



# Conference Guide

## IEEE - PEMC 2016

2016 IEEE International Power Electronics  
and Motion Control Conference (PEMC)

Festival and Congress Centre Varna  
Varna, Bulgaria  
25 - 30 September, 2016

Sponsored by  
The Institute of Electrical and Electronics Engineers (IEEE)  
IEEE Industrial Electronics Society (IES)  
IEEE Industry Applications Society (IAS)

Co-sponsored by  
Technical University of Sofia, Bulgaria  
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## Welcome to IEEE - PEMC 2016

Dear conference participants,

It is a great honour and pleasure to welcome you to the 17th IEEE-PEMC2016 conference, held in the beautiful city of Varna.

The Power Electronics and Motion Control (PEMC) conference was founded in the second half of the past century, more precisely 46 years ago, with a slightly different name and a more local orientation. That conference had a great and powerful driver, Professor Istvan Nagy, who gradually shaped and established it into a well-known and internationally recognized scientific event. Also, this internationalization was symbolically expressed by the East-West bridge of the previous logo. After the fall of the East-West physical and psychological barriers, the PEMC conference edition of the 1990 made its first big step into the wider international collaboration, attracting colleagues from a wide spectrum of countries.

Unfortunately for all of us, soon after our last meeting in Antalya, in 2014, we lost Professor Nagy, the man who gave everything to this conference. It is sad that we lost such a great man, but at the same time we were lucky to be able to collaborate with him and to be powered by his positive way of thinking. Even in his last days, he answered phone calls from his hospital bed... He will always teach us on his own example that the good which men do lives after they are gone from our lives. We see that from the seeds he planted, from the life he dedicated to the PEMC, strength for learning, research and development has sprung in all fields of energy and electronics. Therefore, we would like to dedicate this edition of our conference to the memory of Professor Istvan Nagy!

The recent times appear to be challenging for the economies. Our universities neglect the importance of the conference meetings, supporting exclusively the journal publications. The price of attending a conference has become prohibitive so we need to carefully select where to apply the university and research centre funds. In this difficult situation we are even prouder, since at this 17th edition, we have 268 submitted papers, while 195 papers are to be presented. We have now more participants, coming from a greater number of countries (more than 45), in comparison to PEMC 1990 (32 countries), almost equal to the immediately preceding PEMC 2014 (51 countries), held in better, financially more comfortable times.

Another important milestone achieved in this year's edition is that PEMC officially became a conference of the progressive and truly international Industrial Electronics Society (IES) of IEEE. The name IEEE-PEMC is officially reserved for our conference since July 2015. In response to the changes taking place in the conference and in the world at large, we will maintain our PEMC Council as an important advisory board but in the same time we will strictly follow the financial and administrative rules of the IEEE and IES.

The 17<sup>th</sup> PEMC International Conference is the first edition to open under the name IEEE-PEMC conference and we would like to congratulate everybody that made this possible. In the first place the congratulations go to the participants who contributed with their papers. Without your high

quality articles, we would not be here today. We would like to express our deepest gratitude to the "army" of voluntary hard working reviewers whose effort contributed for the outstanding quality of the paper selection process. In order to make this conference possible many people abdicated of their personal research, family life, and free time and worked day and night, some of them were paid, many others were not... Special thanks go to all those who contributed with their time and effort for the success of this conference! Last but not least we would like to acknowledge the participation of our reliable industrial friends and colleagues.

We expect that Bulgaria, with its many thousands of years of history, beautiful nature and friendly people will become a frequent venue for the IEEE conferences. We expect to be imaginative in creating new models of conferences, with high value and contribution to humanity. We will be responsive to the changes and provide the environment and culture that fosters talented young human resources for a new and more advanced world.

Please have a look at the conference program and booklet to find out the most important themes for you. We also hope the industrial visitors will draw their conclusions about the research perspectives and applications. We expect next time more companies will send representatives and exhibitors. We wish you a productive conference and hope you enjoy your stay in the beautiful Varna town, a multicultural city with a great selection of outstanding places to visit and to remember!

**Welcome to IEEE-PEMC 2016!**

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## Program At a Glance

### Tutorials

25 September Varna Naval Academy	
08:00-09:00	Registration
08:30-10:30	Tutorials 1 (3 rooms) Tu-1, Tu-2, Tu-3
10:30-11:00	Coffee break
11:00-13:00	Tutorials 1 (continuation) Tu-1, Tu-2, Tu-3
14:00-16:00	Tutorials 2 (3 rooms) Tu-4, Tu-5, Tu-6
16:00-16:30	Coffee break
16:30-18:30	Tutorials 2 (continuation) Tu-4, Tu-5, Tu-6

### PEMC Council Meetings

25 September Varna Naval Academy		27 September Festival and Congress Center	
		13:00-14:30	Meeting 2 BM City Restaurant
16:00-19:00	Meeting 1 Varna Naval Academy		

Tu-1: Johann Kolar, Switzerland  
 Tu-2: Kaloyan Mihaylov, Bulgaria  
 Tu-3: Slobodan Mircevski, Macedonia

Tu-4: Tomislav Dragicevic, Denmark  
 Tu-5: Alex Ruderman, Kazakhstan  
 Tu-6: Luis Palma Brito, Portugal

	<b>26 September Festival and Congress Center</b>	<b>27 September Festival and Congress Center</b>	<b>28 September Festival and Congress Center</b>						
8:00-19:00	Registration	Registration	Registration						
8:30-9:00	Opening ceremony	Plenary Session 3: KA4+KA5+KA6	Parallel sessions 4 (4 rooms)						
09:00-10:30	Plenary Session 1: In memoriam István Nagy		SS02 4	SS03 6	TT05-1 6	TT07-2 6			
10:30-11:00	Coffee break	Coffee break	Coffee break						
11:00-13:00	Plenary Session 2: KA1+KA2+KA3	Parallel sessions 2 (4 rooms)	Parallel sessions 5 (4 rooms)						
		TT01-2 6	TT03-2 6	TT04-2 6	TT02-1 6	SS06 5	SS09 6	TT05-2 6	TT07-3 6
13:00-14:30	Lunch	Lunch	Lunch						
14:30-16:30	Parallel sessions 1 (4 rooms)	Parallel sessions 3 (5 rooms)							
	TT01-1 6	TT03-1 6		TT04-1 6	SS04 6	TT01-3 6	TT03-3 6	SS01 6	TT07-1 6
16:30-19:00 Including coffee between 16:30- 17:00	Dialogue sessions 1 (DS1)	Dialogue session 2 (DS2)							
	TT01 15	TT03 18	TT10 2		TT02 7	TT04 13	TT05 10	SS01 1	TT07 15
20:00-21:00	Welcome Cocktail	Gala Dinner							
21:00-22:00									

KA1 - Kouhei Ohnishi, Japan  
KA2 - Ilhami Colak, Turkey  
KA3 - Peter Palenski, Austria  
KA4 - Zdeněk Peroutka  
KA5 - David Del Regno  
KA6 - Pavol Bauer

- TT01 = Power Electronic Converter Topologies, Design and Control, Power Supplies
- TT02 = Power Electronics in Transportation (Road, Aerospace, Marine and Railway Vehicles, Electric and Hybrid Vehicles)
- TT03 = Power Electronics in Electrical Energy Systems (Generation, Transmission and Distribution, Smart Grid Technologies, Renewable Energy Systems)
- TT04 = Electrical Machines and Actuators
- TT05 = Motion Control, Adjustable Speed Drives
- TT06 = Robotics and Mechatronics
- TT07 = Sensors, Measurement and Observation Techniques
- TT08 = Active Filtering and Unity Power Factor Correction
- TT09 = Semiconductor Devices Modelling, Packaging and Integration
- TT10 = Education
- SS01 = Contactless Charging of Electric vehicles
- SS02 = Demand Response in Smart Grid
- SS03 = Intelligent Fault Monitoring and Fault-Tolerant Control in Power Electronics and Electric Drives
- SS04 = Power electronics and control technology application to railway power supply systems
- SS05 = Application of nature-inspired approaches to motion control
- SS06 = Multilevel Converters for Drives, Renewable Energy and Grid Power Quality Applications
- SS07 = Efficient and Reliable Hybrid and Electric Propulsion Systems
- SS08 = Electrical Energy Systems with High Temperature Superconducting Technology
- SS09 = Concentrating Solar Photo-Voltaic-Thermal Collectors: Efficiency, Redesign And Industrial Applications.

## Session Chairs

Session	Date, Time	Session Co-Chairs		
Opening ceremony	26 September, 8:30-9:00	Stan Valtchev Ivan Yatchev	Yousef Ibrahim Mihai Cernat	2 local organizing committee members
Istvan Nagy	26 September, 9:00-10:30	Peter Korondi Pavol Bauer	Hitoshi Hayashiya	Giuseppe Buja Teresa Orłowska-Kowalska
PEMC Council Meeting 1	25 September 16:00-19:00	Peter Korondi	Slobodan Mircevski	Ilhami Colak
PEMC Council Meeting 2	27 September 13:00-14:30	Peter Korondi	Pavol Bauer	Marian Kazmierkowski
KA1	26 September, 11:00-13:00	Giuseppe Buja	Teresa Orłowska-Kowalska	Marian Kazmierkovski
KA2				
KA3				
KA4	27 September, 8:30-10:30	Ilhami Colak	Slobodan Mircevski	Sandor Halasz
KA5				
KA6				
SS01	27 September 14:30-16:30	Giuseppe Buja	Andrei Marinescu	
SS02	28 September 8:30-10:30	Zaiye Yang	Catalin Mihai	
SS03	28 September 8:30-10:30	Teresa Orłowska-Kowalska	Vanja Ambrozic	
SS04	26 September 14:30-16:30	Hitoshi Hayashiya	Ilhami Colak	
SS06	28 September 11:00-13:00	Viliam Fedak	Mihai Cernat	
SS09	28 September 11:00-13:00	Carlos Fernandes	Luigi Costanzo	
TT01-1	26 September 14:30-16:30	Giuseppe Buja	David Del Regno	
TT01-2	27 September, 11:00-13:00	Asif Şabanoviç	Viliam Fedak	
TT01-3	27 September, 14:30-16:30	Doron Shmilowitz	Longya Xu	
TT01-DS1 (15)	26 September, 16:30-19:00	Slobodan Mircevski Doron Shmilovitz	Sandor Halasz	Felix Himmelstoss
TT02+SS07	27 September, 11:00-13:00	Calin Ciufudean	Petre-Marian Nicolae	
TT02-DS2 (2)	27 September, 16:30-19:00	Calin Ciufudean	Petre-Marian Nicolae	
TT03-1 (+SS08)	26 September, 14:30-16:30	Elena Helerea	Yusuke Hayashi	
TT03-2 (+SS08)	27 September, 11:00-13:00	Felix Himmelstoss	Leonid Bulyga	
TT03-3 (+SS08)	27 September, 14:30-16:30	Francois Bruno	Ivan Yatchev	

<b>Session</b>	<b>Date, Time</b>	<b>Session Co-Chairs</b>		
TT03-DS1 (18)	26 September, 16:30-19:00	Kostandinos Sourkounis Sorina Costinas	Massimo Vitelli Carlos Cardeira	Hideki Omori Ileana-Diana Nicolae
TT04-1	26 September, 14:30-16:30	Leonard Livadaru	Sergei Ryvkin	
TT04-2	27 September, 11:00-13:00	Alex Ruderman	Jawad Faiz	
TT04-DS2	27 September, 16:30-19:00	Marian Kazmierkowi	Sandor Halasz	
TT05-1 (+TT06+SS05)	28 September, 8:30-10:30	Sergey Ryvkin	Jan Vittek	
TT05-2 (+TT06+SS05)	28 September, 11:00-13:00	Krzysztof Zawirski	Goga Cvetkovski	
TT05-DS2 (9)	27 September, 16:30-19:00	Kazumasa Miura	Slobodan Mircevski	
TT07-1 (+TT08+TT09)	27 September, 14:30-16:30	Mihaela Popescu	Alex Van den Bossche	
TT07-2	28 September, 8:30-10:30	Ileana-Diana Nicolae	Marian Gaiceanu	
TT07-3	28 September, 11:00-13:00	Alexandru Bitoleanu	Michal Gwozd	
TT07-DS2 (15)	27 September, 16:30-19:00	Dan Valentin Nicolae	Mihaela Popescu	Alexander Ruderman
TT10-DS1	26 September, 16:30-19:00	Kostandinos Sourkounis	Sandor Halasz	

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## Sunday 25th of September

### TU 1 - Solid-State Transformers - Key Design Challenges, Applicability, and Future Concepts

Tut-1 - Tutorial 1, Sunday 25th of September, 08:30  
Lecturer/s: Johann Kolar, Switzerland

This tutorial introduces participants to the Solid-State Transformer (SST) concept in a comprehensive and easy-to-follow fashion. After a brief review of transformer basics and of the SST concept history, the motivation, requirements, and challenges associated with SST applications in future locomotives, smart distribution systems, and source-side (e.g., connection of wind power generators to a DC collecting grid, or of photovoltaic power plants to the MV AC grid) as well as load-side applications (e.g., medium voltage interface of high-power EV battery chargers or general MV-connected power supplies) are identified.

Conceptual aspects like, e.g., single-cell vs. multi-cell converter approaches, isolated front-end vs. isolated back-end converter architectures, reliability of multi-cell converters, protection, etc. are discussed. Furthermore, the operation of high-power isolated DC/DC converters is detailed, and modern SiC power semiconductors, medium-frequency transformer design, multi-cell converter control system partitioning, etc. are discussed. Finally, aspects of testing high-power medium-voltage systems and construction issues of modular medium-voltage converters are summarized. In order to render the discussions more tangible, the challenges and potential solutions are illustrated using an exemplary 1MVA multi-cell distribution level SST system.

Finally, future concepts such as unidirectional SSTs are addressed, and the most promising application scenarios for SSTs as well as future research areas are identified, before the tutorial concludes with a critical evaluation of the SST concept. The tutorial is tailored to serve the interests of a broad audience with academic or industrial backgrounds.

### TU 2 - Tutorial 2

Tut-2 - Tutorial 2, Sunday 25th of September, 08:30  
Lecturer/s: TBA

### TU 3 - EU Project Motor Challenge - Recommendations and Comments

Tut-3 - Tutorial 3, Sunday 25th of September, 08:30  
Lecturer/s: Slobodan Mircevski, Macedonia

In this tutorial you will inform about results of EU project Motor Challenge. It is well known that electric drives are the greatest consumers of electric energy, so as the best kWh is the saved one. In this you will learn how to save electric energy in electric drives, improving the production process with lower production costs and reducing global pollution with emission of green house gasses (GHG). You will understand that consumption of non-active energy (reactive and distortion) is not negligible. The tutorial is supported by practical examples with real measurements. Presented material is based on duty cycles of electric drives (IEC 60034-1), power measurement (DIN 40110) and power quality/harmonics (IEC 6100-3-2, IEC 61000-3-4).

## Contents

Results of EU project “Motor Challenge” are presented. Energy efficiency is basis of technical systems working. Electric drives account for approximately 65% of the electricity consumed by EU industry. The efficiency of an electric drive depends on more factors, including: motor efficiency, motor speed control, proper sizing, power supply quality, distribution losses, mechanical transmission, maintenance practices, end-use mechanical efficiency (pump, compressor, fan, etc.). The energy efficiency has influence on the work of electric drive, its consumption and paying of electric energy (active, reactive), the working life etc. What energy efficiency practice for? The answer is simple - because of getting high quality and cheaper products, lower production costs and reducing of global pollution. How to realize energy efficiency in electric drives? The right way is with usage of better working machines, power convertors for getting variable speed to reduce power losses and energy efficient motors. These lectures deal strongly with energy efficiency in electric drives through energy parameters - efficiency  $\eta$  and power factor  $\lambda$  (in special case with ideal supply without harmonics  $\cos \varphi$ ). The attention is focused on motor speed control with saving potential of 50 billion kWh/year for EU-25 and motor losses expressed through its efficiency and power factor, with saving potential more than 27 billion kWh/year for EU-25, as it is recommended in results of MChP.

## TU 4 - Power architectures, applications and control of DC distribution systems and microgrids

Tut-1 - Tutorial 1, Sunday 25th of September, 14:00

Lecturer/s: Tomislav Dragicevic, Denmark

### Scope and benefits

DC distribution systems have higher efficiency, better current carrying capacity and faster response when compared to conventional AC systems. They also provide more natural interface with many types of RES and ESSs and better compliance with consumer electronics. Furthermore, when components are coupled around a DC bus, there are no issues with reactive power flow, power quality and frequency regulation, resulting in a notably less complex control system when compared to the AC coupled systems. All these facts lead to more and more applications of DC systems in modern power systems, including data/telecom centers, maritime industry, high voltage transmission systems, electric vehicle charging infrastructure, and DC microgrids. Still, design and operation of general DC systems imposes a number of specific challenges. The aim of this tutorial is to identify these challenges and transmit to the audience the instructor’s industrial and academic experiences in the field. Tutorial will provide a framework in hardware and control design of DC distribution systems and microgrids, as well as overview of recent research activities in this area. Practical requirements and implementation details of several types of DC distribution systems used in real world industrial applications will be presented. Also, a number of study cases power architectures will be discussed in the first part of the tutorial. On the other hand, second part will address the features of several types of coordinated control design concepts that can assure intelligent real-time control of MGs. Moreover, the concepts of constant power load (CPL) and negative impedance instability will be explained in detail. In line with this, principles of linear stability analysis techniques will be reviewed and a broad class of stabilization techniques for MGs loaded with CPLs will be presented and examined. Tutorial will also present the view of the instructor on the promising research directions and future industrial applications in this area.

### Tutorial Contents

Tutorial will be organized in the two main parts:

a) DC Distribution Power Systems Introduction: Applications, Architectures and Control

This part of tutorial aims firstly to shed light on the practical design aspects of DC distribution technology concerning typical power hardware topologies and their suitability for different existing and emerging applications. Following this introduction, a systematical control structure for DC distribution systems is presented and classified into local and coordinated control levels according to the respective functionalities in each level. As opposed to local control which relies only on local measurements, some line of communication between units needs to be made available in order to achieve coordinated control. In this view, the overall control is, depending on the communication method, divided into three basic coordinated control strategies, i.e. decentralized, centralized and distributed control. These methods are briefly reviewed and the foundation is being laid for their deeper evaluation in the second part of the tutorial.

b) DC Distribution System Coordination Strategies

The second part of the tutorial goes more in detail with regard to functionalities of each coordinated control strategy. It also assesses stability analysis and stabilization techniques for DC distribution systems. Decentralized control can be regarded as an extension of local control since it is also based exclusively on local measurements. In contrast, centralized and distributed control strategies rely on digital communication technologies. A number of approaches of using these three coordinated control strategies to achieve various control objectives are reviewed in the paper. Moreover, properties of DC MG dynamics and stability are discussed. The paper illustrates that tightly regulated point-of-load (POL) converters tend to reduce the stability margins of the system since they introduce negative impedances, which can potentially oscillate with lightly damped power supply input filters. It is also demonstrated how the stability of the whole system is defined by the relationship of the source and load impedances, referred to as the minor loop gain. Several prominent specifications for the minor loop gain are reviewed. Finally, a number of active stabilization techniques are presented.

## TU 5 - Natural Balancing in Multilevel Converters - What You Always Wanted to Know but Had No Chance to Ask

Tut-2 - Tutorial 2, Sunday 25th of September, 14:00

Lecturer/s: Alex Ruderman, Kazakhstan

This Tutorial will present the original research on natural capacitor voltage balancing in multilevel converters conducted by the author over the past decade.

The first major topic is converters with capacitive filtering - reconfigurable Switched Capacitor Converters (SCC) with multiphase switching. The major contributions are related to balanced switching that makes charge flow for buck type converters as smooth as possible, newly discovered additional voltage target ratios for classic Flying Capacitor Converter (FCC) based and Fibonacci SCC topologies, and charge flow (equivalent resistance) analysis for SCC described by underdetermined linear equations (Minimal Norm principle).

The second major topic is natural balancing for different multilevel DC-DC and DC-AC converters with inductive loads or LC-filtering. Here the major results include simple and powerful time averaging based analytical methodology, understanding root causes of poor balancing, improved balancing rate by modified switching patterns, simple time domain theory for balance booster that essentially speeds-up natural balancing dynamics, understanding possible capacitor balanced voltage offsets for ideal symmetric switching and due to non-ideal unbalanced switching. Based on good natural balancing it is possible to make self-precharge that is charging capacitors to their predefined balanced voltages during power-up (start-up) at virtually no cost.

Each subtopic is illustrated by an in-depth analysis of simple representative demo cases. The presented material is self-explanatory intended for an entry / intermediate level audience.

## TU 6 - Intelligent Fault Tolerant Control Systems - Application to Industrial Processes and X8-Quadcopter Drones.

Tut-3 - Tutorial 3, Sunday 25th of September, 14:00

Lecturer/s: Luis Palma Brito, Portugal

A typical feedback control structure for an industrial process plant or vehicle system may result in unsatisfactory closed-loop performance, in the event of faults or failures in actuators, sensors, controllers or other components of the overall system. Faults or failures can also generate dangerous situations for humans or machines, reduce products quality, and cause economic losses. Intelligent fault tolerant control systems (I-FTCS) should guarantee that faults don't provoke dangerous failures, using intelligent fault detection / diagnosis and fault tolerance approaches.

The tutorial aims to present theoretical concepts, in a comprehensive and integrated framework, related to dynamical systems, classical control techniques, fault detection / diagnosis and intelligent fault tolerant control approaches. Besides concepts, industrial and academic experiences are to be transmitted to the audience, as well as new challenges in these fields. In order to clarify the concepts, simulations and real applications in the industrial processes field, and also in multi-rotors drones, will be presented.

Main tutorial topics:

- \* dynamical signals and systems: modeling and system identification;
- \* linear and nonlinear control techniques;
- \* optimization approaches;
- \* control loop performance analysis;
- \* faults and failures concepts;
- \* fault detection techniques;
- \* fault diagnosis techniques;
- \* intelligent fault tolerant control approaches;
- \* industrial processes applications;
- \* X8-quadcopter drones: kinetics and dynamics modeling, identification, simulation in Matlab/Simulink and in virtual reality environment, real world experiments, and intelligent fault tolerant control;
- \* concluding remarks and future trends;
- \* discussion with the audience.

## Monday 26th of September

### CE - Opening Ceremony

Plenary Session Room - Europe, Monday 26th of September, 08:30

### CE - Keynote Address 1

Plenary Session Room - Europe, Monday 26th of September, 11:00

Keynote Addresser: Kouhei Ohnishi, Japan

Presenter: Teresa Orłowska-Kowalska

Abstract - We can immediately know what the object is when we touch it. If the object is soft, it must be a sponge (or similar thing.) If it is rigid, it may be a metal block. That sensation is an ability of the human being called "haptic sense". "Real-haptics" is a technology to reconstruct haptic sense by acquiring dynamic physical information that is transferred bi-directionally between the surrounding environment and the human. An abandonment of haptics causes difficulty in further advance in automated machine, or may even result in threatening the safety and security of the process.

Maybe large gap between real human and robot comes from the excessive expectation induced at first

from the S.F. movie entitled "Metropolis" released in 1926. In fact, the artificial machine has been developed from the machine tool.

The performance has been measured by its stiffness almost proportional to the forward gain in the servo control. High stiffness seems to give high performance, however it loses compliant motion.

The robot motion based on the existing servo system is quite stiff and generates the motion far from the human action. Soft robotics is a new concept coming from real haptics. This gives not only compliant motion but also skillful motion to the robot and/or mechatronics. The talk will show the structure of motion control together with its implementation including a newly developed "haptic core-chip". Also the talk will introduce various applications by visual demonstrations.

### CE - Keynote Address 2 - A survey on the contributions of power electronics to smart grid systems

Plenary Session Room - Europe, Monday 26th of September, 11:40

Keynote Addresser: İlhami Colak, Turkey

Presenter: Teresa Orłowska-Kowalska

Abstract - The smart grid (SG) as a research area is advancing dealing with a wider range of topics such as power systems, energy generation and telecommunication. The conventional utility grid is used to operate in a passive mode absorbing energy from the substations and delivering it to the customers. This approach is well developed but the needs of the state-of-the-art technology require a bidirectional flow of power and data. Nevertheless, smart grid systems provide more flexible, reliable, sustainable, secure and two-way communication service. Especially, integration of renewable energy sources, electrical vehicles and distributed generations (DG) into network can be achieved in an efficient way in smart grid systems. Moreover, control and monitoring capabilities, automatic configuration of the grid, and active involvement of consumers in energy production extend the importance of smart grids. All these positive aspects of smart grids have been attained by integration of power electronics and telecommunication technologies with the grid. This talk deals with contributions of power electronics to SG in the context of generation,

conversion, distribution, and control of power. The recent power electronic devices and systems adapted to SG are also introduced in detail with several power control methods.

Moreover, the renewable energy sources (RESs), which are an extensively studied topic of power engineering and their integration to smart grid, are also surveyed in terms of DG units, control and management features. Thus, a particular section is dedicated to RES utilization in SG covering almost all aspects of a monotype and hybrid energy plants. Finally, the talk is carried on by reviewing the most recent and comprehensive articles to highlight the importance of power electronics in a logical way in the smart grids for reader

## CE - Keynote Address 3 - Simulation of heterogeneous energy systems

Plenary Session Room - Europe, Monday 26th of September, 12:20

Keynote Addresser: Peter Palenski, Austria

Presenter: Teresa Orłowska-Kowalska

Abstract - This talk will introduce the audience into the concepts of smart grid with its current research topics and the principles of cyber-physical energy systems, how to describe and how to work with them. The smart grid is the ICT answer to the power challenges of today and tomorrow by enabling flexible loads, active distribution grids, storage management, smart energy markets, and bidirectional power flows. Conceptually it is a distributed IT and automation system that is amalgamated with the physical power infrastructure: a cyber-physical system, and even a system of systems. Designing, optimizing, running, and diagnosing such systems requires reliable and scalable models which is the main problem with cyberphysical systems: hybrid models (discrete and continuous) are hard to deal with. There are, however, new and promising languages and methods to deal with such systems. Learn what works and what does not, and see how you can enhance your research and development with these methods.

## TT01 1 - Power Electronic Converter Topologies 1

Room 4 - Hermann Ludwig Ferdinand von Helmholtz, Monday 26th of September, 14:30

Chair/s: Giuseppe Buja, David Del Regno

### **Thermo-Puncture Devices - Mechanical and Electrical Concepts**

Dr. Felix A Himmelstoss, Dr. Karl H. Edlmoser

### **Time Domain Optimization of Voltage and Current THD for a Three-Phase Cascade H-Bridge Inverter**

Mr. Rassul Bairamkulov, Prof. Alex Ruderman, Prof. Yakov Familiant

### **UDE-Based Robust Average Current Control of Bi-Directional Non-Inverting Buck-Boost Converter**

Mr. Ilan Aharon, Prof. Doron Shmilovitz, Prof. Alon Kuperman

### **Design of a Robust Cascaded Controller for Cuk Converter**

Mr. Fiaz Ahmad, Mr. Akhtar Rasool, Dr. Esraf Emre Ozsoy, Prof. Asif Sabanovic, Prof. Meltem Elitas

**Optimum SPWM parameters for unbalanced grid voltage of n parallel connected inverters**

Dr. Zebbadji Tahar, Prof. Ibtouen Rachid, Prof. Hadji Seddik

**One Switch Three Phase Modified Vienna/Modular-Boost Rectifiers**

Ms. Amina Hasan Abedin, Prof. Mohammad Ali Choudhury

**TT03 1 - Power Electronics in Electrical Energy Systems 1**

Room 5 - Hendrik Antoon Lorentz, Monday 26th of September, 14:30

Chair/s: Elena Helerea, Yusuke Hayashi

**Refurbishing Existing MVAC Distribution Cables to Operate Under DC Conditions**

Mr. Aditya Shekhar, Mr. Epameinondas Kontos, Prof. Armando Rodrigo Mor, Prof. Laura Ramirez-Elizondo, Prof. Pavol Bauer

**Comparison of Battery Management Approaches for Energy Flow Optimization in Microgrids**

Prof. Mario Vasak, Mr. Goran Kujundzic

**Stability Study of Large-Scale Photovoltaic Plant Containing Polytype Inverters**

Dr. Chen Zheng, Prof. Lin Zhou, Mr. Ke Guo, Mr. Qiang Liu, Dr. Bao Xie

**Considerations on a MV/LV Transformer which Supplies a Distorting Load**

Prof. Petre - Marian Nicolae, Mr. Ionut Daniel Smarandescu, Prof. Ileana-Diana Nicolae, Dr. Marian-Stefan Nicolae, Dr. Dinut-Lucian Popa

**Energy-Saving Sliding Mode Control for Pumping System Fed by Renewable Energy**

Prof. Sergey Ryvkin

**The Mathematical Modeling of Alternating Current Electric Drive with DC-DC Converter and Ultracapacitors**

Prof. Isaak Braslavskiy, Mr. Iurii Plotnikov, Prof. Stanimir Valtchev

**TT04 1 - Electrical Machines and Actuators 1**

Room 6 - Carl Friedrich Gauss, Monday 26th of September, 14:30

Chair/s: Leonard Livadaru, Sergey Ryvkin



**Impact of Smooth Torque on Efficiency Performance in a High-Speed Automotive SRM Drive**

Mr. Iliya Ralev, Mr. Fang Qi, Mr. Bernhard Burkhart, Ms. Annegret Klein-Hessling, Prof. Rik W. De Doncker

**Investigation of a 2V 1.1kW MOSFET Commutated DC Motor**

Mr. Stefan Haller, Dr. Peng Cheng, Prof. Bengt Oelmann

**Diagnostic Methods of Frequency Response Analysis for Power Transformer Winding A Review**

Mr. Gideon Nnachi, Prof. Dan Valentin Nicolae

**Operation of an Electrical Excited Synchronous Machine by Contactless Energy Transfer to the Rotor**

Mr. Marcel Maier, Prof. Nejila Parspour

**Flexible Lyapunov Function based Model Predictive Direct Current Control of Permanent Magnet Synchronous Generator**

Mr. Tin Bariša, Dr. Andor Š. Ileš, Prof. Damir Sumina, Prof. Jadranko Matuško

**Design, simulation and use of an energy harvester based on a permanent magnet synchronous generator**

Mr. Jelle De Vlieger, Dr. Dries Vanoost, Dr. Joan Peuteman, Mr. Stefan Verbrugge, Prof. Herbert De Gersem, Prof. Davy Pissoort

**SS04 - Power Electronics on Railway Power Supply Systems**

Room 7 - Michael Faraday, Monday 26th of September, 14:30  
Chair/s: Hitoshi Hayashiya, Ilhami Colak

**Regenerative energy utilization in a.c. traction power supply system**

Dr. Hitoshi Hayashiya

**AC Electrification Systems with Power Converters for 25 kV 50 Hz Railways: a Comparative Study**

Dr. Nilanjan Mukherjee, Dr. Stuart Hillmansen, Dr. Pietro Tricoli

**Enhanced Operating Scheme of ESS for DC Transit System**

Mr. Kyoungmin Kwon, Mr. Kyoung-Gu Lee, Mr. Taesuk Kim, Mr. Jinkook Lee, Mr. Byoung-Jeun Jone, Prof. Jaeho Choi, Prof. Ilhami Colak

**Feasibility Study on Application of Force Control to Wear Test Apparatus for Contact Current Collection System**

Mr. Minoru Yokoyama, Prof. Tomoyuki Shimono, Dr. Chikara Yamashita, Mr. Sei Nagasaka, Mr. Takuya Ohara

**Robust State Estimation for Double Pantographs with Random Missing Measurements in High-Speed Railway**

Dr. Xiaobing Lu, Prof. Zhigang Liu, Dr. Yanbo Wang, Dr. Hongrui Wang, Dr. Fuchuan Duan

**The function development for emergency train running by battery application in traction power supply system**

Mr. Yoshiki Shimizu, Mr. Junichi Kaminishi, Mr. Hiroataka Takahashi, Mr. Yasunori Kume, Mr. Kazuharu Honda, Mr. Hironori Kawatsu

**ST DS1 - Dialog Session 1**

Poster - Main Hall, Monday 26th of September, 17:00

Chair/s:

**P01 A Novel Five-level Optimized Carrier Multilevel PWM Quad-Inverter Six-Phase Asymmetrical AC Drive**

Dr. P. Sanjeevikumar, Prof. Frede Blaabjerg, Prof. Patrick Wheeler, Prof. Viliam Fedák, Prof. Mario Javier Duran, Prof. Pierluigi Siano

**P02 Predetermining the size of Inrush Current at Power Transformers Coupling using LabVIEW**

Ms. Maria-Cristina Nitu, Mrs. Claudiu-Ionel Nicola, Mr. Dorin Popa, Ms. Viorica Voicu, Mr. Marian Duta

**P03 Unconventional technologies for achieving the contacts for the current paths**

Mr. Silviu Andreescu, Ms. Maria-Cristina Nitu, Mr. Marian Duta, Ms. Viorica Voicu

**P04 Synchronous PWM Control of Triple Transformer-Connected Inverters for Photovoltaic System**

Dr. Valentin Oleschuk, Prof. Mihai Cernat, Dr. Marek Pastor, Dr. P. Sanjeevikumar

**P05 A Three-Phase Power Factor Corrected (PFC) Single Ended Primary Inductor (SEPIC) AC-DC Converter**

Ms. Amina Hasan Abedin, Ms. Khandaker Lubaba Bashar, Prof. Mohammad Ali Choudhury

**P06 Power Electronics Controlled Voltage Source Based on Modified Sigma-Delta Modulator**

Prof. Michał Gwóźdź, Mr. Dominik Matecki

**P07 HVDC Power Transmission Simulation for Offshore Wind System with Three-Level Converter**

Mrs. Mafalda Seixas, Prof. Rui Melicio, Prof. Victor Mendes

**P08 Non Isolated and Non-Inverting Cockcroft Walton Multiplier Based Hybrid 2Nx Interleaved Boost Converter For Renewable Energy Applications**

Mr. Mahajan Sagar Bhaskar, Dr. P. Sanjeevikumar, Prof. Frede Blaabjerg, Prof. Viliam Fedák, Prof. Mihai Cernat, Mr. Rishi Kulkarni

**P09 Comparative Analysis of Modulation Techniques in Frequency Converter**

Dr. Anshul Agarwal, Dr. P. Sanjeevikumar, Dr. Vineeta Agarwal, Dr. Rajasekar Selvamuthukumarn, Prof. Marek Pastor, Prof. Mihai Cernat

**P10 Experimental study on SVPWM Switching Sequences for VSIs**

Mr. G Vivek, Mrs. Meenu Nair, Mrs. Mukti Barai

**P11 AC Voltage Regulators with Switched Capacitors**

Dr. Aleksey Udovichenko, Prof. Gennady Zinoviev

**P12 Hybrid 5-level cascaded H-Bridge converter with model predictive controller.**

Mr. Pawel Wiatr, Prof. Marian Kazmierkowski

**P13 Wind Energy Conversion System under a Supervisor Deterministic Finite State Machine**

Dr. Carla Vivieros, Prof. Rui Melicio, Prof. José Igreja, Prof. Victor Mendes

**P14 Harmonic Minimization In Modulated Frequency Single-Phase Matrix Converter**

Dr. Anshul Agarwal, Dr. P. Sanjeevikumar, Dr. Vineeta Agarwal, Dr. Rajasekar Selvamuthukumarn, Prof. Viliam Fedák, Prof. Mihai Cernat

**P15 Technical Aspects of Common-Mode Leakage Current Suppression in PV-Generation Systems**

Mr. Evgeny Grishanov, Prof. Sergey Brovanov, Dr. Maxim Dybko, Prof. Sergey Kharitonov, Prof. Sergey Leonov

**P16 Calculation of Steady Non-Sinusoidal Modes and Electric Power Losses in Complex Electrical Networks**

Dr. Nikolay N. Kharlov, Mr. Vyacheslav S. Borovikov, Prof. Vasily Ya. Ushakov, Mr. Evgeniy V. Tarasov, Mr. Leonid L. Bulyga

**P17 Implementation of Genetic Algorithm to find the optimal timing of Overcurrent relays.**

Mr. Anand Pandey, Dr. Sheeraz Kirmani

**P18 Economic Evaluation on the Use of Reconfiguration Systems for Energy Production Increase in PV Plants**

Dr. Giuseppe Schettino, Dr. Massimo Caruso, Prof. Rosario Miceli, Dr. Fabio Viola, Dr. Pietro Romano

**P19 Prediction of events in the smart grid: interruptions in distribution transformers**

Mr. Joaquim Viegas, Dr. Susana Vieira, Dr. Rui Melicio, Dr. João Sousa, Mr. Hugo Matos

**P20 Design and Simulation of a 10 MW Photovoltaic Power Plant using MATLAB and Simulink**

Dr. Dinut-Lucian Popa, Dr. Marian-Stefan Nicolae, Prof. Petre-Marian Nicolae, Mr. Marius Popescu

**P21 Effects of Renewable Energy Sources on the Power System**

Prof. Ramazan Bayindir, Dr. Sevki Demirbas, Dr. Erdal Irmak, Mr. Umut Cetinkaya, Mr. Ahmet Ova, Mr. Merden Yesil

**P22 A wind turbine two level back-to-back converter power loss study**

Dr. Ivan Mrcela, Prof. Damir Sumina, Mr. Filip Sacic, Mr. Tin Bariša

**P23 Design a Grid Tie Inverter for PMSG Wind Turbine using FPGA & DSP Builder**

Prof. Ilhami Colak, Mr. Eklas Hossain, Prof. Ramazan Bayindir, Mr. Jakir Hossain

**P24 PV Module Parameters Extraction with Maximum Power Point Estimation Based on Flower Pollination Algorithm**

Mr. Rabah Benkercha, Dr. Samir Moulahoum, Prof. Ilhami Colak, Mr. Bilal Taghezouit

**P25 Standards-Based Investigation of Voltage Dips and Voltage Imbalances in an Organized Industrial Zone**

Prof. Ramazan Bayindir, Dr. Mehmet Yesilbudak, Mr. Salih Ermis

**P26 An Approach to Quantify the Technical Impact of Power Factor Correction in Medium Voltage Distribution Systems**

Mr. Felix Dlamini, Prof. Dan Valentin Nicolae

**P27 Study on Electromagnetic Emissions from Wireless Energy Transfer**

Mrs. Elena Baikova, Prof. Stanimir Valtchev, Prof. Rui Melicio, Prof. Anastassia Krusteva, Mr. George Gigov

**P28 Industrial internet of micro smart grid for educational process**

Mr. Lev Khruslov, Mr. Vladimir Shishov, Mr. Sergei Kireev, Mr. Mikhail Rostowikov

**P29 On Adequacy of Electrical Engineering and Computers Curriculum to Current and Future Technological Challenges - A Case Study**

Prof. Elena Helerea, Prof. Nicolae Danut Ilea, Dr. Moasa Beatrice Costela

**P30 Bidirectional DAB DC-DC Converter with Hysteresis Current Mode Control**

Mr. Georgi T. Kunov, Prof. Ilona I. Iatcheva, Mr. Danail H. Marinov, Prof. Elissaveta D. Gadjeva, Prof. Ivan S. Yatchev

**P31 Steep Voltage Gain Quadratic Boost Converter Steep Voltage Gain Quadratic Boost Converter With a Switched-Coupled Inductor**

Dr. Boris Axelrod, Dr. Yefim Berkovich

**P32 Resonant converter for charging a supercapacitor stack**

Prof. Dimitar Aranudov, Prof. Nikolay Hinov, Mr. Ivan Nedyalkov

**P33 Conception of a YBCO Superconducting ZFC-Magnetic Bearing Virtual Prototype**

Mr. Arsénio Carvalho, Mr. Martim Carvalho, Prof. Carlos Cardeira, Prof. Paulo Branco, Prof. Rui Melicio

**P34 Viability of a Frictionless Bearing with Permanent and HTS Magnets**

Mr. António Arsénio, Mr. Martim Carvalho, Prof. Carlos Cardeira, Prof. Rui Melicio, Prof. Paulo Branco

**CE - Welcome Cocktail**

Restaurant - BM City Restaurant, Monday 26th of September, 20:00

## Tuesday 27th of September

### CE - Keynote Address 4 - Keynote speech: Challenges of Modern AC Motor Traction Drives

Plenary Session Room - Europe, Tuesday 27th of September, 08:30

Keynote Addresser: Zdeněk Peroutka, Slovakia

Presenter: Ilhami Colak

Abstract - Research of modern ac motor traction drives brings many challenges including a drive concept, a design of particular drive components, a drive and vehicle control, interactions of a vehicle with its environment, etc. One of the most important characteristics of a traction drive is its reliability and safety. Thus, the experimental testing and validation are important part of the research of new traction drive technologies. R&D center RICE opened in June 2016 in Pilsen, Czech Republic a world unique laboratory for transportation systems and medium-voltage power electronics. Its technology will be briefly discussed in the first part of this contribution. A drive concept is a big issue to be discussed in the next part of the presentation. There exist many solutions from conventional wheel-set/axle drives with gearbox to either direct axle or wheel drives. Many solutions have been introduced specifically in light traction vehicles, where full low-floor design is a standard requirement at present. The main research challenge is the significant reduction of the weight and volume of the traction drive unit while keeping its tractive effort, long lifetime and as low as possible cost. A design of power electronics converters is the next big issue which will be discussed in the third part of this contribution. New packages (such as XHP) and new power electronics devices (specifically with wide bandgap semiconductors) require new concepts of converter design. The last part of this presentation will be dedicated to a traction drive control. A control has to provide the traction drive not only with excellent dynamics, but it must also secure the drive stability and appropriate interaction between the drive and a supplying system. Application of optimal control theory, specifically model predictive control techniques, in modern ac motor traction drives will be discussed.

### CE - Keynote address 5 - A Holistic Framework For Power Electronics

Plenary Session Room - Europe, Tuesday 27th of September, 09:10

Keynote Addresser: David Del Regno, USA

Presenter: Ilhami Colak

Abstract - The ubiquitous role of Power Electronics in delivering and controlling electrical energy makes the innovation of these technologies a strong priority in relation to sustainable development goals all over the world. Power electronics technologies were deemed mature already in the early 2000s and have always relied on innovations in materials for their own progress, while the design processes have remained substantially unchanged. Approaches based on Linear Design Workflow, roadmapping, and traditional forms of modelling and simulations seems to be unfit to fulfill the current need for innovation of Power Electronics. It is here introduced an overview on a holistic framework for power electronics design that tackles innovation needs with systems engineering, decision making, multidisciplinary optimization, and knowledge-based technologies. The framework is based on subject-independent, process-independent abstractions from systems engineering and decision making, and exploits multidisciplinary optimization for automatic exploration of the design space. The framework is said to be "holistic" because it can address the problems related to power electronics design considering the whole system from source to load and allows integration in the design process of

information from the context (market, societal systems) thus reducing the gap between designers and customers and, more in general, reducing the uncertainty associated to the design decisions. The framework employees also knowledge-based technologies to support the accurate construction of power electronics systems descriptions, the automatic management of the models used for analyses, the capturing and reuse of knowledge generated during the design process, and the automatic validation against domain knowledge. This approach has already found applications in other industries (aerospace, automotive) achieving remarkable time reductions in complex designs and with the added advantage of automating the less creative design activities.

## CE - Keynote address 6 - Solutions for System Integration of Renewable Energy and Storage

Plenary Session Room - Europe, Tuesday 27th of September, 09:50

Keynote Addresser: Pavol Bauer, Netherlands

Presenter: Ilhami Colak

Abstract - Integration of renewable energy sources namely solar, wind and storage (e.g. electric vehicles) is addressed in the presentation. Two different scenarios are discussed: renewable energy at convenient location and also local energy production and integration into smart cities with storage. Several examples of integration with LV DC grids and needed power electronic interfaces and systems with high efficiency will be shown. Development of power electronics technology for DC grids and challenges, solutions for Electric mobility (charging with renewable energy, inductive charging) related to smart cities are suggested. DC systems and (micro) grids for integration of Renewable Energy Sources and Energy Storage in applications such as smart (green) cities; electric mobility; utilization, reliability and controllability of DC grids are briefly discussed. HV/MV DC Transmission Networks for large scale implementation of Renewable Energy Sources (solar, wind, wave), optimization and controllability of HVDC transmission grids are addressed too.

## TT02 - Power Electronics in Transportation

Plenary Session Room - Europe, Tuesday 27th of September, 11:00

Chair/s: Calin Horatiu Ciufudean, Petre-Marian Nicolae

### **Proposal of a novel control method of Li-ion battery system for regenerative energy utilization in traction power supply system**

Dr. Hitoshi Hayashiya, Mr. Shotaro Abe, Mr. Yuuki Iino, Mr. Katsutoshi Nakao, Mr. Masami Hino, Mr. Hiroshi Ikarashi, Mr. Haruo Nemoto, Mr. Hironori Kawatsu, Mr. Tetsuya Kato

### **Evaluation of installation effect of the energy storage system in d.c. traction power supply system**

Mr. Yuuki Iino, Mr. Masami Hino, Mr. Shotaro Abe, Mr. Katsutoshi Nakao, Mr. Kishin Kudo, Dr. Hitoshi Hayashiya

### **A Robust Active Stabilization Technique for DC Microgrids with Tightly Controlled Loads**

Dr. Bijan Zahedi, Dr. Babak Nahid-Mobarakeh, Prof. Serge Pierfederici, Prof. Lars Norum

**Improving Magnetic Coupling for Battery Charging Through 3D Magnetic Flux**

Mr. Luis Jorge, Prof. Stanimir Valtchev, Prof. Rui Melicio

**Energy Management Strategy of a Propulsion System with Supercapacitors for Electric and Hybrid Vehicles**

Mr. Waled M. Elsayed, Dr. Jorge Estima, Prof. Chiara Boccaletti, Prof. Antonio J. Marques Cardoso

**TT01 2 - Power Electronics Converter Topologies 2**

Room 4 - Hermann Ludwig Ferdinand von Helmholtz, Tuesday 27th of September, 11:00  
Chair/s: Asif Sabanovic, Viliam Fedák

**Development Of 30kva Inverter Using Sic Mosfet For 180°C Ambient Temperature Operation**

Prof. Longya Xu

**A Study of Parallel Structures of DC-DC Converters for Application in Wind Energy Conversion Systems**

Prof. Zahari Zarkov, Mr. Ivan Bachev, Prof. Ludmil Stoyanov, Prof. Vladimir Lazarov

**Seven Level Asymmetric Cascade Inverter with Space Vector PWM Added PR Control**

Prof. Ilhami Colak, Dr. Ersan Kabalci, Mr. Gökhan Keven

**Optimization of PWM for Overmodulation Region of Two-level Inverters**

Dr. Peter Stumpf, Prof. Sándor Halász

**Novel Hybrid Buck L Converter for Wide Conversion Ratios**

Prof. Folker Renken, Mr. Udo Schürmann, Mrs. Qingyue Chen, Dr. Ioana-Monica Pop-Calimanu

**A comparison of TFET rectifiers for RF energy harvesting applications**

Mr. David Cavalheiro, Prof. Francisc Moll, Prof. Stanimir Valtchev

**TT03 2 - Power Electronics in Electrical Energy Systems 2**

Room 5 - Hendrik Antoon Lorentz, Tuesday 27th of September, 11:00  
Chair/s: Felix Himmelstoss, Leonid Bulyga

**Analysis and prototyping of multicellular ac-dc converter for future dc distribution system**

Dr. Yusuke Hayashi, Mr. Yoshikatsu Matsugaki, Dr. Tamotsu Ninomiya, Dr. Hiromichi Ohashi



**Resonant Electromagnetic Vibration Harvesters feeding Sensor Nodes for real-time Diagnostics and Monitoring in Railway Vehicles for Goods Transportation: a numerical-experimental analysis**

Prof. Massimo Vitelli, Dr. Luigi Costanzo, Dr. Marco Balato, Prof. Roberto Langella, Dr. Alessandro Lo Schiavo, Dr. Osvaldo Brignole, Dr. Claudio Cavalletti, Dr. Antonino Maresca, Dr. Nadia Mazzino, Prof. Alfredo Testa

**Linear Programming Based Optimization Tool For Day Ahead Energy Management Of A Lithium-Ion Battery For Industrial Application**

Mr. Juri Fedjaev, Dr. Sid-Ali Amamra, Prof. Bruno Francois

**Control design and Day-Ahead Supervision of a Distributed Energy Storage Systems**

Dr. Sid-Ali Amamra, Prof. Bruno Francois

**Stability Analysis of an Isolated Power System controlled by a Virtual Synchronous Machine**

Dr. Salvatore D'Arco, Dr. Jon Are Suul

**Power Transfer Computations for Medium Voltage AC Link by Imposing Rated Current at Sending End**

Mr. Aditya Shekhar, Mr. Epameinondas Kontos, Prof. Laura Ramirez-Elizondo, Prof. Armando Rodrigo Mor, Prof. Pavol Bauer

**TT04 2 - Electrical Machines and Actuators 2**

Room 6 - Carl Friedrich Gauss, Tuesday 27th of September, 11:00  
Chair/s: Alexander Ruderman, Jawad Faiz

**Flywheel Energy Storage System with Magnetic HTS Suspension and Embedded in the Flywheel Motor-Generator**

Mr. Pavel Dergachev, Mr. Kosterin Alexander, Ms. Ekaterina Kurbatova, Dr. Kurbatov Pavel

**An improved Dynamic Model for Induction Motors Including Core Losses**

Mr. Gabriel Khoury, Prof. Ragi Ghosn, Dr. Flavia Khatounian, Prof. Maurice Fadel, Mr. Mathias Tientcheu

**Study of Cage Torsional Resonance Failures in Inverter-Fed Fabricated-Cage Induction Motors Used in Traction Drives**

Prof. Claudio Bruzzese, Prof. Ezio Santini

**No-Load Analysis of Permanent Magnet Machines With Bread-Loaf Magnets and Fractional-Slot Winding Using Conformal Mapping and Magnetic Equivalent Circuits**

Mrs. Ana Hanic, Prof. Damir Zarko, Prof. Dalibor Kuhinek, Mr. Zlatko Hanic

**Model-Based Development of Induction Motor Control Algorithms with Modular Architecture**

Mr. Krisztián Horváth, Mr. Márton Kuslits

**Performance Comparison of Control Strategies for Mono-Inverter Dual-PMSM System**

Mr. Tianyi Liu, Prof. Maurice Fadel

**TT01 3 - Power Electronic Converter Topologies 3**

Room 4 - Hermann Ludwig Ferdinand von Helmholtz, Tuesday 27th of September, 14:30

Chair/s: Doron Shmilowitz, Yousef Ibrahim

**An Improved Fully Soft Switched PWM Boost Converter**

Dr. Sevilay Cetin

**Novel High Frequency Soft Switching DC/DC Converter with Active Rectifier and Active Snubber**

Mr. Róbert Atkovič, Prof. Jaroslav Dudrik

**High-Frequency Soft-Switching DC-DC Converter With Full-Bridge Output Rectifier**

Mr. Marek Pastor, Mr. Jaroslav Dudrik, Mr. Ondrej Revak

**Modular Multilevel Converter based Test Bed for MVDC Applications - A Case Study with a 12 kV, 5 MW Setup**

Mr. Pawel Blaszczyk, Dr. Michael Steurer, Mr. Dionne Soto, Mr. Ferenc Bogdan, Mr. John Hauer, Mr. Karl Schroder

**A generic method of Pulse Width Modulation applied to 3-Level T-type NPC inverter**

Dr. Simon Cailhol, Dr. Paul-Etienne Vidal, Prof. Frédéric Rotella

**Highly Efficient High Frequency Inverter for Induction Heating Using SiC Power Module.**

Prof. Hiroyuki Ogiwara, Prof. Misao Itoi, Prof. Mutsuo Nakaoka

**TT03 3 - Power Electronics in Electrical Energy Systems 3**

Room 5 - Hendrik Antoon Lorentz, Tuesday 27th of September, 14:30

Chair/s: Francois Bruno, Ivan Yatchev

**Synchronous Reluctance Generator with FPGA Control of Three-Level Neutral-Point-Clamped Converter for Wind Power Application**

Mr. Mohammed Alnajjar, Prof. Dieter Gerling

**Comparative Study of IGBT and SiC-MOSFET in a Wireless V2H System with a New Bidirectional Single-Ended ZVS Converter**

Mr. Shinya Ohara, Prof. Hideki Omori, Dr. Kenji Fukuda, Dr. Hisato Michikoshi, Prof. Noriyuki Kimura, Prof. Toshimitsu Morizane, Prof. Mutsuo Nakaoka

**Modeling of PV Generators from Different Technologies - Case Study**

Prof. Zahari Zarkov, Prof. Ludmil Stoyanov, Mr. Valentin Milenov, Mrs. Hristina Voynova, Prof. Vladimir Lazarov

**An Efficient Maximum Power Point Tracking Algorithm for Photovoltaic Arrays under Partial Shading Conditions**

Mr. Jawad Ahmad, Prof. Filippo Spertino, Prof. Paolo Di Leo, Mr. Alessandro Ciocia

**State Trajectory Analysis for Modular Multilevel Converter**

Mr. Chen Li, Mr. Yadong Lyu, Dr. Fred C. Lee

**Continuity of power supply in smart grid with PV penetration**

Dr. Vesselin Chobanov

**SS01 - Contactless Charging of Electric Vehicles**

Room 6 - Carl Friedrich Gauss, Tuesday 27th of September, 14:30  
Chair/s: Giuseppe Buja, Andrei Marinescu

**Mathematical Model of Series-Parallel Compensation for Contactless Power Transfer System**

Mr. Brijesh Kumar Kushwaha, Mr. Gautam Rituraj, Dr. Praveen Kumar, Prof. Pavol Bauer

**Contribution to the System Design of Contactless Energy Transfer Systems**

Mr. David Maier, Mr. Jörg Heinrich, Mr. Marco Zimmer, Mr. Marcel Maier, Prof. Nejila Parspour

**Using VNA for IPT Coupling Factor Measurement**

Prof. Andrei Marinescu, Mr. Ionel Dumbrava

**Analysis and Comparison of Multi-Coil Inductive Power Transfer Systems**

Mr. Venugopal Prasanth, Mr. Soumya Bandyopadhyay, Prof. Pavol Bauer, Prof. Braham Ferreira

**Efficiency and power sizing of SS vs. SP topology for wireless battery chargers**

Prof. Giuseppe Buja, Prof. Manuele Bertoluzzo, Mr. Rupesh Jha, Mr. Giacomuzzi Stefano, Mr. Kishore Naik Mude

### **3D space transformers analysis for Inductive Energy Transfer**

Dr. Artur Moradewicz, Mr. Rafal Miskiewicz, Dr. Renata Sulima, Prof. Jan Sikora

### **TT07 - Sensors, Active Filtering, Semiconductor Devices**

Room 7 - Michael Faraday, Tuesday 27th of September, 14:30

Chair/s: Mihaela Popescu, Alex Van den Bossche

### **Electrical parameter observation for induction machine sensorless drive using a sensitivity and observability based ekf**

Mr. Gaëtan Lefebvre, Dr. Jean-Yves Gauthier, Dr. Alaa Hijazi, Mr. Vincent Le Digarcher, Prof. Xuefang Lin-Shi

### **High Performance Load Acceleration Control based on Singular Spectrum Analysis for Industrial Robot**

Dr. Thao Tran Phuong, Prof. Kiyoshi Ohishi, Dr. Yuki Yokokura, Mr. Thang Bo Xuan, Mr. Akinori Yabuki

### **Optimal Controllers Design in Indirect Current Control System of Active DC-Traction Substation**

Prof. Alexandru Bitoleanu, Prof. Mihaela Popescu, Dr. Vlad Suru

### **Behavioral Modeling of CMOS Digital Potentiometers Using VHDL-AMS**

Dr. Ivailo Pandiev

### **Peltier Module based Temperature Control System for Power Semiconductor Characterization**

Mr. Georges Engelmann, Mr. Michael Laumen, Mr. Karl Oberdieck, Prof. Rik W. De Doncker

### **Wavelet Packet Transform, a Reliable and Fast Method to Obtain the Fundamental Components Required for Active Filtering in Power Plants**

Prof. Ileana-Diana Nicolae, Prof. Petre-Marian Nicolae, Dr. Marian-Stefan Nicolae, Mr. Ionut Daniel Smarandescu

### **ST DS2 - Dialog Session 2**

Poster - Main Hall, Tuesday 27th of September, 17:00

Chair/s:

### **P01 Contactless Power Transfer Modeled in Software ANSYS**

Mr. Radek Fajtl, Mr. Michal Košík

**P02 Some aspects of the reliability increasing of the transport electric drives**

Dr. Isaak Braslavskiy, Dr. Vladimir Metelkov, Dr. Stanimir Valtchev, Mrs. Dina Esaulkova, Dr. Alex Kostylev, Dr. Andrey Kirillov

**P03 Designing the universal vector control system using relay current regulation principle for controlling of general purpose industrial AC drives**

Prof. Victor Mesherayakov, Mr. Vladimir Voekov, Mr. Vladimir Ivashkin, Prof. Stanimir Valtchev

**P04 Angular Rate Damping Algorithm of the SamSat-218D Nanosatellite**

Mr. Andrey V. Kramlikh, Mrs. Maria E. Melnik

**P05 Modeling, Simulation and Validation of DC Motor with Spring Load System**

Mr. Zafer Ibrahim Esen, Mr. Semih Cakiroglu, Dr. Murat Sahin, Mr. Zafer Kulunk

**P06 Optimization Of The Control Loops Of The Variable Frequency Induction Motor Drive Of The Flame Reactor Feed Screw**

Mr. Yury Dementyev, Mr. Nikolay Koyain, Mr. Sergey Kladiyev, Mr. Kirill Negodin, Mr. Konstantin Obraztsov

**P07 Nonlinear Redesign of Vibration Energy Harvester: Linear Operation Test and Nonlinear Simulation of Extended Bandwidth**

Mr. Ondrej Rubes, Mr. Jan Smilek, Mr. Martin Brablc, Prof. Zdenek Hadas

**P08 Position and Attitude Control of Quadrotor UAV**

Mr. Yusuf Atalay, Mr. Kemal Buyukkabasakal, Prof. Aydogan Savran

**P09 Modeling and Supervisory Control of a Virtual X8-VB Quadcopter**

Mr. Vasco Brito, Prof. Luis Brito Palma, Prof. Fernando Vieira Coito, Prof. Stanimir Valtchev

**P10 Optimizing The Automation of an Iron Ore Production Line - A Case Study, Part I: Optimal Automated Logistics**

Prof. Lubomir T. Dechevsky, Dr. Gabor Sziebig, Prof. Peter Korondi

**P11 A Novel Type of High Power-Factor Miniaturized Wireless EV Charger with Optimized Power Receiving Circuit and Single-Ended Inverter**

Mr. Takuya Kitamoto, Prof. Hideki Omori, Mr. Shinya Ohara, Prof. Toshimitsu Morizane, Prof. Noriyuki Kimura, Prof. Mutsuo Nakaoka

**P12 Analysis of Power Converters with Devices of SiC for Applications in Electric Traction Systems.**

Mr. Efren Fernandez, Mr. Alejandro Paredes, Dr. Luis Romeral, Dr. Vicent Sala

**P13 Supercapacitor Based Storage System for Efficiency Improvement of Lead-Acid Powered Light Electric Vehicle**

Mr. Kaspars Kroics, Prof. Viesturs Brazis

**P14 Development of Constant Current Power System for HHO Cell operations to reduce fuel consumption**

Mr. Pavan Kumar K A, Mr. Nikhil S. Arora, Dr. M. Mahesh

**P15 Experimental study of wireless inductive system for electro vehicles batteries charging**

Prof. George Gigov, Prof. Anastassia Krusteva, Prof. Stanimir Valtchev

**P16 Electronic Differential for Electric Vehicle with Evenly Split Torque**

Mr. Jorge Folgado, Prof. Stanimir Valtchev, Prof. Fernando Coito

**P17 An Induction Motor Design for Urban Use Electric Vehicle**

Dr. Muhammet Tahir Güneşer, Mr. Adem Dalcalı, Mr. Turgut Öztürk, Mr. Cemil Ocak, Prof. Mihai Cernat

**P18 Analysis of broken rotor bar fault in a squirrel-cage induction motor by means of stator current and stray flux measurement**

Mrs. Ielyzaveta Chernyavska, Dr. Ondřej Vitek

**P19 Performance Verification of Saturated IPM Bearingless Motors Considering Magnetic Pull Variation**

Prof. Jawad Faiz, Dr. Zahra Nasiri-Gheidari, Prof. M. Azizur Rahman

**P20 Maximisation of back EMF in a high performance PMSM machine with concentrated windings**

Mr. Niklas Förster, Prof. Roberto Leidhold, Prof. Stefan Palis

**P21 Estimation of Losses in Inverter-fed Induction Machines including Electrical Insulation Losses**

Prof. Jawad Faiz, Mr. A Ghasemi

**P22 Optimizing of Tram DC Traction Motors Pairing**

Dr. Miroslav Novak, Prof. Zelmira Ferkova

**P23 Modelling of Switched Reluctance Motor Drive Based on ANSYS/Simplorer**

Mr. Lubos Suchy, Dr. Zelmira Ferkova

**P24 Comparative Finite Element Analysis of Two PM Fractional Slot Machines with 9/8 and 9/10 Structure**

Mr. Madalin Bodea, Prof. Alecsandru Simion, Dr. Leonard Livadaru

**P25 Analysis of electromagnetic processes in high-speed electrical machines with foil gas-dynamic bearings**

Dr. Mikhail Rumyantsev, Dr. Alexey Sizyakin, Mr. Nikolay Shevyrev

**P26 Numerical and Experimental Comparison of TLA Synchronous Reluctance Motor and Induction Motor**

Mr. U. Emre Dogru, Mr. N.Gökhan Ozcelik, Mr. Hakan Gedik, Dr. Murat İmeryüz, Prof. Lale T. Ergene

**P27 Design of a Position Controlled Electric Actuator Used in Fluid Control Valves**

Mr. Gurkan Tosun, Mr. Omer Cihan Kivanc, Mr. Ender Oguz, Mr. Yasar Mutlu, Dr. Ozgur Ustun

**P28 Multi-objective Optimal Design of Permanent Magnet Synchronous Motor**

Prof. Goga Cvetkovski, Prof. Lidija Petkovska

**P29 Importance of Reliability for Power Electronic Circuits, Case Study: Inrush Current Test and Calculating of Fuse Melting Point**

Mr. Murat Demir, Prof. Ali Bekir Yıldız, Mr. Gürmen Kahramanoğlu

**P30 Design of Buck DC-DC Converters from the Linear Quadratic Regulator Approach**

Ms. Diana Mata-Hernandez, Dr. Victor R. Gonzalez-Diaz, Dr. J. Fermi Guerrero-Castellanos, Dr. Gerardo Mino-Aguilar, Dr. Fabio Pareschi

**P31 Virtual Instrumentation for No-Load Testing of Induction Motor**

Dr. Gheorghe-Eugen Subtirelu, Prof. Mircea Dobriceanu, Dr. Mihaita Linca

**P32 Development of an Experimental Classification Method for Lithium-Ion Secondary Battery State Indication**

Mr. Martin Pecnik, Mr. Christoph Uran, Mr. Stephan Thaler

**P33 Asymptotic Calculation of a Single-Phase Multilevel Inverter Current Total Harmonic Distortion in the Presence of LCL-Filter**

Mr. Ramazan Abdikarimuly, Mr. Boris Reznikov, Prof. Yakov Familiant, Prof. Alex Ruderman

**P34 A new analytical approach for modelling the switching losses of a power MOSFET**

Mr. Vladimir Dimitrov, Prof. Peter Goranov, Mr. Dimcho Hvarchilkov

**P35 Wireless technologies for Controlling a Traffic Lights Prototype**

Mr. João Cunha, Prof. Carlos Cardeira, Prof. Rui Melicio, Dr. Nelson Batista

**P36 Infrastructure Development for Implementation Control-as-a Service in Substations**

Mr. Atanas lovev, Dr. Peter Yakimov

**P37 Functional verification of a torque sensor based on volumetric strain method**

Mr. Muhammad Nazar Ul Islam, Dr. Peng Cheng, Prof. Bengt Oelmann

**P38 A Novel Method for Online Correction of Amplitude and Phase Imbalances in Sinusoidal Encoders Signals**

Mr. Asem Khattab, Prof. Mohieddine Benammar, Dr. Faycal Bensaali

**P39 Approaches and Instruments for Overcoming the Challenges of the Smart Grids Control**

Dr. Peter Yakimov

**P40 Biometric Access Control Systems: a review on technologies to improve their efficiency**

Mr. Tiago Duarte, Mr. Sérgio Onofre, Prof. João Paulo Pimentão, Prof. Pedro Sousa

**P41 Distributed Regenerative Drive System**

Prof. Marian Gaiceanu, Dr. Silviu Epure, Mr. Stefan Ciuta

**P42 Analysis of the Current Balancing Device Based on Power Electronic Converter**

Dr. Yuriy Rozanov, Mr. Mikhail Kiselev, Mr. Mikhail Lapanov, Mr. Konstantin Kryukov, Mr. Pavel Dergachev

**P43 Active power filter based on dual-converter topology**

Prof. Michał Gwózdź

**P44 Optimizing The Automation of an Iron Ore Production Line - A Case Study, Part II: Optimal Automated Quality Control**

Prof. Lubomir T. Dechevsky, Dr. Gabor Sziebig, Prof. Peter Korondi

**P45 The impact of PV orientation in smart grids**

Dr. Vesselin Chobanov

**CE - Gala Dinner**

Restaurant - BM City Restaurant, Tuesday 27th of September, 20:00



## Wednesday 28th of September

### SS02 - Demand Response in Smart Grid

Room 4 - Hermann Ludwig Ferdinand von Helmholtz, Wednesday 28th of September, 08:30  
Chair/s: Zaiyue Yang , Catalin Mihai

#### **Load Profiling for Gas Stations using cluster techniques**

Dr. Catalin Mihai, Mr. Cosmin Popa, Dr. Paul Mihai Mircea

#### **Flexible Load Control In Electric Power Systems With Distributed Energy Resources And Electric Vehicle Charging**

Prof. Metody Georgiev, Prof. Rad Stanev, Prof. Anastasia Krusteva

#### **Stochastic Optimization of Coordinated Wind-Photovoltaic Bids in Electricity Markets**

Mr. Isafias Gomes, Prof. Hugo Pousinho, Prof. Rui Melicio, Prof. Victor Mendes

### SS03 - Intelligent Fault Monitoring and Fault-Tolerant Control

Room 5 - Hendrik Antoon Lorentz, Wednesday 28th of September, 08:30  
Chair/s: Teresa Orłowska-Kowalska, Vanja Ambrožič

#### **Simplified Model of Induction Machine with Broken Rotor Bars**

Dr. Mitja Nemec, Dr. Klemen Drobnič, Prof. Rastko Fišer, Prof. Vanja Ambrožič

#### **Stator Current Modeling of an Induction Motor for Rotor Faults Diagnosis**

Mr. Mohammed El Amine Khodja, Dr. Ahmed Hamida Boudinar, Dr. Nouredine Benouzza, Dr. Azeddine Bendiabdellah

#### **Rotor-Flux-Based Diagnosis Method for IGBT Open-Circuits Faults in a Field-Oriented-Control Induction Motor Drive**

Mr. Piotr Sobanski, Prof. Teresa Orłowska-Kowalska

#### **Modified space vector modulation for fault tolerant control of PMSM drive**

Mr. Krzysztof Siembab, Prof. Krzysztof Zawirski

#### **Stator Current Sensor Fault Detection and Isolation for Vector Controlled Induction Motor Drive**

Dr. Mateusz Dybkowski, Mr. Kamil Klimkowski

**Neural Network Approach for Stator Current Sensor Fault Detection and Isolation for Vector Controlled Induction Motor Drive**

Mr. Kamil Klimkowski, Dr. Mateusz Dybkowski

**TT06 1 - Motion Control, Robotics, Mechatronics 1**

Room 6 - Carl Friedrich Gauss, Wednesday 28th of September, 08:30

Chair/s:

**Artificial bee colony based auto-tuning of PMSM state feedback speed controller**

Dr. Tomasz Tarczewski, Prof. Lech M. Grzesiak

**Suppression of Motion-Induced Vibration for a Two-DoF System Using State Feedback Control**

Prof. Kuo-Shen Chen, Ms. Wan-Tzu Lin, Mr. Yu-Chen Chen, Prof. Stanislav Vechet

**Advanced calibration applied to a collaborative robot**

Mr. Pierre Besset, Dr. Adel Olabi, Prof. Olivier Gibaru

**Resonant Electromagnetic Vibration Energy Harvesters: the Harvester Ideal Utilization Factor**

Prof. Massimo Vitelli, Dr. Luigi Costanzo, Dr. Marco Balato

**Adaptive Neural Speed Controller for Direct Drive with PMSM**

Dr. Tomasz Pajchrowski, Mr. Wojciech Kogut

**Experimental Analysis of Selected Control Algorithms of Electromechanical Object with Backlash and Elastic Joint**

Prof. Krzysztof Zawirski, Mr. Krzysztof Nowopolski, Mr. Bartlomiej Wicher

**TT07 2 - Sensors, Active Filtering, Semiconductor Devices 2**

Room 7 - Michael Faraday, Wednesday 28th of September, 08:30

Chair/s: Ileana-Diana Nicolae, Marian Gaiceanu

**A New Design Method of an LCL Filter in Active DC-Traction Substations**

Prof. Mihaela Popescu, Prof. Alexandru Bitoleanu, Dr. Alexandra Preda

**Characterization of High-Voltage-SiC-Devices with 15 kV Blocking Voltage**

Mr. Jürgen Thoma, Mr. Sven Kolb, Mr. Christopher Salzmänn, Mr. Dirk Kranzer

**Performance Benchmark of Si IGBTs vs. SiC MOSFETs in Small-Scale Wind Energy Conversion Systems**

Mr. Abdallah Suliman Hussein, Dr. Alberto Castellazzi, Prof. Pat Wheeler, Dr. Christian Klumpner

**Petri Net Model for Energy Sparing in Railway Traffic**

Prof. Calin Ciufudean, Dr. Cornel Buzduga

**The crankshaft position sensor based on magnetoelectric materials**

Dr. Roman Petrov

**Evaluation of Short-Time Fourier-transformation spectrograms derived from the vibration measurement of internal-combustion engines**

Mr. Gabor Manhertz, Mr. Daniel Modok, Dr. Akos Bereczky

**SS06 - Multilevel Converters for Drives, Grid Power Quality Applications**

Room 4 - Hermann Ludwig Ferdinand von Helmholtz, Wednesday 28th of September, 11:00  
Chair/s: Viliam Fedák, Mihai Cernat

**Design and implementation of a multi-DSP based digital control system architecture for Modular Multilevel Converters**

Mr. Elie Talon Louokdom, Mr. Serge Gavin, Dr. Daniel Siemaszko, Prof. Frederic Biya Motto, Prof. Bernard Essimbi Zobo, Prof. Mauro Carpita

**Multiphase Quad-Inverter System with Feedforward Synchronous PWM and Nonlinear Voltage Regulation**

Dr. Valentin Oleschuk, Dr. P. Sanjeevikumar, Prof. Mihai Cernat, Prof. Viliam Fedák, Dr. Marek Pastor

**Stable DC Bus Voltage Balancing in a Renewable Source Grid Connected Neutral Point Clamped Inverter**

Mr. Ivano Forrasi, Dr. Jean-Philippe Martin, Dr. Babak Nahid-Mobarakeh, Prof. Giovanni Petrone, Prof. Giovanni Spagnuolo, Prof. Serge Pierfederici

**A SVPWM for reduction of common mode and bearing currents applied to diode clamped three level inverter fed induction motor**

Mr. Deepak Ronanki, Dr. Parthiban Perumal

**Contribution to the Prediction of Photovoltaic Module Performances**

Ms. Bouaziz Nadia, Prof. Benfdila Arezki, Dr. Lakhlef Ahcene

## SS09 - Concentrating Solar Photo-Voltaic-Thermal Collectors

Room 5 - Hendrik Antoon Lorentz, Wednesday 28th of September, 11:00  
Chair/s: Carlos A.F. Fernandes, Luigi Costanzo

### **Optimum Control Strategy based on an Equivalent Sliding Mode for Solar Systems with Battery Storage**

Dr. Abdelhakim Belkaid, Prof. Ilhami Colak, Dr. Korhan Kayisli

### **Stationary Solar Concentrating Photovoltaic-Thermal Collector -Cell String Layout**

Prof. Carlos Fernandes, Dr. João Torres, Prof. Paulo Branco, Dr. João Gomes, Dr. Samuel Nashih

### **Analysis of different C-PVT reflector geometries**

Dr. João Gomes, Dr. Bonfiglio Luc, Dr. Giovinazzo Carine, Prof. Carlos Fernandes, Dr. João Torres, Dr. Olle Olsson, Dr. Paulo Branco, Dr. Samuel Nashih

### **Aging of Solar PV plants and mitigation of their consequences**

Prof. Carlos Fernandes, Dr. João Torres, Dr. Miguel Morgado, Dr. Jose Morgado

### **Model and Research of Power Electronics Solar Converter Working with Power Grid**

Dr. Michał Krystkowiak, Mr. Adam Gulczyński, Dr. Michał Gwózdź

### **Series-Parallel PV arrays: a comparison between the performances of two algorithms for strings with an equal or with a different number of PV modules**

Prof. Massimo Vitelli, Dr. Luigi Costanzo, Dr. Marco Balato

## TT05 2 - Motion Control, Robotics, Mechatronics 2

Room 6 - Carl Friedrich Gauss, Wednesday 28th of September, 11:00  
Chair/s: Krzysztof Zawirski, Goga Cvetkovski

### **Rotor Flux Control with Copper Losses Reduction in a High Power Drive System**

Dr. Khoudir Marouani, Mr. Mokhtar Nesri, Mr. Kamal Nounou

### **Case Study of Energy Optimal and Energy Near-optimal Control Algorithms for the Drives with Constant, Linear and Quadratic Frictions**

Prof. Jan Vittek, Dr. Branislav Ftorek, Mr. Peter Butko, Mr. Tomas Fedor

### **Application of Unscented Kalman Filter in Adaptive Control Structure of Two-Mass System**

Mr. Krzysztof Drozd, Prof. Krzysztof Szabat

**Assessment of Industrial Robots Accuracy in relation to Accuracy Improvement in Machining Processes**

Mr. Tomas Kubela, Mr. Ales Pochyly, Mr. Vladislav Singule

**Virtual short pitch control model for fully pitched switched reluctance machines using a three-phase inverter**

Mr. Abraham J. Visser, Prof. Duco W.J. Pulle, Prof. Rik W. De Doncker

**High-Speed Position Control of Dynamic Elastic Actuator Using Elastic Potential Energy**

Mr. Kazumasa Miura, Prof. Seiichiro Katsura

**TT07 3 - Sensors, Active Filtering, Semiconductor Devices 3**

Room 7 - Michael Faraday, Wednesday 28th of September, 11:00

Chair/s: Alexandru Bitoleanu, Michał Gwóźdź

**Surpassing Bluetooth Low Energy Limitations on Distance Determination**

Mr. Pedro Silvestre, Prof. João Pimentão, Mr. Sérgio Onofre, Prof. Pedro Sousa

**Improvement of Power Quality and Energy Efficiency in Bucharest Metro Traction Substations**

Prof. Mihaela Popescu, Prof. Alexandru Bitoleanu, Dr. Ionut Deaconu, Prof. Mircea Dobriceanu

**Design and Analysis of the Compensating Capacitor Charging Algorithm for Active Filtering Systems**

Mr. Constantin Vlad Suru, Mr. Mihaita Linca, Mrs. Alexandra Preda, Mr. Eugen Subtirelu

**Winding Resistance and Power Loss for Inductors With Litz and Solid-Round Wire**

Dr. Rafal Wojda

**Simultaneous Total Harmonic Distortion Minimization and Selective Harmonic Elimination: Combining the Best of Both Worlds**

Mr. Kenessary Koishybay, Prof. Tohid Alizadeh, Prof. Yakov Familiant, Prof. Alex Ruderman

**Analytical simulation and experimental comparison of the losses in resonant DC/DC converter with Si and SiC switches**

Prof. Alex Van den Bossche, Mr. Nikolay Dukov, Dr. Angel Marinov, Prof. Vencislav Valchev, Mr. Radko Stoyanov

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