in Belgium
F. Geth¹, K. Willekens¹, K. Clement¹, J. Driesen¹, S. De Breucker²
¹Katholieke Universiteit Leuven, Belgium; ²VITO, Belgium

This paper determines the electrical power required for charging a fleet of PHEVs in Belgium. A stochastic model based on the driving behavior of Western European drivers, determines the availability of the PHEVs for grid charging. Three scenarios are defined to generate charging profiles based on the driving profiles. The first two are based on current electricity tariff schemes available to residential users, i.e. a single or a double tariff (day and night). In the third scenario, coordinated charging is proposed. The extra load caused by charging PHEVs is added to the residential and industrial electricity consumption of Belgium in 2008 and analysed.

A5L-A2  16:40

Distributed Energy Resources Management with Cyber-Physical SCADA in the Context of Future Smart Grids
Z. Vale², H. Morais², P. Faria², H. Khodr², J. Ferreira², P. Kadar¹
¹Budapest University of Technology and Economics, Hungary; ²ISEP/GECAD, Portugal

In the energy management of a small power system, the scheduling of the generation units is a crucial problem for which adequate methodologies can maximize the performance of the energy supply. This paper proposes an innovative methodology for distributed energy resources management. The optimal operation of distributed generation, demand response and storage resources is formulated as a mixed-integer linear programming model (MILP) and solved by a deterministic optimization technique CPLEX-based implemented in General Algebraic Modeling Systems (GAMS). The paper
deals with a vision for the grids of the future, focusing on conceptual and operational aspects of electrical grids characterized by an intensive penetration of DG, in the scope of competitive environments and using artificial intelligence methodologies to attain the envisaged goals. These concepts are implemented in a computational framework which includes both grid and market simulation.

A5L-A3  17:00

**Intelligent Processing of IED Data for Protection Engineers in the Smart Grid**
M. Kezunovic\(^2\), F. Xu\(^2\), B. Cuka\(^2\), P. Myrda\(^1\)
\(^1\)Electric Power Research Institute, United States; \(^2\)Texas A&M University, United States

The described solution in this study is aimed at automated processing of substation IED recorded data and generating information-rich and format-efficient report describing IED operation for protection engineers. This smart solution ensures high efficiency in root-course analysis for understanding and trouble-shooting relay operations, resulting in improved protection and reliability of the Smart Grid.

A5L-A4  17:20

**The Role of Pervasive and Cooperative Sensor Networks in Smart Grids Communication**
S. Ullo, A. Vaccaro, G. Velotto
*Università degli Studi del Sannio, Italy*

The cornerstone of a Smart Grid is the ability for multiple entities to interact via communication networks. A scalable and pervasive communication infrastructure represents a crucial issue in both structuring and operating smart networks. In addressing this problem this paper figures out the potential role of cooperative wireless sensor networks (WSN). In detail it analyses the performance of IEEE 802.15.4 based WSN in order to establish their suitability for a typical set of monitoring and supervision functionalities required by urban-scale Smart Grids applications. The results obtained show that the application of this technology may be very promising in several Smart Grids applications as far as automation, remote monitoring and supervision are concerned.
A5L-A5 17:40

**Software Architecture for Smart Metering Systems with Virtual Power Plant**

S. Vukmirovic\(^2\), A. Erdeljan\(^2\), F. Kulic\(^2\), S. Lukovic\(^1\)

\(^1\)University of Lugano, Switzerland; \(^2\)University of Novi Sad, Serbia

This paper presents a novel architecture for Smart Metering systems which enables their seamless, secure and efficient integration wider SmartGrid software structures. Smart metering solutions represent one of the fastest evolving areas in the field of power distribution systems. There is an extensive interest of leading software vendors in the field, for development of architectures that can efficiently manage transmission, processing and storing of tremendous amount of data produced by such metering devices deployed at the end-end side. The integration of these systems into existing power system software architectures (outage management, workforce management, etc.) represents a major challenge for research community. In such an environment it is extremely important to adopt standardized data exchange mechanisms. The proposed architecture is conceived as modular and scalable structure so that it can support implementation of novel power distribution concepts as Virtual Power Plants (VPPs). The proposed architecture has been successfully tested and verified in real life operation as one of modules of Smart Metering system named Meter Data Management (MDM).

A5L-A6 18:00

**Modelling Different Scenarios of Virtual Power Plant Operating Possibilities**

T. Dragicevic, D. Skrlec, M. Delimar

*Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia*

Virtual Power Plant (VPP) is a flexible representation of such a portfolio of distributed energy resources (DER), and one of its key assignments is to guide each DER in order to dispatch desirable active power. An algorithm was developed, based upon an active power requests for VPP, weather conditions and expected consumer loading, which optimizes dispatch of controllable generators in order to track the production of intermittent sources and in that way make VPP wanted output. Simulations were carried on a real distribution network (Sopot, part of Zagreb) through one usual
consumption day comparing three scenarios of VPP controllability and investigating the best scenario either for the Distribution System Operator (DSO), either for VPP. Results demonstrate that the logic algorithm is able to efficiently control the portfolio and, based upon the primary requirements for VPP, either to maximize reduction of total losses in distribution network, either to cut off the peak demand from external grid, either to produce constant power through whole day.
A5L-B1 16:20

**Ring Clustering Algorithm for Wireless Ad Hoc Networks**
D. Hassan, H. Fahmy, A. Bahaa
*Ain Shams University, Egypt*

This paper presents a new connected dominating set clustering algorithm called the Ring-Clustering Algorithm (RCA) for formation of virtual backbones wireless ad hoc networks. Since determining the minimum connected dominated set is an NP-hard problem, RCA heuristically finds the Connected Dominated Set (CDS). The algorithm uses available one-hop neighboring data to determine ring-nodes, which are responsible for establishing the CDS. The simulation study shows that ring algorithm is more effective in reducing the size of CDS against recently proposed algorithms.

A5L-B2 16:40

**Efficient Frequency Reuse Scheme in Cooperative Relaying for Multi-Cell OFDMA Systems**
A. Najjar², N. Hamdi¹, A. Bouallegue²
¹*Carthage University, Tunisia;* ²*ENIT, Tunisia*

Cooperative communication has recently gained a lot of interest for the next generation cellular network. This paper addresses the co-channel cell interference (CCI) mitigation techniques in the downlink cooperative relaying for multi-cell OFDMA systems with 19-cell structure. It divides each cell into two regions: the central region and the edge region. The frequency reuse factor (FRF) is set to 1 in the central region and 3 in the edge region. A relay station (RS) which amplifies and forwards the received signal to the mobile, is placed at the limit of the two regions. Numerical results show that the proposed cooperative scheme provides a significant performance gain over the strategy without relay and can be considered as a powerful solution for CCI avoidance in the edge of the cell.
A5L-B3  17:00

Optimal Periodic Radio Sensing and Low Energy Reasoning for Cognitive Devices
A. Merentitis, A. Kaloxyllos, M. Stamatelatos, N. Alonistioti
University of Athens, Greece

This work proposes a solution to the problem of low energy periodic sensing of available wireless networks, focusing on the definition of optimal sensing period through markovian models. Moreover, low energy decision making utilizing a hierarchical fuzzy logic approach consisting of reasoners organized in tree form is introduced. The input parameters of the system are grouped taking into consideration their interrelation, in order to define the position of each reasoner in the structure. Such an approach facilitates utilization of previous knowledge and triggers a minimal number of reasoners, thus considerably reducing energy costs.

A5L-B4  17:20

Evaluation of Mobile WiMAX Handover Procedure
P. Latkoski, B. Popovski
Faculty of Electrical Engineering and Information Technologies, Skopje, Macedonia

This paper presents the impact of handover parameters value and an error-prone radio channel over the IEEE 802.16e CDMA-based handover procedure performance. We analytically analyzed the handover latency and connection dropping probability. The results were compared with the experimental measurements conducted on a protocol prototype specially developed for this purpose by using Specification and Description Language. The following parameters were investigated: value of the contention window minimal and maximal size, number of transmission allocations per frame, number of available CDMA ranging codes, timers and maximum retransmission limits used in the processes of ranging, basic capabilities negotiation and registration. We have found that all these parameters need to be carefully adjusted in accordance to the number of stations performing handover at a same time, WiMAX physical layer working parameters, and frame-error rate in the uplink and downlink radio channel.
A5L-B5  17:40

Broadband Access Network Investment Optimization in Rural Areas
L. Vidmar¹, B. Peternel¹, M. Stular¹, A. Kos²
¹Mobitel dd, Slovenia; ²University of Ljubljana, Slovenia

Broadband access network planning with techno-economic calculations is an important topic when optimal broadband network deployments are considered. This paper analyzes optimal deployment combination of digital subscriber line (xDSL) and fiber to the home (FTTx) technologies, considering real copper cable lengths. Furthermore, the article discusses the payback period and net present value of various broadband network deployments. Modeling of copper access networks with a tree structure makes new extensions in planning of broadband access networks. Therefore a planning tool was developed by Laboratory for telecommunications, University of Ljubljana.

A5L-B6  18:00

Efficient Frequency Synchronization and Channel Estimation Method for OFDM Wireless Systems
E. Kocan, M. Pejanovic-Djurisic, Z. Veljovic
University of Montenegro, Montenegro

Very efficient and robust frequency synchronization and channel estimation method based on pilot tone usage, for OFDM systems in the case of slow time varying channels is proposed. The presented method uses preamble consisting of just one OFDM symbol, for channel and frequency offset estimation and additional two pilot tones embedded in each data symbol, for the neutralization of the cumulative effect of frequency offset in the slow time varying channels. This method enables accurate estimation and correction of all frequency offset values, even those larger than subcarrier spacing. Simulation results show that OFDM system with the proposed frequency synchronization method keeps the BER performance close to the performance of the ideally synchronized system.
# A5L-C 16:20

**Feature-Based Error Processing for Robust Surface Registration in Computer Assisted Orthopedic Surgery**  
M. Taquet  
*Université catholique de Louvain, Belgium*

Accurate registration algorithms are required in computer assisted orthopedic surgery to provide a reliable correspondence between the bone and its tridimensional model. In surface registration, the main source of errors lies in the points acquisition process. This paper presents an online point processing algorithm based on features correlated to the error. The features are organized in classification trees to detect and remove outliers. Different common classification trees are investigated. The efficiency of the approach to remove outliers is demonstrated through experiments on a pelvic bone.

# A5L-C2 16:40

**Real-Time Structure from Motion for Monocular and Stereo Cameras**  
R. Mazzon  
*Queen Mary University of London, United Kingdom*

This paper deals with the real-time estimations of the rigid motion and three-dimensional structure of a scene from one or stereo moving camera. The method is based on an Extended Kalman Filter (EKF) that permits to obtain an executable real-time implementation. The extensions of an existent single camera solution and the new formulation of the stereo case is explained. Synthetic and real data experiments show that the estimations obtained by the binocular system are more accurate and the system is more robust as compared to the monocular case.
A5L-C3 17:00

Average Power Reduction in Compression-Based Scan Designs
E. AlQuraishi, R. AlTeenan
Kuwait University, Kuwait

Toggling of scan cells during the shift of consecutive complementary values reflects into excessive switching activity in the combinational logic under test unnecessarily. Elevated levels of power dissipation during test ensue as a result, endangering the reliability of the chip. The test power problem may be alleviated via a proper specification of don't care bits to create transitionless runs of bit values. However, these don't care bits are rather reserved so as to ensure the encodability of patterns through the on-chip decompressor. In this paper, we propose a DfT-based approach for reducing test power in an Illinois scan architecture. The proposed on-chip mechanism enables the reconfigurable swapping of transition-wise costly stimulus fragments across different channels, absorbing these transitions and reducing power. The proposed solution reduces power without resorting to x-filling, enabling orthogonal x-filling techniques to be applied in conjunction. Experimental results justify the efficacy of the proposed swapping mechanism in attaining test power reductions.

A5L-C4 17:20

A Simple Stochastic Channel Simulator for Car-to-Car Communication at 24 GHz
M. Linde
Karlsruhe Institute of Technology, Germany

A channel model, based on stochastics and Ray tracing, is described for a communication system, in which moving participants communicate in the 24 GHz band. A realistic behaviour of propagation effects, both short-term and long-term, is modeled. This allows to simulate and design future vehicle-to-vehicle systems.
A5L-C5  17:40

Non-Volatile and Volatile Bipolar Resistive Electrical Switching in Ag and Cu Chalcogenide Memories with a Dedicated Switching Layer
H. Radhakrishnan
Katholieke Universiteit Leuven, Belgium

We report on the realisation of bipolar resistive electrical switching in memories based on inorganic solid ionic conductors, where the switching is localized in a dedicated switching layer. The switching mechanism is the electrochemical formation of a conductive metallic filament that bridges an insulating switching layer (ON state) and its reversible dissolution (OFF state). These memories have moderate write voltages of \(~3\)V, excellent ON/OFF current ratios of \(~10^3\) and write/erase cyclic endurances of \(~10^4\) cycles. For the first time, volatile switching behaviour has been reported for cation-conduction based nanoionic memories. This phenomenon has been explained based on electromigration-induced filament rupture.

A5L-C6  18:00

A Low Complexity Soft-Input Soft-Output MIMO Detector Which Combines a Sphere Decoder with a Hopfield Network
D. Louw, P. Botha, B. Maharaj
University of Pretoria, South Africa

In this paper, a reduced complexity soft-input softoutput MIMO detector is presented. The detector combines a Sphere Decoder, a Hopfield neural network and an error correction code in an iterative structure (turbo). The simulation results demonstrate that with less computational complexity, the proposed system's performance equals that of a sphere decoder based max-log-map detector in ideal channel conditions. In correlated channel conditions, the system performs within 0.3 dB of the max-log-map detector at a reduced complexity. An adaptive extrinsic information scaling factor is also introduced to improve performance in non-ideal channel conditions.
B1P-E1
Matrix Converter Applied to Energy Saving for Street Lighting Systems
M. Román-Lumbreras, G. Velasco-Quesada, A. Conesa-Roca
Universitat Politècnica de Catalunya, Spain

This work presents a three-phase AC-AC converter, with independent phase control, based on matrix-converter structure. This converter is applied to electrical energy saving on the public lighting systems by means of regulation and control of the voltage applied to the lamps. The developed converter represents a technological improvement respect to the traditional systems based on an autotransformer: it reduces system cost and volume, and increases lamps life time.

B1P-E2
Analysis of Dynamic Behavior of Switched Reluctance Motor-Design Parameters Effects
J. Faiz\textsuperscript{2}, G. Shahgholian\textsuperscript{1}, H. Ghazizadeh\textsuperscript{1}
\textsuperscript{1}Islamic Azad University, Iran; \textsuperscript{2}University of Tehran, Iran

In the design of switched reluctance motor (SRM) and its drive, analysis and simulation of the dynamic behavior of the motor is essential. In this simulation process, model of the SRM and its controller must be taken into account. In this paper motor characteristics are examined and effects of the motor design parameters, such as inductance, resistance and supply voltage, on the system response is studied. Variations of phase current and developed torque of the motor are predicted and discussed.
B1P-E3

A Fault Tolerant Communication Architecture Supporting Critical Monitoring with Wireless Sensor Networks
L. Bencini, G. Collodi, D. Di Palma, A. Manes, G. Manes
Università degli Studi di Firenze, Italy

This paper deals with an integrated MAC and Routing protocol, able to manage faults occurring in Wireless Sensor Network (WSN). To this end, the protocol design has been inspired by the cross-layer principle to minimize both the signaling overhead and power consumption. After an accurate functional characterization, the performance is presented for the most relevant figures (recovering efficiency and latency, as well as the length of established end-to-end paths). The satisfactory results suggest the application to more complex scenarios where the nodes mobility is allowed.

B1P-E4

Designing a Doherty Power Amplifier
P. Colantonio, F. Giannini, R. Giofrè, L. Piazzon
Università degli Studi di Roma Tor Vergata, Italy

The aim of this paper is to present an easy and rigorous way to design a Doherty power amplifier (DPA) starting from the requirements of the wireless system, in which it has to be integrated. In particular, accounting for the value of the pick to average power ratio (PAPR) of the system, design guidelines will be given to correctly address each design step. The presented design flow will be validated through the realisation of a DPA in GaN technology at 2.14GHz.

B1P-E5

Nonuniform Transmission Line Simulation with Circuit Simulator
J. Izydorczyk
Silesian University of Technology, Poland

In the present article a method of lossless nonuniform transmission line (NUTL) analysis is proposed. The method reduces analysis of the NUTL to the analysis of cascaded sections of linear varied transmission line (LNTL). Frequency response of each section is described by Bessel functions. Therefore direct implementation of the method in circuit simulator is usually impossible. LNTL input-output relations can be approximated by rational function in frequency domain. It is a form of Padé approximation.
The model can be implemented in circuit simulator as an active circuit. Author proposed a method which deforms rational approximation residua slightly so frequency response of the model is disturbed minimally and passivity of the circuit is preserved. Synthesis of the passive modeling circuit was conducted for broad range of LNTL slope parameter. The circuit was a cascade connection of Darlington C-type sections. Parameters of the sections were approximated by polynomial regression functions.

B1P-E6

The Influence of a Malignant Nodule on Resonance Frequencies of the Thyroid Gland
G. Gavriloaia², A. Ghemigean¹, M. Gavriloaia¹
¹Medical and Farmaceutical University of Bucharest, Romania; ²University of Pitesti, Romania

The thyroid is investigated as a resonant cavity. A number of 16 eigenfrequencies and eigenmodes are evaluated for a thyroid geometric model excited by ultrasounds. The malignant tissue was modelled by spheres with different diameters. The spatial distributions of the acoustic eigenmodes are in accordance with blood supplier positions. Blood supplier efficiency and local temperature will decrease as a result of nodules or cysts. The acoustic field eigenfrequency for the same propagation mode is bigger when thyroid has a malignant nodule. Efficiency of ultrasound diagnose and thyroid treatment will be increased by knowing these modes and frequencies.

B1P-E7

Electrical Losses Developed Into the Mechanical Reinforcing System's Parts of the Three-Phase Power Transformers
I. Deaconu, C. Ghita, V. Navrapescu, A. Chirila
Universitatea POLITEHNICA din Bucuresti, Romania

The paper presents a study on the losses developed into the mechanical reinforcing system's parts of the three-phase power transformers. These losses are obtained based on the electromagnetic field near the parts. The electromagnetic field is computed using a 3D finite element method. It is also studied the influence of the magnetic permeability of the material that these parts are made of over the generated losses. The influence of the distance between the top-side of the windings and the U-shape tightening beams that press the magnetic yokes over the losses is also analyzed.
**B1P-E8**

**Experiments in Iterative Feedback Tuning for Level Control of Three-Tank System**

R. Precup², I. Mosincat¹, M. Radac², S. Preitl², S. Kilyeni², E. Petriu³, C. Dragos²
¹Aalborg University, Denmark; ²Politehnica University of Timisoara, Romania; ³University of Ottawa, Romania

This paper investigates the applicability of Iterative Feedback Tuning (IFT) to the level control of a three-tank system laboratory equipment. First two PID controllers are designed in terms of the frequency domain approach. Next IFT is employed to improve the control system performance indices. Digital simulation results and real-time experimental results validate the new control solution.

**B1P-E9**

**Study and Implementation of an Iterative Decoder for SFBC-OFDM Systems with Imperfect Channel Knowledge**

A. Massaoudi³, N. Sellami², N. Masmoudi¹, M. Siala³
¹ENIS, Tunisia; ²Institut supérieur d'électronique et de communication de Sfax, Tunisia; ³SUP'COM, Tunisia

In this paper, we consider the problem of the Space Frequency Block Codes (SFBC) decoding, according to the Maximum A Posteriori (MAP) criterion when the channel is not perfectly known at the receiver. We propose to use the Expectation Maximization (EM) algorithm to solve this problem. Simulation results show that the performance of our iterative decoder using the EM algorithm is very close to the performance obtained when the channel is perfectly known. We also propose an efficient implementation of the iterative decoder (based on the EM algorithm) on FPGA.

**B1P-E10**

**IEEE 802.15.4 Based Wireless Monitoring of pH and Temperature in a Fish Farm**

M. López, J. Gómez, J. Sabater, A. Herms
Universitat de Barcelona, Spain

We present a practical application of wireless networks: The sensing of the pH and temperature for a fish farm. The application requires two different
kind of modules: the sensor itself and the wireless module. The sensor collect and transmit the information to a wireless module using a wired connection. Once the information reaches the wireless node, it is forwarded to the central unit through a wireless protocol. The wireless transmission follows the standard IEEE 802.15.4, and implements the routing protocol based on the ZigBee standard. The number of nodes distributed in the fish farm has been limited to 30 while the maximum number of hops to 6. Moreover, between the MAC and the routing layer an energy management layer have been included. This layer reduces the power consumption of the wireless network using an RF activity duty cycle for the reception stage at the final end device of around 0.1%.

B1P-E12

Characterizing the Heat Transfer on the End-Windings of an Electrical Machine for Transient Simulations
M. Hettegger\textsuperscript{1}, B. Streibl\textsuperscript{2}, O. Bíró\textsuperscript{1}, H. Neudorfer\textsuperscript{2}
\textsuperscript{1}Graz University of Technology, Austria; \textsuperscript{2}Traktionssysteme Austria GmbH, Austria

This article presents a method to determine the convective heat transfer coefficient on the end windings of an induction motor. Based on dimensional analysis and heat transfer coefficient values derived by computational fluid dynamics, a correlation between given boundary conditions and the heat transfer coefficient on the end windings was found. The results can be used in transient simulations of operating cycles. In order to make the application more universal, the approach was made independent of the characteristics of the fan used for cooling the electrical machine.

B1P-E13

Classification of Two Common Power Quality Disturbances Using Wavelet Based SVM
C. Kocaman, H. Usta, M. Özdemir, I. Eminoglu
Ondokuz Mayis University, Turkey

Development of technology increased the attention of the research community on power quality (PQ) disturbance classification problem. This paper presents wavelet based effective feature extraction method and support vector machines (SWM) for PQ disturbance classification problem. Two common kinds of power quality disturbances, voltage sag and swell, are considered in this paper. After multi-resolution signal decomposition of
PQ disturbances, feature vector can be obtained. Multi-resolution analysis (MRA) technique of discrete wavelet technique (DWT) and Parseval's theorem are employed to extract the energy distribution features of sag and swell signals. SVM are used to classify these feature vectors of PQ disturbances. Performance of two kinds of method used in SVM is compared aspect of training time and training error.

**B1P-E14**

**Metaprogramming Approaches to Finite State Machine Modeling for SIP Applications**

E. Pjanic, A. Hasanovic, N. Suljanovic, A. Mujcic, M. Zajc

*University of Ljubljana, Slovenia; Univerzitet u Tuzli, Bosnia*

This paper presents a methodology to develop a complete domain specific language (DSL) for simple finite state machine (FSM) modeling, utilizing metaprogramming techniques found in Ruby programming language. Additionally, two libraries for FSM modeling are reviewed. A simple vending machine model is used to demonstrate the effectiveness of the DSL code. The proposed techniques together with the SIP Servlet API can be combined with Ruby's web development environments to develop complex converged telecom applications.

**B1P-E15**

**Implementation of a P1619 Crypto-Core for Shared Storage Media**

E. Hatzidimitriou, A. Kakarountas

*Technological & Educational Institute of Ionian Islands, Greece; University of Patras, Greece*

An alternative hardware implementation of a P1619 XTS-AES architecture, compared to the typical that have been proposed by now, is presented in this paper. The implementation is based on the use of two AES cores for simultaneous Tweak value calculation and block encoding/decoding operations. The implementation is efficient for burst mode of operation, decreasing by 25% the required time, exploiting pre-calculation of the tweak value. The overall performance satisfies the constraints for storage devices.
B1P-E16

Coded OFDM Scheme for Image Transmission Over Time-Varying Multipath Rayleigh Fading Channels
M. Salah\(^1\), A. Elrahman\(^2\)
\(^1\)Armed Forces, Egypt; \(^2\)Thebes Academy, Egypt

Orthogonal frequency division multiplexing (OFDM) is an excellent technique to reduce the effect of frequency selective in time varying multipath channels by dividing the transmission bandwidth into many narrow-band subcarriers, each of which exhibits an approximately flat fading. Cyclic extensions are added to OFDM symbols to allow time for multipath signals from the previous symbol to die away before the information from the current symbol is gathered. In this paper, a modified OFDM scheme for image transmission is proposed. The new proposal is based on modification of the OFDM structure through using unequal power allocation for the successive OFDM symbols. Unequal cyclic time guard is also applied with unequal power allocation. The proposed method is compared with the conventional OFDM. Results show that the performance is improved at lower average cyclic extension periods and lower average power when using the proposed method. The performance study of OFDM scheme is examined with and without forward error correction (FEC).

B1P-E17

LC Voltage Controlled Oscillators Design Using MHS SCMOS3 0.5\(\mu\)m Process
M. Kanoun\(^1\), H. Mnif\(^2\), F. Kallel\(^1\), M. Loulou\(^1\)
\(^1\)ENIS, Tunisia; \(^2\)ISECS, Tunisia

This paper deals with the design of an LC Voltage Controlled Oscillators using MHS SCMOS3 0.5 \(\mu\)m process. A sizing method is proposed to meet the WiFi and Bluetooth standards requirement. The layout of the circuit with CADENCE environment has been accomplished. Based on this layout, post layout simulations were performed and circuit improvement has been proposed in order to overcome parasites drawback.
B1P-E18

Stability Analysis for a Petrochemical Complex with on-Site Generation Tied to the Mexican Utility Grid
J. Calderón-Guizar
Instituto de Investigaciones Eléctricas, Mexico

Electrical systems of industrial plants, i.e. oil, gas, and petrochemical industries usually incorporate local generation either to supply the complete demand of the industrial plant or to ensure continuity in electrical supply to critical processes when interconnected with the utility grid. Disturbances such as electrical short-circuits either in the distribution system of the industrial facility or in the utility grid, loss of local generation or system islanding condition may compromise the continuity of critical processes in the industrial plant or even cause the blackout of the industrial facility.

B1P-E19

A Force Feedback Glove Based on Magnetorheological Fluid: Preliminary Design Issues
D. Cassar, M. Saliba
University of Malta, Malta

This work first provides an overview of haptic gloves found in the literature, with a focus on their applications and their requirements. This information is then used to justify the use of Magnetorheological Fluid (MRF), a smart fluid which reversibly changes viscosity proportionally to an applied magnetic field, to effect the force feedback in a haptic glove. This is followed by the development of a linear damper to form part of the proposed glove, as well as a report on our selection of MRF through experiments performed on a number of fluids with different iron content, developed in-house. Finally, the paper describes the position sensing system and the preliminary design of the force feedback glove.

B1P-E20

A Model Based Approach for Pipeline Monitoring and Leak Locating
M. Daneti
Politehnica University of Timisoara, Romania

A fluid flowing through a pipeline is a complex phenomenon, depending on many factors. Developing efficient methods for system monitoring and leak locating start with a good understanding of the pipeline. The modeling
technique becomes a very useful tool, allowing a separate analysis of the different hypostases describing the process. This paper investigates the problem of using a reduced lumped parameters model for the pipeline system. Both static and dynamic regimes are discussed. The final goal is oriented on testing the acoustic methods on the resulted model, given the fact that the pipeline is a multipath, noise-correlated environment. An equivalent laboratory experimental model is used for comparison.

B1P-E21
Multi-Chip Integrate and Fire Neural Network Architecture
F. Sargeni, V. Bonaiuto
Università degli Studi di Roma Tor Vergata, Italy

In the field of the Artificial Neural Networks, multi-chip architecture can be effectively used to implement very large networks. The availability of large neural electronic systems can represent a really useful tool to deeply and effectively investigate on innovative, "bio-inspired", computational paradigms. In this paper, the authors present a technique to reduce the I/O analogue pins of about 87%, previously applied from the authors to Cellular Neural Networks, well suited for neuromorphic neural networks.

B1P-E22
Some Remarks on the Reduced Constellation Decision-Directed Blind Phase Correction
G. Dziwoki
Silesian University of Technology, Poland

Phase offset recovery, besides channel equalization and timing synchronization, belongs to important task performed in physical layer of receivers. Correct information symbol detection is impossible without accurate phase estimation. The paper presents analysis of a decision-directed blind phase recovery schemes applied in communication systems with square QAM modulations. The cost function of the phase recovery scheme with a reduced constellation approach is considered as well as a way of its application in an adaptive algorithm. The algorithm operation is additionally controlled by an activation threshold. A comparison between different versions of decision-directed methods is made. The performed experiments show the influence of the activation threshold on the phase correction efficiency.
B1P-E24

A Real Time Algorithm for Exposure Fusion of Digital Images
T. Kartalov¹, A. Petrov², Z. Ivanovski¹, L. Panovski¹
¹Faculty of Electrical Engineering and Information Technologies, Skopje, Macedonia; ²Netcetera, Macedonia

A real time algorithm for fusion of differently exposed images. The algorithm blends the details from two images of high dynamic range scene, acquired with different exposure values, into one output image which can be displayed on low dynamic range devices. The blending is performed in the spatial domain, using pixel by pixel approach. It's high efficiency makes it applicable on low processing power platforms, such as mobile devices. The obtained results are visually comparable with previously published algorithms that are computationally much more expensive.

B1P-E25

New Method for Analyzing the Quality of a Telephone Network
G. Bousaleh², F. Hassoun¹, A. Jammal³
¹France Telecom, France; ²Lebanese University, Lebanon; ³Ministry of Higher education, Lebanon

The development of new services over broadband access network (5 to 8 Mbit / s), require a good quality of telephone installation. An important parameter that verifies the quality of a telephone system is the symmetry of the cable. To address this problem, a new method for analyzing the quality of the pair is proposed in this paper. This method is based on the quantification of the symmetry in Low Frequency (LF), made from a telephone exchange. The purpose of this study is to verify the feasibility and validity of this technique, by a theoretical approach based on the theory of multi-wire transmission lines, associated with a topological approach. The results obtained by the theory are validated using experimental measurements.
Deregulated Power Market Congestion Management
C. Barbulescu, S. Kilyeni, D. Mnerie, D. Cristian, A. Simo
Politehnica University of Timisoara, Romania

The transmission network represents undoubtedly the infrastructure that enables the power market. Nowadays operating conditions of the power systems, open access to the transmission network, leading to different transactions within a certain power system or cross-border transactions, are increasing the risk of congestions. Taking into consideration these facts, new tools are necessary to be developed, according to the actual conditions. This paper aims to elaborate an original mathematical model used for congestion management in case of deregulated environment. In the following, a software tool is developed in Matlab environment, designed for probabilistic congestion management. The West and South-West power system is used as a case study.

Indices for Fast Contingency Ranking in Large Electric Power Systems
S. Grillo, S. Massucco, A. Pitto, F. Silvestro
Università degli Studi di Genova, Italy

The liberalization of the electricity market induces a large variety of scenarios that may lead power systems close to their operation limits. This supports the need for on-line dynamic security assessment (DSA) of the grids, in order to provide operators with a clear insight of the current network state. The on-line application of DSA to a realistic network needs adequate methods to screen the large amount of contingencies to be examined by DSA tools. This paper proposes some practical heuristic indices for Transient Stability contingency pre-filtering and ranking in an on-line DSA session.
B2L-A3  10:53

Ancillary Services Dispatch Using Linear Programming and Genetic Algorithm Approaches
Z. Vale, C. Ramos, P. Faria, J. Soares, B. Canizes, H. Khodr
ISEP/GECAD, Portugal

Electricity market players operating in a liberalized environment requires access to an adequate decision support tool, allowing them to consider all the business opportunities and take strategic decisions. Ancillary services represent a good negotiation opportunity that must be considered by market players. For this, decision support tools must include ancillary market simulation. This paper proposes two different methods (Linear Programming and Genetic Algorithm approaches) for ancillary services dispatch. The methodologies are implemented in MASCEM, a multi-agent based electricity market simulator. A test case concerning the dispatch of Regulation Down, Regulation Up, Spinning Reserve and Non-Spinning Reserve services is included in this paper.

B2L-A4  11:10

A New Robust Load Frequency Control Design Using Sequential Quadratic Programming (SQP) Method
M. Ezatabadi Pour, A. Khodabakhshian
University of Isfahan, Iran

This paper presents a new technique for tuning the parameters of a PID controller for load frequency control (LFC) using sequential quadratic programming (SQP) method. In this method the frequency deviation of the system is directly utilized to tune the controller parameters. Simulations are carried out with considering the effect of generation rate constraints (GRC) and the governor limiters. Comparative results of the proposed method and a conventional PI controller show its robustness with a satisfactory response when the parameters of the system change.

B2L-A5  11:26

Voltage Index for Stationary and Transient States
M. Borrás2, J. Montaño1, M. Castilla2, A. López2, J. Gutiérrez2, J. Bravo2
1Spanish Research Council (CSIC), Spain; 2University of Seville, Spain

The Fourier Transform analysis is able to estimate the amplitude and frequency of signals under stationary conditions. For transient or aperiodic
signals the Fourier analysis is unable to obtain accurate results and a joint time-frequency analysis must be used to provide simultaneous time and frequency information of transient intervals. A voltage quality index is proposed for evaluation of both the stationary and transient quality aspects of electrical signals. The widely used total harmonic distortion index (THD) is redefined in this paper to include harmonics, oscillatory transients, voltage sags and swells. The new index is defined between the 0-1 range.

B2L-A6  11:43

**Intelligent Management of Distributed Generators Reactive Power for Loss Minimization and Voltage Control**

M. Che Wanik², I. Erlich², A. Mohamed¹

¹Malaysian National University, Malaysia; ²University of Duisburg Essen, Germany

This paper presents an intelligent technique for managing reactive power from a group of distributed generators (DG) connected to low voltage (LV) bus and controlling voltage in a distribution network. The objective is to minimize active power losses and keep the voltage profiles in the network within specified limit. This technique finds optimal reactive power DG reactive power and optimal tap changer position for main substation transformer. The effectiveness of the technique is demonstrated in finding twelve DGs reactive power and optimal tap position in a test network. Optimization results shows that this technique manage to reduce power losses and at the same time keeping the voltages within required limit. Intelligent management technique presented in paper is suitable to be integrated into management scheme for virtual power plant under smart grid concept.
B2L-B1 10:20

Class-D Power Amplifiers Using LDMOS and GaN Power Devices: a Comparative Analysis
N. Chevaux, M. De Souza
University of Sheffield, United Kingdom

This paper provides new analytical expressions for the prediction of efficiency and power added efficiency in current mode class-D (CMCD) power amplifiers (PAs). Derived from a switch-based model which includes 9 parasitic elements, these expressions are then used to compare two device technologies in silicon and GaN in a 60W, 2.5GHz CMCD PA. This study reveals that the knee voltage and the drain and source resistances are mainly responsible for the lower PAE of the LDMOS device in comparison to GaN.

B2L-B2 10:40

Effect of Sand and Dust Storms on Microwave Propagation Signals in Southern Libya
E. Abuhdima, I. Saleh
1Al Fateh University, Libya; 2General Post and Telecommunications Company, Libya

The propagation of Electromagnetic waves in millimeter band is severely affected by rain and dust particles in terms of attenuation and depolarization. There is a growing interest in the effect of dust particles on the propagation of microwaves. This is brought by the increasing number of terrestrial and satellite links in those regions that encounter dust and/or sand storms. Computations of these effects require knowledge of electrical properties of the scattering particles and climate conditions of the studied region. Libya has a large area and it is counted as a country having desertification climatic. Wireless communication networks and microwave links, has been installed in the southern part of Libya, where there are dust and sand storms that may affect the microwave signal propagation. The main object of this paper is to study the effect of sand and dust storms on
wireless communication, such as microwave links, in the southern region of Libya (Sebha, Ashati, Obari, Morzok, Ghat) by determining the attenuation. The result should that there are some consideration that has to be taken into account in the communication power budget.

**B2L-B3  11:00**

**Modeling Electromagnetic Interference Generated by a WLAN System Onboard Commercial Aircraft**

C. De Raffaele, C. Debono, A. Muscat  
*University of Malta, Malta*

The growing demand for the utilization of personal communication devices onboard commercial aircraft necessitates the assurance of safety by airline operators and regulators. Therefore, potential risks posed by the deployment of wireless systems on critical aircraft equipment must be carefully assessed. In this paper, a model based on a ray-tracing algorithm is developed to calculate the electromagnetic interference incident on the fuselage structure of a commercial airline from a 2.4 GHz data communications network. The electromagnetic interference map incident on the fuselage resulting from the onboard wireless network is generated by combining the resulting propagation map from each wireless device.

**B2L-B4  11:20**

**Direct Determination of PE and PAE of an Active Patch Antenna**

N. Ali\(^1\), N. McEwan\(^2\), E. Elkhazmi\(^2\)  
\(^1\)Khalifa University, U.A.E.; \(^2\)University of Bradford, United Kingdom

In this paper, the power added efficiency and/or the power efficiency of an active antenna was measured using a specially devised setup. This was based on previous work by the authors whereby the power input to a radiating element of an active patch antenna was measured using a small sensing patch. Combined with an estimate of patch radiation efficiency, the method also yields a measurement of total radiated power. Because of weakly frequency-dependant calibration factor, the method has advantages of convenience and can be integrated with modern computer based measurement systems.
Coupling the Electromagnetic Inverse Problem Based on Genetic Algorithms with Moment's Method for EMC of Circuits
J. Ben Hadj Slama, S. Saidi
LSE-ENISO, Tunisia

In this paper, we present the inverse problem in electromagnetism based on the Genetic Algorithm method. We apply then, this method to structures having big dimension circuits and we show limits of this method in that case of structures. We propose after, a new technique which is based on the coupling of the inverse method in electromagnetism with the Moment's method. The proposed hybrid method is implemented and is validated on simple structures by referring to simulation results made with the numerical software NEC. Results are compared to those obtained by the inverse electromagnetic method. Results analysis show that the proposed hybrid method is more appropriate to structures with big dimension circuits and with rectangular loops.
B2L-C1 10:20

**Cross Standard Network Management for the First Responder's Application**

A. Zvikachevskaya, L. Mihaylova

*Lancaster University, United Kingdom*

In this paper the effectiveness of the networking existing data links to provide a robust and resilient network for the first responder's application is analysed. Methodology and an algorithm that can assist the internetworking different standards are presented. A cross standard scenario is simulated and results are explained.

B2L-C2 10:40

**Implementation of Information Systems in Heterogeneous Networks: QoS-Aware Platform Design**

I. Manuylov, D. Tsitserov

*Lancaster University, United Kingdom*

In this article we present a particular case of a QoS-aware platform design intended for the scenarios where user applications run as an integral part of a distributed Information System. Putting QoS at the forefront of design has encouraged to review some network mechanisms and revealed specific mathematical challenges. The early research results have illustrated that the proposed framework can be constructed and made usable.

B2L-C3 11:00

**Enhancing Location Estimation Accuracy in WiMAX Networks**

A. Awang Md Isa

*Lancaster University, United Kingdom*

Mobile location technologies have attracted significant attention as a mean to deal with the ever increasing demand of wireless communication services. With the availability of WiMAX systems, the technology becomes
a feasible solution to support location services in wireless broadband networks. In this paper, we utilise some of the WiMAX offered features namely multiple input multiple output (MIMO), adaptive modulation and coding (AMC), beamforming, and relay station (RS) for enhancing the location estimation accuracy in location services. Simulation results show that in term of location estimation accuracy, the proposed solution adheres to Federal Communications Commission (FCC) requirements.

**B2L-C4 11:20**

**Segmented Video Distribution Over WiMAX: Proposed Approach and Experimental Methodology**

D. Tsitserov, A. Zvikhachevskaya, I. Manuilov  
*Lancaster University, United Kingdom*

Provision of the flexible QoS concept together with promising coding, modulation and other MAC, PHY essentials laid in the core of the WiMAX (Worldwide Interoperability for Microwave Access) standard are admitted to provide a leverage to tackle bit-variable rate, stringent delay, high throughput, video traffic sensitive demands in multimedia service for multi-user environment offered by telecommunication operators. Novel technique is presented for video transmission over WiMAX, which exploits structural features of the MPEG-family (Moving Picture Expert Group) compression standards and QoS flow-oriented MAC connections adopted by the IEEE802.16. The proposed new approach, hopefully, could tackle ever-pressing challenges for any service provider - to offer maximum video-quality for most end-users and for less resources. Experimental algorithm coupled with simulation results are provided in the article as well as promising findings achieved for further investigation.

**B2L-C5 11:40**

**Packet Header FEC**

L. Barukang, G. Markarian  
*Lancaster University, United Kingdom*

In this paper, we investigate the effect of providing error correction capability (Forward Error Correction) in IP packet header. Our simulation results shows that FEC in IP header reduces the number of retransmission significantly, and having FEC in both header and payload improves the Bit Error Rate performance even further compared to without FEC in which we obtained BER performance improvement over 2dB at 10^-4.
A New Simplified Model for Charge Injection Induced Sample and Hold Error
A. Danchiv\textsuperscript{1}, M. Bodea\textsuperscript{2}
\textsuperscript{1}Infineon Technologies Romania, Romania; \textsuperscript{2}Politehnica University of Bucharest, Romania

This paper introduces a new simplified model describing the charge injection induced error in sample and hold circuits. The proposed model has the advantage of a simpler analytical form than the exact model present in literature, while describing the error dependence on all important factors with good accuracy. We also present analytical constant error curves for different parameter combination.

Analysis, Simulation and Circuit Implementation of a Precise High-Output Impedance Analog Current Mirror
N. Charalampidis\textsuperscript{1}, M. Spasos\textsuperscript{1}, K. Tsiakmakis\textsuperscript{1}, K. Hayatleh\textsuperscript{2}
\textsuperscript{1}Alexander Technological Educational Institute of Thessaloniki, Greece; \textsuperscript{2}Oxford Brookes University, United Kingdom

The decision for the most appropriate current mirror topology is a matter of trade-offs between impedance, current transfer ratio, area on chip, power consumption and voltage-headroom, expandability etc. Current mirrors are mainly used for biasing, for transferring current from one part of the circuit to another or as load for amplifier stages. This paper presents the theoretical analysis, the simulation and the circuit built of a current mirror with excellent performance characteristics compared to conventional designs at the expense of voltage-headroom. Great emphasis has been paid on the current transfer ratio and the output impedance of the configuration.
B2L-D3  11:00

Thermal and Electrical Layout Optimisation of Multilayer Structure Solid-State Devices Based on the 2-D Fourier Series
R. Marani, A. Perri
Politecnico di Bari, Italy

In this paper a 2-D Fourier transform-based analytical method for the thermal and electrical layout optimisation of multilayer structure solid-state devices is proposed. Compared with previous models presented in literature, it is general and can be easily applied to a large variety of integrated devices, provided that their structure can be represented as an arbitrary number of superimposed layers with a 2-D embedded thermal source, so as to include the effect of the package. The proposed method is independent of the specific physical properties of the layers, hence GaAs MESFETs and HEMTs as well as Silicon and Silicon-On-Insulator MOSFETs and heterostructure LASERs can be analysed. Moreover, it takes into account the dependence of the thermal conductivity of all the layers on the temperature; the heat equation is solved coupled with the device current-voltage relation in order to give physical consistence to the experimental evidence that a temperature increase causes a degradation of the electrical performances and that the electrical power is not uniformly distributed.

B2L-D4  11:20

A New UWB Pulse Generator for Narrowband Interference Avoidance
V. Mir-Moghtadaei¹, A. Jalili¹, A. Fotowat-Ahmady², A. Zeidaabadi Nezhad¹, H. Hedayati²
¹Isfahan University of Technology, Iran; ²Sharif University of Technology, Iran

In this paper a new IR-UWB pulse generator circuit is proposed which is capable of solving the coexistence problem of narrowband and ultra wideband communication systems. This is done by creating a notch in the PSD of the generated UWB signal and adjusting its center frequency at the frequency of the narrowband interference. Using a triangular pulse generator, a triangular signal is generated and applied to the proposed circuit which consists of three main function blocks including quadratic, exponential and differentiator circuits. A differential pair MOS transistors in sub threshold region is utilized in order to realize the exponential block. The circuit is designed using a 0.18µm RF CMOS technology. The notch is produced with the center frequency of 5GHz. Simulation results verify the
effectiveness of the proposed pulse generation technique where simulated signals are in accordance with mathematical analyses. The resultant IR-UWB signal also satisfies the FCC mask requirements.

**B2L-D5  11:40**

**Design and Optimization of LNAs Through the Scattering Parameters**  
M. Boughariou, M. Fakhfakh, M. Loulou  
*University of Sfax, Tunisia*

This brief presents a symbolic approach for the optimal design of low noise amplifiers through the scattering parameters. An optimization algorithm, which is also proposed in this paper, generates the optimal values of all the design parameters that meet imposed specifications on the scattering parameters. ADS simulations, using 0.35µm CMOS technology, are presented to show the good agreement between theoretical and simulation results.
B3L-A  14:15

Design of a System for Analysis and Monitoring of Vibrations in Linear Switched Reluctance Machines
J. Salvado\textsuperscript{1}, A. Espírito Santo\textsuperscript{2}, M. Calado\textsuperscript{2}
\textsuperscript{1}EST-IPCB, Portugal; \textsuperscript{2}University of Beira Interior, Portugal

The acceptance and usage of switched reluctance machines has been conditioned, beside other reasons, by the acoustic noise produced. Research efforts to minimize vibrations on the design stage and during machine operation mainly concentrate on rotational machines and only a few works can be found focusing on the linear configuration. This paper proposes a system to analyze and monitoring vibrations in switched reluctance machines, with special focus on the linear configuration, aiming a real-time data operation. The system is based on the MSP430 family of microcontrollers manufactured by Texas Instruments Inc, and comprises a network of intelligent accelerometers sensors, distributed along the machine mechanical structure. The intelligent sensors communicate via USB 2.0 protocol with the Host PC. An experimental vibration tests applied to a Linear Switched Reluctance Actuator (LSRA) is performed and results are presented to validate the proposed system.

B3L-A3  14:55

Flux Vector Control with Space Vector Modulation for PWM Inverter Fed Induction Motor Drive
M. Kazmierkowski, P. Wójcik
Warsaw University of Technology, Poland

This paper presents a simple Direct Flux Vector Control with Space Vector Modulation (DFVCSVM) scheme for induction motor drives. Developed algorithm has several advantages like: simplicity (coordinate transformations, current and flux controller are eliminated), wide speed operation range, good dynamics, low torque ripples, constant switching and low sampling frequency. The DFVCSVM can be used in various applications like electric vehicles, where field weakening operation is
required. Drive operation ranges including field weakening region are described. Selected experimental results measured on the 7.5kW induction motor drive which illustrates steady state and dynamic performances of the developed system are given.

**B3L-A4  15:15**

**Real Time Digital Simulation (RTDS) Software and Hardware in the Loop (HIL) Architecture for Brushless DC Motors**

A. Sarikan\(^2\), T. Aydemir\(^1\)

\(^1\)Gazi University, Turkey; \(^2\)KAREL Electronics, Turkey

This paper presents a new approach for the real-time digital simulation and hardware in the loop support for brushless dc motors. Sampling theory is used to model the interaction between the digital simulator infrastructure and the motor controller. A 6-step Voltage Source Inverter (VSI) is used as an illustrative example for the hardware in the loop and the results are compared with the Matlab Simulink results of brushless dc motor.

**B3L-A5  15:35**

**Nonlinear Torque Control for PMSM**

K. Jezernik

*University of Maribor, Slovenia*

This study presents a novel means of designing a simple and effective torque control for Permanent Magnet Synchronous Motor (PMSM). The overall stability of the system is shown using Lyapunov technique. The Lyapunov functions used contain a term penalizing incremental energy of control error, torque and stator flux, enhancing the stability. A new logical FPGA torque controller and flux observer based on Lyapunov theory are developed, analyzed and experimentally verified.
B3L-B SPECIAL SESSION: INTERMEDIA: Communicating
Here, Anytime Using Wearables
Date: Tuesday, April, 27
Time: 14:15 - 15:55
Room: Aragon
Chair: Nadia Magnenat-Thalmann, University of Geneva

B3L-B1 14:15
A Context-Aware Adaptive Rendering System for User-Centric Pervasive Computing Environments
N. Nijdam, S. Han, B. Kevelham, N. Magnenat-Thalmann
MIRALab, University of Geneva, Switzerland

In user-centric pervasive computing environments where users can utilize heterogeneous devices nearby anytime and anywhere, context-aware remote rendering is essential because it is impractical not only to manually copy 3D contents from one device to another whenever a user moves but also to render complex 3D data locally on the resource-limited devices, such as mobile phone and PDA. In this paper, we propose a context-aware adaptive rendering system which visualizes 3D contents with the customized user interfaces dynamically adapting to the current device contexts while preserving interactive performance of 3D contents. To increase responsiveness of remote 3D rendering, we use a mechanism which temporally adjusts quality of visualization adapting to the current device contexts. In order to overcome inevitable physical limitations of display capabilities and input controls on client devices, we provide a user interface adaptation mechanism which dynamically binds operations provided by 3D application and user interfaces with profiles.

B3L-B2 14:35
A Formative Analysis of Mobile Devices and Gestures to Control a Multimedia Application from the Distance
A. Lorenz3, M. Jentsch1, C. Concolato4, E. Rukzio2
1Fraunhofer Institut for Applied Information Technology, Germany;
2Lancaster University, United Kingdom; 3RWTH Aachen University, Germany; 4Telecom ParisTech, France

The use of mobile and handheld devices is a desirable option for implementation of user interaction with remote services from a distance. Another prominent option to operate a remote application is the use of
gestures performed in the air. This paper describes the design and realization of a system to enable mobile devices and gesture recognition tools to have control on a remote movie-player application. A small qualitative user study verified the use of mobile phones, switching between three input modalities, and the opportunity of another three methods of performing gestures in the air.

**B3L-B3  14:55**

**Proposition of a Modular I2C-Based Wearable Architecture**  
X. Righetti, D. Thalmann  
*VRLab / Ecole Polytechnique Fédérale de Lausanne, Switzerland*

In this paper we propose a novel wearable architecture based on the popular and proven I2C protocol. Our goal is to develop a modular approach towards wearable computing in a sense that users simply attach specific modules to their garments depending on their requested functionalities. The I2C bus is embedded in the clothes and magnets are used as connectors to physically attach the modules and connect them at the same time to the bus. This usable principle makes the clothes versatile as they can be entirely personalized in terms of functionality.
B3L-C1 14:15

A Simple Adaptive Control Application to Large Flexible Structures
I. Barkana, J. Ben-Asher
Technion, Israel Institute of Technology, Israel

This paper addresses the problem of synthesizing a closed-loop controller for attaining robust stabilization and position control of a flexible structure using adaptive control. The number of relevant flexible modes, that could normally be large and their frequencies pretty much unknown, presents a serious challenge for any control methodology. Although it was shown that when sensors and actuators are collocated the structure can be stabilized by output position-plus-velocity feedback, design of controllers requires good knowledge of the (uncertain) plant parameters. On the other hand, implementation of robust adaptive control algorithms, that seem fit to solve such problems with uncertain parameters, require satisfaction of so-called Almost Strictly Positive Realness (ASPR) conditions. The paper will show that the flexible structure with collocated sensors and actuators do satisfy the desired ASPR conditions and thus, robust adaptive control can be used without requiring any other knowledge regarding the frequencies or even the number of modes. An example is also given in order to demonstrate these concepts and the efficiency of Simple Adaptive Control (SAC).

B3L-C2 14:35

Games Based Guidance in Anti Missile Defence for High Order Participants
I. Rusnak
RAFAEL, Israel

Three person game, the Target, the Missile and the Defender (TMD) for high order players is formulated and solved. The Missile that is attacking the Target has an objective to minimize his miss distance to the Target, while the Target is trying to maximize the miss distance from the Missile. The Defender is trying to intercept the Missile prior to his arrival to the Target. An approach based on the Multiple Objective Optimization and
Differential Games theories is presented. Closed loop saddle point solution in linear strategies is derived. The solution is not continuous. Example demonstrates the result.

B3L-C3 14:55

Pole-Shifting Procedure to Specify the Weighting Matrices for a Load-Frequency Controller
S. Mariano\textsuperscript{2}, J. Pombo\textsuperscript{2}, M. Calado\textsuperscript{2}, L. Ferreira\textsuperscript{1}
\textsuperscript{1}Instituto Superior Tecnico, Technical University of Lisbon, Portugal;
\textsuperscript{2}University of Beira Interior, Portugal

This paper addresses the stabilization and performance of the load frequency regulator. Proposes a new technique, based on pole placement using optimal regulators, to overcome the difficulties of specifying the weighting matrices Q and R. The design method employs successive shifting of an either real pole or a pair of complex conjugate poles at a time. The proposed technique builds Q and R in such a way that the system's response also obeys conventional criteria for the system pole location. The effectiveness of the proposed method is illustrated by numerical examples.

B3L-C4 15:15

Two Dimensional Iterative Learning Control for Second Fornasini-Marchesini Model
S. Paran, H. Adloo
Shiraz University, Iran

In this paper, a new method for iterative learning control (ILC) of two-dimensional (2-D) systems is introduced so that the output of the process follows a desired trajectory. In this method the input of process in each iteration is determined by an innovative method called two-dimensional method by means of the obtained error between the output of the process and the desired trajectory which was given in previous iteration and the ability of this new method is illustrated by computerized simulation. Besides, the convergence of this method will be examined. All of the results can be generalized and used for systems with more dimensions.
B3L-D1 14:15

Spin-Offs from Particle Detectors in the Field of Medicine and Biology
P. Lecoq
CERN, Switzerland

Since the discovery of X-Rays by Roentgen in 1895 physicists have played a major role in the development of medical imaging instrumentation. Today, just as important are, fast, state of the art signal processing and software codes. The technical requirements on medical imaging devices are very challenging but are rather similar in many respects to the ones of modern particle detectors on high luminosity accelerators. This talk will address these points and explain and review critical parameters of modern medical imaging, including the electronics, data acquisition and data analysis/software requirements.

B3L-D2 14:35

Deciphering the Signal Output from the Eye
A. Litke
University of California, Santa Cruz, United States

The back of the eye is lined by an extraordinary biological position sensitive detector, the retina. This living neural network is able to extract vital information about the external visual world, and transmit this information in a timely manner to the brain. In this talk, after a brief introduction to retinal architecture, I will describe how we measure the functional properties of the retina, and show what we have learned about its functional organization. This project was inspired by the development of silicon microstrip detectors for particle physics experiments.
Recent progress in the development of hybrid pixel detectors of the Medipix/Timepix type used for on-line imaging of single radiation quanta interacting in solid state sensor and its application for their position sensitive detection and/or tracing will be reported. Chip design, manufacturing as well as readout electronics and data acquisition systems will be introduced and discussed.
B4P-E1

A New Look at Classification of Transformer Normal and Abnormal Currents
M. Abdel-Hafez, A. Gaouda
United Arab Emirates University, U.A.E.

The paper proposes an enhanced wavelet-based feature extraction technique to classify transformer inrush currents (TIC) and transformer internal faults (TIF). The proposed tool utilizes the number of wavelet coefficients of local maxima as current signal slides into Kaiser's window. The general pattern of number of coefficients of local maxima at the first three resolutions are used to design a new automated tool for monitoring and classifying abnormal conditions in power transformers. The proposed monitoring technique is evaluated using large data sets.

B4P-E2

Performance of an Embedded Monopole Antenna Array in a UAV Wing Structure
M. Sharawi1, O. Rawashdeh2, D. Aloi2
1King Fahd University of Petroleum & Minerals, Saudi Arabia; 2Oakland University, United States

In this work we present a small size, printed monopole antenna embedded within the wing structure of a small Unmanned Aerial Vehicle (UAV) and operating in the 2.4 GHz ISM band. Integration of antenna elements within UAV structures will reduce the weight and cost. Also, the use of embedded antenna arrays will increase the communication range and data throughput. 4-element and 8-element embedded uniform linear antenna arrays are modeled, simulated and studied. Simulation and measurement results for the resonant frequency of the basic element were performed. Results showing the HPBW and SLL of the simulation models for different excitations for the wing structure antenna array are presented and compared.
B4P-E3

An Anticipative Control Application for Marine on-Board Electrical Network
P. Kvieska¹, M. Ait Ahmed², G. Lebret¹
¹Ecole Centrale de Nantes, France; ²Université de Nantes, France

This paper addresses the issue of controlling the output voltage of a marine electrical on-board network. The goal is to present the recent developments in the disturbance rejection problem due to load commutations in electrical networks. For that, an application of anticipative gain-scheduling control is presented. The strategy will be presented and an example given to illustrate the method.

B4P-E4

Comparison Between Two Approaches to Overload Control in a Real Server: "Local" or "Hybrid" Solutions?
S. Montagna, M. Pignolo
ITALTEL SpA, Italy

This work analyzes the performances of two algorithms candidate to overload control within a server. An algorithm works according to a "local" strategy, using the concept of measuring the processor occupancy. The other algorithm takes advantage of measuring both the processor occupancy and the call losses. The latter fits in the "hybrid" family, because it exploits a further element (Load Balancer) to reduce the charge of the cpu of the server under protection. The job assumes the throughput, i.e. the number of calls managed within one second, as the unit of comparison.

B4P-E5

Low Power State Assignment Using ILP Techniques
A. Sagahyroon¹, F. Aloul¹, A. Sudnitson²
¹American University of Sharjah, U.A.E.; ²Tallinn University of Technology, Estonia

State assignment for finite state machines is a critical optimization problem in the synthesis of sequential circuits. In this paper we address the state assignment problem from a low power perspective. We experiment with Boolean Satisfiability and Integer Linear Programming techniques to solve the assignment problem where the primary goal is the reduction of switching activity during state transitions. We also detect and evaluate the
use of symmetries in speeding up the search process. These techniques have been applied to the MCNC benchmark circuits and yielded promising results.

B4P-E6

**Simulation of Lightning Transients on 110 kV Overhead-Cable Transmission Line Using ATP-EMTP**
K. Fekete\(^3\), S. Nikolovski\(^3\), G. Knezevic\(^3\), M. Stojkov\(^1\), Z. Kovac\(^2\)

\(^1\)Faculty of Mechanical Engineering Slavonski Brod, Croatia; \(^2\)HEP grupa, Croatia; \(^3\)University of Osijek, Croatia

Due to construction of a highway in the eastern part of Croatia, a new 110/x kV substation was built with two parallel connecting underground cables. At the place where the transition between overhead lines and cables is made, surge arresters were installed. In this paper lightning stroke at the grounding wire on the overhead line and its impact on underground cables were studied. Transient program Electromagnetic Transients Program (ATP-EMTP) is used to create a model of the system and to perform simulation of the transient process during lightning stroke. The results of the simulation are briefly presented and discussed in the paper.

B4P-E7

**Fast H.264 Picture in Picture (Pip) Transcoder with B-Slices and Direct Mode Support**
Y. Michalevsky, T. Shoham

Technion, Israel Institute of Technology, Israel

H.264, the modern standard for video coding is gaining popularity and appearing in many video applications. Some of these require insertion of content into an already compressed video. We present Guided Encoding - a novel solution for efficient Picture-in-Picture embedding, using the coding parameters of the original compressed bit stream. We present a method to handle Spatial Direct mode encoding to prevent error propagation caused by the embedding. We reduce the computational time by an average factor of five in comparison to performing full re-encoding while preserving the video quality.
B4P-E8

An Efficient Smart System for Time-Frequency Analysis Based on the Cross-Terms-Free Wigner Distribution Signal Representation

V. Ivanovic, S. Jovanovski  
*University of Montenegro, Yugoslavia*

This paper outlines the development of an efficient multi-cycle, signal adaptive hardware design of a system for time-frequency (TF) signal analysis, suitable for real-time implementation on an integrated chip. The proposed design allows the implemented system to take variable number of clock (CLK) cycles (the only necessary ones regarding the high auto-terms quality) in different TF points within the execution. In this way, the proposed design optimizes execution time of the implemented system, producing a pure cross-terms-free Wigner distribution (WD) signal representation. Additionally, the proposed multi-cycle design optimizes both critical design performances, related to the complexity of the hardware, and the CLK cycle time. The design has been verified by a field-programmable gate array (FPGA) circuit design, suitable of performing processing of nonstationary signals in real-time.

B4P-E9

A Fuzzy Control Scheme for Integration of DGs Into a Microgrid

C. Papadimitriou, N. Vovos  
*University of Patras, Greece*

In order to integrate different distributed generations (DGs) into a microgrid connected to a weak distribution grid, this paper proposes local controllers based in fuzzy logic. The integration of the DGs is achieved through the «plug and play» procedure. The understudy microgrid includes an hybrid fuel cell-battery system and a Doubly Fed Induction Generator (DFIG). Through the proposed controllers the DGs provide primary frequency control and local bus voltage support to the local grid in both cases either the microgrid operates in islanded mode or in connected mode when local disturbances occur. Using MATLAB/Simulink software the response of the system is recorded when the microgrid from the connected mode is transferred to the islanded operation and the system presents a good performance.
B4P-E10

An Analysis of Cross Points in the Low-Degree Polynomial Gains of P-Lag Unbiased Smoothing FIR Filters
L. Morales-Mendoza\textsuperscript{2}, Y. Shmaliy\textsuperscript{1}, S. Pérez-Cáceres\textsuperscript{2}
\textsuperscript{1}Guanajuato University, Mexico; \textsuperscript{2}Veracruzana University, Mexico

We address an analysis of the low-degree polynomials gains of the p-lag unbiased smoothing FIR filters. It is shown that such a gain is uniquely specified for unbiased FIR filters depending on the number of system states. An important feature of the p-lag gain is that, at the cross points, it converges to the reduced degree gain. The cross points between the uniform, linear, quadratic, and cubic smoothing unbiased FIR filter gains have therefore been investigated in detail. At these points, a number of simulations have been provided and advantages demonstrated.

B4P-E11

Agent Based Model for Optimal Generation Mix Determination
F. Careri, C. Genesi, P. Marannino, M. Montagna, S. Rossi, I. Siviero
Università degli studi di Pavia, Italy

In this work the problem of defining the optimal generation mix for a system with a liberalised electricity market is dealt with by an agent based model, in which several GENCOs compete to define the optimal planning strategy that maximizes their profits. Strategies are defined according to the market share that each GENCO wants to satisfy and the best solution is found by means of a genetic algorithm that evaluates the fitness of strategies making them compete in a electricity market simulator. Results provided by the model describe the optimal generation mix for a set of GENCOs making up the whole generation mix for a system with reference to a specified target year.

B4P-E12

Optimal Location and Control of Shunt Facts for Transmission of Renewable Energy in Large Power Systems
A. Danesh Shakib, G. Balzer
Technische Universität Darmstadt, Germany

Shunt FACTS devices provide the possibility to control voltages and therefore to improve the security of the system. In order to use this possibility, the optimal location and the set values of the FACTS controllers
have to be selected correctly. The singular analyses of the power system Jacobian matrix are applied to identify the optimal location of shunt FACTS devices in large power systems. Furthermore, the application of Optimal Power Flow control is a possible method for choosing set values. In this paper, a sensitivity index for the detection of sensor nodes is defined. Sensitivity analysis is used to determine the area on which the FACTS device has significant influence. And then only this limited area is included in the Optimal Power Flow control, because it is very difficult to include the entire system into the optimization process. Simulations are performed on an IEEE 57-bus system. Furthermore, the objective function of Optimal Power Flow control is analyzed.

B4P-E14

SiGe BiCMOS CSA-Shaper Radiation Detection Front End: Noise Performance and Noise Modelling
T. Noulis¹, N. Kaiserlis¹, S. Siskos¹, G. Sarrabayrouse²
¹Aristotle University of Thessaloniki, Greece; ²CNRS LAAS, Université de Toulouse, France

Detailed comparison of four equivalent charge-sensitive, folded-cascode amplifiers in terms of noise performance is presented. A couple of complementary structures, one with a noise-optimised input nMOSFET and the other with a noise-optimised input pMOSFET were designed in 0.35 µm CMOS process by Austria MicroSystems (AMS). Another couple of complementary structures consisting of a noise-optimized input NPN with a pMOSFET cascode, and the respective structure having a pMOS as input device, were developed in a 0.35 um SiGe BiCMOS process (AMS). The structures' comparison is performed through simulation, after careful selection of the parameters that remain constant in all four variations - extended analysis regarding SiGe BiCMOS radiation detection folded cascode based Charge pre-amplifiers is presented and selection criteria are suggested in relation to the detector capacitance value. In addition, NPN HBT noise modeling analysis is also performed in order to extract conclusions about the related noise sources and to investigate the capability for extra noise reduction.
B4P-E15

Characterization of Electromagnetic Propagation in Multilayered Structures Using the Finite-Difference Time Domain Method
F. Choubani, M. Choubani, A. Gharsallah, J. David, N. Mastorakis
ENSEEIHT, France; ENSEEIHT, Institut National Polytechnique de Toulouse, France; Faculté des sciences de Tunis, Tunisia; SUP’COM, Tunisia

The finite Difference Time Domain (FDTD) method is used to analyze periodic structures with arbitrary geometries and dielectric permittivities. Its inherent advantages allow the wide band characterization of such structures in terms of reflection and Transmission coefficients. Various applications to Electromagnetic Band Gap (EBG) structures showed a good agreement with published results.

B4P-E17

Time Invariant Control of MIMO Systems Under Random Transient Failures
A. Gonzalez, A. Sala, P. Albertos
Universidad Politecnica de Valencia, Spain

This paper investigates a control design methodology to achieve a stable controller for a multivariable system inside the fault tolerance framework. The main goal consists of designing a time invariant controller that guarantees stability even with a certain performance in terms of decay rate subject to random transient failures both in sensors and actuators. LMI, BMI, and other possible solutions are pursued for this objective. The most general case of fault tolerant including internal failures is also discussed. Finally a numerical example is shown to illustrate the proposed control design method.

B4P-E18

Real-Time Video Sequences Matching Using the Spatio-Temporal Fingerprint
O. Pribula, J. Pohanka, J. Fischer
Czech Technical University in Prague, Czech Rep.

This paper proposes a method that can be used for matching of video streams or fast seeking of a short video sequence in a long video stream. Output from the algorithm is a vector of video sequence fingerprints that
contains information about temporal and spatial video content. Having analyzed real video data, we show that reliable video sequence matching using introduced method can be achieved by using a video fingerprint data flow of 32 bytes per second of video stream. This is important for systems with reduced data transfer bandwidth or low storage capacity, e.g. video-based TV channels rating measurement.

B4P-E19

**Semiconductor Solid Solutions Hg1-xMnxTe -Based Schottky Diodes for the Mid Infrared Radiation**

I. Ivanchenko\(^2\), V. Godovanyuk\(^1\), M. Kovalchuk\(^1\), S. Ostapov\(^1\), S. Paranchich\(^1\), N. Popenko\(^2\), I. Ranenko\(^1\)

\(^1\)Chernivtsi National University, Ukraine; \(^2\)Usikov Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine, Ukraine

The electric and photoelectric parameters of the semiconductor solid solutions Hg1-xMnxTe-based Schottky diodes are presented in this paper. It is showing that the aforementioned diodes are the sensitive ones at lower frequencies of the infrared radiation in comparison with the InSb-based photodiodes and demonstrate the significant improvement of the crystal structure perfection in comparison with the Hg1-xCdTe-based photodiodes.

B4P-E20

**CMOS Fully Integrated 2.5GHz Active RFID Tag with on-Chip Antenna**

L. Fragomeni, F. Zito, F. Della Corte, F. Aquilino, M. Merenda

*Università degli Studi Mediterranea di Reggio Calabria, Italy*

The design and experimental characterization of a fully integrated active RFID tag exploiting an embedded antenna are presented. The chip is realised in a 0.35µm CMOS process. The implemented tag is basically composed of a digital section for storing the identifying code and a 2.5GHz complementary cross-coupled LC oscillator based OOK transmitter. The system is duty cycled for reducing the power consumption. For transmitting the 32bit ID code at 5kbit/s data rate, the average power consumption is 160µW. The data rate can be increased up to 2Mbit/s. The integrated loop antenna radiates sufficient power for 1m communication range.
**B4P-E21**

**Design of a Periphery Control FPGA Board for Electric Drive Systems**  
R. Raute¹, C. Caruana¹, C. Spiteri Staines¹, J. Cilia¹, M. Sumner²  
¹University of Malta, Malta; ²University of Nottingham, United Kingdom

The paper describes the setup of an experimental microprocessor control system for electric drive systems. Particularly, the design of a customised designed periphery control FPGA board is described in detail. The setup has been used for research on sensorless drive control algorithms.

**B4P-E22**

**Study of Current Distribution Over a Power Cable Presenting Non-Uniform Geometry Using the Partial Differential Equations Approach**  
G. Bousaleh², F. Hassoun¹, R. Hage Chehade²  
¹France Telecom, France; ²Lebanese University, Lebanon

This paper presents a theoretical study of the currents and voltages characteristics of Power Line Transmission (PLT) over an energy cable whose geometry is non-uniform. The proposed approach is based on the Distributed Network model of transmission lines, where the lumped parameters vary as the line's geometry. Most of the numerical methods applied use a frequency approach. However, other techniques are available in the time domain that are more applicable when the perturbation is transitory or an impulse. This paper presents the adaptation and application of the FDTD method to solve the problem of transmission of an electric wave over a transmission line whose electromagnetic topology is non-uniform. As an example, the final part of the paper proposes the modeling of the transmission of a transitory wave over an electric power cable. We present a study the effect of an electromagnetic disturbance type lightning on a transmission line.

**B4P-E23**

**Effects of Eccentricity on External Magnetic Field of Induction Machine**  
O. Vitek, M. Janda, V. Hajek  
Brno University of Technology, Czech Rep.

This paper deals with the analysis of external magnetic field of three-phase induction motor in order to diagnose the air gap asymmetry caused by eccentric rotor. Dynamic eccentricity produces low frequency air gap flux
components, however they can be observed in stator current only under mixed eccentricity. Unlike MCSA (motor current signature analysis), described method allows to detect purely dynamic eccentricity or to detect dynamic eccentricity under mixed eccentricity with a minimal effect of static eccentricity. Although many papers have been focused on external magnetic field analysis, they have usually described other types of faults. In this paper the amplitudes of characteristic frequency components are predicted using FEM and some obtained results are verified by measurement. Both purely dynamic and mixedeccentricities are taken into account as well as saturation of magnetic circuit due to its significant influence on calculated spectrum.

**B4P-E24**

**Application of Wireless Communication to Small WECS with Induction Generator**

M. Adamowicz\(^2\), R. Strzelecki\(^2\), Z. Krzeminski\(^1\), J. Szewczyk\(^1\), L. Lademan\(^1\)

\(^1\)Gdansk University of Technology, Poland; \(^2\)Gdynia Maritime University, Poland

Wind energy conversion systems (WECS) seem to be self-evident elements of the future smart grids. Among many generator types the squirrel cage induction generator (SCIG) characterizes robustness and low cost. A full-scale power converter can perform smooth grid connection over wide speed range of multiple-stage geared SCIG. Increasing number of sensors can improve the WECS control and diagnostics but increasing number of thin wires i.e. between a nacelle and the converter housing can reduce reliability. A wireless communication using ADF7020 transceiver for data acquisition and transmission is proposed in the paper.
B5L-A1 16:35

Optimal MRAS Speed Estimation for Induction Generator in Wind Turbine Application
B. Dumnicć, D. Matic, V. Katic, V. Vasic, M. Delimar
1Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia; 2Faculty of Technical Sciences, Serbia

This paper proposes improved sensorless vector control of squirrel cage induction generator for variable speed wind energy conversion system. The rotational speed of the induction generator is estimated with the MRAS observer. The estimated rotational speed is used as the feedback of the control loop in the converter control system. PI controller in the MRAS observer is optimized via Genetic Algorithm, Particle Swarm Optimization and Simulated Annealing. The performance of the sensorless controlled variable speed wind turbine drive is evaluated through simulation in Matlab/Simulink. Experimental results are gained via laboratory model based on dSpace DS1104 digital control card.

B5L-A2 16:55

Wind Power Short-Term Prediction by a Hybrid PSO-ANFIS Approach
H. Pousinho, J. Catalão, V. Mendes
1Instituto Superior de Engenharia de Lisboa, Portugal; 2University of Beira Interior, Portugal

The increased integration of wind power into the electric grid, as nowadays occurs in Portugal, poses new challenges due to its intermittency and volatility. Wind power prediction plays a key role in tackling these challenges. A novel hybrid approach, combining particle swarm optimization and adaptive-network-based fuzzy inference system, is proposed in this paper for short-term wind power prediction. Results from a real-world case study are presented. Conclusions are duly drawn.
Comparison of Speed Control Strategies for Maximum Power Tracking in a Wind Energy Conversion System

J. Zaragoza\textsuperscript{2}, C. Spiteri Staines\textsuperscript{3}, A. Arias\textsuperscript{2}, J. Pou\textsuperscript{2}, E. Robles\textsuperscript{1}, S. Ceballos\textsuperscript{1}

\textsuperscript{1}Robotiker-Tecnalia Technology Corporation, Spain; \textsuperscript{2}Universitat Politècnica de Catalunya, Spain; \textsuperscript{3}University of Malta, Malta

This paper presents two different variable-speed control strategies to obtain the maximum power from wind turbines (WT). The control strategies are based on linear or nonlinear controllers. The first strategy is composed of standard proportional-integral (PI) regulators tuned for a specific operation mode. However, since the system is nonlinear, for different operating conditions, the values of the PI parameters may not be optimal. The second control approach includes a nonlinear (fuzzy) controller to compensate for the nonlinearity of the WT, to achieve improved speed performance under different operating points. The results show that in most cases the fuzzy controller obtains superior performance to that of the standard PI-based solution.

Multi-Source Power Generation System in Semi-Isolated and Safety Grid Configuration for Buildings

M. Sechilariu, F. Locment, I. Houssamo

University of Technology of Compiègne, France

Due to technical constraints of major incidents related to connecting distributed green sources with the public grid, we propose, in urban areas, a semi-isolated and safety system for self-feeding of buildings equipped with renewable electricity. With an aim of elimination of multiple energy conversions, a direct current (DC) network distribution is considered. The semi-isolated and safety DC network is studied using a multi-source system (photovoltaic panels, storage, and public grid) and numerical simulation results are given. The results confirm the relevance of such a network in urban areas, and can map out perspectives on integrated and optimized building energy management.
Control Strategies for Energy Storage to Smooth Power Fluctuations of Wind Parks
B. Ni, C. Sourkounis
Ruhr-University Bochum, Germany

Fluctuating wind speed cause power output fluctuations of wind parks. A concept of dynamic conditioning was developed to smooth these fluctuations. This paper gives a brief introduction to the energy conditioning concept, discusses various energy storage systems and compares control strategies for a fly wheel energy storage to smooth the power fluctuations. The storage controls, tolerance band and stochastic dynamic optimization, were implemented and compared. By the application of dynamic storage systems an intermediate storage of the wind energy is realized. Therefore short time fluctuation of the energy sources can be absorbed directly on location.

Wind Power Generation and Transmission System Planning: the Italian Case
F. Careri, C. Genesi, P. Marannino, M. Montagna, S. Rossi, I. Siviero
Università degli studi di Pavia, Italy

The paper analyzes the impact of wind generation on the Italian transmission network. It takes into account that the most suitable sites for installation of wind farms are located in Southern Italy and that the power flows from wind turbines will arise in addition to the existing ones, mainly directed to Central Italy, increasing the possibility of network congestions. The application of an Optimal Power Flow procedure determines any limitations to the exploitation of wind generation because of network constraints. A sensitivity analysis, based on Weighted Transmission Loading Relief, assesses the impact of wind farms' generation on power system security.
B5L-B1 16:35

Thresholds for the Identification of Wireless SAW RFID-Tags with ASK
G. Cerda-Villafana, Y. Shmaliy
Guanajuato University, Mexico

The optimum threshold is proposed for the identification (ID) of passive wireless surface acoustic wave (SAW) ID-tags with binary amplitude shift keying (BASK) widely used in SAW sensing. We first find the generic identification error probability for such tags employing the Marcum Q-function of first order and then minimize it in order to find the optimal threshold. The results are obtained for arbitrary signal-to-noise ratios in the On-pulses and Off-pulses. As examples of applications, we give the estimate of the optimal threshold for the 28-bit pulse-burst measured and consider in detail the thresholds for the SAW ID-tags with the Barker code-based BASK.

B5L-B2 16:55

On Generalisation of Dual-Thermocouple Sensor Characterisation to RTDs
C. Brown², R. Kee², G. Irwin², S. McLoone¹, P. Hung¹
¹National University of Ireland, Maynooth, United Kingdom; ²Queen's University Belfast, United Kingdom

Intrusive temperature sensors such as thermocouples and resistance temperature detectors (RTDs) have become industry standards for simple and cost-effective temperature measurement. However, many situations require the use of physically robust and therefore low bandwidth temperature sensors. Much work has been published on dual-thermocouple thermometry as a means of obtaining increased sensor bandwidth from relatively robust thermocouples, which are assumed to have first-order response. This contribution seeks to determine if RTDs, which are known to have approximately first-order response, can also be characterised using the dual-thermocouple approach. Experimental results show that the response
of an RTD cannot be represented by a first-order model with sufficient accuracy to allow successful application of this method. Furthermore, simulation studies demonstrated that if a sensor exhibits even marginally second-order response, highly inaccurate temperature reconstructions follow. It is concluded that a higher-order model that more accurately reflects RTD response would be required for successful dual-RTD characterisation.

B5L-B3 17:15

**Over-the-Air Programming of PSoC Sensor Interface in Wireless Sensor Networks**

I. Adly¹, H. Ragai³, A. El-Hennawy¹, K. Shehata²

¹Ain Shams University, Egypt; ²Arab Academy for Science and Technology, Egypt; ³French University, Egypt

This work focuses on the development of PSoC based sensor interface board. The usage of PSoC in sensors interfaces allows for a broad range of sensors to be interfaced. Signal conditioning, filtering and amplification tasks are all preformed on the PSoC chip and can be modified and tuned by means of OTAP. Over-The-Air Programming (OTAP) technology enable firmware update of motes and sensor interfaces used in wireless sensor networks in their final locations from a central base station.

B5L-B4 17:35

**Experimental Comparison of Algorithms for Interference Control in Ad-Hoc Wireless Networks**

S. Athanassopoulos, C. Kaklamanis, E. Papaioannou, C. Tsantilas

*University of Patras, Greece*

Interference is an issue of outstanding importance for efficient communication in ad-hoc wireless networks. Interference arises due to overlapping transmission power levels of nodes causing message collisions that require energy-consuming retransmissions. In this work we study algorithms for interference control in ad-hoc wireless networks in the Euclidean space that aim at constructing low-interference network topologies with particular properties preserving network connectivity. We survey relative research work on such algorithms and provide implementations for four such algorithms comparing them on random geometric instances in average-case networks showing that a unified model
for decreasing simultaneously edge- and node-interference remains hard to define.

**B5L-B5  17:55**

**Wireless Sensor Network for Maritime Deployment: Modeling and Simulation**

P. Barbosa, N. White, N. Harris  
*University of Southampton, United Kingdom*

A new simulator was built to express the particularities of the wireless models required to correctly understand the application. The models provide realistic channel simulation, along with additive interference from other sources, where all transmissions are considered independently. The receiver decides which transmission was first and what is the level of noise from the environment and contending nodes. Network algorithms were implemented and compared using different network sizes and parameters. Results show that algorithms are sensitive to deployment conditions and respond differently to each set of environmental parameters.

**B5L-B6  18:15**

**Framework for Opportunistic Routing in Wireless Sensor Networks with Application to Multiple Antennas in Fading Environments**

B. Hamilton², M. Gidlund¹, S. Culver³  
¹ABB Corporate Research, Sweden; ²Georgia Institute of Technology, United States; ³Nokia Siemens Networks, Denmark

In this article we present a framework for routing based on a distributed routing decision and adapt the framework on a multiple-input multiple-output (MIMO) system. Our proposed framework provides a cross-layer design where the routing decision is decided through silent negotiation between candidate relays. The proposed protocol divides the routing decision between transmitter and the receivers: the transmitter decides the direction and an angle spread to broadcast the packet; each receiver, without communicating each other, decides whether to start a timer whose duration depends on the strength of the channel state information. The node with the shortest timer transmits first and thus becomes the transmitter for the next hop. We verify the performance of the proposed framework by computer simulations.
B5L-C  Circuits & Systems
Date: Tuesday, April, 27
Time: 16:35 - 18:35
Room: Provence
Chair: Edward Gatt, University of Malta

B5L-C1  16:35
Non-Active Power Multivector
J. Bravo\(^2\), M. Castilla\(^2\), J. Montaño\(^1\), M. Ordoñez\(^2\), M. Castilla\(^2\), A. López\(^2\),
D. Borras\(^2\), J. Gutierrez\(^2\)
\(^1\)Spanish Research Council (CSIC), Spain; \(^2\)University of Sevilla, Spain

This paper is a new contribution to the clarification of the non-active power concept. It is based on a Generalized Complex Geometric Algebra spanned by a frequency-domain vector space. The classic definition of this quantity is usually associated to the use of the scalar product of voltages and currents rms values. We show that the non-active power can be deduced directly from the power multivector [12]. A simple application example is provided to illustrate the clear capabilities of the suggested concept.

B5L-C2  16:55
Equivalent Circuit Modeling of Terahertz Devices and Resonant MEMS with Two-Dimensional Electron Gas System
I. Khmyrova
University of Aizu, Japan

Equivalent circuit models have been developed to study the performance of the devices with 2DEG system for THz applications and for sensing. The components of the equivalent circuits were related to physical and geometrical parameters of the devices under consideration. The developed equivalent circuits were used to simulate frequency performance of the devices under consideration invoking IsSpice circuit simulator.
B5L-C3  17:15

A Fast Cycle-Accurate Instruction Set Simulator Based on QEMU and SystemC for SoC Development
T. Yeh, G. Tseng, M. Chiang
National Sun Yat-sen University, Taiwan

This paper presents a fast cycle-accurate ISS based on QEMU and SystemC for the SoC development. The CA-ISS proposed herein can not only produce the cycle-accurate waveform, but it also provides the capability of design space exploration. Moreover, our experience shows that the proposed framework can even benefit from whatever enhancements are made to QEMU and SystemC. Our experimental result shows that the design space exploration can be easily achieved by making QEMU play the role of an ISS, which will send all the information required by design space exploration to SystemC such as the instructions executed, the instructions fetched by the pipeline, the condition code flags in the processor register, the addresses of the memories accessed, the I/O operations performed, and so on. Finally, the "fast" co-simulation time indicates that the framework we proposed herein makes it possible to co-simulate a full-fledged operating system in the early stage of the SoC development.

B5L-C4  17:35

Fully Asynchronous Neural Paradigm
M. Salerno, D. Casali, G. Costantini, M. Carota
Università degli Studi di Roma Tor Vergata, Italy

In this paper, a new integrate-and-fire neural model is proposed. In order to obtain an asynchronous behaviour, a different delay time is assigned to every firing process, in function of the inner dynamics of the single neuron. This model allows also an efficient computer simulation, which has been implemented with MATLAB and supports up to a hundred of thousands of neurons. Simulations show an auto-confinement property: when proper input is given, we observe a specific neural group selection in which the activity appears in a quite high level, while it remains lower in the regions among different groups.
B5L-C5  17:55  
Component-Based Specification for Multi-Processor System-on-Chip Design  
V. Zadrija, V. Sruk  
University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia  

This paper presents component-based design for modeling Multi-Processor Systems-on-Chip (MPSoC), where SaveComp Component Model (SaveCCM) technology was employed. SaveCCM is light-weighted, HW/SW platform-independent and considers non-functional constraints inherent for heterogeneous MPSoC. Additional extensions are introduced to efficiently describe dataflow applications usually present in embedded systems. SaveCCM specification is further synthesized to Transaction Level Model (TLM) using Embedded Systems Environment (ESE) toolset, while evaluating different MPSoC designs and eliminating possible bottlenecks in early stages of design. As a case study, JPEG encoder was implemented in MPSoC according to SaveCCM using execution time quality attribute. Design space exploration results are presented and evaluated.

B5L-C6  18:15  
Low Power Ultra Wideband Up-Conversion Mixer in CMOS 0.13 µm Technology  
A. Kara-Omar, D. Dragomirescu, A. Coustou, R. Plana  
CNRS LAAS, Université de Toulouse, France  

This paper presents a low power, UWB up-conversion mixer, designed on CMOS 0.13 µm technology. This circuit is based on a double balanced Gilbert topology, which uses a feedback loop in its transconductance stage; in order to match the IF input impedance over a 10-510 MHz frequency range. This mixer exhibits a 0 dB conversion gain, a 7 dB noise factor, a DC power in the range of 4.2 mW and can output an RF signal over the 6-8.5 GHz frequency range.
B5L-D SPECIAL SESSION: Special Topics, Spin-Offs & Applications from Nuclear & Particle Physics Research 2
Date: Tuesday, April, 27
Time: 16:35 - 18:35
Room: Castille
Chairs: Uwe Bratzler, CERN
Chikara Fukunaga, Tokyo Metropolitan University

B5L-D1 16:35
Radiation Hardness and Application of CCDs As Particle Detectors
A. Sopczak
Lancaster University, United Kingdom

The Nobel Prize-winning invention of an imaging semiconductor circuit (the CCD sensor) has important applications for particle physics detectors. The Charge Coupled Devices (CCDs) have been successfully used in several high energy physics experiments over the past two decades. Their high spatial resolution and thin sensitive layers make them an excellent tool for studying short-lived particles. Prototypes with 50 MHz readout in column-parallel technique have been developed in recent years and extensively tested. For the application of CCDs as vertex detectors in high-radiation environments of future particle colliders, the study of their radiation hardness is crucial for these applications.

B5L-D2 16:59
Vertical Integration of Radiation Sensors and Readout Electronics
Y. Arai
High Energy Accelerator Research Organization, Japan

We have developed monolithic radiation detectors based on a 0.2 um Fully-Depleted Silicon-on-Insulator (FD-SOI) CMOS technology. It has both a thick, high-resistivity sensor layer and thin LSI circuit layer in a single chip. To shield the electronics part from the sensor region, we have generated buried well region under the buried oxide (BOX) layer of the SOI wafer. Thus we can apply more than 100V sensor voltage under the 1.8V MOS circuits. Furthermore we bonded another circuit layer by using a μ-bump technique of 5 um pitch.
Networking and Computing for Particle Physics Leads to World Wide Web and Grids
J. Knobloch
CERN, Switzerland

One of the most popular and best known spin-offs from computing for particle physics is the World Wide Web, created at CERN by Tim Berners-Lee. While the web enabled the world-wide sharing of information, the global physics community now requires the next step namely the world-wide sharing of computing resources in terms of CPU, data storage and data access. This talk reviews the leadership in computing since the early days of particle physics and the knowledge transfer to other domains. We describe the computing for the world's largest scientific instrument, the Large Hadron Collider (LHC) at CERN, and the implementation in European and global Grids. The Grid now serves many communities including Earth Sciences, Computational Chemistry, Astronomy and Life Sciences.

Soft Sensors and Artificial Intelligence for Nuclear Fusion Experiments
A. Rizzo
Politecnico di Bari, Italy

The importance of monitoring a large set of process variables is strongly felt in the experimental physics community. However, key obstacles to the implementation of large-scale plant monitoring and control policies are posed by both the high cost of on-line measurement devices and the difficulty to keep hundreds of measurements under control. Soft sensors are mathematical models of processes, designed on the basis of experimental data via system identification procedures. In this framework, soft computing techniques can help in dealing with the intrinsic uncertainty of real world problem, exploiting efficiently both experimental data and human expertise.
C1P-E1

Optimum Current Reference Generation Algorithm for PMSMS Drive System for Wide Speed Range
N. Olarescu¹, M. Weinmann¹, S. Zeh¹, S. Musuroi², C. Sorandaru²
¹Diehl AKO Stiftung & Co KG, Germany; ²Politehnica University of Timisoara, Romania

This paper proposes an algorithm to generate the optimum d- and q-axes current references for PMSMS (permanent magnet synchronous motor with sinusoidal excitation) drive system for wide speed range that is fed by frequency converter that has not regenerative unit. The algorithm offers optimum torque capability for PMSMS despite significant changes in the dc link voltage and machine parameters and it can be used in field oriented control of PMSMS with or without mechanical sensors, but also in the scalar control algorithm (without motor current measurement sensors) with good results. The algorithm use the maximum torque-per-ampere (MTPA) control method, in the constant-torque region, to generate the d- and q-axes current references and it identifies also when the machines enters in the field weakening region and determine the optimum d- and q-axes current references dependent of the field-weakening region (region I, and II). Experimental steady-state performance results and dynamic performance results are examined by several drive tests with a PMSMS.

C1P-E2

Transmit Beamforming Based on Rotation Weight and Switched Sub-Codebook
I. Sfaihi³, N. Hamdi², A. Bouallegue¹
¹ENIT, Tunisia; ²INSAT, Carthage University, Tunisia; ³Institut Supérieur d'Informatique de Gestion de Kairouan, Tunisia

In this study, we consider a scheduling algorithm for a limited feedback opportunistic beamforming (OBF). Our proposal is based on making Transmit OBF codebook vectors controlled by a rotation weight (RW) in order to obtain almost a zero correlation between the OBF codebook vectors
used for the selected spatial channels. Accordingly, we meet the performance of OBF based on the feedback of the full channel state information while reducing the amount of data to be transmitted in the feedback link. The proposed limited feedback OBF - rotation weight increases the probability of the selection of the worst case user by applying a rotation on his best codevector to make zero the angle between his couple codevector and channel response. Then, if this user is selected he would be assigned the best possible symbol rate. To analyze and validate the proposed RW idea performance, simulations have been carried out.

C1P-E3

**Power Quality Research in a Modern Mediterranean Marine**

V. Strugar¹, V. Katic²

¹Montenegrin Electric Enterprise, Montenegro; ²University in Novi Sad, Serbia

The paper presents results of power quality (PQ) analysis of a Mediterranean marine electric supply in Montenegro. Impact of the marine activity on public distribution network and mutual impact some consumers into marine are analyzed in details. The analysis is performed in three main steps: 1. One week PQ (harmonics) measurements in real operating conditions; 2. Developing of a simulation model of the marine based on obtained measurement results.; 3. Designing a filter for harmonic mitigation using the simulation model. Measurement were performed according to EN50160 standard. Simulation model was designed in special software for power systems analysis, PSS VIPER. The measurement results were analyzed and compared with simulation ones. A good accordance has been reached. At the end, the effects of filter application on harmonics levels are presented and discussed.

C1P-E4

**Software Package for Polymeric Power Cable System Design**

H. Sherwali¹, Y. Hammad²

¹Al Fateh University, Libya; ²High Occupational Center Comprehensive Professions, Libya

Selecting the kind and size of the cable required to carry certain given power does not only depend on the cross-sectional area of the conductor but also on many other important factors. Cable ampacity is determined based on the maximum temperature allowed on operation and some other factors
detailed in the paper. This paper presents a developed software package calculates the minimum cross section area required for a given power network and calculates exact ampacity, induced voltage and permissible value of short circuit current according to the laying conditions in the given region.

C1P-E5

Transmission Cost Allocation Using the Distribution Factors Method
S. Kilyeni, O. Pop, T. Slavici, C. Craciun, P. Andea, D. Mnerie
Politehnica University of Timisoara, Romania

One of the key problems of energy transmission system in an independent environment refers to necessity to establish a cost for system services on nondiscriminatory bases. The prices must to be simple and transparent. A properly established cost provides economical signals for short-term and long-term recovery current expenses and for a fair cost allocation for participants. This paper presents allocation of transmission costs to consumers and to generator using the distribution factors method. A detailed comparison between regime with active losses and the regime without active losses are presented. A case study based on a 12-node system is provided.

C1P-E6

Highly Effective Predictor Blending Method for Lossless Image Coding
G. Ulacha², R. Stasinski¹
¹Poznan University of Technology, Poland; ²West Pomeranian University of Technology, Poland

A fast and effective predictor blending method is described in the paper. They are 17 blended predictors, including GAP+, and (novel) texture context mapping. An advanced error bias removal method is applied to some subpredictors. A sophisticated adaptive context arithmetic coder forms the final stage of the algorithm. Experimental results show that indeed, for considered execution times (few seconds for Lenna image) the presented technique is better than other state-of-the-art methods.
C1P-E8

Physico-Chemical Properties of Power Transformer Oil Mixtures
H. Moulai\textsuperscript{2}, I. Khelfane\textsuperscript{1}, A. Yahiat\textsuperscript{1}, T. Toudja\textsuperscript{2}, A. Nacer\textsuperscript{2}, M. Zemirli\textsuperscript{2}, F. Doussas\textsuperscript{2}
\textsuperscript{1}Centre of Research and Development of Electricity and Gas, Algeria; \textsuperscript{2}University of Sciences and Technology Houari Boumediene, Algiers, Algeria

This work is devoted to the study of the physico-chemical properties (aspect, colour, density, water content, acidity, discharge voltage, dissipation factor, viscosity and flash point) of mixtures between a used transformer mineral oil and a new one other of the same nature, and compatibles between them for all ratios. It is oriented towards the research of optimal ratios enabling to have acceptable properties of the mixture.

C1P-E9

GUI-Aided NIR and Color Image Blending
A. Guidi, R. Achanta, C. Fredembach, S. Süsstrunk
Ecole Polytechnique Fédérale de Lausanne, Switzerland

We combine the most relevant information from both near-infrared (NIR) and visible (VS) spectrum to improve the quality of images. We present two schemes of combining NIR and VS information to obtain visually better images. The first is an automatic approach that performs segment-based alpha-blending. The second uses a GUI based approach where the user chooses segments and manually sets parameters. To minimize artifacts at the segment boundaries, three different boundary smoothing methods are compared.

C1P-E10

Multi-Tracking Single-Fed PV Inverter
A. Al-Diab, C. Sourkounis
Ruhr-University Bochum, Germany

Grid-connected photovoltaic system is the most important among the photovoltaic applications. High efficiency power converter and maximum power point tracking (MPPT) are the key technologies of grid-connected inverters for photovoltaic system. Shadows created by clouds, trees ...etc. partially cover PV modules causes illumination decrease, in this condition the Current-voltage and power-voltage characteristics of large photovoltaic
(PV) arrays become more complex and difficult to identify because different maximum power points exist, and the location of the global maximum power point is changing corresponding to the changing on the shading conditions. A multi-MPPT grid-connected photovoltaic system configuration based on the Perturb & Observe MPPT algorithm and Phase Shift Control is proposed in this paper. Two different configurations for a Grid-connected photovoltaic system, conventional and the proposed configurations, are investigated to verify the performance of the proposed configuration.

C1P-E11

Digital Hardware Implementation of Self-Organising Maps
M. Cutajar, E. Gatt, J. Micallef, I. Grech, O. Casha
University of Malta, Malta

In this paper a digital hardware implementation of the Self-Organising Maps (SOMs) for the application of handwritten digit recognition is presented. Two methods were implemented: Euclidean and Manhattan method. The highest recognition rate for both methods was calculated through three testing techniques. The highest recognition rates obtained are 71.267% and 63.667% for the Euclidean and the Manhattan methods respectively. Both methods were implemented on the Xilinx Spartan-3 200K gates (XC3S200) to compare their speed performance and area consumed.

C1P-E12

Design and Modeling of a Novel 4H-SiC Normally-Off BMFET Transistor for Power Applications
F. Pezzimenti, F. Della Corte
Università degli Studi Mediterranea di Reggio Calabria, Italy

First numerical simulation results targeted to the design of a novel 4H-SiC normally-off Bipolar Mode Field Effect Transistor (BMFET) are presented. The developed analysis predicts the feasibility of a transistor well suitable for high power applications, with a very high current gain, a forward current density up to 1 kA/cm², an on-state output resistance in the order of few m Omega x cm² and a blocking voltage in the range of 1-2 kV. The 4H-SiC fundamental physical models, such as the doping incomplete ionization and the carrier recombination processes, were carefully taken into account during the simulations.
C1P-E13

Electro-Optical Modulation and Photoinduced Absorption Effects on a CMOS-Compatible Alpha-Si:H/Alfa-SiCN Multistack Waveguide
S. Rao, F. Della Corte
Università degli Studi Mediterranea di Reggio Calabria, Italy

In this paper we report results on a field-effect induced light modulation at \( \lambda = 1.55 \text{um} \) in a high-index-contrast waveguide based on a multisilicon-on-insulator (MSOI) platform. The device is realized with the hydrogenated amorphous silicon (a-Si:H) technology and it is suitable for monolithic integration in a CMOS Integrated Circuit. The device exploits the free carrier optical absorption electrically induced in the semiconductor core waveguide. The dynamic behaviour of the device was experimentally analyzed in presence of a visible illumination showing a link between the photogeneration and free carriers provided by doped a-Si:H. The amorphous silicon waveguiding layer contains several thin dielectric films of amorphous silicon carbonitride (a-SiCN) embedded along its thickness highly enhancing the absorbing action of the modulator held in the on-state.

C1P-E14

Experimental Study of a Phase Modulator Using an Active Interferometric Device
R. Dionísio, C. Reis, P. André, R. Nogueira, A. Teixeira
Instituto de Telecomunicacoes, Portugal

A novel architecture for an optical phase modulator is presented and experimentally demonstrated. This approach relies on a commercially available integrated Mach-Zehnder interferometer structure with Semiconductor Optical Amplifiers (MZI-SOA) and it is based in cross-phase modulation effect (XPM). The feasibility of the proposed optical phase modulator will be experimentally investigated using different scenarios of input power and bit rates.

C1P-E15

Individual Plant Recognition Using the RGB Color Model
M. Tilneac, V. Dolga
Mechanical Engineering Faculty of Timisoara, Romania

Changes in light intensity cause major difficulties in the plant recognition. In order to solve this problem, we started the development of a plant
recognition method, with high efficiency in variable lighting conditions. This will be implemented to an autonomous mobile robot for weed control. The method consists in determining of dependency relations between the leaves color and the light intensity.

**C1P-E16**

**Positioning Control of Voice Coil Motor with Shorted Turn**  
T. Liu, C. Yeh  
*National Chiao Tung University, Taiwan*

This research designs and fabricates a voice coil motor with shorted turn for positioning control experiment and uses laser displacement sensor to measure the displacement. Sliding-mode-based fuzzy control is developed to carry out positioning control of a moving component in the voice coil motor. According to experimental results, the motor with shorted turn in positioning requires less voltage input and generates longer stroke.

**C1P-E17**

**ANN Based Day-Ahead Ancillary Services Forecast for Electricity Market Simulation**  
P. Faria, Z. Vale, J. Soares, H. Khodr, B. Canizes  
*ISEP/GECAD, Portugal*

Adequate decision support tools are required by electricity market players operating in a liberalized environment, allowing them to consider all the business opportunities and take strategic decisions. Ancillary services (AS) represent a good negotiation opportunity that must be considered by market players. Based on the ancillary services forecasting, market participants can use strategic bidding for day-ahead ancillary services markets. For this reason, ancillary services market simulation is being included in MASCEM, a multi-agent based electricity market simulator that can be used by market players to test and enhance their bidding strategies. The paper presents the methodology used to undertake ancillary services forecasting, based on an Artificial Neural Network (ANN) approach. ANNs are used to day-ahead prediction of non-spinning reserve (NS), regulation-up (RU), and regulation down (RD). Spinning reserve (SR) is mentioned as past work for comparative analysis. A case study based on California ISO (CAISO) data is included; the forecasted results are presented and compared with CAISO published forecast.
C1P-E19

Original Low-Dimensional X-Band Dielectric Disk Antenna
M. Khruslov, I. Ivanchenko, N. Popenko

Usikov Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine, Ukraine

The simulation and measurement results relative to the radiation characteristics of dielectric disk antennas with the axial-symmetric excitation are presented. Based on the results of computational modeling the compact dielectric disk antenna with the -10dB impedance bandwidth Delta f=4.1GHz and mono-beam radiation pattern is manufactured and tested. The choice of relation between the dielectric disk radius and substrate height allows for designing a set of antennas operating from f=5GHz to 21.77GHz.

C1P-E20

Problems Found During Testing of SDH Devices Used for Transmitting Data Between Power Systems Line Differential Protections
R. Kowalik, M. Januszewski

Warsaw University of Technology, Poland

The paper presents the testing methods, laboratory stand and devices used in tests of protection devices exchanging data through SDH network devices. The paper has arisen as a result of Institute of Power Engineering and PSE Operator cooperation. In this cooperation many tests were made. The range of tests covers the protection functionality tests and SDH devices test focused on determination of possibilities, conditions and problems that exist or may happen during their interoperation.

C1P-E21

A Novel Rotary-Linear Permanent Magnets Synchronous Machine Using Common Active Parts
P. Bolognesi

University of Pisa, Italy

Rotary-linear motors, able to simultaneously provide torque and force, represent one of the most interesting types of multi-degree-of-freedom machines. In fact, in several applications the combination of a rotary and a linear motion along the same axis is used. This paper presents the basic concepts and the theoretical analysis of a novel rotary-linear machine, purposely conceived to be assembled using common active parts easily
found on the market. The machine structure is described and its analytical model is derived and commented, developing considerations concerning several aspects including control strategy, capability and preliminary design.

C1P-E23

50 MHz Reduced Noise Active Bandpass Filter Using Current Feedback Amplifiers
K. Mezher², N. Ali², P. Bowron¹
¹Bradford University, United Kingdom; ²Khalifa University, U.A.E.

In determining the dynamic range of analogue systems, the lower limit is defined by the rms output noise level \( V_{no} \). A 50 MHz active bandpass filter (BPF) is designed and simulated using current feedback amplifiers (CFA). The designed circuit produced much lower noise level as well as better output signal level compared to traditional active BPF topologies. This is verified by signal and noise spectral-analysis simulation, which is compared with well known active-RC filter circuits.

C1P-E25

A Proposed Computational Framework for Autonomous Vehicles
P. Zammit, D. Zammit-Mangion
University of Malta, Malta

Modern high performance navigation systems have substantial shortcomings when it comes to size and cost. This work presents the design and development of a low-cost, light weight, general-purpose navigation system. The proposed system integrates GPS, inertial sensor, magnetometer and range-finder modules together with a high-performance microcontroller. Debugging facilities and various data communication and storage capabilities are proposed in order to enhance access and the overall performance of the system. An object-oriented driver library written in C++ is proposed. This is intended to facilitate development and/or adaptation of software to run on the proposed system; consequently, widening the target audience as much as possible.
C2L-A1  10:30

Magnetic Gear Dynamics for Servo Control
R. Montague, C. Bingham, K. Atallah
University of Sheffield, United Kingdom

The paper considers the analysis and application of magnetic gearbox and magnetic coupling technologies and issues surrounding their use for motion control servo systems. Analysis of a prototype magnetic gear is used as a basis for demonstrating the underlying nonlinear torque transfer characteristic, nonlinear damping, and 'pole-slipping' when subject to over-torque (overload) conditions. It is also shown how 'pole-slipping' results in consequential loss of control. A theoretical investigation into the suppression of mechanical torsional resonances in transmission systems encompassing these highly-compliant magnetically-coupled components is included, along with experimental results, from a demonstrator drive-train. The automatic detection of pole-slipping, and recovery scenarios, is also presented.

C2L-A2  10:50

Preliminary Design and Analysis of a High Speed Permanent Magnets Synchronous Generator
F. Papini¹, P. Bolognesi²
¹Università di Pisa, Italy; ²University of Pisa, Italy

Micro-turbine based high speed gensets exhibit several interesting features such as compactness and light weight, low maintenance, fuel flexibility, relatively low emissions, durability, high reliability etc. They represent an interesting solution in the distributed generation perspective, especially when employed as mid-low power co-generation units possibly exploiting byproduct of farming activities. This paper deals with the preliminary design and FEM/circuital analysis of a high-speed permanent magnets synchronous brushless machine used as generator in such units. Different operating conditions are compared considering both ideal and actual current
waveforms, aiming to evaluate the possible benefits deriving from using a controlled AC/DC converter in spite of a diodes rectifier bridge.

**C2L-A3  11:10**

**Utilization of the Inverter As a Boost Rectifier for the Voltage Regulation of Mechanical Batteries**

K. Aydin\(^2\), M. Aydemir\(^1\)

\(^1\)Gazi University, Turkey; \(^2\)Turkish Aerospace Industries Inc, Turkey

Mechanical batteries have been drawing interest due to their longer life time and bigger depth-of-discharge ratings. Also, they do not have the adverse effects on the environment as the electro-chemical batteries. In mechanical batteries, an electric machinery is run in motor mode at a constant speed, storing kinetic energy in its inertia. When there is a need of energy, the machine is operated in the generator mode and the kinetic energy is returned to the system as electrical power again. These systems are also being considered for space systems for the future. In these systems, regenerated voltage needs to be regulated at the bus level of the space vehicle. Using the inverter that drives the motor as a controlled rectifier in the generator region is proposed in this paper. The system is explained and experimental results are given for a small system to demonstrate the concept.

**C2L-A4  11:30**

**Problems Found During Testing of PDH Devices Used for Transmitting Data Between Power Systems Line Differential Protections**

R. Kowalik, M. Januszewski

*Warsaw University of Technology, Poland*

The paper presents the testing methods, laboratory stand and equipment applied for the tests of exchanging data from protection devices by the PDH equipment. The paper has been developed as a result of cooperation between the Power Engineering Institute of Warsaw University of Technology and PSE Operator S.A. (PPGC Operator). A number of tests had been made under this cooperation, including functional tests of protections and PDH equipment performed with regard to determining the possibilities, conditions and problems that may arise or occur during their interoperability.
C2L-B1  10:30

An Analysis on the Effect of Transmission Errors in Real-Time H.264-MVC Bit-Streams
B. Micallef, C. Debono
University of Malta, Malta

This paper studies the quality of transmitted multi-view video when the corrupted packets are not discarded by the underlying protocols of the decoder. It assumes a wireless channel where the errors can be significant and implements solutions within the current H.264-MVC to reduce their impact on the video quality perceived by the user. The results show that transmission errors drastically reduce the quality of the reconstructed 3D video and confirm that a new type of error propagation between views exists. Furthermore, employing the Context Adaptive Variable Length Coding (CAVLC) entropy encoder, coding and transmitting the video streams in smaller packets, and having a small cyclic-Intra coded period, all improve the error resilience of the system.

C2L-B2  10:50

Combining Optimal Performance with Cost-Efficiency in Adaptive Wireless Broadcast-Based Systems
C. Liaskos, S. Petridou, G. Papadimitriou
Aristotle University of Thessaloniki, Greece

Research on push-based systems has introduced several outstanding theoretical analyses and algorithms, aiming to optimize the clients' mean waiting time under several conditions. However, the computational and memory requirements aspect has been neglected to a great extend, thusly undermining the primary advantage of push systems over pull-based ones, i.e. their minimal cost. In this paper influential and top performing, well-known algorithms are evaluated from a cost aspect. It is shown that radical improvements are required for them to be realizable. Moreover, a new cost-efficient broadcast scheduling algorithm is introduced, achieving nearly top performance with minimal CPU and memory requirements. The new
algorithm also promotes the adaptivity of push systems to the clients' changing needs, another factor that has not been taken into account by traditional approaches.

C2L-B3  11:10

**A Generic Monitoring Architecture for Assuring the QoS in Mobile TV Platforms**

A. Cuadra-Sanchez¹, C. Casas-Caballero²

¹Telefonica R&D, Spain; ²Telefonica Spain, Spain

This article shows a common architecture for monitoring the QoS (Quality of Service) of mobile TV platforms. This solution, which is based on the analysis of quality figures through network probes, will allow service providers to offer their audiovisual services in a competitive manner. The proposal includes the development of an monitoring architecture founded on a common open architecture that gathers the data from the different network segments in a convergent way. This aspect means that the mobile TV services are permanently end-to-end supervised from both the access and the core network. In this specific scenario, the UMTS/3G underlying transport network has been considered to carry the mobile TV service. On the other hand, the core network is constituted by the content delivery platform and the central services centre (CSC), which orchestrates the services offered to end users, such as multicast TV, Video on Demand (VoD) or Pay-per-view (PPV). This paper includes the results obtained from this monitoring platform, applied to one of the major mobile Telco companies, explicitly for the VoD service based on videostreaming sessions.

C2L-B4  11:30

**A Quality of Service-Aware Routing Scheme for Multimedia Streaming in Wireless Cabin Environments**

K. Chetcuti, C. Debono

*University of Malta, Malta*

The advent of efficient video compression algorithms and the increase in the data-rate handling capabilities of wireless standards facilitate multimedia streaming over wireless networks. The Quality of Service (QoS) of this application depends on the number of lost packets and end-to-end delay. In this paper we propose a solution where we ensure a higher success rate of the transmitted multimedia packets in adverse channel conditions.
The proposed algorithm determines the better channel conditions between direct routing and one hop ad-hoc routing. The selected solution is then used for transmission of subsequent multimedia packets until the performance degrades, reinitiating channel selection.

C2L-B5  11:50

60-GHz Transceivers for Wireless HD Uncompressed Video Communication in Nano-Era CMOS Technology
D. Pepe¹, D. Zito²
¹Tyndall National Institute, Ireland; ²University College Cork/Tyndall National Institute, Ireland

This paper reports the system-level study of high-speed wireless system at 60 GHz for uncompressed video communications. The study is addressed to explore the implementation of 60-GHz transceivers in nano-scale CMOS technology. A model of the high data rate physical layer based on the specification released by the consortium Wireless® has been implemented in MATLAB® and the system simulations of the bit error rate have carried in order to derive the specifications of the building blocks of 60-GHz transceiver. Finally, these specifications have been derived by taking into account the capabilities of the 65nm standard CMOS technology.
C2L-C1  10:30

The Challenge of Implementation of Long Term Evolution / System Architecture Evolution (LTE/SAE)
A. Skopljak-Ramovic, S. Pivac
BH Telecom d d Sarajevo, Bosnia

Current 3GPP Release-8 is addressing Evolved-UTRAN or LTE as a new access network and SAE / EPC as an improved version of 3,5G core based on All-IP infrastructure. This workpaper describes the objectives of the actual LTE/SAE standard relating its deployment in Bosnia and Herzegovina and suggests how to implement it smoothly in a mid-size network.

C2L-C2  10:46

An IEEE802.16j Prototype Relay Station Architecture
N. Athanasopoulos3, P. Tsiakas3, K. Voudouris3, D. Manor4, A. Mor1, G. Agapiou2
1DesignArt Networks Ltd, Israel; 2Hellenic Telecommunications Organization S A, Greece; 3Technological Educational Institution of Athens, Greece; 4Ubiquam Ltd, Israel

This research focuses on the architecture of a WiMAX Relay Station (RS) prototype, based on the IEEE802.16j standard. Non-Transparent (NTR) operation is implemented in Time-division Transmit and Receive (TTR) mode. The prototype is configured as a Single Unit Relay Station (SURS). MAC-based relay option is selected as well as distributed scheduling. The prototype RS frequency band of operation is 3.3-3.8 GHz. The top-level architecture of the prototype RS is presented and the operating specifications are given. A detailed description of the modules consisting of that prototype is provided and finally areas of potential research in the framework of the proposed RS architecture are suggested.
C2L-C3  11:03

Improving Contactless Technology by Increase of Transponder Load Modulation with Serial Capacitor
M. Gebhart², R. Szoncso², M. Münzer¹
¹Graz University of Technology, Austria; ²NXP Semiconductors Austria, Austria

Contactless chip technology based on International Standards can be used to implement person-related, secure contactless technology also into objects defining smaller antenna sizes than cards. Provided that sufficient power for chip operation is available, low transponder load modulation is the most limiting factor for the communication distance. A simple capacitance matching network allows to balance between power requirements and load modulation amplitude, so that compliance to the requirements of the Standard and to existing terminal infrastructure can be achieved.

C2L-C4  11:20

A Variance Based Scheduling Strategy for Multi-User MIMO-OFDM System with Generalized Beamforming (GBF)
S. Rahima¹, N. Hamdi²
¹Ecole Nationale d'Ingénieurs de Tunis/SysCOM Laboratory, Tunisia; ²SysCOM laboratory and Institut National des Sciences Appliquées et de Technologie Tunis, Tunisia

In this paper, a new user scheduling strategy is proposed for multiuser MIMO-OFDM system with a low complexity Generalized beamforming scheme. In GBF, user antenna outputs are linearly combined with the receive GBF vector to construct an equivalent MISO downlink channel for each subcarrier. The scheduler located at the base station allocates data streams to users based on the subchannel gains of their subcarriers on each spatial channel. The user with maximum variance of subchannel gains is allowed to select his best subcarrier on his best spatial channel in order to maximize the system weighted sum-rate and fairness among users. The system power is simply uniformly allocated to all the subchannels. A selection of simulation results is presented to illustrate the performance of the proposed algorithm.
In wireless push systems, the server schedules the broadcasts of its information items aiming at satisfying the clients' preferences efficiently. Latest research efforts have proposed adaptive push systems, enhanced with a learning automaton, in which the server has the ability to update its estimated item demand probability vector. This vector indicates the level of the items' desirability. Even though the adaptive push systems are capable of operating in dynamic environments, where the item demand probability distribution changes periodically, the time that the learning automaton needs to adapt its estimated probability vector to a new demand probability distribution leads to degradation of the system's performance. This work addresses this problem, by applying the spline interpolation method to produce an estimation of the changed desirability immediately after this change takes place. A set of indicative feedback samples are collected by the server and the new item demand probability distribution function is approximated, providing the learning automaton with estimated item probabilities, as initial probabilities.

Clustering of mobile nodes among separate domains has been proposed as an efficient approach to mimic the operation of the fixed infrastructure and manage the resources in multi-hop networks. In this paper, it was analyzed a weight-based clustering algorithm. This algorithm is called Enhanced Performance Clustering Algorithm (EPCA). It selects clusterhead according to its weight computed by combining a set of system parameters and defines new mechanisms as cluster division, merging diminution and extension. EPCA was simulated and tested in real conditions in a campus environment.
C2L-D1  10:30

Magnetically Tuned CRLH CPW Zeroth Order Antenna
G. Sajin, S. Simion, F. Craciunoiu, A. Muller, A. Bunea
IMT Bucharest, Romania

This paper presents the results in frequency tuning of a CPW antenna based on CRLH (Composite Right/Left-Handed) transmission lines. In order to be tuned, the antenna was made on a ferrite substrate. The tuning is obtained by magnetically biasing this ferrite substrate with a magnetic biasing field variable between 0 T and 0.26 T. Data obtained by simulation with a suitable microwave software indicate a frequency shift of 530 MHz at a working frequency of 12.88 GHz, in very good agreement with the experimental results showing a frequency shift of 450 MHz.

C2L-D2  10:50

Spline-Profile Smooth-Walled Horn As a Feed of the Multi-Beam Millimetre Focal Plane Array
N. Popenko³, R. Chernobrovkin³, V. Khaikin², M. Nakhimovich³, C. Granet¹
¹BAE Systems, Australia; ²Special Astrophysical Observatory of Russian Academy of Sciences, Russia; ³Usikov Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine, Ukraine

In this paper the optimized smooth-walled spline-profile horn as the feed of the non-phased multibeam focal plane array is presented. The measured -10dB beamwidth is less than 450 in the H- and E-planes. The measured side-lobe levels of the radiation pattern are less than -18dB in the both principal planes. The measured input reflection coefficient is better than -20dB in the frequency range 30GHz -38GHz. The experimental results are in good agreement with simulated ones in the operational frequency band 34GHz - 38GHz. Therefore we consider the smooth-walled spline-profile horn as a good feed of the MFPA for radio telescope.
C2L-D3 11:10

Receiver Antenna Array
L. Dudás³, V. Rösner³, R. Seller³, K. Kazi², N. Minh¹
¹Academy of Military Science and Technology - Radar Institute, Vietnam, Vietnam; ²Bonn Hungary Electronics Co Ltd, Hungary; ³Budapest University of Technology and Economics, Hungary

Our aim is to develop a microwave receiver antenna system on X-band, which can form its radiation pattern (main lobe direction, null-point direction, structure of the side lobes), measure the direction of the RF source in milliseconds. In this paper we will show the theoretical background of the antenna system, the build-up of the realized system and some measurement results.

C2L-D4 11:30

Performance Improvement of Long Distance MIMO Links Using Cross Polarized Antennas
J. Vella, S. Zammit
University of Malta, Malta

MIMO systems can increase channel capacity and improve the range when the number of antennas is increased at both the transmitter and the receiver, without demanding more transmit power. However, point-to-point long distance MIMO links are limited by the keyhole effect which results in a degenerate channel. In this paper we study the use of cross polarization diversity to eliminate the keyhole effect on 802.11n draft 2.0 links. Our results prove the hypothesis that a 2x2 MIMO system with cross polarization at both ends of the link will mitigate the "keyhole" effect and benefit from the MIMO spatial multiplexing gain.
C3L-A1 14:00

Matrix Converter with Overvoltage Protection Circuit
M. Pfeifer, G. Schröder
University of Siegen, Germany

In this paper a matrix converter with a special circuit is presented. It works so that no overvoltage can be produced by an interruption of an input phase when operating with inductive load current. Also a switching off of one or more semiconductors of the inverter matrix can not produce the high voltage spikes by using the overvoltage protection circuit. This matrix converter works without any complicated commutation strategy. This reduces the measurement and control complexity significantly. Also the weight, the volume and the cost are reduced.

C3L-A2 14:20

Control of Doubly Fed Induction Machine Using a Matrix Converter
K. Spiteri, C. Spiteri Staines, M. Apap
University of Malta, Malta

This paper presents the control of a doubly fed induction machine (DFIM) via a matrix converter applied to the machine's rotor side. The experimental set-up shall be used to show its viability for wind energy applications. Stator Field Oriented control of the machine was implemented for active and reactive power control. The effects of harmonics, present in the rotor windings, on the control scheme were analysed. The paper also presents experimental results for power control and variable speed operation of the DFIM.
C3L-A3  14:40

Extended First Harmonic Approximation in Case of LLCC Converters with Capacitive Output Filter
A. Bucher, T. Duerbaum
Friedrich-Alexander-University Erlangen-Nuremberg, Germany

The analysis of resonant converters is in general more cumbersome than in case of PWM converters. Therefore, approximations are required in order to facilitate the design process. An extended approximation for the steady-state solution of the multi-resonant LLCC converter with capacitive output filter is presented in this paper, with a new degree of simplification regarding the resulting closed-form solution. By means of this approximation, the design of the fourth-order resonant LLCC converter is significantly simplified, providing a tool for rapid simulation combined with a very high accuracy. The accuracy of the investigated approach was double-checked by means of exact calculations.

C3L-A4  15:00

Resonant LCC Converter for Low-Profile Applications
A. Pawellek, A. Bucher, T. Duerbaum
Friedrich-Alexander-University Erlangen-Nuremberg, Germany

In addition to high efficiency of switch mode power supplies, miniaturization of converters is an increasingly important aspect. The transformer necessary for mains isolation is realized on a ring core, thus regulation requirements are combined with a low-cost magnetic component. The exact analysis of the LCC converter in the time domain is presented and the solutions of the four important modes of the converter are derived. A prototype was designed in order to demonstrate the feasibility of the proposed approach with an application scenario typical for notebook adapters.
C3L-B1 14:00

**Analysis of Channel Estimation Error for OFDM Reception Over Severely Time-Dispersive Channels**
T. Hurnanen, J. Poikonen  
*University of Turku, Finland*

The accuracy of equalization in the demodulation of orthogonal frequency division multiplexing signals is directly dependent on the density of pilot carriers in the signal and the delay dispersion of the propagation channel. In this paper, the error introduced by an insufficient pilot density with respect to the channel delay dispersion is theoretically analyzed. An expression is derived for the average channel estimation error given an OFDM pilot density and channel power delay profile. Based on this expression, the effect of channel estimation error on the perceived signal-to-noise ratio in the receiver demodulation is approximated. Results of the theoretical analysis and approximation are compared to simulations of OFDM transmitted over time-dispersive channels.

C3L-B2 14:20

**Mitigation of Intercarrier Interference in OFDM Systems Over Slow Fading Channels Based on the EM Algorithm**
A. Vizziello, P. Savazzi, L. Favalli  
*Università degli studi di Pavia, Italy*

Orthogonal Frequency Division Multiplexing (OFDM) is a transmission technique that allows simple multipath channel equalization schemes. On the other side it is sensitive to frequency offset at the local oscillator, phase noise and Doppler shift which may destroy the orthogonality among subcarriers causing Inter Carrier Interference (ICI). It is possible to represent this interference in the frequency domain by means of an ICI matrix. Since these types of errors greatly affect the performance of an OFDM system, estimation of this matrix is crucial. In this work we propose an iterative method to mitigate the interference among subcarriers exploiting the presence of pilot tones in the frequency domain. It can be
explained referring to the Expectation-Maximization (EM) paradigm. The proposed technique is very effective in multipath fading channels and a simplified version is also introduced in case of AWGN channel with frequency offset at the local oscillator. Simulation results show that the presented algorithm converges very quickly and looks promising to be used in actual implementations.

C3L-B3  14:40

FFT-Based Frequency Offset Estimation in OFDM Systems
F. Wu, M. Ali Abu-Rgheff
University of Plymouth, United Kingdom

In this paper, two fast and accurate FFT-based frequency offset estimation methods for OFDM systems are proposed. We analyze and simulate proposed methods in both Gaussian and multipath fading channels, and compare the results with those obtained using well known Schmidl's method. The simulation results are presented in terms of Error Variance (EV). Both proposed FFT-based methods have significantly smaller EV than Schmidl's method in AWGN and Multipath static fading channel and the proposed FFT method-II also has smaller EV than Schmidl's method in multipath time-varying fading channel.

C3L-B4  15:00

Precoding for Improved Performance of Welch-Bound Signature Sets
E. Lehtonen, J. Paavola, A. Dudkov, T. Hurnanen
University of Turku, Finland

Welch-bound signature sets are optimal for oversaturated synchronous CDMA in terms of minimizing the multiple access interference. In this paper, precoding of the sum signal of Welch-bound signatures, in order to maximize the mean signal-to-interference ratio for conventional receivers, is analysed. The gain compared to normal sum signal is calculated, and also the effect on the energy of the sum signal is derived. It is shown that the system with precoding outperforms the system without it, assuming that conventional receiver is used.
C3L-B5  15:20

Treatment of Temporary Narrowband Interference in Non-Coherent Multiband Impulse Radio UWB

H. Dehner¹, H. Jäkel¹, D. Burgkhardt¹, F. Jondral¹, R. Moorfeld², A. Finger²
¹Karlsruhe Institute of Technology, Germany; ²Technische Universität Dresden, Germany

This paper considers low complex interference handling with regard to temporary narrowband interference occurrence within a non-coherent On-Off Keying based multiband impulse radio UWB system. The approach allows a precise and reliable sub-band specific on-line detection of narrowband interference's presence or absence within a packet's data phase. Due to the system's instability after detection of interference absence, a decision threshold replacement is applied to correctly demodulate the data packet's remaining possibly not interfered data bits. Hence, an increased flexibility with respect to efficient interference handling as well as a significant performance gain can be achieved.
Classification of Biological Signals Based on Nonlinear Features
A. Jovic, N. Bogunovic
Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia

The problem of patient disorder classification and prediction from biological signals is addressed. We approach the problem from the perspective of nonlinear dynamical systems. Explored signals are ECG and EEG. We propose a combination of linear and nonlinear features for classification of four different types of heart rhythms through heart rate variability analysis. Classification accuracy is evaluated by three well-known machine learning algorithms: C4.5, support vector machines and random forest. The algorithms' success rates are compared. The method of combining linear and nonlinear measures shows promising results in heart rate variability modeling. Random forest method has exhibited 99.6% classification accuracy.

Optimal Mental Task Discrimination for Brain-Computer Interface
M. Salerno, G. Costantini, D. Casali, G. Saggio, L. Bianchi
Università degli Studi di Roma Tor Vergata, Italy

A Support Vector Machine (SVM) classification method for data acquired by EEG recording for brain/computer interface systems is here proposed. The aim of this work is to evaluate the SVM performance in the recognition of a human mental task, among others. A prerequisite has been the developing of a system able to recognize and classify the following four tasks: thinking to move the right hand, thinking to move the left hand, performing a simple mathematical operation, and thinking to a nursery rhyme.
C3L-C3  14:40

**ECG Signal Acquisition and Analysis for Telemonitoring**
E. Plesnik, O. Malgina, J. Tasic, M. Zajc
*Faculty of Electrical Engineering, University of Ljubljana, Slovenia*

The goal of this article is to present an algorithm for QRS complex detection in an electrocardiogram (ECG) signal, realized in Matlab software. The algorithm was tested on real ECG signals acquired with a commercial monitoring system Alive Heart Monitor [1] and also for reference on signals from MIT-BIH online ECG signal database [2]. The goal of our research is to import signals from the monitoring system to a PDA or a Smart Phone via wireless network for signal processing and use in telehealthcare and telemonitoring. Therefore, we examine the concept of wireless acquisition and digital signal processing of ECG (electrocardiogram) signal, which, in addition to traditional medicine is increasingly used in the field of telemedicine as well as in completely non-medical areas, such as sport, entertainment, marketing, etc. Furthermore, we describe the fundamental architecture of an electrocardiograph and describe and overview the basic methods for ECG signal processing.

C3L-C4  15:00

**A Neural-Network-Based System for Monitoring Driver Fatigue**
S. Ribaric¹, J. Lovrencic¹, N. Pavesic²
¹*Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia;* ²*Univerza v Ljubljani, Fakulteta za elektrotehniko, Slovenia*

A driver's lack of attention due to fatigue or sleepiness is one of the major reasons for traffic accidents. As a result, over the past ten years there has been an increased interest in the methods, techniques and technologies for developing driver-fatigue monitoring systems. In this paper we describe a prototype of a neural-network-based system for monitoring driver fatigue. The system consists of a combination of neural-network-based modules for the extraction of visual bio-behavioural features and a knowledge-based decision module. The prototype of the system was tested under laboratory conditions and the results of the experiment are presented.
C3L-D Analog & Mixed-Signal Circuits

Date: Wednesday, April, 28
Time: 14:00 - 15:40
Room: Castille
Chair: Ivan Grech, University of Malta

C3L-D1  14:00
Power Management Unit for a Ground Referenced Audio Amplifier for Mobile Phones in 65nm CMOS
F. Neri¹, W. Groeneweg¹, M. Balucani²
¹ST-Ericsson, Switzerland; ²Università degli studi di Roma la Sapienza, Italy

This paper presents a fully integrated Ground Referenced Power Management Unit, made up of two linear voltage regulators and a regulated charge pump providing symmetrical power supply system for the earphone audio amplifier. Embedded in a CODEC for mobile phone application and implemented in a 65nm CMOS technology, the paper illustrates in details the architecture and the final measurement on silicon, highlighting great performance for a high quality earphone audio amplifier successfully validated on silicon.

C3L-D2  14:20
Wireless Temperature Sensor Integrated Circuits with on-Chip Antennas
F. Zito, L. Fragomeni, F. Aquilino, F. Della Corte
Università degli Studi Mediterranea di Reggio Calabria, Italy

Two wireless temperature sensors with on-chip antenna realized in 0.35µm CMOS technology are presented. The first sensor exploits a double 3-stage ring oscillator structure, which transform the silicon substrate temperature variation into a frequency modulation. The second device is based on a PTAT (proportional to absolute temperature) sensing element, where the base-emitter voltage difference between two diode connected PNP BJT's with different emitter currents is measured. Temperature information provided by the sensors are transmitted by means of small loop antenna structures which are realized by aluminium deposition on the top surface of the chip, eliminating the need for external connection and sophisticated packaging. The first sensor measurements show a 2.2GHz oscillation frequency vs. temperature at 3.2V bias voltage, for each ring oscillator. The
double oscillator technique allow us to use a mathematical procedure between two different signals, in order to extract a reliable information on temperature, regardless of the frequency vs. bias voltage variation showed by ring oscillator, with the goal of avoiding a voltage regulators. The second sensor measurements show a wide voltage swing vs. temperature at 3.3V bias voltage: this results allow us to convert this voltage in a 8-bits digital signal, in order to drive a RF-transmitter using the On-Off Keying (OOK) modulation.

C3L-D3  14:40

Test Buffer with Extended Common Mode Input Voltage
C. Nicolae\textsuperscript{2}, A. Cracan\textsuperscript{2}, R. Cojan\textsuperscript{1}
\textsuperscript{1}Infineon Romania, Romania; \textsuperscript{2}Universitatea Tehnica Gheorghe Asachi din Iasi, Romania

The paper presents a adequate buffer for testing integrated circuits. The buffer operation is based on changing the DC level of the incoming signal to a reference common mode voltage VR with an error of 0.003\% and it functions for a large domain of common mode input voltages. Also the proposed circuit uses a negative feedback loop to achieve unity gain by transconductance control.

C3L-D4  15:00

Tunable CMOS Resistor Circuit with Improved Linearity Based on the Arithmetical Mean Computation
C. Popa
Universitatea POLITEHNICA din Bucuresti, Romania

An original active resistor structure using exclusively MOS devices working in the saturation region will be further presented. Performing the great advantage of an excellent linearity, obtained by a proper biasing of the differential core (using original translation and arithmetical mean blocks), the proposed circuit is designed for low-voltage low-power operation and allows a very good controllability of the equivalent resistance. The estimated linearity is obtained for an extended range of the differential input voltage and in the worst case of considering second-order effects that affect MOS transistors operation. The frequency response of the new active resistor is strongly increased by operating all MOS devices in the saturation region. The circuit is implemented in 0.35um CMOS technology on a die area of 30umx40um, being supplied at +/-3.6V. The active resistor presents
a very good linearity (THD<0.8%) for an extended range of the input voltage (-2.5<\text{Vx-Vy}<2.5\text{V}). The tuning range is extremely large comparing with the previous reported active resistors: +/- (500\text{kohm}-5\text{Mohm}), the circuit being able to simulate both positive and negative active resistances.
A Neural Network Based Wind Speed Estimator for a Wind Turbine Control
O. Barambones\textsuperscript{2}, J. Gonzalez de Durana\textsuperscript{2}, E. Kremers\textsuperscript{1}
\textsuperscript{1}Universitat Karlsruhe, Denmark; \textsuperscript{2}University of the Basque Country, Spain

Variable speed wind generation systems are more attractive than fixed-speed systems because of the more efficient energy production improved power quality, and improved dynamic performance during grid disturbances. In this sense, to implement maximum wind power extraction, most controller designs of the variable-speed wind turbine generators employ anemometers to measure wind speed in order to derive the desired optimal shaft speed for adjusting the generator speed. In this paper it is proposed a new Neural Network Based Wind Speed Estimator for a wind turbine control. The design uses an feedforward Artificial Neural Network (ANN) to implement a rotor speed estimator, and simulated results show that the proposed observer provides high-performance dynamic characteristics.

Assessment of VoIP Quality Using Bayesian Networks
Z. Gáspár, I. Gócza
University of Transilvania, Romania

This paper presents a novel method for VoIP quality assessment by means of a Bayesian network. Current quality assessment methods are mainly based on voice stream analysis, their main drawback being the large computing power requirements. This novel method relies on call detail records, fact that substantially reduces the processing power requirements. An analysis of real life data, consisting of 460000 answered calls and 371 customer complaints, was done showing that more than 75\% of customer complaints can be identified using this method.
C4P-E3

Overvoltage Protection Systems for Low Voltage and Domestic Electric Consumers
D. Vatau, P. Andea, F. Frigura-Iliasa, F. Surianu, A. Kilyeni, C. Barbulescu
Politehnica University of Timisoara, Romania

The purpose of the paper is to stimulate the power users in Romania to develop a European policy concerning the protection against overvoltages of low voltage electric installations, equipment and apparatus. In this respect, besides a short comparative analysis of the protecting system, there have been presented a Romanian concept concerning the realization of protecting modules equipped with ZnO varistors and original experiments which demonstrate their high quality and usefulness.

C4P-E4

Frequency Domain Stability Inequalities for Nonlinear Time Delay Systems
V. Rasvan, D. Danciu, D. Popescu
University of Craiova, Romania

Motivated by various applications, among which one can mention the problem of PIO - P(ilot)-I(n-the-loop)-O(scillations), it is considered the problem of the absolute (global asymptotic) stability of the zero equilibrium for systems with slope restricted nonlinearities. Since the linear part incorporates also time delay, it is taken the approach of integral equations subject to the so-called IQC - Integral Quadratic Constraints. It is thus obtained an early stability inequality due to V.A. Yakubovich, but valid for time delay systems in the basic (stable) case - when the linear part is exponentially stable.

C4P-E5

A Concept of Q-Varying Digital IIR Narrow Bandpass Filter with Improved Dynamic Behavior
J. Piskorowski, R. Kaszynski
West Pomeranian University of Technology, Poland

Many applications require narrow (single-frequency) bandpass filters (NBPFs) which possess both a very selective magnitude response (i.e. high quality factor Q) and a transient response of short duration. However, increasing the quality factor also increases the duration of the transient...
process in the filter after the action of the excitation. This paper presents a concept of digital IIR narrow bandpass filters whose quality factor changes with time. Owing to a temporary change in the value of the quality factor, the transient can be considerably reduced. Simulations verifying the effectiveness of the proposed Q-varying bandpass filter are presented and compared to the performance of the traditional Q-constant filter.

C4P-E6

Applying Quality of Service Prediction in WDM Optical Networks
P. Sarigiannidis
University of Western Macedonia, Greece

A dynamic prediction scheme is presented in this paper, named PROPHET. The purpose of the proposed technique is to predict, given two different classes of quality of service (QoS), the total amount of the demanded transmission requests per QoS class. PROPHET is constructed based on Hidden Markov Chains (HMC), modeled by an ergodic framework. The prediction objective is to reduce the amount of time spent in computing the transmission schedule by predicting traffic requests. The evaluation of the predictor is realized in a Wavelength Division Multiplexing (WDM) single-hop network with star topology. Furthermore, PROPHET is compared to a previous prediction-based scheme, called POSA. Simulation results indicate that the novel technique supports efficient predictable QoS, since it operates more accurately than POSA.

C4P-E7

Constrained-Control of a Quadrotor Helicopter for Trajectory Tracking Under Wind-Gust Disturbances
K. Alexis, G. Nikolakopoulos, A. Tzes
University of Patras, Greece

In this paper a Constrained Finite Time Optimal Controller (CFTOC) for the problem of trajectory tracking of an Unmanned quadrotor Helicopter (UqH) is presented. The controller is designed based on a Piecewise modeling of the quadrotor for the rotational angles, that are inherently coupled to the translation equations of motion. The proposed CFTO-control scheme is able to take under certain factors that degrade the performance of the helicopter such as the physical and mechanical constraints of the system. Simulation studies illustrate the efficacy of the proposed scheme
and also its ability to attenuate external disturbances that are introduced from environmental causes such as wind gusts.

**C4P-E8**

**Electromagnetic Transients Due to Lightning Strikes on Wind Turbines: a Case Study**

R. Rodrigues¹, V. Mendes¹, J. Catalao²  
¹Instituto Superior de Engenharia de Lisboa, Portugal; ²University of Beira Interior, Portugal

The lightning discharge is one of the two natural sources of electromagnetic interference. Electric and magnetic fields generated by lightning represent a serious hazard to various systems, particularly those containing sensitive electronics. As wind power generation undergoes rapid growth, lightning damages involving wind turbines have come to be regarded with more attention. This paper is concerned with lightning surge propagation in wind turbines. We present a case study, based on a wind turbine with an interconnecting transformer, for the analysis of lightning surges. Computer simulations obtained by using the EMTP-RV code are presented, and conclusions are duly drawn.

**C4P-E9**

**Influence of a SVC on AC Arc Furnaces Harmonics, Flicker and Unbalance. Measurement and Analysis**

M. Donsión³, J. Güemes², F. Oliveira¹  
¹Institute for Systems and Computer Engineering at Coimbra, Portugal; ²University of Basque Country, Spain; ³Vigo University, Spain

An AC arc furnace is an unbalanced, nonlinear and time varying load, which can cause many problems to power system quality. Different studies on arc furnaces harmonics analysis can be found in the bibliography on the topic; however, it is very difficult obtain an exact model that takes into account all the parameters that have influence on the process, therefore it is necessary to take measurements under different conditions. In this paper we'll present the harmonic distortion, flicker and unbalance results and conclusions on three different measurement campaigns in an iron and steel industry (SNL) with an AC arc furnace of 83 MW (170 TM) with a transformer of 120 MVA connected with a dedicated power line of 220 kV (55 km) to the Carregado Substation, where there are another other branches that connect industrial and domestic consumers.
C4P-E11

Impact of Altered Maintenance Cycles on OPEX Regarding HV Equipment
L. Asgarieh\(^2\), G. Balzer\(^2\), A. Gaul\(^1\)
\(^1\)RWE Rheinland Westfalen Netz AG, Germany; \(^2\)Technische Universität Darmstadt, Germany

Nowadays the optimized use of financial resources plays a central role in all areas and hence also in electric power companies. Consequential the utilities are anxious to keep the level of the operational expenditures (OPEX) as low as possible. The determination of the capital and operational expenditures (CAPEX and OPEX) will be done with the aid of an evaluated ageing model for 110-kV circuit-breakers. The ageing model was implemented with the simulation software Powersim Studio® which is based on system dynamics. In this paper the influence of changed overhaul cycles and failure rates on OPEX will be investigated in order to find an optimum relation between these two parameters.

C4P-E12

Evaluation of Errors in Polish Phones Segmentation for Different Types of Transitions
B. Ziolko\(^1\), M. Ziolko\(^1\), S. Manandhar\(^2\), R. Wilson\(^2\)
\(^1\)AGH University of Science and Technology, Poland; \(^2\)University of York, United Kingdom

The paper presents an evaluation of Polish phone segmentation for different types of phones. The categorisation was done based on acoustic properties. The segmentation method is based on discrete wavelet transform and was already published. The results show that several types of transitions, especially from and to vowels cause more errors than others.

C4P-E13

Assessment of Renewable Wind Resources in UK Urban Areas
J. Acosta, S. Djokic
University of Edinburgh, United Kingdom

Renewable wind resources in UK urban areas are analysed in this paper based on the available wind speed measurements and wind turbine manufacturers' data. Power curves of selected wind turbines and measured/fitted wind speed distributions for considered UK urban sites are
used for the estimation of wind turbines maximum annual energy outputs. These results are then compared with the energy outputs obtained when commonly assumed UK mean wind speed values and Rayleigh distribution of average wind speeds are used instead of the measurements. The paper concludes that standard assumptions for UK mean wind speeds and Rayleigh distribution cannot be used for the correct assessment of UK urban wind resources, while Weibull distribution can be used if corresponding factors k and lambda are determined from the measured wind speed data.

C4P-E14

A New Pressure Sensor-Based Electronic Medical Device for the Analysis of Lung Sounds
R. Marani, A. Perri
Politecnico di Bari, Italy

The survival of patients submitted to Intensive Care is often related to the mechanical ventilation, which makes up for serious respiratory insufficiencies but can also become a lethal health risk. To decrease these risks, smart electromedical devices are required. In this paper a microcontroller-based digital electronic device has been designed and realized. This device, which is designed with reference to the most advanced and reliable electronic technologies, is oriented to the monitoring of the respiratory cycle and the relevant ventilator setting.

C4P-E15

Using SAT Techniques in Dynamic Burn-in Vector Generation
F. Aloul, A. Sagahyroon
American University of Sharjah, U.A.E.

Dynamic burn-in testing is an integral component of any test plan that seeks to produce reliable integrated circuits. Despite its importance in ensuring the reliability of semiconductors, burn-in has been a major contributor to overall test cost and turnaround time. In this work we discuss the application of advanced Boolean satisfiability (SAT) techniques to generate a set of vectors or input stimuli that increases the nodal activity in the circuit and hence the elevation of its temperature. The vectors are designed to uniformly stress all parts of the circuit. Additionally, we present a SAT-based methodology where weak nodes can selectively be targeted for high switching activity in an effort to detect potential failures. Finally, SAT-
based solvers are compared against generic Integer Linear Programming (ILP) solvers when handling the vector generation problem.

**C4P-E16**

**Design and "Inteligent" Control of Hybrid Power System in Telecommunication**  
B. Panajotovic, B. Odadzic  
*Republic Telecommunication Agency, Serbia*

The basic prerequisites imposed to telecommunication power systems are related to their safety, long life and uninterruptible power. Hybrid power system design for power feeding of telecommunication equipment has to provide quality uninterruptible voltage. The subject of this paper is hybrid power system requirements, design, practical calculation and sizing of its major part: photovoltaic cell, wind turbine, diesel generators and storage battery. Focus of this paper is "inteligent" control based on weather condition and battery status in this kind of system and benefits as: fuel consumption and CO2 emission reduction and logistic cost decreasing.

**C4P-E17**

**Performance Improvement Method for the Voltage-Fed qZSI with Continuous Input Current**  
D. Vinnikov, I. Roasto, R. Strzelecki, M. Adamowicz  
1*Gdynia Maritime University, Poland; 2Tallinn University of Technology, Estonia*

This paper proposes the performance improvement method for the voltage-fed continuous input current quasi-impedance source inverter (qZSI) by the introduction of the two-stage quasi-Z-source network (qZS-network). The two-stage qZS is derived by adding the one diode, one inductor and two capacitors to the traditional qZSI. The proposed two-stage qZSI inherits all the advantages of traditional solution (voltage boost and buck functions in a single stage, continuous input current and improved reliability). Moreover, the proposed solution features over the 30% shoot-through duty cycle reduction for the same voltage boost factor and component stresses as compared to conventional qZSI. Theoretical analysis of the two-stage qZSI in shoot-through and non-shoot-through operating modes is presented. The design guidelines for the two-stage qZS-network based step-up DC/DC converter are provided. A prototype has been built to verify the theoretical
assumptions. The simulation and experimental results are presented and discussed.

C4P-E18

Amorphous Silicon Waveguides Grown by PECVD on an Indium Tin Oxide Buried Contact
S. Rao², F. Della Corte², C. Summonte¹
¹Institute for Microelectronics and Microsystems, Consiglio Nazionale delle Ricerche, Italy; ²Università degli Studi Mediterranea di Reggio Calabria, Italy

Low-loss hydrogenated amorphous silicon (a-Si:H) waveguides were realized by plasma enhanced chemical vapour deposition (PECVD) on a transparent conductive oxide (TCO) layer which is intended to provide the buried contact in active devices, e.g switches and modulators. In particular we propose a technological solution to overcome both the strong reduction in optical transmittance due to the very high extinction coefficient of metal contacts and, at the same time, the optical scattering induced by the texturization effect induced on a-Si:H films grown on TCO. The realized waveguides were characterized in terms of propagation losses at 1550nm and surface roughness. The experimental performances have been compared to those obtained through calculations using an optical simulation package. The results are found to be in agreement with the experimental data.

C4P-E19

Improved Modeling of Switched Reluctance Motor Including Mutual and Saturation Effects
K. Mhatli², B. Ben Salah¹
¹ENIT, Tunisia; ²Institut supérieure des Etudes Technologiques de Radès, Tunisia

An advanced nonlinear model of four phase switched reluctance motor (SRM) has been developed. The proposed model takes account of the existence of saturation and mutual inductances. A magnetic data based on the finite element method (FEM) has been generated to check the case of single and doubly energized phases. In this data, the self and mutual inductances and the electromagnetic torque have been computed for wide range of current levels and rotor positions. The present predictions are used as look-up tables in order to guess the behavior of the SRM. Finally, as a
demonstration, simulation results are presented to validate the proposed model in both single and doubly excited phase's mode.

**C4P-E20**

*A Genetic Algorithm Solution to the Unit Commitment Problem Based on Real-Coded Chromosomes and Fuzzy Optimization*

A. Ademovic, S. Bisanovic, M. Hajro  
*Faculty for Electrical Engineering University of Sarajevo, Bosnia*

This paper presents a combined Genetic Algorithm (GA) - Fuzzy Optimization (FO) approach to the Unit Commitment (UC) problem. In order to obtain an improved result with respect to all given constraints, a GA using real-coded chromosomes is proposed in opposite to the more commonly used binary coded scheme. Using data from a list of strict priority order, the GA generates different candidate solutions, whereas FO guides the search process under an uncertain environment. The results obtained show satisfactory outcome in total cost, compared to Dynamic Programming based applications and the sole GA solution to the problem.

**C4P-E21**

*Sampling Optimization for Macro-Modeling Interconnect Parasitic Extraction*

A. Shehata Abdellatif, A. El Rouby, M. Abdelhalim, A. Khalil  
1*AASTMT, Egypt*; 2*Cairo University, Egypt*

In this paper, we are focusing on optimizing the sampling stage of the macro-modeling method for interconnect parasitic extraction. Herein, we optimize (minimize) the sample size where a graphically inspired method is introduced to define the minimum sample size for complex non-linear model equation mathematically. This method also addresses the impact of the data set uncertainty on the minimum required sample size. Then, we introduce a method for optimizing the distributing of those minimum required sample size. This sample distribution method, is based on Latin hypercube hybridization, optimizes inter-sample distances and correlations concurrently.
C4P-E22

Adapting the Bloom Filter to Multithreaded Environments
I. Voras, M. Zagar
University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia

Many classical algorithms like the Bloom filter were envisioned and created at a time when computers were the size of rooms and multithreading was not yet even explored theoretically. The landscape of modern mainstream computer systems today is heavily dominated with multi-core CPU-s but the effort to make full use of such systems is still ongoing. The Bloom filter is very useful both as a core algorithm and as a supportive or optimizing addition to existing database algorithms. This work explores adaptations to the basic Bloom filter algorithm for use in multithreaded applications on SMP systems and the consequences of such adaptations to its overall efficiency.

C4P-E24

Thermal Behavior of a Three Phase Inverter for EV (Electric Vehicle)
M. Fakhfakh, M. Ayadi, R. Neji
1ENIS, Tunisia; 2University of Sfax / Electric Vehicle and Power Electronics Group, Tunisia

Power modules including IGBT are widely used in the applications of motor drivers in EV. The thermal behavior of these modules becomes more important to choose the optimum design of cooling system. In this paper, we propose a RC thermal model of the dynamic electro-thermal behavior of IGBT PWM (Pulse Width Modulation) inverter modules. This model is used to estimate the maximum junction temperature of the module. The thermal behaviors of the junction and power dissipation are studied with and without influences between the module components. The electro-thermal model is implemented and simulated with MATLAB simulator.
C4P-E25

Analysis of Permanent Magnet Synchronous Motors with Integer-Slot and Fractional-Slot Windings
J. Güemes\textsuperscript{2}, A. Iraolagoitia\textsuperscript{1}, M. Donsión\textsuperscript{3}, P. Fernández\textsuperscript{2}
\textsuperscript{1}University of Basque Country, Spain; \textsuperscript{2}University of the Basque Country, Spain; \textsuperscript{3}University of Vigo, Spain

This paper examines torque ripple, cogging torque, and d-axis and q-axis reactances variation in permanent magnet synchronous motors (PMSMs). Effect of number of poles on electromagnetic motor torque waveform (including cogging torque), and d- and q-axis reactance, has been analyzed for two different PMSM configurations having the same envelop dimensions and output requirements. Finite element technique is used for computation of the machine characteristics. Maxwell stress tensor is used to find the torque.
C5L-A1 16:20
Flatness-Based Control of an Hydro Power Plant
F. Michaud, G. Robert
EDF Hydro Engineering Center, France
This paper aims at describing a new control law based on the non-linear flatness for the speed governor of an hydroelectric power plant, in order to participate to power-frequency control. Comparison of this nonlinear structure with a linear PI feedforward controller gives better results: lower overshoot and less sensitive with process variations.

C5L-A2 16:40
Influence of Battery Size on Predictive Control for Hybrid Cars
M. Stiegeler, M. Richter, J. Lindenmaier, H. Kabza
University of Ulm, Germany
This paper describes the influence of battery size and electric motor size on the fuel saving potential of a predictive operation strategy for hybrid cars. This predictive control is an enhancement of a standard operation strategy for a parallel hybrid car. Therefore the information about the potential energy along a given route is estimated and included in the determination of operation points of the hybrid control strategy. Smaller batteries benefit most from the knowledge of the potential energy characteristic of a route. This benefit is even higher if the power of the electric motor in the hybrid drivetrain is increased.

C5L-A3 17:00
Micro-Kinetic Generator: Modeling, Energy Conversion Optimization and Design Considerations
M. Lossec, B. Multon, H. Ben Ahmed
SATIE, France
This article focuses on a micro-kinetic generator, which is used in Autoquartz watches designed by the Swiss manufacturer ETA (part of the
Swatch Group). This original electromechanical system, incorporating an intermediate energy storage located in a spring, is based on harnessing the energy from movement. We have built an electromechanical model using the Matlab Simulink application and proceeded with its experimental validation on various movement profiles. Our research has highlighted the existence of an optimal transfer of energy (obtained by either influencing generator design or regulating output voltage of the active rectifier connected to the generator) that helps maximize energy recovery. Finally, this paper presents the results of a system resizing study for the purpose of studying potential system productivity at other scales, and highlights the existence of an optimal set of parameters maximizing energy recovery.

C5L-A4 17:20

A Maximum Power Point Tracking Algorithm for Stand-Alone Photovoltaic Systems Controlled by Low Computational Power Devices
A. Ingegnoli¹, A. Iannopollo²
¹Altair Srl, Italy; ²University of Rome Tor Vergata, Italy

A new Maximum Power Point Tracking (MPPT) algorithm, based on the well known Perturb and Observe (P&O) method is presented. The proposed algorithm includes some refinements, as a three point comparison, variable duty-cycle increment and a timed reset of working parameters, allowing a more efficient control of a stand-alone photovoltaic system. The experimental results show the good response and the robustness of the algorithm.

C5L-A5 17:40

Integrating KPCA and Locally Weighted Support Vector Regression for Short-Term Load Forecasting
E. Elattar, J. Goulermas, H. Wu
University of Liverpool, United Kingdom

This paper proposes a new approach to solve the STLF problem that considers electricity price as one of the main characteristics of the system load. The proposed method is derived by integrating KPCA with locally weighted support vector regression (LWSVR). LWSVR can be derived by modifying the risk function of the support vector regression algorithm with use of LWR while keeping the regularization term in its original form. In addition, to optimize the weighting function's bandwidth, the weighted distance algorithm is presented. The performance of the proposed model is
evaluated with the historical load, temperature and price data from the Victorian electricity market in Australia. The results show that the proposed method provides a relatively better forecasting performance in comparison with other published models employing the same data.

**C5L-A6  18:00**

**AALRES: an Intelligent Expert System for Realization of Adaptive Autonomy Using Logistic Regression**

A. Fereidunian, M. Zamani, F. Boroomand, H. Jamalabadi, H. Lesani, C. Lucas  
*University of Tehran, Iran*

We have introduced a novel framework for realization of Adaptive Autonomy (AA) in human-automation interaction (HAI) systems, as well as several expert system realizations of that. This study presents an expert system for realization of AA, using logistic regression (LR), referred to as Adaptive Autonomy Logistic Regression Expert System (AALRES). The proposed system prescribes proper Levels of Automation (LOAs) for various environmental conditions, here modeled as Performance Shaping Factors (PSFs), based on the extracted rules from the experts' judgments. LR is used as the expert system's inference engine. The practical list of PSFs and the judgments of GTEDC's (the Greater Tehran Electric Distribution Company) experts are used as expert system database. The results of implementing AALRES to GTEDC's network are evaluated against the exact predictions of the presented expert system. Evaluations show that AALRES can predict the proper LOA for GTEDC's Utility Management Automation (UMA) system, which change according to changes in PSFs; thus providing an adaptive LOA scheme for UMA.
C5L-B1 16:20

Simple Implementation of Almost Passivity in PID Controlled Systems
I. Rusnak\textsuperscript{2}, I. Barkana\textsuperscript{1}
\textsuperscript{1}Gordon Center for Engineering Research, Technion IIT, Israel; \textsuperscript{2}RAFAEL, Israel

The theory, use and implementation of robust adaptive control algorithms require the understanding of Passivity and Almost Passivity. For LTI system these are the Strictly Positive Realness (SPR) and Almost Strictly Positive Realness (ASPR) concepts. Although these concepts have been defined in the existing literature, their grasp is not straightforward for the practicing control engineer that deals with real-world plants. In an attempt to present the interpretation and meaning of these concepts in a more intuitive way, in this paper we use various frequency domains illustrations that may help the control engineer better grasp their implications. An important result that is formalized and proved is that any system controlled by PID controller can be made to become ASPR and thus, robust adaptive control can be used towards improvement of performance. An example is also given in order to demonstrate these concepts.

C5L-B2 16:40

Proportional Navigation with Integral Action
C. Heller, I. Yaesh
Israel Military Industries Ltd, Israel

A new version of the Proportional Navigation guidance law is derived where integral action is included to compensate for target maneuvers while avoiding the need to estimating these maneuvers. The new guidance law is derived also for situations where the Line of Sight is rotating, and can be, therefore used also for mechanizing command to line of sight guidance. The new guidance law can be applied in a variety of applications, e.g. mobile robots or aerial robotic vehicles which are required to intercept moving objects. The new guidance law is demonstrated using a simple numerical example.
C5L-B3 17:00

Almost Decentralized Model Predictive Control of Power Networks
R. Hermans, M. Lazar, A. Jokic, P. van Den Bosch
Eindhoven University of Technology, Netherlands

Stable operation of the electrical power grid in the future will require novel, advanced control techniques for supply and demand matching, as a consequence of the liberalization and decentralization of electrical power generation. Currently, there is an increasing interest for using model predictive control (MPC) for power balancing. However, a centralized implementation of MPC is hampered by the large scale and complexity of power networks. Non-centralized, scalable control schemes are more suited for future application. In this paper we therefore propose a novel almost-decentralized Lyapunov-based predictive control algorithm for power balancing, i.e. for asymptotic stabilization of the network frequency. The algorithm is particularly suited for large-scale power networks, as it requires only local information and limited communication between directly-neighboring control areas to provide a stabilizing control action. We assess the suitability of this scheme and compare it with state-of-the-art non-centralized MPC in a benchmark case study.

C5L-B4 17:20

A Nonlinear Control Law for Two-Wheeled Self-Balanced Vehicles
V. Madero, J. Aracil, F. Gordillo
University of Seville, Spain

This paper presents the design of a nonlinear control law for two-wheeled self-balanced vehicles. The design is based on forwarding and gives a Lyapunov function that allows us to obtain an estimation of the domain of attraction for the resultant law.

C5L-B5 17:40

Controllers for Trajectory Tracking and String-Like Formation in Wheeled Mobile Robots with Bounded Inputs
A. Ailon, I. Zohar
Ben-Gurion University of the Negev, Israel

This study presents simple controllers for achieving trajectory tracking for the kinematic model of a Wheeled Mobile Robots (WMRs) with bounded inputs. The proposed controllers are based on smooth uniformly bounded
functions that can easily be realized. The underlying tracking controller can be applied to control a group of WMRs, in particular for achieving a string-like formation.

C5L-B6 18:00

Study on Power System Extended Small Signal Stability Region (DE-SSSR) in Time Delay Space
H. Jia, X. Yu, C. Wang, W. Wei, Y. Zeng, J. Zhao, P. Li
Tianjin University, China

In power system, coordination controllers are usually designed based on the data from PMU and WAMS. Time delays in the measurement data are significant so that they can not be simply ignored. So, it is important to evaluate the impact of time delays on power system stability analysis and controller design. In this paper, an extended small signal stability region in time delay space (DE-SSSR) is presented so that it can consider the low frequency oscillation phenomena captured in the power system operations. Definition of DE-SSSR is first given, and the structure of its boundaries is discussed. Then a practical method is given to trace the boundaries of DE-SSSR. Finally, WSCC 3-generator-9-bus system is employed to validate the effectiveness of the presented method. Work of this paper is helpful to power system stability assessment and controller design with considering time delays in wide-area environment.
C5L-C1 16:20

A Cross Layer Fair Resource Allocation Scheme for an OV-CDMA Based Optical Network
E. Inaty³, R. Raad³, P. Fortier², M. Maier¹
¹Institut National de la Recherche Scientifique, Canada; ²Laval University, Canada; ³University of Balamand, Lebanon

This paper addresses the problem of resource allocation for a multiclass time-slotted optical overlapped code-division multiple-access (OV-CDMA) network. A faire resource allocation (FRA) scheme is considered with the quality of service (QoS) requirements on both physical layer signal-to-interference ratio (SIR) and MAC layer average packet delay. A cross-layer approach in allocating the transmission power and rate for every class of users in the network is considered. It is shown that, although the FRA allocates the largest bandwidth under the R-ALOHA protocol, it forces the users to transmit with relatively higher power in comparison with the power required for the S-ALOHA and the R3T protocols.

C5L-C2 16:40

Round-Trip Time Estimation in Telecommunication Networks Using Composite Expanding and Fading Memory Polynomials
G. Lusilao-Zodi², M. Dlodlo², G. De Jager², K. Ferguson¹
¹Council for Scientific and Industrial Research Meraka Institute, South Africa; ²University of Cape Town, South Africa

Heterogeneous communication networks with their variety of application demands, time-varying load, and mixture of wired and wireless links pose several challenging problems in modeling and control. This paper focuses on estimation of the round trip time which is important for the transport layer because it impacts the throughput of TCP and allows efficient development of congestion control techniques for multimedia applications. An algorithm that combines expanding and fading memory polynomials to predict a future value of the round trip time from previously recorded values is proposed. Comparison using real data collected when streaming a
video over the Internet proves that a composite filter of degree zero provides better start-up estimations than the round trip time estimator currently used in TCP. Additionally, the paper provides an algorithm of a composite polynomial filter of degree 3 and illustrates its ability in tracking the instant value of the round trip time.

**C5L-C3 17:00**

**Determining Optimal Signal Features and Parameters for HMM-Based Emotion Classification**  
R. Böck, D. Hübner, A. Wendemuth  
*Otto-von-Guericke-University Magdeburg, Germany*

The recognition of emotions from speech is a challenging issue. Creating emotion recognisers needs well defined signal features, parameter sets, and a huge amount of data material. Indeed, it is influenced by several conditions. This paper focuses on a proposal of an optimal parameter set for an HMM-based recogniser. For this, we compared different signal features (MFCCs, LPCs, and PLPs) as well as several architectures of HMMs. Moreover, we evaluated our proposal on three databases (eNTERFACE, Emo-DB, and SmartKom). Different proposals for acted/naive emotion recognition are given as well as recommendations for efficient and valid validation methods.

**C5L-C4 17:20**

**Fairness of Scheduling Algorithms for Real-Time Traffic in DiffServ Based Networks**  
S. Zoric, M. Bolic  
*BH Telecom d d Sarajevo, Bosnia*

In this paper is presented methodology of provisioning QoS (Quality of Service) in DiffServ based IP network. DiffServ is scalable IP based technology which can efficiently provide QoS in networks of DiffServ supporting routers. We evaluated performances of our proposed scheme for QoS provisioning of real-time traffic, using WFQ (Weighted Fair Queuing) scheduler to schedule the transmissions. Simulations are performed using network simulator ns2, while EXP and CBR traffic generators are used as real-time traffic sources for voice and video applications. Through the simulation study we show the effect on queuing delays and jitter of both traffic types when their WFQ weights vary and derive and optimal weights that provide the best overall delay and jitter for real-time traffic.
C5L-C5  17:40

Channel Equalization with Cellular Neural Networks
A. Özmen, B. Tander
Kadir Has University, Turkey

In this paper, a dynamic neural network structure called Cellular Neural Network (CNN) is employed for the equalization in digital communication. It is shown that, this nonlinear system is capable of suppressing the effect of intersymbol interference (ISI) and the noise at the channel. The architecture is a small-scaled, simple CNN containing 9 neurons, thus having only 19 weight coefficients. Proposed system is compared with linear transversal filters as well as with a Multilayer Perceptron (MLP) based equalizer.

C5L-C6  18:00

Towards a Broadband Communications Manager to Regulate Train-to-Earth Communications
U. Gutiérrez, I. Salaberria, A. Perallos, R. Carballedo
University of Deusto, Spain

This paper describes an innovative broadband (WiFi) communications manager designed to manage 'train-to-earth' communications. This communications manager aims to deal with applications communication needs and make decisions about what applications can communicate in each moment taking into account broadband features, application priorities and train connection states. Currently, as part of the architecture's validation, new digital services in the field of railways have been developed and they are being implanted, and some others are being scheduled to be developed.
C5L-D1  16:20

Competing Risk Model for Oil Circuit Breaker Dynamic Reliability Assessment
R. Medjoudj¹, D. Aissani¹, K. Haim²
¹University of Bejaia, Algeria; ²University of Zittau, Germany

In this paper, we investigate the modeling of competing risk problems involving both catastrophic and degradation failures of oil circuit breaker under normal functioning conditions. Using a real case study, shocks highlighted by short-circuits frequency and magnitudes are modeled using non homogeneous Poisson process, however the random variables representing degradations are modeled following Weibull, uniform and exponential distributions respectively. The aim is the evaluation of system reliability and state probabilities upon the mission time. In this paper it has been proved that one part of system reliability improvement may be supported throughout the relevance of the downstream performances.

C5L-D2  16:40

New Method for Voltage Sags Characteristics Detection in Electrical Networks
F. Molnar-Matei, M. Moga, A. Pana
Politehnica University of Timisoara, Romania

Voltage sag is one of the most important problems of the power quality which affects the new sensitive equipments. For analysing the effects of voltage sag on sensitive equipments, we need to establish a method for characterization of voltage sags. This paper present a new method for detecting the type of voltage sags, from real-time measured data, method that will be implemented in an algorithm, for monitoring the voltage sags in distribution electrical network.
C5L-D3  17:00

Calculation of Outage Costs for Maintenance Purposes in Medium Voltage Networks
J. Bühler, T. Krontiris, G. Balzer
Technische Universität Darmstadt, Germany

This paper presents a simulation model used to determine the importance of every single asset in a given medium voltage network. Each asset is ranked on the basis of the outage costs caused by its failure. In this way, sensitive areas in the grid can be detected and maintenance of the net can be organized in such a way as to maximize the cost-profit rate.

C5L-D4  17:20

Risk Sensitivity of Failure Rate and Maintenance Expenditure: Application of VaR Metrics in Risk Management
A. Schreiner2, G. Balzer2, A. Precht1
1EnBW Regional AG, Germany; 2Technische Universität Darmstadt, Germany

Analysis of risks is an inseparable part of asset management of power systems. The paper presents the simple but reliable method for risk management of power system carried out for an urban 10 kV network located in Germany. The basis of the method is operational risk calculation. The proposed approach combines the probability and severity of risk contingencies based on reliability indices of the system components. The calculated risk index calls Value at Risk and is very common in risk calculation of financial assets. Proposed approach allows furthermore the sensitivity analysis of such important risk factors and improves the asset management activities.

C5L-D5  17:40

Power Quality Monitoring. Data Relevance and Usefulness
D. Apetrei2, G. Chicco1, R. Neurohr3, M. Albu3, P. Postolache3
1Politecnico di Torino, Italy; 2SC Electrica SA, Romania; 3Universitatea POLITEHNICA din Bucuresti, Romania

Power quality data gathered on-site are referred to specific standards to assess whether the power parameters are within the prescribed limits. In this paper, data resulting from several voltage waveform long-term monitoring campaigns are studied as to highlight their relevance to the steady-state
conditions of the distribution grids. Mainly based on half-cycle voltage measurement, this paper presents ways to improve data versatility in power quality investigation. Thanks to the latest technology developments, now it is possible to deal with significant amounts of data that can be used in improving power quality management. After recalling the IEC61000-4-30 requirements for voltage measurement, the paper presents an analysis of the measurement results, including a statistical approach which enables considerations on data stationarity.

**C5L-D6  18:00**

**Welch Periodogram Analysis of the Leakage Current on Insulator Model Under Wetted Contaminated Conditions for Flashover Prediction**  
M. Douar, A. Mekhaldi, M. Bouzidi  
Ecole Nationale Supérieure Polytechnique d'Alger, Algeria

This work is devoted to study the dielectric performances of a plane model wetted and contaminated by salt solutions having different conductivities. This insulator model simulates the 1512 L outdoor insulator which is greatly used by the Algerian Company of Gas and Electric Power (SONELGAZ). In this paper, we present signal processing results obtained through leakage current waveforms in order to predict the insulator flashover. These investigations were achieved after calculations operated on the leakage current energy by using the Welch frequency spectrum analysis. This frequency representation is performed on leakage current waveforms during the electric discharges activity appearing on the polluted plane surface. Reported results showed that the occurrence of electric discharges induced a progressive evaporation of the electrolytic solution and that this evaporation became stronger with the increase of pollution level.
<table>
<thead>
<tr>
<th>Author</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abate, Leonardo</td>
<td>20</td>
</tr>
<tr>
<td>Abdel-Akher, Mamdouh</td>
<td>12</td>
</tr>
<tr>
<td>Abdel-Hafez, Mohammed</td>
<td>79</td>
</tr>
<tr>
<td>Abdelhalim, Mohamed Bakr</td>
<td>137</td>
</tr>
<tr>
<td>Abdelhedi, Manel</td>
<td></td>
</tr>
<tr>
<td>Abuhdima, Esmaeil Mohamed</td>
<td>63</td>
</tr>
<tr>
<td>Achanta, Radhakrishna</td>
<td>103</td>
</tr>
<tr>
<td>Acosta, Jorge</td>
<td>133</td>
</tr>
<tr>
<td>Adamowicz, Marek</td>
<td>88, 135</td>
</tr>
<tr>
<td>Adegovic, Alma</td>
<td>137</td>
</tr>
<tr>
<td>Adloo, Hassan</td>
<td>76</td>
</tr>
<tr>
<td>Adly, Ihab</td>
<td>93</td>
</tr>
<tr>
<td>Agapiou, George</td>
<td>114</td>
</tr>
<tr>
<td>Ailon, Amit</td>
<td>144</td>
</tr>
<tr>
<td>Aissani, Djamil</td>
<td>149</td>
</tr>
<tr>
<td>Ait Ahmed, Mourad</td>
<td>80</td>
</tr>
<tr>
<td>Alabbasi, Rabee'</td>
<td>1</td>
</tr>
<tr>
<td>Albertos, Pedro</td>
<td>85</td>
</tr>
<tr>
<td>Albu, Mihaela</td>
<td>150</td>
</tr>
<tr>
<td>Al-Diab, Ahmad</td>
<td>103</td>
</tr>
<tr>
<td>Alexis, Kostas</td>
<td>131</td>
</tr>
<tr>
<td>Alfonzetti, Salvatore</td>
<td>38</td>
</tr>
<tr>
<td>Ali Abu-Rghaff, Mosa</td>
<td>122</td>
</tr>
<tr>
<td>Ali, Mahmoud</td>
<td>4, 122</td>
</tr>
<tr>
<td>Ali, Nazar</td>
<td>64, 108</td>
</tr>
<tr>
<td>Al-Jufout, Saleh</td>
<td>3</td>
</tr>
<tr>
<td>Alo, Daniel</td>
<td>79</td>
</tr>
<tr>
<td>Alonistioti, Nancy</td>
<td>45</td>
</tr>
<tr>
<td>Aloul, Fadi</td>
<td>80, 134</td>
</tr>
<tr>
<td>AlQuraishi, Eman</td>
<td>48</td>
</tr>
<tr>
<td>AlTeenan, Reem</td>
<td>48</td>
</tr>
<tr>
<td>Anagnostatos, Stavros</td>
<td>31</td>
</tr>
<tr>
<td>Andea, Petru</td>
<td>102, 130</td>
</tr>
<tr>
<td>Andre', Paulo</td>
<td>105</td>
</tr>
<tr>
<td>Andrei, Horia</td>
<td>33</td>
</tr>
<tr>
<td>Andrei, Paul</td>
<td>33</td>
</tr>
<tr>
<td>Apap, Maurice</td>
<td>8, 119</td>
</tr>
<tr>
<td>Apretrei, Dan</td>
<td>150</td>
</tr>
<tr>
<td>Aquilino, Fabio</td>
<td>86, 126</td>
</tr>
<tr>
<td>Aracil, Javier</td>
<td>144</td>
</tr>
<tr>
<td>Arai, Yasuo</td>
<td></td>
</tr>
<tr>
<td>Argypopoulous, Theodore</td>
<td></td>
</tr>
<tr>
<td>Arias, A</td>
<td></td>
</tr>
<tr>
<td>Armenakis, Andreas</td>
<td></td>
</tr>
<tr>
<td>Asada, Kunihiro</td>
<td></td>
</tr>
<tr>
<td>Asgarieh, Leyla</td>
<td></td>
</tr>
<tr>
<td>Astad, Kristian Prestrud</td>
<td>10</td>
</tr>
<tr>
<td>Atallah, Kais</td>
<td></td>
</tr>
<tr>
<td>Athanasopoulous, Nikos</td>
<td>114</td>
</tr>
<tr>
<td>Athanasopoulou, Stavros</td>
<td>93</td>
</tr>
<tr>
<td>Ayadi, Moez</td>
<td></td>
</tr>
<tr>
<td>Aydemir, Mehmet Timur</td>
<td>72, 110</td>
</tr>
<tr>
<td>Aydin, Kutlay</td>
<td></td>
</tr>
<tr>
<td>Bahaa, Ayman</td>
<td>44</td>
</tr>
<tr>
<td>Balafas, Constantine</td>
<td>6</td>
</tr>
<tr>
<td>Balucani, Marco</td>
<td>126</td>
</tr>
<tr>
<td>Balzer, Gerd</td>
<td>83, 133, 150</td>
</tr>
<tr>
<td>Bandera, Antonio</td>
<td>8</td>
</tr>
<tr>
<td>Bandera, Juan Pedro</td>
<td>8</td>
</tr>
<tr>
<td>Barambones, Oscar</td>
<td>129</td>
</tr>
<tr>
<td>Barbancho, Ana M</td>
<td>31</td>
</tr>
<tr>
<td>Barbancho, Isabel</td>
<td>31</td>
</tr>
<tr>
<td>Barbosa, Pedro</td>
<td>94</td>
</tr>
<tr>
<td>Barbulescu, Constantin</td>
<td>13, 60, 130</td>
</tr>
<tr>
<td>Barkana, Itzhak</td>
<td>75, 143</td>
</tr>
<tr>
<td>Barukang, Liawas</td>
<td>67</td>
</tr>
<tr>
<td>Basili, Roberto</td>
<td>18</td>
</tr>
<tr>
<td>Begic, Zlatan</td>
<td>5</td>
</tr>
<tr>
<td>Ben Ahmed, Hamid</td>
<td>140</td>
</tr>
<tr>
<td>Ben Hadj Slama, Jaleleddine</td>
<td>65</td>
</tr>
<tr>
<td>Ben Hamida, Ahmed</td>
<td></td>
</tr>
<tr>
<td>Ben Messaoud, Zaineb</td>
<td>23</td>
</tr>
<tr>
<td>Ben-Asher, Joseph</td>
<td>75</td>
</tr>
<tr>
<td>Bencini, Luca</td>
<td>51</td>
</tr>
<tr>
<td>Berg, Yngvar</td>
<td>26</td>
</tr>
<tr>
<td>Bianchi, Luigi</td>
<td>124</td>
</tr>
<tr>
<td>Bingham, Christopher</td>
<td>109</td>
</tr>
<tr>
<td>Author</td>
<td>Page(s)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Bíró, Oszkár</td>
<td>54</td>
</tr>
<tr>
<td>Bisanovic, Smajo</td>
<td>137</td>
</tr>
<tr>
<td>Biscarri, Félix</td>
<td>13</td>
</tr>
<tr>
<td>Biscarri, Jesús</td>
<td>13</td>
</tr>
<tr>
<td>Blanchfield, Peter</td>
<td>34</td>
</tr>
<tr>
<td>Bobric, Elena-Crenguta</td>
<td>12</td>
</tr>
<tr>
<td>Böck, Ronald</td>
<td>147</td>
</tr>
<tr>
<td>Bodea, Mircea</td>
<td>68</td>
</tr>
<tr>
<td>Bogunovic, Nikola</td>
<td>124</td>
</tr>
<tr>
<td>Bolic, Melika</td>
<td>5, 147</td>
</tr>
<tr>
<td>Bolognesi, Paolo</td>
<td>107, 109</td>
</tr>
<tr>
<td>Bonaiuto, Vincenzo</td>
<td>58</td>
</tr>
<tr>
<td>Borlea, Ioan</td>
<td>13</td>
</tr>
<tr>
<td>Boroomand, Farzam</td>
<td>142</td>
</tr>
<tr>
<td>Borras, Dolores</td>
<td>95</td>
</tr>
<tr>
<td>Borrás, Maria Dolores</td>
<td>61</td>
</tr>
<tr>
<td>Borzi, Giuseppe</td>
<td>38</td>
</tr>
<tr>
<td>Botez, Ruxandra</td>
<td>10</td>
</tr>
<tr>
<td>Botha, Philip</td>
<td>49</td>
</tr>
<tr>
<td>Bouallegue, Ammar</td>
<td>37, 44, 100</td>
</tr>
<tr>
<td>Boughariou, Mariam</td>
<td>70</td>
</tr>
<tr>
<td>Bouktir, T</td>
<td>30</td>
</tr>
<tr>
<td>Bousaleh, Ghazi</td>
<td>59, 87</td>
</tr>
<tr>
<td>Bouzidi, Mohamed Chérif</td>
<td>151</td>
</tr>
<tr>
<td>Bowron, Peter</td>
<td>108</td>
</tr>
<tr>
<td>Bravo, Juan Carlos</td>
<td>61, 95</td>
</tr>
<tr>
<td>Brown, Colin</td>
<td>92</td>
</tr>
<tr>
<td>Bualoti, Rajmonda</td>
<td>22</td>
</tr>
<tr>
<td>Bucher, Alexander</td>
<td>120</td>
</tr>
<tr>
<td>Bühler, Jochen</td>
<td>150</td>
</tr>
<tr>
<td>Buissen, Jean</td>
<td>4</td>
</tr>
<tr>
<td>Bunea, Alina Cristina</td>
<td>32, 117</td>
</tr>
<tr>
<td>Burgkhardt, Dennis</td>
<td>123</td>
</tr>
<tr>
<td>Carota, Massimo</td>
<td>96</td>
</tr>
<tr>
<td>Cartina, Gheorghe</td>
<td>12</td>
</tr>
<tr>
<td>Caruana, Cedric</td>
<td>87</td>
</tr>
<tr>
<td>Casali, Daniele</td>
<td>18, 96, 124</td>
</tr>
<tr>
<td>Casas-Caballero, Clara</td>
<td>112</td>
</tr>
<tr>
<td>Casha, Owen</td>
<td>104</td>
</tr>
<tr>
<td>Cassar, David</td>
<td>57</td>
</tr>
<tr>
<td>Castilla, Manuel</td>
<td>61, 95</td>
</tr>
<tr>
<td>Catalão, Joao</td>
<td>30, 89</td>
</tr>
<tr>
<td>Ceballos, S</td>
<td>90</td>
</tr>
<tr>
<td>Celo, Marialis</td>
<td>22</td>
</tr>
<tr>
<td>Cepisca, Costin</td>
<td>33</td>
</tr>
<tr>
<td>Cerda-Villafana, Gustavo</td>
<td>92</td>
</tr>
<tr>
<td>Cerva, Petr</td>
<td>18</td>
</tr>
<tr>
<td>Chaari, Lamia</td>
<td>38</td>
</tr>
<tr>
<td>Charalampidis, Nikolaos</td>
<td>68</td>
</tr>
<tr>
<td>Che Wanik, Mohd Zamri</td>
<td>62</td>
</tr>
<tr>
<td>Chen, Xiao Lin</td>
<td>34</td>
</tr>
<tr>
<td>Chernobrovkin, Roman</td>
<td>117</td>
</tr>
<tr>
<td>Chetcuti, Keith</td>
<td>112</td>
</tr>
<tr>
<td>Chevaux, Nicolas</td>
<td>63</td>
</tr>
<tr>
<td>Chiang, Ming-Chao</td>
<td>96</td>
</tr>
<tr>
<td>Chicco, Gianfranco</td>
<td>14, 150</td>
</tr>
<tr>
<td>Chinnici, Stefano</td>
<td>1</td>
</tr>
<tr>
<td>Chirila, Aurel-Ionut</td>
<td>52</td>
</tr>
<tr>
<td>Choubani, Fethi</td>
<td>85</td>
</tr>
<tr>
<td>Choubani, Mohsen</td>
<td>85</td>
</tr>
<tr>
<td>Chrysoulas, Christos</td>
<td>39</td>
</tr>
<tr>
<td>Cilia, Joseph</td>
<td>87</td>
</tr>
<tr>
<td>Cipriani, Elisa</td>
<td>33</td>
</tr>
<tr>
<td>Clement, Kristien</td>
<td>40</td>
</tr>
<tr>
<td>Cojan, Radu</td>
<td>127</td>
</tr>
<tr>
<td>Colantonio, Paolo</td>
<td>33, 51</td>
</tr>
<tr>
<td>Collodi, Giovanni</td>
<td>51</td>
</tr>
<tr>
<td>Concolato, Cyril</td>
<td>73</td>
</tr>
<tr>
<td>Conesa-Roca, Alfonso</td>
<td>50</td>
</tr>
<tr>
<td>Correia, Higino</td>
<td>36</td>
</tr>
<tr>
<td>Corsonello, Pasquale</td>
<td>29</td>
</tr>
<tr>
<td>Costantini, Giovanni</td>
<td>18, 96, 124</td>
</tr>
<tr>
<td>Costou, Anthony</td>
<td>97</td>
</tr>
<tr>
<td>Coviello, Giuseppe</td>
<td>7</td>
</tr>
<tr>
<td>Cracan, Arcadie</td>
<td>127</td>
</tr>
<tr>
<td>Craciun, Cristian</td>
<td>102</td>
</tr>
<tr>
<td>Craciunoil, Florea</td>
<td>32, 117</td>
</tr>
<tr>
<td>Cristian, Dan</td>
<td>60</td>
</tr>
</tbody>
</table>
AUTHOR INDEX

Cuadra-Sanchez, Antonio ............ 112
Cucek, Hrvoje ............................ 2
Cuka, Biljana ............................ 41
Culver, Stephen ........................ 94
Cutajar, Michelle ....................... 104

D

Danchiv, Andrei ......................... 68
Danciu, Daniela ......................... 130
Danesh Shakib, Arefeh ............... 83
Daneti, Marllene ....................... 57
Dardi, Francesca ....................... 20
David, Jacques ......................... 85
De Breucker, Sven ..................... 40
De Jager, Gerhard ...................... 146
de Trazegnies, Carmen ............... 19
Deaconu, Ioan-Dragos ................. 52
Debono, Carl ............................ 64, 111, 112
Decanis, Carmelo ...................... 1
Dehner, Hanns-Ulrich ................. 123
Delimar, Marko ......................... 42, 89
Della Corte, Francesco ............... 86, 104, 105, 126, 136
Deng, Jing ................................ 15
Dervos, Constantine ................. 6, 35
Deschrijver, Dirk ...................... 33
Dhaene, Tom ............................ 33
Di Palma, Davide ....................... 51
Dionisio, Rogério ...................... 105
Djokic, Sasa ............................. 133
Djurovic, Zeljko ....................... 15, 39
Dlodlo, Mqhele ......................... 7, 24, 146
Dolga, Valer ........................... 105
Donsión, Manuel ....................... 132, 139
Douar, Mohammed Adnane .......... 151
Doussas, Farida ......................... 103
Draca, Dragana ......................... 25
Dragicevic, Tomislav ................... 42
Dragomirescu, Daniela ............... 97
Dragos, Claudia-Adina ............... 53
Driesen, Johan ......................... 40
Dudás, Levente ......................... 25, 118
Dudkov, Alexey ......................... 122
Duerbaum, Thomas ..................... 120

Dumnic, Boris ........................... 89
Dumur, Didier ........................... 17
Dziwoki, Grzegorz ..................... 58

E

El Rouby, Alaa B ....................... 137
Elattar, Ehab ............................ 141
El-Hennawy, Adel ........................ 93
Elkhazmi, Elmahti ..................... 64
Elrahman, Ashraf Mahmoud .......... 56
El-Zein, Abd Elatif ..................... 37
Eminoglu, Ilyas ........................ 54
Erdeljan, Aleksandar ................. 42
Eremenko, Vladimir ................. 9
Erlich, Istvan ........................... 62
Ezatabadi Pour, Mostafa ............. 61

F

Fahmy, Hossam ......................... 23, 44
Faiz, Jawad .............................. 50
Fakhfakh, Mohamed Amine ........... 70, 138
Fakhfakh, Mourad ....................... 70, 138
Faria, Pedro ............................ 40, 61, 106
Farrugia, Reuben ...................... 19, 32
Favalli, Lorenzo ....................... 121
Fekete, Kresimir ....................... 81
Fereidunian, Alireza ................... 142
Ferguson, Keith ....................... 146
Fernández, Pablo ...................... 139
Ferreira, Judite ......................... 40
Ferreira, Luis A.F.M .................. 21, 76
Finger, Adolf .......................... 123
Fischer, Jan ............................ 85
Fisher, R.A. ............................ 3
Fortier, Paul .......................... 146
Fotowat-Ahmady, Ali ................... 69
Fourati, Mohamed ..................... 38
Fragomeni, Letizia .................... 86, 126
Fredembach, Clement ............... 103
Frigura-Iliasa, Flaviu Mihai ........ 130
### AUTHOR INDEX

**G**

<table>
<thead>
<tr>
<th>Author</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaouda, Ahmed</td>
<td>79</td>
</tr>
<tr>
<td>Gáspár, Zoltán</td>
<td>129</td>
</tr>
<tr>
<td>Gatt, Edward</td>
<td>104</td>
</tr>
<tr>
<td>Gaul, Armin</td>
<td>133</td>
</tr>
<tr>
<td>Gavrilovaia, Gheorghe</td>
<td>52</td>
</tr>
<tr>
<td>Gavrilovaia, Mariuca Roxana</td>
<td>52</td>
</tr>
<tr>
<td>Gebhart, Michael</td>
<td>115</td>
</tr>
<tr>
<td>Geidl, Martin</td>
<td>21</td>
</tr>
<tr>
<td>Genesi, Camillo</td>
<td>83, 91</td>
</tr>
<tr>
<td>Geth, Frederik</td>
<td>40</td>
</tr>
<tr>
<td>Gharsallah, Ali</td>
<td>85</td>
</tr>
<tr>
<td>Ghazizadeh, H.</td>
<td>50</td>
</tr>
<tr>
<td>Ghemigean, Adina Mariana</td>
<td>52</td>
</tr>
<tr>
<td>Ghita, Constantin</td>
<td>52</td>
</tr>
<tr>
<td>Ghoneim, Salma</td>
<td>23</td>
</tr>
<tr>
<td>Giannini, Franco</td>
<td>33, 51</td>
</tr>
<tr>
<td>Gidlund, Mikael</td>
<td>94</td>
</tr>
<tr>
<td>Giofrè, Rocco</td>
<td>33, 51</td>
</tr>
<tr>
<td>Góczka, Izabella</td>
<td>129</td>
</tr>
<tr>
<td>Godovanyuk, Vladimir</td>
<td>86</td>
</tr>
<tr>
<td>Gómez, Jose Maria</td>
<td>53</td>
</tr>
<tr>
<td>Gonzalez, Antonio</td>
<td>85</td>
</tr>
<tr>
<td>Gordillo, Francisco</td>
<td>144</td>
</tr>
<tr>
<td>Goulernas, John</td>
<td>141</td>
</tr>
<tr>
<td>Granet, Christophe</td>
<td>117</td>
</tr>
<tr>
<td>Grech, Ivan</td>
<td>104</td>
</tr>
<tr>
<td>Grigoras, Gheorghe</td>
<td>12</td>
</tr>
<tr>
<td>Grigorie, Lucian</td>
<td>10</td>
</tr>
<tr>
<td>Grillo, Samuele</td>
<td>60</td>
</tr>
<tr>
<td>Groeneweg, Willem</td>
<td>126</td>
</tr>
<tr>
<td>Güemes, José Antonio</td>
<td>132, 139</td>
</tr>
<tr>
<td>Guerrero, Juan Ignacio</td>
<td>13</td>
</tr>
<tr>
<td>Guidi, Andrea</td>
<td>103</td>
</tr>
<tr>
<td>Gunes, Ece Olcay</td>
<td>3</td>
</tr>
<tr>
<td>Gustavsen, Bjorn</td>
<td>33</td>
</tr>
<tr>
<td>Gutiérrez, Jaime</td>
<td>61</td>
</tr>
<tr>
<td>Gutiérrez, Unai</td>
<td>148</td>
</tr>
<tr>
<td>Hajek, Vitezslav</td>
<td>87</td>
</tr>
<tr>
<td>Hajro, Mensur</td>
<td>137</td>
</tr>
<tr>
<td>Hamdi, Noureddine</td>
<td>44, 100, 115</td>
</tr>
<tr>
<td>Hamdi, Omessaad</td>
<td>37</td>
</tr>
<tr>
<td>Hamilton, Benjamin</td>
<td>94</td>
</tr>
<tr>
<td>Hammad, Youssef A.</td>
<td>101</td>
</tr>
<tr>
<td>Han, Seunghyun</td>
<td>73</td>
</tr>
<tr>
<td>Harris, Nick</td>
<td>94</td>
</tr>
<tr>
<td>Hasanovic, Amer</td>
<td>55</td>
</tr>
<tr>
<td>Hassan, Dina</td>
<td>44</td>
</tr>
<tr>
<td>Hassoun, Fahd</td>
<td>59, 87</td>
</tr>
<tr>
<td>Hatzidimitriou, Epameinontas</td>
<td>55</td>
</tr>
<tr>
<td>Hayatleh, Khaled</td>
<td>68</td>
</tr>
<tr>
<td>Hedayati, Hajir</td>
<td>69</td>
</tr>
<tr>
<td>Heller, Carmit</td>
<td>143</td>
</tr>
<tr>
<td>Hermans, Ralph</td>
<td>144</td>
</tr>
<tr>
<td>Herms, Atila</td>
<td>53</td>
</tr>
<tr>
<td>Hettegger, Martin</td>
<td>54</td>
</tr>
<tr>
<td>Holburn, David M</td>
<td>28</td>
</tr>
<tr>
<td>Houssamo, Issam</td>
<td>90</td>
</tr>
<tr>
<td>Hübner, David</td>
<td>147</td>
</tr>
<tr>
<td>Hung, Peter</td>
<td>92</td>
</tr>
<tr>
<td>Hurnenan, Tero</td>
<td>121, 122</td>
</tr>
</tbody>
</table>

**I**

<table>
<thead>
<tr>
<th>Author</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iannopollo, Antonio</td>
<td>141</td>
</tr>
<tr>
<td>Ibarra-Manzano, Oscar</td>
<td>2</td>
</tr>
<tr>
<td>Ikeda, Makoto</td>
<td>26</td>
</tr>
<tr>
<td>Ilic, Nemanja</td>
<td>17</td>
</tr>
<tr>
<td>Inaty, Elie</td>
<td>146</td>
</tr>
<tr>
<td>Ingegnoli, Alessandro</td>
<td>141</td>
</tr>
<tr>
<td>Iraolagoitia, Ana</td>
<td>139</td>
</tr>
<tr>
<td>Irwin, George</td>
<td>15, 92</td>
</tr>
<tr>
<td>Ivanchenko, Igor</td>
<td>86, 107</td>
</tr>
<tr>
<td>Ivanovic, Veselin</td>
<td>82</td>
</tr>
<tr>
<td>Ivanovski, Zoran</td>
<td>59</td>
</tr>
<tr>
<td>Izydorczyk, Jacek</td>
<td>51</td>
</tr>
</tbody>
</table>

**H**

<table>
<thead>
<tr>
<th>Author</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hage Chehade, Rafic</td>
<td>87</td>
</tr>
<tr>
<td>Haim, Klaus Dieter</td>
<td>149</td>
</tr>
<tr>
<td>Hairik, Haroutuon</td>
<td>1</td>
</tr>
<tr>
<td>Jáckel, Holger</td>
<td>123</td>
</tr>
<tr>
<td>Jalili, Armin</td>
<td>69</td>
</tr>
<tr>
<td>Jamalabadi, Hamid Reza</td>
<td>142</td>
</tr>
<tr>
<td>Jammal, Ahmad</td>
<td>59</td>
</tr>
<tr>
<td>Name</td>
<td>Page Numbers</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Janda, Marcel</td>
<td>87</td>
</tr>
<tr>
<td>Januszewski, Marcin</td>
<td>107, 110</td>
</tr>
<tr>
<td>Jentsch, Marc</td>
<td>73</td>
</tr>
<tr>
<td>Ježernik, Karel</td>
<td>72</td>
</tr>
<tr>
<td>Ji, Helen</td>
<td>36, 145</td>
</tr>
<tr>
<td>Jia, Hongjie</td>
<td>145</td>
</tr>
<tr>
<td>Jiang, Jiming</td>
<td>28</td>
</tr>
<tr>
<td>Jigoria-Oprea, Dan</td>
<td>13</td>
</tr>
<tr>
<td>Jokic, Andrej</td>
<td>144</td>
</tr>
<tr>
<td>Jondral, Friedrich</td>
<td>123</td>
</tr>
<tr>
<td>Jones, Richard</td>
<td>34</td>
</tr>
<tr>
<td>Jovanovski, Srdjan</td>
<td>82</td>
</tr>
<tr>
<td>Jovic, Alan</td>
<td>124</td>
</tr>
<tr>
<td>Kabza, Herbert</td>
<td>140</td>
</tr>
<tr>
<td>Kadar, Peter</td>
<td>40</td>
</tr>
<tr>
<td>Kadhem, Wissam</td>
<td>1</td>
</tr>
<tr>
<td>Kaiserlis, Nikolaos</td>
<td>84</td>
</tr>
<tr>
<td>Kakali, Vasiliki</td>
<td>116</td>
</tr>
<tr>
<td>Kakarountas, Athanasios</td>
<td>39, 55</td>
</tr>
<tr>
<td>Kaklamanis, Christos</td>
<td>93</td>
</tr>
<tr>
<td>Kalivas, Grigoris</td>
<td>9</td>
</tr>
<tr>
<td>Kallet, Firas</td>
<td>56</td>
</tr>
<tr>
<td>Kaloxylos, Alexandros</td>
<td>45</td>
</tr>
<tr>
<td>Kamoun, Lotfi</td>
<td>38</td>
</tr>
<tr>
<td>Kanoun, Mariem</td>
<td>56</td>
</tr>
<tr>
<td>Kara-Omar, Ali</td>
<td>97</td>
</tr>
<tr>
<td>Kartalov, Tomislav</td>
<td>59</td>
</tr>
<tr>
<td>Kasznynski, Roman</td>
<td>130</td>
</tr>
<tr>
<td>Katie, Vladimir</td>
<td>89, 101</td>
</tr>
<tr>
<td>Kazi, Károly</td>
<td>118</td>
</tr>
<tr>
<td>Kazmierkowsk, Marian</td>
<td>71</td>
</tr>
<tr>
<td>Kee, Robert</td>
<td>92</td>
</tr>
<tr>
<td>Kevelham, Bart</td>
<td>73</td>
</tr>
<tr>
<td>Kezunovic, Mladen</td>
<td>41</td>
</tr>
<tr>
<td>Khaikin, Vladimir</td>
<td>117</td>
</tr>
<tr>
<td>Khalil, Ahmed H</td>
<td>137</td>
</tr>
<tr>
<td>Khelfane, Ilham</td>
<td>103</td>
</tr>
<tr>
<td>Khmyrova, Irina</td>
<td>95</td>
</tr>
<tr>
<td>Khodabakhshian, Amin</td>
<td>61</td>
</tr>
<tr>
<td>Khodr, Hussein</td>
<td>40, 61, 106</td>
</tr>
<tr>
<td>Khruslov, Maksym</td>
<td>107</td>
</tr>
<tr>
<td>Kilyeni, Annamaria</td>
<td>13, 130</td>
</tr>
<tr>
<td>Kilyeni, Stefan</td>
<td>53, 60, 102</td>
</tr>
<tr>
<td>Kircl, Murvet</td>
<td>3</td>
</tr>
<tr>
<td>Knezevic, Goran</td>
<td>81</td>
</tr>
<tr>
<td>Knobloch, Juergen</td>
<td>99</td>
</tr>
<tr>
<td>Kocaman, Cagri</td>
<td>54</td>
</tr>
<tr>
<td>Kocan, Enis</td>
<td>46</td>
</tr>
<tr>
<td>Kocijan, Jus</td>
<td>16</td>
</tr>
<tr>
<td>Kos, Andrej</td>
<td>46</td>
</tr>
<tr>
<td>Koufakis, Emmanuel</td>
<td>31</td>
</tr>
<tr>
<td>Kovac, Zoran</td>
<td>81</td>
</tr>
<tr>
<td>Kovalchuk, Michail</td>
<td>86</td>
</tr>
<tr>
<td>Kowalik, Ryszard</td>
<td>107, 110</td>
</tr>
<tr>
<td>Kremers, Enrique</td>
<td>129</td>
</tr>
<tr>
<td>Krontiris, Thanos</td>
<td>150</td>
</tr>
<tr>
<td>Krzeminski, Zbigniew</td>
<td>88</td>
</tr>
<tr>
<td>Kulic, Filip</td>
<td>42</td>
</tr>
<tr>
<td>Kvascev, Goran</td>
<td>15</td>
</tr>
<tr>
<td>Kvieska, Pedro Neiva</td>
<td>80</td>
</tr>
<tr>
<td>Lademan, Lukasz</td>
<td>88</td>
</tr>
<tr>
<td>Lang, Sidney</td>
<td>3</td>
</tr>
<tr>
<td>Laoudias, Costas</td>
<td>27</td>
</tr>
<tr>
<td>Lashley, Jason</td>
<td>3</td>
</tr>
<tr>
<td>Lassen, Benny</td>
<td>34</td>
</tr>
<tr>
<td>Latkoski, Pero</td>
<td>45</td>
</tr>
<tr>
<td>Lazar, Mircea</td>
<td>144</td>
</tr>
<tr>
<td>Lebret, Guy</td>
<td>80</td>
</tr>
<tr>
<td>Lecoq, Paul</td>
<td>77</td>
</tr>
<tr>
<td>Lefranc, Pierre</td>
<td>17</td>
</tr>
<tr>
<td>Lehtonen, Eero</td>
<td>122</td>
</tr>
<tr>
<td>León, Carlos</td>
<td>13</td>
</tr>
<tr>
<td>Lesani, Hamid</td>
<td>142</td>
</tr>
<tr>
<td>Li, Kang</td>
<td>15</td>
</tr>
<tr>
<td>Li, Peng</td>
<td>145</td>
</tr>
<tr>
<td>Liaskos, Christos</td>
<td>111</td>
</tr>
<tr>
<td>Linde, Micha</td>
<td>48</td>
</tr>
<tr>
<td>Lindenmaier, Jochen</td>
<td>140</td>
</tr>
<tr>
<td>Linenber, Nadav</td>
<td>35</td>
</tr>
<tr>
<td>Litke, Alan</td>
<td>77</td>
</tr>
<tr>
<td>Liu, Tzong-Shi</td>
<td>106</td>
</tr>
<tr>
<td>Locment, Fabrice</td>
<td>90</td>
</tr>
<tr>
<td>López, Antonio</td>
<td>61, 95</td>
</tr>
<tr>
<td>López, Manel</td>
<td>53</td>
</tr>
</tbody>
</table>
Lorenz, Andreas ..................... 73
Lossec, Marianne ................... 140
Lou, Mourad ............................ 56, 70
Louw, Daniel ......................... 49
Lovrencic, Juraj ...................... 125
Luca, Anamaria ....................... 17
Lucas, Caro ............................ 142
Lukovic, Slobodan ................... 42
Lusilao-Zodi, Guy-Alain .......... 146

M
Madero, Vicente ....................... 144
Magnenat-Thalmann, Nadia .... 73
Maharaj, B.T ............................ 49
Mahdad, Belkacem .................... 30
Mahmoud, Karar ...................... 12
Maier, Martin .......................... 146
Malgina, Olga ........................... 125
Mamou, Mahmoud ..................... 10
Manandhar, Suresh ................... 133
Mandai, Shingo ....................... 26
Manes, Antonio ....................... 51
Manes, Gianfranco ................... 51
Manor, Daniel .......................... 114
Manuilov, Ivan ........................ 67
Manuylov, Ivan ........................ 66
Marani, Roberto ....................... 69, 134
Marannino, Paolo .................... 83, 91
Mariano, Silvio J.P.S ............... 21, 76
Markarian, Garik ..................... 67
Masmoudi, Nouri ...................... 53
Massaoudi, Ayman ................... 53
Massucco, Stefano ................... 60
Mastorakis, Nikos ................... 85
Matic, Dragan ......................... 89
Mazzon, Riccardo ..................... 47
McEwan, Neil ......................... 64
McLoone, Sean ....................... 92
Mebarik, Youssef ..................... 10
Medjoudj, Rabah ...................... 149
Mekhaldi, Abdelouahab ......... 151
Melicio, Rui ............................ 30
Mendes, Paulo ......................... 36
Mendes, Victor ...................... 30, 89, 132
Merenda, Massimo .................... 86
Merentitis, Andreas ................ 45
Mergos, John ........................... 35
Mezher, Kahtan ....................... 108
Mhatli, Kais ............................ 136
Micallef, Alexander ................. 8
Micallef, Brian ........................ 111
Micallef, Joseph ...................... 104
Michalevsky, Yan .................... 81
Michaud, Frederic ................. 140
Micskei, Tibor ......................... 25
Mihaylova, Lyudmila ................ 66
Millán, Rocio .......................... 13
Minh, Nguyen Thi Ngoc .......... 118
Mir-Moghtadai, Vahid .............. 69
Mnerie, Dumitru ..................... 60, 102
Mnif, Hassene .......................... 56
Modic, K.A .............................. 3
Moga, Mihai ............................ 149
Mohamed, Azah ....................... 62
Molina, Marta ......................... 10
Molina-Matei, Florin ............. 149
Monedero, Iñigo ....................... 13
Montagna, Mario ..................... 83, 91
Montagna, Sergio ..................... 80
Montague, Ryan ....................... 109
Montaño, Juan-Carlos .............. 61, 95
Moorfeld, Rainer ...................... 123
Mor, Avishay .......................... 114
Morais, Hugo ......................... 40
Morales-Mendoza, Luis Javier ... 83
Mosincat, Ioan ....................... 53
Moulai, Hocine ....................... 22, 103
Mujcic, Aljo ............................ 55
Muller, Andrei ......................... 32, 117
Multon, Bernard ..................... 140
Münzer, Martin ....................... 115
Muscat, Adrian ....................... 64
Musuroi, Sorin ....................... 100
Myrda, Paul ............................ 41

N
Nacer, Azzeddine ..................... 103
<table>
<thead>
<tr>
<th>Author Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Najjar, Abdelhalim</td>
<td>44</td>
</tr>
<tr>
<td>Nakhimovich, Mark</td>
<td>117</td>
</tr>
<tr>
<td>Nakura, Toru</td>
<td>26</td>
</tr>
<tr>
<td>Navrapescu, Valentin</td>
<td>52</td>
</tr>
<tr>
<td>Neji, Rafik</td>
<td>138</td>
</tr>
<tr>
<td>Neri, Filippo</td>
<td>126</td>
</tr>
<tr>
<td>Neudorfer, Harald</td>
<td>54</td>
</tr>
<tr>
<td>Neurohr, Ralf</td>
<td>150</td>
</tr>
<tr>
<td>Ni, Bingchang</td>
<td>91</td>
</tr>
<tr>
<td>Nicolae, Cojan</td>
<td>127</td>
</tr>
<tr>
<td>Nijdam, Niels</td>
<td>73</td>
</tr>
<tr>
<td>Nikolakopoulos, George</td>
<td>131</td>
</tr>
<tr>
<td>Nikolovski, Srete</td>
<td>81</td>
</tr>
<tr>
<td>Nogueira, Rogério</td>
<td>105</td>
</tr>
<tr>
<td>Noulis, Thomas</td>
<td>27, 84</td>
</tr>
<tr>
<td>Nouza, Jan</td>
<td>18</td>
</tr>
<tr>
<td>Novakovic, Jelica</td>
<td>35</td>
</tr>
<tr>
<td>Obaidat, Mohammad</td>
<td>6</td>
</tr>
<tr>
<td>Odadzic, Borislav</td>
<td>135</td>
</tr>
<tr>
<td>Olarescu, Nicola Valeriu</td>
<td>100</td>
</tr>
<tr>
<td>Oliveira, Filipe</td>
<td>132</td>
</tr>
<tr>
<td>Orbán, József</td>
<td>25</td>
</tr>
<tr>
<td>Ordoñez, Manuel</td>
<td>95</td>
</tr>
<tr>
<td>Ostapov, S.E</td>
<td>86</td>
</tr>
<tr>
<td>Ozbudak, Ozlem</td>
<td>3</td>
</tr>
<tr>
<td>Özdemir, Muammer</td>
<td>54</td>
</tr>
<tr>
<td>Özmen, Atilla</td>
<td>148</td>
</tr>
<tr>
<td>Paavola, Jarkko</td>
<td>122</td>
</tr>
<tr>
<td>Pacheco, Javier</td>
<td>19</td>
</tr>
<tr>
<td>Pana, Adrian</td>
<td>25, 149</td>
</tr>
<tr>
<td>Panajotovic, Aleksandra</td>
<td>25</td>
</tr>
<tr>
<td>Panajotovic, Boban</td>
<td>135</td>
</tr>
<tr>
<td>Panovski, Ljupcho</td>
<td>59</td>
</tr>
<tr>
<td>Papadimitriou, Christina</td>
<td>82</td>
</tr>
<tr>
<td>Papadimitriou, Georgios</td>
<td>6, 111, 116</td>
</tr>
<tr>
<td>Papadopoulos, Charalampos</td>
<td>9</td>
</tr>
<tr>
<td>Papaioannou, Evi</td>
<td>93</td>
</tr>
<tr>
<td>Papic, Veljko</td>
<td>15, 39</td>
</tr>
<tr>
<td>Papini, Francesco</td>
<td>109</td>
</tr>
<tr>
<td>Paran, Sanaz</td>
<td>76, 86</td>
</tr>
<tr>
<td>Paranchich, Stepan</td>
<td>86</td>
</tr>
<tr>
<td>Pavesic, Nikola</td>
<td>125</td>
</tr>
<tr>
<td>Pawellek, Alexander</td>
<td>120</td>
</tr>
<tr>
<td>Pejanovic-Djurisic, Milica</td>
<td>46</td>
</tr>
<tr>
<td>Pepe, Domenico</td>
<td>113</td>
</tr>
<tr>
<td>Perallos, Asier</td>
<td>148</td>
</tr>
<tr>
<td>Pérez-Cáceres, Silverio</td>
<td>83</td>
</tr>
<tr>
<td>Perfetti, Renzo</td>
<td>18</td>
</tr>
<tr>
<td>Perri, Anna Gina</td>
<td>69, 134</td>
</tr>
<tr>
<td>Perri, Stefania</td>
<td>29</td>
</tr>
<tr>
<td>Peter, Blaz</td>
<td>46</td>
</tr>
<tr>
<td>Petridou, Sophia</td>
<td>6, 111</td>
</tr>
<tr>
<td>Petriu, Emil M</td>
<td>53</td>
</tr>
<tr>
<td>Petrov, Aleksandar</td>
<td>59</td>
</tr>
<tr>
<td>Pezzimenti, Fortunato</td>
<td>104</td>
</tr>
<tr>
<td>Pfiefer, Markus</td>
<td>119</td>
</tr>
<tr>
<td>Phulpin, Yannick</td>
<td>4</td>
</tr>
<tr>
<td>Piazzon, Luca</td>
<td>33, 51</td>
</tr>
<tr>
<td>Pignolo, Maurizio</td>
<td>80</td>
</tr>
<tr>
<td>Piskorowski, Jacek</td>
<td>130</td>
</tr>
<tr>
<td>Pitto, Andrea</td>
<td>60</td>
</tr>
<tr>
<td>Pivac, Senad</td>
<td>114</td>
</tr>
<tr>
<td>Pjantic, Edin</td>
<td>55</td>
</tr>
<tr>
<td>Plana, Robert</td>
<td>97</td>
</tr>
<tr>
<td>Plesnik, Emil</td>
<td>125</td>
</tr>
<tr>
<td>Pohanka, Jan</td>
<td>85</td>
</tr>
<tr>
<td>Poikonen, Jussi</td>
<td>121</td>
</tr>
<tr>
<td>Polikrati, Aikaterini</td>
<td>31</td>
</tr>
<tr>
<td>Pombo, Jose A.N</td>
<td>76</td>
</tr>
<tr>
<td>Pomportsis, Andreas</td>
<td>116</td>
</tr>
<tr>
<td>Pop, Oana</td>
<td>102</td>
</tr>
<tr>
<td>Popa, Cosmin</td>
<td>127</td>
</tr>
<tr>
<td>Popenko, Nina</td>
<td>86, 107, 117</td>
</tr>
<tr>
<td>Popescu, Dan</td>
<td>130</td>
</tr>
<tr>
<td>Popov, Andrei</td>
<td>10</td>
</tr>
<tr>
<td>Popovski, Borislav</td>
<td>45</td>
</tr>
<tr>
<td>Porsumb, Radu</td>
<td>14</td>
</tr>
<tr>
<td>Pospisil, Stanislav</td>
<td>78</td>
</tr>
<tr>
<td>Postolache, Petru</td>
<td>14, 150</td>
</tr>
<tr>
<td>Pou, J</td>
<td>90</td>
</tr>
<tr>
<td>Pousinho, Hugo</td>
<td>89</td>
</tr>
<tr>
<td>Precht, Armin</td>
<td>150</td>
</tr>
<tr>
<td>Precup, Radu-Emil</td>
<td>53</td>
</tr>
<tr>
<td>Preitl, Stefan</td>
<td>53</td>
</tr>
<tr>
<td>Author</td>
<td>Page(s)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Pribula, Ondrej</td>
<td>85</td>
</tr>
<tr>
<td>Prikryl, Jan</td>
<td>16</td>
</tr>
<tr>
<td>Proios, Achilles</td>
<td>31</td>
</tr>
<tr>
<td>Psychalinos, Costas</td>
<td>27</td>
</tr>
<tr>
<td>Puche-Panadero, Ruben</td>
<td>39</td>
</tr>
<tr>
<td>Raad, Robert</td>
<td>146</td>
</tr>
<tr>
<td>Radac, Mircea-Bogdan</td>
<td>53</td>
</tr>
<tr>
<td>Radhakrishnan, Hariharsudan</td>
<td>49</td>
</tr>
<tr>
<td>Sivaram</td>
<td></td>
</tr>
<tr>
<td>Radonjc, Milutin</td>
<td>11</td>
</tr>
<tr>
<td>Radusinovic, Igor</td>
<td>11</td>
</tr>
<tr>
<td>Ragai, Hani</td>
<td>93</td>
</tr>
<tr>
<td>Rahima, Sayeb</td>
<td>115</td>
</tr>
<tr>
<td>Ramos, Carlos</td>
<td>61</td>
</tr>
<tr>
<td>Ramponi, Giovanni</td>
<td>20</td>
</tr>
<tr>
<td>Ranenko, Illarly</td>
<td>86</td>
</tr>
<tr>
<td>Rao, Sandro</td>
<td>105, 136</td>
</tr>
<tr>
<td>Rasvvan, Vladimir</td>
<td>130</td>
</tr>
<tr>
<td>Raute, Reiko</td>
<td>87</td>
</tr>
<tr>
<td>Rawashdeh, Osamah</td>
<td>79</td>
</tr>
<tr>
<td>Reis, Claudia</td>
<td>105</td>
</tr>
<tr>
<td>Ribaric, Slobodan</td>
<td>125</td>
</tr>
<tr>
<td>Ribeiro, Joao</td>
<td>36</td>
</tr>
<tr>
<td>Richter, Michael</td>
<td>140</td>
</tr>
<tr>
<td>Righetti, Xavier</td>
<td>74</td>
</tr>
<tr>
<td>Rizzo, Alessandro</td>
<td>99</td>
</tr>
<tr>
<td>Roasto, Indrek</td>
<td>135</td>
</tr>
<tr>
<td>Robert, Gerard</td>
<td>140</td>
</tr>
<tr>
<td>Robles, E</td>
<td>90</td>
</tr>
<tr>
<td>Rodrigues, Rafael</td>
<td>132</td>
</tr>
<tr>
<td>Rodriguez, Juan Antonio</td>
<td>8</td>
</tr>
<tr>
<td>Rodriguez-Ayerbe, Pedro</td>
<td>17</td>
</tr>
<tr>
<td>Román-Lumbresas, Manuel</td>
<td>50</td>
</tr>
<tr>
<td>Rösnner, Vilmos</td>
<td>118</td>
</tr>
<tr>
<td>Rossi, Stefano</td>
<td>83, 91</td>
</tr>
<tr>
<td>Rukzio, Enrico</td>
<td>73</td>
</tr>
<tr>
<td>Rusnak, Ilan</td>
<td>75, 143</td>
</tr>
<tr>
<td>Sabater, Jordi</td>
<td>53</td>
</tr>
<tr>
<td>Sagahyroon, Assim</td>
<td>80, 134</td>
</tr>
<tr>
<td>Saggio, Giovanni</td>
<td>124</td>
</tr>
<tr>
<td>Saidi, Sofiene</td>
<td>65</td>
</tr>
<tr>
<td>Sajin, Gheorhe</td>
<td>32, 117</td>
</tr>
<tr>
<td>Sala, Antonio</td>
<td>85</td>
</tr>
<tr>
<td>Salaberrra, Itziar</td>
<td>148</td>
</tr>
<tr>
<td>Salah, Moatza</td>
<td>56</td>
</tr>
<tr>
<td>Saleh, Ibrahim</td>
<td>63</td>
</tr>
<tr>
<td>Salerno, Mario</td>
<td>96, 124</td>
</tr>
<tr>
<td>Salerno, Nunzio</td>
<td>38</td>
</tr>
<tr>
<td>Saliba, Chris</td>
<td>32</td>
</tr>
<tr>
<td>Saliba, Michael</td>
<td>57</td>
</tr>
<tr>
<td>Salvador, José</td>
<td>71</td>
</tr>
<tr>
<td>Samaranyake, Meththa</td>
<td>36</td>
</tr>
<tr>
<td>Sandoval, Francisco</td>
<td>19</td>
</tr>
<tr>
<td>Sarban, Rahim</td>
<td>34</td>
</tr>
<tr>
<td>Sargeni, Fausto</td>
<td>58</td>
</tr>
<tr>
<td>Sarigiannisid, Panagiotis</td>
<td>6, 116, 131</td>
</tr>
<tr>
<td>Sarikan, Alper</td>
<td>72</td>
</tr>
<tr>
<td>Sarrabayrous, Gerard</td>
<td>27, 84</td>
</tr>
<tr>
<td>Savazzi, Pietro</td>
<td>121</td>
</tr>
<tr>
<td>Schreiner, Andrej</td>
<td>150</td>
</tr>
<tr>
<td>Schröder, Günter</td>
<td>119</td>
</tr>
<tr>
<td>Secerbegovic, Elmir</td>
<td>5</td>
</tr>
<tr>
<td>Sechiliariu, Manuela</td>
<td>90</td>
</tr>
<tr>
<td>Segura, Cristian</td>
<td>31</td>
</tr>
<tr>
<td>Sekulovic, Nikola</td>
<td>25</td>
</tr>
<tr>
<td>Sellami, Noura</td>
<td>53</td>
</tr>
<tr>
<td>Seller, Rudolf</td>
<td>25, 118</td>
</tr>
<tr>
<td>Sezgin, Abdullah</td>
<td>5</td>
</tr>
<tr>
<td>Sfaihi, Imen</td>
<td>100</td>
</tr>
<tr>
<td>Shahgholian, Gh</td>
<td>50</td>
</tr>
<tr>
<td>Shallom, Ilan D</td>
<td>35</td>
</tr>
<tr>
<td>Sharawi, Mohammad</td>
<td>79</td>
</tr>
<tr>
<td>Shehata, Khaled</td>
<td>93</td>
</tr>
<tr>
<td>Sherwali, Hamid H</td>
<td>101</td>
</tr>
<tr>
<td>Shmaliy, Yuriy</td>
<td>2, 83, 92</td>
</tr>
<tr>
<td>Shoham, Tamar</td>
<td>81</td>
</tr>
<tr>
<td>Siala, Mohamed</td>
<td>53</td>
</tr>
<tr>
<td>Silva, Manuel</td>
<td>36</td>
</tr>
<tr>
<td>Silvestro, Federico</td>
<td>36</td>
</tr>
<tr>
<td>Simion, Stefan</td>
<td>32, 117</td>
</tr>
<tr>
<td>Simo, Attila</td>
<td>32, 60</td>
</tr>
<tr>
<td>Siskos, Stylianos</td>
<td>27, 84</td>
</tr>
<tr>
<td>Siviero, Ilaria</td>
<td>83, 91</td>
</tr>
<tr>
<td>Skafidas, Panagiotis</td>
<td>6</td>
</tr>
<tr>
<td>Name</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Sklavos, Nicolas</td>
<td>39</td>
</tr>
<tr>
<td>Skopljak-Ramovic, Alma</td>
<td>114</td>
</tr>
<tr>
<td>Skrlec, Davor</td>
<td>42</td>
</tr>
<tr>
<td>Slavici, Titus</td>
<td>13, 102</td>
</tr>
<tr>
<td>Soares, João</td>
<td>61, 106</td>
</tr>
<tr>
<td>Sopczak, Andre</td>
<td>98</td>
</tr>
<tr>
<td>Sorandaru, Ciprian</td>
<td>100</td>
</tr>
<tr>
<td>Sourkounis, Constantinos</td>
<td>91, 103</td>
</tr>
<tr>
<td>Spasos, Michalis</td>
<td>68</td>
</tr>
<tr>
<td>Spinei, Fanica</td>
<td>33</td>
</tr>
<tr>
<td>Spiteri Staines, Cyril</td>
<td>8, 87, 90, 119</td>
</tr>
<tr>
<td>Spiteri, Kenneth</td>
<td>119</td>
</tr>
<tr>
<td>Srairi, K</td>
<td>30</td>
</tr>
<tr>
<td>Sruk, Vlado</td>
<td>97</td>
</tr>
<tr>
<td>Stamatelatos, Makis</td>
<td>45</td>
</tr>
<tr>
<td>Stankovic, Milos</td>
<td>17</td>
</tr>
<tr>
<td>Stankovic, Srdjan</td>
<td>17</td>
</tr>
<tr>
<td>Stasinski, Ryszard</td>
<td>102</td>
</tr>
<tr>
<td>Stefanovic, Caslav</td>
<td>25</td>
</tr>
<tr>
<td>Stefanovic, Mihajlo</td>
<td>25</td>
</tr>
<tr>
<td>Stiegeler, Markus</td>
<td>140</td>
</tr>
<tr>
<td>Stojkov, Marinho</td>
<td>81</td>
</tr>
<tr>
<td>Streibl, Bernhard</td>
<td>54</td>
</tr>
<tr>
<td>Strugar, Velimir</td>
<td>101</td>
</tr>
<tr>
<td>Strzelecki, Ryszard</td>
<td>88, 135</td>
</tr>
<tr>
<td>Stular, Mitja</td>
<td>46</td>
</tr>
<tr>
<td>Sudnitson, Alexander</td>
<td>80</td>
</tr>
<tr>
<td>Sujjanovic, Nermin</td>
<td>55</td>
</tr>
<tr>
<td>Sumina, Damir</td>
<td>2</td>
</tr>
<tr>
<td>Summonte, Caterina</td>
<td>136</td>
</tr>
<tr>
<td>Sumner, Mark</td>
<td>87</td>
</tr>
<tr>
<td>Surianu, Flavius Dan</td>
<td>130</td>
</tr>
<tr>
<td>Süssstrunk, Sabine</td>
<td>103</td>
</tr>
<tr>
<td>Svigir, Nikola</td>
<td>2</td>
</tr>
<tr>
<td>Szewczyk, Janusz</td>
<td>88</td>
</tr>
<tr>
<td>Szoncso, Reinhard</td>
<td>115</td>
</tr>
<tr>
<td>Teixeira, António</td>
<td>105</td>
</tr>
<tr>
<td>Thalmann, Daniel</td>
<td>74</td>
</tr>
<tr>
<td>Thomos, Christos</td>
<td>9</td>
</tr>
<tr>
<td>Tilneac, Mihaela</td>
<td>105</td>
</tr>
<tr>
<td>Toader, Cornel</td>
<td>14</td>
</tr>
<tr>
<td>Todisco, Massimiliano</td>
<td>18</td>
</tr>
<tr>
<td>Todorov, Predrag</td>
<td>39</td>
</tr>
<tr>
<td>Topalova, Irina</td>
<td>4</td>
</tr>
<tr>
<td>Toudja, Tahar</td>
<td>103</td>
</tr>
<tr>
<td>Trovato, Michele</td>
<td>22</td>
</tr>
<tr>
<td>Tsantilas, Constantinos</td>
<td>93</td>
</tr>
<tr>
<td>Tsarabaris, Panagiotis</td>
<td>31</td>
</tr>
<tr>
<td>Tseng, Guo-Fu</td>
<td>96</td>
</tr>
<tr>
<td>Tsiakas, Panagiotis</td>
<td>114</td>
</tr>
<tr>
<td>Tsiakmakis, Kyriakos</td>
<td>68</td>
</tr>
<tr>
<td>Tsitserov, Dmitry</td>
<td>66, 67</td>
</tr>
<tr>
<td>Tzes, Anthony</td>
<td>131</td>
</tr>
<tr>
<td>Tzokev, Alexander</td>
<td>4</td>
</tr>
<tr>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Ulacha, Grzegorz</td>
<td>102</td>
</tr>
<tr>
<td>Ullo, Silvia</td>
<td>41</td>
</tr>
<tr>
<td>Urdiales, Cristina</td>
<td>19</td>
</tr>
<tr>
<td>Usta, Hanife</td>
<td>54</td>
</tr>
<tr>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Vaccaro, Alfredo</td>
<td>41</td>
</tr>
<tr>
<td>Vale, Zita</td>
<td>40, 61, 106</td>
</tr>
<tr>
<td>van Den Bosch, Paul</td>
<td>144</td>
</tr>
<tr>
<td>Vasic, Veran</td>
<td>89</td>
</tr>
<tr>
<td>Vasile, Nicole</td>
<td>33</td>
</tr>
<tr>
<td>Vatau, Doru</td>
<td>130</td>
</tr>
<tr>
<td>Velasco-Quesada, Guillermo</td>
<td>50</td>
</tr>
<tr>
<td>Velempini, Mthulisi</td>
<td>7, 24</td>
</tr>
<tr>
<td>Veljovic, Zoran</td>
<td>46</td>
</tr>
<tr>
<td>Vella, Jean Marie</td>
<td>118</td>
</tr>
<tr>
<td>Velotto, Giovanni</td>
<td>41</td>
</tr>
<tr>
<td>Vidmar, Luka</td>
<td>46</td>
</tr>
<tr>
<td>Vinnikov, Dmitri</td>
<td>135</td>
</tr>
<tr>
<td>Vitek, Ondrej</td>
<td>87</td>
</tr>
<tr>
<td>Vizziello, Anna</td>
<td>121</td>
</tr>
<tr>
<td>Voras, Ivan</td>
<td>138</td>
</tr>
<tr>
<td>Voudouris, Konstantinos</td>
<td>114</td>
</tr>
<tr>
<td>Author</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Voulkidou, Adriana</td>
<td>27</td>
</tr>
<tr>
<td>Vovos, Nicholas</td>
<td>82</td>
</tr>
<tr>
<td>Vuc, Gheorghe</td>
<td>13</td>
</tr>
<tr>
<td>Vukmirovic, Srdjan</td>
<td>42</td>
</tr>
<tr>
<td>Wang, Chengshan</td>
<td>145</td>
</tr>
<tr>
<td>Wang, Peng</td>
<td>34</td>
</tr>
<tr>
<td>Wei, Wei</td>
<td>145</td>
</tr>
<tr>
<td>Weinmann, Martin</td>
<td>100</td>
</tr>
<tr>
<td>Wendemuth, Andreas</td>
<td>147</td>
</tr>
<tr>
<td>White, Neil</td>
<td>94</td>
</tr>
<tr>
<td>Willekens, Koen</td>
<td>40</td>
</tr>
<tr>
<td>Wilson, Richard</td>
<td>133</td>
</tr>
<tr>
<td>Wójcik, Pawel</td>
<td>71</td>
</tr>
<tr>
<td>Wu, Fan</td>
<td>122</td>
</tr>
<tr>
<td>Wu, Henry</td>
<td>141</td>
</tr>
<tr>
<td>Wulich, Dov</td>
<td>35</td>
</tr>
<tr>
<td>Xu, Feng</td>
<td>41</td>
</tr>
<tr>
<td>Yaesh, Isaac</td>
<td>143</td>
</tr>
<tr>
<td>Yahiat, Ahmed</td>
<td>103</td>
</tr>
<tr>
<td>Ye, Zuo-Guang</td>
<td>3</td>
</tr>
<tr>
<td>Yeh, Chung-Wei</td>
<td>106</td>
</tr>
<tr>
<td>Yeh, Tse-Chen</td>
<td>96</td>
</tr>
<tr>
<td>Yu, Xiaodan</td>
<td>145</td>
</tr>
<tr>
<td>Yüksel, Tolga</td>
<td>5</td>
</tr>
<tr>
<td>Zadrija, Valentina</td>
<td>97</td>
</tr>
<tr>
<td>Zagar, Mario</td>
<td>138</td>
</tr>
<tr>
<td>Zajc, Matej</td>
<td>55, 125</td>
</tr>
<tr>
<td>Zamani, Mohammad Ali</td>
<td>142</td>
</tr>
<tr>
<td>Zammit, Paul</td>
<td>108</td>
</tr>
<tr>
<td>Zammit, Saviour</td>
<td>118</td>
</tr>
<tr>
<td>Zammit-Mangion, David</td>
<td>108</td>
</tr>
<tr>
<td>Zaragoza, Jordi</td>
<td>90</td>
</tr>
<tr>
<td>Zdansky, Jindrich</td>
<td>18</td>
</tr>
<tr>
<td>Zeh, Stefan</td>
<td>100</td>
</tr>
<tr>
<td>Zeidaabadi Nezhad, Abolghasem</td>
<td>69</td>
</tr>
<tr>
<td>Zemirli, Mohamed Mehdi</td>
<td>103</td>
</tr>
<tr>
<td>Zeng, Yuan</td>
<td>145</td>
</tr>
<tr>
<td>Zhao, Jinli</td>
<td>145</td>
</tr>
<tr>
<td>Zhu, W.M.</td>
<td>3</td>
</tr>
<tr>
<td>Ziani, Abderahmane</td>
<td>22</td>
</tr>
<tr>
<td>Zicari, Paolo</td>
<td>29</td>
</tr>
<tr>
<td>Ziolko, Bartosz</td>
<td>133</td>
</tr>
<tr>
<td>Ziolko, Mariusz</td>
<td>133</td>
</tr>
<tr>
<td>Zito, Domenico</td>
<td>113</td>
</tr>
<tr>
<td>Zito, Fabio</td>
<td>86, 126</td>
</tr>
<tr>
<td>Zohar, Ilan</td>
<td>144</td>
</tr>
<tr>
<td>Zoican, Roxana</td>
<td>116</td>
</tr>
<tr>
<td>Zoric, Sladjana</td>
<td>147</td>
</tr>
<tr>
<td>Zuters, Janis</td>
<td>9</td>
</tr>
<tr>
<td>Zvikhachevskaya, Anna</td>
<td>66, 67</td>
</tr>
<tr>
<td>Zvikhachevsky, Dimitry</td>
<td>9</td>
</tr>
<tr>
<td>CHAIR INDEX</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td><strong>A</strong></td>
<td></td>
</tr>
<tr>
<td>Ali, Nazar ................................117</td>
<td></td>
</tr>
<tr>
<td>Aloul, Fadi................................50</td>
<td></td>
</tr>
<tr>
<td>Apap, Maurice ................................21</td>
<td></td>
</tr>
<tr>
<td>Athanasopoulos, Nikos .....................114</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td></td>
</tr>
<tr>
<td>Barkana, Itzhak ..........................75</td>
<td></td>
</tr>
<tr>
<td>Bratzler, Uwe ..........................77, 98</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td></td>
</tr>
<tr>
<td>Casha, Owen ................................129</td>
<td></td>
</tr>
<tr>
<td>Catalão, João P. S. ......................140</td>
<td></td>
</tr>
<tr>
<td>Chicco, Gianfranco ........................12</td>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td></td>
</tr>
<tr>
<td>Debono, Carl James ......................146</td>
<td></td>
</tr>
<tr>
<td>Delimar, Marko ..........................40</td>
<td></td>
</tr>
<tr>
<td>do Rosário Alves Calado, Maria ........109</td>
<td></td>
</tr>
<tr>
<td><strong>F</strong></td>
<td></td>
</tr>
<tr>
<td>Fahmy, Hossam ..........................23</td>
<td></td>
</tr>
<tr>
<td>Farrugia, Reuben ........................1</td>
<td></td>
</tr>
<tr>
<td>Fukunaga, Chikara........................60, 77, 98</td>
<td></td>
</tr>
<tr>
<td><strong>G</strong></td>
<td></td>
</tr>
<tr>
<td>Gatt, Edward .............................95</td>
<td></td>
</tr>
<tr>
<td>Gavriloiu, Gheorghe ........................79</td>
<td></td>
</tr>
<tr>
<td>Grech, Ivan ................................126</td>
<td></td>
</tr>
<tr>
<td><strong>I</strong></td>
<td></td>
</tr>
<tr>
<td>Irwin, George .............................15</td>
<td></td>
</tr>
<tr>
<td><strong>J</strong></td>
<td></td>
</tr>
<tr>
<td>Jasinski, Marek ..........................89, 119</td>
<td></td>
</tr>
<tr>
<td><strong>K</strong></td>
<td></td>
</tr>
<tr>
<td>Kazmierkowski, Marian P. ................89</td>
<td></td>
</tr>
<tr>
<td><strong>L</strong></td>
<td></td>
</tr>
<tr>
<td>Loulou, Mourad ...........................68</td>
<td></td>
</tr>
<tr>
<td><strong>M</strong></td>
<td></td>
</tr>
<tr>
<td>Magenat-Thalmann, Nadia ..................73</td>
<td></td>
</tr>
<tr>
<td>Markarian, Garik ..........................66, 92</td>
<td></td>
</tr>
<tr>
<td>Micallef, Paul ............................111</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td></td>
</tr>
<tr>
<td>Nassar, Elias .............................63</td>
<td></td>
</tr>
<tr>
<td><strong>P</strong></td>
<td></td>
</tr>
<tr>
<td>Paunovic, Djordje ........................47</td>
<td></td>
</tr>
<tr>
<td>Pereira, Fernando ........................18</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td></td>
</tr>
<tr>
<td>Ribaric, Slobodan ........................124</td>
<td></td>
</tr>
<tr>
<td>Rusnak, Ilan ..............................143</td>
<td></td>
</tr>
<tr>
<td><strong>S</strong></td>
<td></td>
</tr>
<tr>
<td>Sargeni, Fausto ..........................29</td>
<td></td>
</tr>
<tr>
<td>Savazzi, Pietro ...........................121</td>
<td></td>
</tr>
<tr>
<td>Spiteri Staines, Cyril ....................71</td>
<td></td>
</tr>
<tr>
<td><strong>V</strong></td>
<td></td>
</tr>
<tr>
<td>Vale, Zita ...............................149</td>
<td></td>
</tr>
<tr>
<td><strong>Z</strong></td>
<td></td>
</tr>
<tr>
<td>Zajc, Matej ................................100</td>
<td></td>
</tr>
<tr>
<td>Zammit, Saviour ...........................44</td>
<td></td>
</tr>
<tr>
<td>Zito, Domenico .............................26</td>
<td></td>
</tr>
</tbody>
</table>