36th International Conference
on Electrical Drives and Power Electronics

EDPE 2023

11th Joint Slovak-Croatia Conference

CONFERENCE PROGRAM

Conference organizers

Faculty of Electrical Engineering and Informatics, Technical University of Košice, Slovakia

Slovak Electrotechnical Society Branch FEI TU Košice, Slovakia

FER – Faculty of Electrical Engineering and Computing, University of Zagreb Croatia

KoREMA – Croatian Society for Communications, Computing, Electronics, Measurement and Control

Technical co-sponsors

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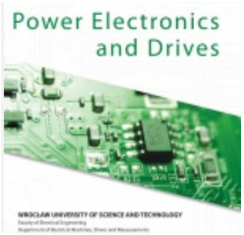

25 – 27 September 2023
Atrium Hotel, Nový Smokovec, The High Tatras, Slovak Republic

EDPE 2023 Conference Secretariat
Dept. of Electrical Engineering and Mechatronics
Technical University of Košice
Letná 9, 042 00 Košice, Slovak Republic

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E-mail: edpe@edpe.sk
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Message from the Conference Chairmen

Dear EDPE 2023 Conference participants,

on behalf of the Organizing Committee and in co-ordination with the Faculty of Electrical Engineering of the Technical University of Košice, Slovakia, Slovak Electrotechnical Society, IEEE Czechoslovakia Section, and in cooperation with the Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia and Croatian Society for Communication, Electronics, Measurement and Control, it is our pleasure to welcome you at the 36th International Conference on Electrical Drives and Power Electronics, EDPE 2023, organized in the High Tatras, Slovakia.

The EDPE 2023 Conference continues in tradition of two former EDPE conferences established independently in Košice, Slovakia, and in Zagreb, Croatia, both in the same year - 1973. The previously independent conferences belong to the oldest ones established in Europe in fields of power electronics, electric machines, electrical drives, and associated topics. By signing a joint agreement between the former organizers of the EDPE conferences – Prof. Nedjelko Perić from FERI (University of Zagreb) and Assoc. Prof. Viliam Fedák (Technical University of Košice) during the 10th EPE-PEMC International Conference in Cavtat (9 – 12 Sept. 2002) both conferences merged and since the year 2003 the conference has been organized biennially as a joint scientific event held alternatively in Croatia and Slovakia. The current event already is the 11th joint Slovak-Croatian conference and for this year we have chosen the congress and wellness ATRIUM Hotel in Nový Smokovec.

The organizers believe the current EDPE Conference in Slovakia will continue in dissemination of scientific knowledge of authors in research, design, development, application, and operation of all types of power converters, electrical machines and electrical drives, mechatronic systems, industrial applications of motion control and in all related topics.

We express our gratitude to the invited speakers for accepting our invitation, all active participants and guests from universities and, most importantly, our industrial partners Infineon Technologies Austria and Semikron Danfoss for their support. Allow us to thank all members of the International Scientific Committee for reviewing the papers and chairing the sessions and to thank the Organizing Committee members for their dedicated efforts during this year's sweltering summer, which greatly contributed to the conference's success.

We are looking forward to meeting you all at the EDPE 2023 Conference and we believe that you will both enjoy and gain valuable insights during your time here. In addition to the scientific program, we have put together an exciting social and tourist program, including mountain hiking trip that will allow you to appreciate the beautiful surroundings near the conference venue.

Karol Kyslan, Marek Pástor

EDPE 2023 Conference Chairmen
Technical University of Košice
Slovak Republic

I. TECHNICAL TRACKS

1. Power Electronics and Applications

1.1 Power Semiconductor Devices and Modules
1.2 Power Semiconductor Converters
1.3 Control of Converters
1.4 Power Quality, EMC, Filtering and PFC
1.5 Converters for Special Applications
1.6 Modelling and Simulation in Power Electronics

2. Electrical Machines and Drives

2.1 Special Electrical Machines
2.2 Control of AC and DC Drives
2.3 Control of SRM Drives
2.4 Special Drives
2.5 CAD of Electrical Machines
2.6 Modelling and Simulation in Electrical Drives

3. Motion Control and Mechatronics

3.1 Sensors and Observers
3.2 Servodrives
3.3 Drives for Vehicles and Traction Drives
3.4 Multi-motor Drives
3.5 Industrial Drives Applications
3.6 Mechatronic Systems with Drives
3.7 Robotics, Robot Control
3.8 Motion Control

4. Other Related Topics

4.1 Measurement and Signal Processing
4.2 Control Systems and Algorithms
4.3 Human EMC
4.4 Emerging Technologies
4.5 Education and Training
4.6 International Projects

Steering Committee Members

PL– Plenary lectures, **Lx-y** – Lecture sessions: **Px-y**– Poster sessions:

25 September 2023 – Day 1	**PL1**	**Helmut Weiss**	Montanuniversitaet Leoben, Leoben, Austria
	9:00 - 9:45	**Viliam Fedák**	Technical University of Košice, Slovakia
	PL2	**Pavol Bauer**	Delft University of Technology, The Netherlands
	9:45 - 10:30	**Marek Pástor**	Technical University of Košice, Slovakia
	L1	**Miroslav Chomát**	Czech Academy of Sciences, Prague, Czech Republic
	11:00 - 12:30	**Krisztián Horváth**	Szechényi István University, Győr, Hungary
	L2	**Željko Jakopović**	University of Zagreb, Croatia
	11:00 - 12:30	**Miroslav Novák**	Technical University of Liberec, Czech Republic
	P1	**Nikolaos Papanikolaou**	Democritus University of Thrace, Greece
	14:30 - 15:45	**Pavel Vorel**	Brno University of Technology, Czech Republic
26 September 2023 – Day 2	**P2**	**František Ďurovský**	Technical University of Košice, Slovakia
	8:30 - 9:30	**Mikuláš Huba**	Slovak University of Technology in Bratislava, Slovakia
	L3	**Olegs Sliskis**	Riga Technical University, Riga, Latvia
	9:45 - 11:00	**Johannes V. Gragger**	University of Applied Sciences Technikum Wien, Austria
	L4	**Michal Frivaldský**	University of Žilina, Slovakia
	9:45 - 11:00	**Marek Pástor**	Technical University of Košice, Slovakia
	PL3	**Péter Korondi**	University of Debrecen, Hungary
	11:15 - 12:00	**Željko Jakopović**	University of Zagreb, Croatia
27 Sept. 2023 – Day 3	**PL4**	**Teresa Orlowska-Kowalska**	Wroclaw University of Science and Technology, Poland
	8:30 - 9:30	**Viliam Fedák**	Technical University of Košice, Slovakia
	L5	**Karol Kyslan**	Technical University of Košice, Slovakia
	10:00 - 11:30	**Viliam Fedák**	Technical University of Kosice, Slovakia
	L6	**Helmut Weiss**	Montanuniversitaet Leoben, Leoben, Austria
	10:00 - 11:30	**Marek Pástor**	Technical University of Košice, Slovakia

Local Organizing Committee Members

Karol Kyslan	Conference Chair	**Assistants**	
Marek Pástor	Program Chair	**Tomáš Basarik**	**Daniel Marcin**
Viliam Fedák	Honorary Chair	**Dávid Bodnár**	**Lukáš Pancurák**
Milan Guzan	Finance Chairman	**Daniel Gordan**	**Viktor Šlapák**

CONFERENCE FINAL PROGRAM

Conference Sessions at a Glance

(21 September 2023)

Notation:
PLy – Plenary lectures: y – order of the **plenary lecture**
Lx-y – Lecture sessions: x – order of **lecture session**, y – order of the lecture
Px-y– Poster sessions: x – **order of poster session**, y – order of the poster
EXP – Experiment outside of the hotel Academia

Monday, 25 September 2023 — *Day 1*

Time	Code	Session	Room
7:30 – 10:00		**Registration**	**Lobby**
8:30 – 9:00		**Opening Ceremony**	**Room S1**
9:00 – 9:45	**PL1**	**Power Electronics 5.0 – Standing on the Shoulders of Giants**	**Room S1**
9:45 – 10:30	**PL2**	**Power GaN for Sustainable Energy Solution**	**Room S1**
10:30		**Coffee break**	**Corridor**
11:00 – 12:30	**L1**	**Electrical Drives**	**Room S2**
	L2	**Power Electronics: DC-DC Converters**	**Room S1**
12:30		**Lunch**	**Restaurant**
14:30 – 15:45	**P1**	**Power Electronics and Applications**	**Lobby**
16:00 – 16:30	**EXP**	**Li-ion battery Destruction with Open Fire**	**Outside**
18:00 – 22:00		**Welcome Party in the ATRIUM hotel restaurant**	**Restaurant**
21:00 – 22:00		**Swimming pool afterparty in the ATRIUM hotel**	**Wellness**

Tuesday, 26 September 2023 — *Day 2*

7:30 – 8:30		**Registration**	**Lobby**
8:30 – 9:30	**P2**	**Electrical Drives and Mechatronics**	**Lobby**
9:30		**Coffee break**	**Corridor**
9:45 – 11:00	**L3**	**Related Topics, Control and Design**	**Room S2**
	L4	**Power Electronics: Traction and Automotive**	**Room S1**
11:15 – 12:00	**PL3**	**Digital Energy**	**Room S1**
12:00		**Lunch**	**Restaurant**
13:00 – 18:00		**Departure for conference trips (according to the choice) Individual activities (hiking, wellness, discussions)**	**Outside**
19:00 – 22:00		**Traditional folk dinner in the hut Koliba Kamzík, Starý Smokovec, walking distance from ATRIUM hotel 15 min.**	**Koliba Kamzík**

Wednesday, 27 September 2023 *Day 3*

8:30 – 9:30	**PL4**	**Safe Second-Life for Large Li-Ion Batteries through Handling of Fast Thermal Runaway**	**Room S1**
9:30		**Coffee break**	**Corridor**
10:00 – 11:30	**L5**	**Electrical Drives**	**Room S2**
	L6	**Power Electronics: Energy Transfer and Storage**	**Room S1**
11:30		**Closing Session**	**Room S1**
12:00		**Lunch**	**Restaurant**

Monday, 25 September 2023 Day 1.

Opening Ceremony

Monday, 25 September 2023, 08:30 – 09:00 Room S1

Opening and Instructions
Karol Kyslan, Marek Pástor, Viliam Fedák, Technical University of Košice, Slovakia
Željko Jakopović, University of Zagreb, Croatia,
Pavol Bauer, Delft University of Technology, The Netherlands

Plenary Lecture PL1

Monday, 25 September 2023, 09:00 – 09:45 Room S1

Chairs: Helmut Weiss, Montanuniversitaet Leoben, Leoben, Austria
Viliam Fedák, Technical University of Košice, Slovakia

PL1 ----------

Power Electronics 5.0 – Standing on the Shoulders of Giants
Johan W. Kolar, Swiss Federal Institute of Technology in Zürich, Switzerland

Plenary Lecture PL2

Monday, 25 September 2023, 09:45 – 10:30 Room S1

Chairs: Pavol Bauer, Delft University of Techology, The Netherlands
Marek Pástor, Technical University of Košice, Slovakia

PL2 ----------

Power GaN for Sustainable Energy Solution
Andrea Rojko, Infineon Technologies Austria AG, Austria

Lecture session L1: Electrical Drives

Monday, 25 September 2023, 11:00 – 12:30 Room S2

Chairs: Miroslav Chomát, Inst. of Thermomechanics, CAS, Prague, Czech Republic
Krisztián Horváth, Szechényi István University, Győr, Hungary

L1-1 ---------- Paper ID: 25 + 26 ----------

Analysis of the Characteristics of a Six-Phase Induction Motor
Mariusz Korkosz[1]; Andriy Kutsyk[2]; Krystyna Krzywdzińska-Kornak[1]; Marek Nowak[1]; Mykola Semeniuk[2]
[1]Rzeszow University of Technology, Rzeszow, Poland
[2]Lviv Polytechnic National University, Lviv, Ukraine

Analysis of the Characteristics of a Dual-Channel Three-Phase Induction Motor

Mariusz Korkosz[1]; Andriy Kutsyk[2]; Krystyna Krzywdzińska-Kornak[1]; Mateusz Suliga[1]; Mykola Semeniuk[2]
[1]Rzeszow University of Technology, Rzeszow, Poland
[2]Lviv Polytechnic National University, Lviv, Ukraine

L1-2 ---------- Paper ID: 40 ----------

Experimental Verification of Neural Network-Based Fault Types Classifier for Current Sensors in Induction Motor Drive

Krystian Teler; Maciej Skowron; Teresa Orlowska-Kowalska
Wroclaw University of Science and Technology, Wroclaw, Poland

L1-3 ---------- Paper ID: 60 ----------

Torque Ripple Reduction Utilizing Pole-Shoe Extensions for a Traction Wound Field Synchronous Machine

Branko Ban[1]; Ian Brown[2]; Anton Kersten[3]; Lars Sjöberg[4]; Tushar Batra[4],
[1]Torquery Consulting, Göteborg, Sweden
[2]Illinois Institute of Technology, Chicago, Illinois
[3]Research Institutes of Sweden, Borås, Sweden
[4]Alvier Mechatronics, Helsingborg, Sweden

L1-4 ---------- Paper ID: 68 ----------

Nonlinear PMSM Model Implementation in MATLAB-Simulink for Sensorless Polarity Detection

István Szalay; Dénes Fodor, Széchenyi István University, Győr, Hungary

Lecture session L2: Power Electronics: DC-DC Converters

Monday, 25 September 2023, 11:00 – 12:30 **Room S1**

Chairs: Željko Jakopović, University of Zagreb, Croatia
Miroslav Novák, Technical University of Liberec, Czech Republic

L2-1 ---------- Paper ID: 37 ----------

Comparison of Bi-Directional DC/DC Converter using Si and WBG Devices

Kusuma Priya Krovi; Pavel Skarolek; Jan Bauer
Czech Technical University, Praha, Czech Republic

L2-2 ---------- Paper ID: 42 ----------

An Overview of Advanced Gate Driver Concepts for SiC Semiconductors

Tomislav Ivaniš; Marinko Kovačić, University of Zagreb; Zagreb, Croatia

L2-3 ---------- Paper ID: 44 ----------
Mutual Control of Interleaved and Single-Phase DC-DC Converters for Improved Light Load Efficiency and Peak Power Increase
Kristiāns Gaspersons; Kaspars Kroičs, Riga Technical University, Riga, Latvia

L2-4 ---------- Paper ID: 66 ----------
Analysis of Conducted Electromagnetic Interference in Bidirectional Interleaved DC-DC Converter
Martin Makar; Martina Kutija; Marinko Kovačić; Tomislav Ivaniš
University of Zagreb; Zagreb, Croatia

Poster Sessions P1: Power Electronics and Applications

Monday, 25 September 2023, 14:30 – 15:45 **Lobby**

Chairs: Nikolaos Papanikolaou, Democritus University of Thrace, Greece
Pavel Vorel, Brno University of Technology, Brno, Czech Republic

P1-1 ---------- Paper ID: 09 ----------
Wide-Bandgap Semiconductors for Multilevel Inverters – a Comparison with Si IGBT
Rudolf Mecke; Harz University of Applied Sciences, Wernigerode, Germany

P1-2 ---------- Paper ID: 11 ----------
Design of Headlight Power Electronic Supply for Automotive Applications
Michal Frivaldsky; Pavol Spanik; Peter Drgona, University of Zilina, Zilina, Slovakia

P1-3 ---------- Paper ID: 22 ----------
BEV Energy Consumption Estimation for Route Planning
Zdeněk Mašek; Michal Závodník
University of Pardubice, Pardubice, Czech Republic

P1-4 ---------- Paper ID: 29 ----------
Dynamic Flux Balance Control of a Phase-shifted Full Bridge
Jan Martiš; Pavel Vorel; Radek Tománek
Brno University of Technology, Brno, Czech Republic

P1-5 ---------- Paper ID: 30 ----------
Low Input Voltage DC-DC Converter for Energy Harvesting using Iron-Constantan Thermoelectric Cells
Pavel Vorel; Jan Martiš; Tomáš Macík
Brno University of Technology, Brno, Czech Republic

P1-6 ---------- Paper ID: 33 ----------

The Analysis, Modeling, and Control of the Forward DC/DC Converter

Juraj Simko; Michal Prazenica; Roman Konarik, University of Zilina, Zilina, Slovakia

P1-7 ---------- Paper ID: 41 ----------

Mission Profile Parameter Extraction for Automotive Body Power Devices with Rapid Control Prototyping Systems

Andreas Warmuth; Alexander Ulbing; Markus Sievers
Stress Test Methology, KAI Kompetenzzentrum fuer Indutstrie- und Automobilelektronik, Villach, Austria

P1-8 ---------- Paper ID: 54 ----------

Designing Automatic-Reset Controllers with Higher-Order Derivatives

Mikulas Huba[1]; Pavol Bistak[1]; Damir Vrancic[2]
[1]Slovak University of Technology in Bratislava, Bratislava, Slovakia;
[2]J. Stefan Institute, Ljubljana, Slovenia

P1-9 ---------- Paper ID: 56 ----------

The Use of Time Series Database in Measurements

Simona Kirešová; Milan Guzan; Branislav Sobota; Viliam Fedák; Richard Bača; Daniel Bakši, Technical University of Košice, Slovakia

P1-10 ---------- Paper ID: 57 ----------

BESS Application for Wireless Car Charging in Motion

Rodions Saltanovs; Ilya Galkin, Riga Technical University, Riga, Latvia

P1-11 ---------- Paper ID: 63 ----------

On the Design of an Islanding, Neutral Loss and Meter Tampering Detection Kit for Low Voltage Electrical Installations

Nick Rigogiannis; Christos Pechlivanis; Andreas Tichalas; Nick Papanikolaou, Democritus University of Thrace, Xanthi, Greece

P1-12 ---------- Paper ID: 65 ----------

Experimental High-Vvoltage AC Generators for Cardiological Purposes

Martin Folprecht; Dalibor Cervinka; Jiri Ctibor; Pavel Vorel; Martin Hemzal; Veronika Novotna
Brno University of Technology, Brno, Czech Republic

P1-13 ---------- Paper ID: 70 ----------

Overview of Active Balancing Methods and Simulation of Capacitor Based Active Cell Balancing for Battery Pack in EV

Daniel Marcin; Milan Lacko; Dávid Bodnár; Lukáš Pancurák; Lukáš Stach
Technical University of Košice, Slovakia

P1-14 ---------- Paper ID: 71 ----------

Simulation of a Hybrid Power Supply for Robotic Applications Depending on Storage Capacity

Slavomir Kascak; Patrik Resutik; Michal Prazenica
University of Zilina, Zilina, Slovakia

P1-15 ---------- Paper ID: 77 ----------

Power Control of Three Port MAB Converter

Adrian Marcinek; Marek Pastor, Technical University of Košice, Slovakia

P1-16 ---------- Paper ID: 82 ----------

Optimization of Soft-Switching DC-DC Converter

Marek Pastor; Jaroslav Dudrik; Adrian Marcinek
Technical University of Košice, Slovakia

Experiment EXP: Li-ion battery destruction with open fire

Monday, 25 September 2023, 16:00 – 16:30 **Outside**

Li-Ion Battery Destruction with Open Fire

By prof. Helmut Weiss in open area next to the ATRIUM hotel parking lot.

Tuesday, 26 September 2023 Day 2.

Poster Sessions P2: Electrical Drives and Mechatronics

Tuesday, 26 September 2023, 08:30 – 09:30 Lobby

Chairs: František Ďurovský, Technical University of Košice, Slovakia
Mikuláš Huba, Slovak University of Technology in Bratislava, Slovakia

P2-1 ---------- Paper ID: 12 ----------

MTPA Control Strategy for ALA Rotor SynRM Based on Reactive and Apparent Power Calculation under Sensorless V/f Control with Stabilization

Michal Vidlak[1], Sorin Agarlita[2], Ion Boldea[3]
[1]University of Zilina, Zilina, Slovakia
[2]Corporate R&D, DIWRW ZF Group, Timisoara, Romania
[3]University Timisoara Romanian Academy, Timisoara, Romania

P2-2 ---------- Paper ID: 19 ----------

Possibilities of Permanent Magnet Synchronous Motor Efficiency Increasing using Flux Weakening Method

Oleg Sivkov; Jaroslav Novak; Martin Novak
Czech Technical University in Prague, Prague, Czech Republic

P2-3 ---------- Paper ID: 24 ----------

Design and Analysis of the Characteristics of a Brushless Permanent Magnet Motor for Critical Drive

Mariusz Korkosz[1]; Krystyna Krzywdzińska-Kornak[1]; Kamil Parfianowicz[1]; Jan Prokop[1]; Ihor Shchur[2]
[1]Rzeszow University of Technology, Rzeszow, Poland
[2]Lviv Polytechnic National University, Lviv, Ukraine

P2-4 ---------- Paper ID: 34 ----------

Signal Processing and Machine Learning Techniques for Predictive Maintenance of Rotor Bars in Induction Machine

Karolina Kudelina; Hadi Ashraf Raja; Viktor Rjabtšikov; Muhammad Usman Naseer; Toomas Vaimann; Ants Kallaste
Tallinn University of Technology, Tallinn, Estonia

P2-5 ---------- Paper ID: 43 ----------

An Impact of Model Accuracy on Control Performance in Finite Control Set Model Predictive Current Control for Reluctance Synchronous Motor

Robert Surus; Mateusz Tejer; Łukasz J. Niewiara; Tomasz Tarczewski
Nicolaus Copernicus University, Toruń, Poland

P2-6 ---------- Paper ID: 53 ----------
Dynamic Model of Five-Phase Induction Motor
Pavel Záskalický; Ján Kaňuch, Technical University of Košice, Slovakia

P2-7 ---------- Paper ID: 55 ----------
Experimental Study on the Strength of Geared Motor Units by Using Vibration Spectrum
Genadijs Kobenkins; Marks Marinbahs; Nikita Rilevs; Olegs Sliskis
Riga Technical University, Riga, Latvia

P2-8 ---------- Paper ID: 58 ----------
Modeling of Electromagnetic Phenomena in Small Hydroelectric Plants
Pavol Fedor[1]; Daniela Perdukova[1]; Petr Bernat[2]; Libor Stepanec[2]; Viliam Fedak[1]
[1]Technical University of Kosice, Slovakia
[2]VSB Technical University Ostrava, Czech Republic

P2-9 ---------- Paper ID: 67 ----------
Drive Model for Kinetic Energy Storage System
Jiří Kubín[1]; Želmíra Ferková[2]; Lukáš Krčmář[1],
[1]Technical university of Liberec, Liberec, Czech Republic
[2]Technical University of Košice, Slovakia

P2-10 ---------- Paper ID: 69 ----------
Filament Dryer for FDM 3D Printing
Ján Briežnik; Katarína Žáková; Mikuláš Huba,
Slovak University of Technology in Bratislava, Slovakia

P2-11 ---------- Paper ID: 72 ----------
Fuzzy Observer of Induction Motor Torque and Speed Based on Dynamic Filters
Marek Fedor[1]; Pavol Fedor[2]; Daniela Perduková[2]; Viliam Fedák[2]
[1]Procesná Automatizácia, Kosice, Slovakia
[2]Technical University of Kosice, Slovakia

P2-12 ---------- Paper ID: 74 ----------
Neural Network Speed Controller for DC Motor
Peter Girovský; Jaroslava Žilková; Marek Pástor; Ján Kaňuch
Technical University of Košice, Slovakia

P2-13 ---------- Paper ID: 78 ----------
Educational Model of Material Processing Line
Pavol Smoleň; František Ďurovský, Technical University of Košice, Slovakia

P2-14 ---------- Paper ID: 79 ----------
Artificial Intelligence in Control of BLDC Motor
Peter Girovský; Jaroslava Žilková; Marek Pástor; Ján Kaňuch; Tadeáš Kmecik
Technical University of Košice, Slovakia

P2-15 ---------- Paper ID: 81 ----------
Automated Inductance and Resistance Measurement of Electric Motor Windings - An Engineering Guide
Tomáš Basarik; Daniel Gordan; Viktor Šlapák; Marek Pástor
Technical University of Košice, Slovakia

P2-16 ---------- Paper ID: 83 ----------
Rotary Shears Control in Material Processing Lines
František Ďurovský; Viktor Šlapák; Pavol Smoleň; Karol Kyslan; Emil Spišák
Technical University of Košice, Slovakia

P2-17 ---------- Paper ID: 85 ----------
Finite Control Set Model Predictive Direct Speed Control of PMSM
Lukáš Pancurák, Tomáš Jure, Karol Kyslan
Technical University of Košice, Slovakia

Lecture session L3: Related Topics, Control and Design

Tuesday, 26 September 2023, 09:45 – 11:00 **Room S2**

Chairs: Olegs Sliskis, Riga Elektromasinbuves Rupnica, Latvia
Johannes V.Gragger, University of Applied Sciences Technikum Wien, Austria

L3-1 ---------- Paper ID: 18 ----------
Emulation of Electrical Arc Furnace in Laboratory Conditions using Measured Data from Real Furnace Operation
Martin Bejvl; Miroslav Chomát; Petr Šimek; Martin Čerňan, Czech Technical University, Prague, Czech Republic, and Institute of Thermomechanics, Czech Academy of Sciences, Prague, Czech Republic

L3-2 ---------- Paper ID: 23 ----------
High Bandwidth Integrator for Differential, PCB Integrated Rogowski Coils
Markus Zocher; Veit Starost; Norbert Grass; Michael Schmidt; Timo Wilfling
University of Applied Sciences Georg Simon Ohm, Nuremberg, Germany

L3-3 ---------- Paper ID: 39 ----------

Optimizing Constrained Series PIDA Controller for Speed Loops Inspired by Ziegler-Nichols

Mikulas Huba[1]; Pavol Bistak[1]; Damir Vrancic[2]
[1]STU in Bratislava, Bratislava, Slovakia
[2]J. Stefan Institute, Ljubljana, Slovenia

L3-4 ---------- Paper ID: 48 ----------

Effect of Heat Treatment on Magnetic Properties of Selective Laser Melting Processed INVAR Alloy

Miroslav Novák, Technical University of Liberec, Liberec, The Czech Republic

Lecture session L4: Power Electronics: Traction and Automotive

Tuesday, 26 September 2023, 09:45 – 11:00 **Room S1**

Chairs: Michal Frivaldský, University of Žilina, Slovakia
Marek Pástor, Technical University of Košice, Slovakia

L4-1 ---------- Paper ID: 15 ----------

Tuning of Traction Power Station Converter Output Characteristics

Petr Žižlavský; Ladislav Mlynařík
University of Pardubice, Pardubice, Czech Republic

L4-2 ---------- Paper ID: 32 ----------

Design of piece-wised linearized simulation model of the traction inverter suited for efficiency performance evaluation

Jakub Simcak; Michal Frivaldsky; Patrik Resutik
University of Zilina, Zilina, Slovakia

L4-3 ---------- Paper ID: 45 ----------

Advantages of System Level Testing and Modelling for Automotive Smart Power Switches

Dibakar Bala; Alexander Ulbing; Shivam Pathak
Stress Tests and Methodology (STM), KAI GmbH, Villach, Austria

L4-4 ---------- Paper ID: 64 ----------

Power Quality Measurements in Shipboard Microgrids: A Case Study

Nick Rigogiannis[1]; Ioannis Bogatsis[1]; Christos Pechlivanis[1]; Konstantinos Terzopoulos[2]; Anastasios Kyritsis[3]; Nick Papanikolaou[1]; Michael Loupis[2]
[1]Democritus University of Thrace, Xanthi, Greece
[2]National and Kapodistrian University of Athens, Psachna, Greece
[3]Ionian University, Zakynthos, Greece

Plenary Lecture PL3

Tuesday, 26 September 2023, 11:15 – 12:00 **Room S1**

Chairs: Péter Korondi, University of Debrecen, Hungary
Željko Jakopović, University of Zagreb, Croatia

PL3 ----------

Digital Energy

Pavol Bauer, Delft University of Technology, The Netherlands

Wednesday, 27 September 2023 Day 3.

Plenary Lecture PL4

Wednesday, 27 September 2023, 08:30 – 09:30 Room S1

Chairs: Teresa Orlowska-Kowalska, Wroclaw University of Sicence, Poland
Viliam Fedák,Technical University of Košice

PL4 ----------

Safe Second-Life for Large Li-Ion Batteries through Handling of Fast Thermal Runaway

Helmut Weiss, Montanuniversitaet Leoben, Leoben, Austria

Lecture session L5: Electrical Drives

Wednesday, 27 September 2023, 10:00 – 11:30 Room S2

Chairs: Karol Kyslan, Technical University of Košice, Slovakia
Viliam Fedák, Technical University of Košice, Slovakia

L5-1 ---------- Paper ID: 28 ----------

Online Stator and Rotor Resistance Estimation for Current Sensor Fault-Tolerant Control of Induction Motor Drives

Michal Adamczyk; Teresa Orlowska-Kowalska
Wroclaw University of Science and Technology, Wroclaw, Poland

L5-2 ---------- Paper ID: 62 ----------

Analysis of the Heat Dissipation of Synchronous Motor with Reluctance Rotor with Goal of Power Density Increasing

Ludmila Lavrinoviča; Karlis Gulbis; Andrejs Podgornovs; Anatolijs Bižans
Riga Technical University, Riga, Latvia

L5-3 ---------- Paper ID: 36 ----------

Digital Twin of Wind Generator for Modelling Various Turbine Characteristics

Hadi Ashraf Raja[1]; Siarhei Autsou[1]; Karolina Kudelina[1]; Viktor Rjabtšikov[1]; Toomas Vaimann[1]; Ants Kallaste[1]; Raimondas Pomarnacki[2]; Van Khang Hyunh[3]
[1]Tallinn University of Technology, Tallinn, Estonia
[2]Vilnius Gediminas Technical University, Vilnius, Lithuania
[3]University of Agder, Grimstad, Norway

L5-4 ---------- Paper ID: 75 ----------
On the Simulation of Bearing Faults in Induction Machines
Florian Floh; Helmut Weiss
Institute of Electrical Engineering, Montanuniversitaet Leoben, Austria

L5-5 ---------- Paper ID: 87 ----------
Load Torque and Permanent Magnet Flux Linkage Estimation of Surface-Mounted PMSM by Using Unscented Kalman Filter
Krisztián Horváth, Széchenyi István University, Győr, Hungary

Lecture session L6: Power Electronics: Energy Transfer and Storage

Wednesday, 27 September 2023, 10:00 – 11:30 **Room S1**

Chairs: Helmut Weiss, Montanuniversitaet Leoben, Leoben, Austria
Marek Pástor, Technical University of Košice, Slovakia

L6-1 ---------- Paper ID: 35 ----------
A New Quadratic Buck-Boost Converter
Felix A. Himmelstoss; Johannes V. Gragger
University of Applied Sciences Technikum Wien, Vienna, Austria

L6-2 ---------- Paper ID: 46 ----------
Energy Management Algorithm for Battery Sharing based on Model Predictive Control integrating Electro-Thermal Simulation and Demand Forecast
Herbert Hackl; Manuel Freiberger; Philip Matzick; Martin Stoiber; Bernhard Auinger, Silicon Austria Labs, Graz, Austria

L6-3 ---------- Paper ID: 50 ----------
Investigation of the Influence of Geometry of Wireless Power Transfer (WPT) Coupling Coils on Transmitting Performance
Jakub Skorvaga[1]; Patrik Resutik[1]; Michal Frivaldský[1]; Vladimir Kindl[2]; Martin Zavrel[2],
[1]University of Zilina, Zilina, Slovakia
[2]University of West Bohemia in Pilsen, Pilsen, Czech Republic

L6-4 ---------- Paper ID: 59 ----------
Data Science-Based Techniques for Modelling and Diagnostics of Battery Cells Based on End-Of-Life Criteria
Rolando Antonio Gilbert Zequera; Anton Rassõlkin; Toomas Vaimann; Ants Kallaste
Tallinn University of Technology, Tallinn, Estonia

L6-5 ---------- Paper ID: 80 ----------

Temperature Dependence of Li-ion Battery Hysteresis for Battery Modeling Purposes

Dávid Bodnár; Daniel Marcin; František Ďurovský, Technical University of Košice, Slovakia

Closing Ceremony

Wednesday, 27 September 2023, 11:30 – 12:00 **Room S1**

Evaluation of the conference

Announcement of the next 37th EDPE 2025 Dubrovnik conference

VI. GENERAL INFORMATION

Conference Venue

ATRIUM Hotel
Nový Smokovec 42,
062 01 The High Tatras, Slovakia
(In Slovak language: Vysoké Tatry,)

N 49° 10' 05,30" E 20° 16' 28,27"
https://atriumhotel.sk/

Reception:
tel.: +421 903 990 105
+421 52 442 23 42
e-mail: recepcia@atriumhotel.sk
Booking department:
e-mail: rezervacie@atriumhotel.sk
phone: +421 904 945 083

How to Get There

By train

- change the train in Poprad-Tatry to "Tatra electric tram"
- other possibility is to get off in Štrba railway station, to change to Štrbské pleso (cog railway) and again change there – little bit bothering but a nice experience.

The best solution to get off Tatra electric tram (https://www.tatry.sk/infocentrum/doprava-a-infrastruktura/tatranske-vlaky-elektricka-zubacka/) is in **Nový Smokovec station**. Take a path (North direction towards mountains), cross he main road and he Atrium Hotel is just in front of you (1 min. walk form the station). You can also get off in Starý Smokovec, but the way is little bit longer: from the tram station take a path westward along the rails, cross the main road and continue further. After 10 mins. you reach the Atrium Hotel.

When hiring a taxi from Poprad-Tatry railway station to Nový Smokovec the list of taxi services in Poprad can be found at http://www.najditaxi.sk/taxi-poprad.

By plane.

List of destinations:

Vienna Airport	Airport Bratislava	Airport Kosice	Airport Poprad	Airport Krakow	Budapest Airport
www.viennaairport.com	www.bts.aero	www.airportkosice.sk	www.airport-poprad.sk	www.krakowairport.pl	www.bud.hu/english

Take the nearest railway station and travel to Poprad-Tatry.

The travelers from Krakow can:

- take direct bus to Poprad and to get off in Starý Smokovec,
- or use the train connection to Zakopane and then by bus to Poprad-Tatry.

By car – Nový Smokovec is a continuation of Starý Smokovec, so try to get to the Atrium Hotel (**N 49° 10' 05,30" E 20° 16' 28,27"**) from the directions Liptovský Hrádok – Podbanské – Nový Smokovec, or Poprad – Nový Sokovec, or Lysa Poľana – Tatranská Lomnica – Nový Smokovec.
For road directions, please, visit google.com/maps.

Conference Materials

- The booklet of the Conference Program contains detailed conference program and abstracts of the papers which will help participants to get the basic information about each paper.
- The conference proceedings are available in the electronic from on USB key only.
- After the conference the proceedings will be delivered to IEEE for including the papers into IEEE Xplore database.
- According to the IEE rules, not presented papers will be excluded from the submission to IEEE Xplore Digital Library (after the conference).

In case you cannot participate in the conference and the fee was paid, the booklet Program and Abstracts and the conference materials with the USB proceedings will be mailed you after the conference.
The conference participation is transferable to another person at any time. In that case, please, contact the conference secretariat for new delegate information immediately.

- **Regular paper registration fee** covers: conference bag, conference sessions attendance, conference proceedings in electronic form, fee for inclusion the paper into IEEE Xplore Digital Database, Welcome Party, traditional folk dinner in the hut Koliba Kamzík refreshment and meals during the conference, conference trip, uploading and processing one paper (plagiarism check).
- **Accompanying person** - Welcome Party, traditional folk dinner in the hut Koliba Kamzík, refreshment and meals during the conference, conference trip.

Food Services

Meals are served in the Atrium Hotel restaurant. Registered participants have free access to the light refreshment during coffee breaks and lunches in every conference day. For those non-registered, it is possible to pay for the meals in cash, or credit card. In case of accommodation in the hotel, the expenditure can be added to the total payment of the room.

You are kindly asked to carry your name badge visible to be easy recognized by the hotel staff

Welcome Party

The Welcome Party will be held in the Atrium Hotel on Monday, 25 Sept. 2023, starting at 18:00. One ticket is included in the registration fee and accompanying persons can buy the extra ticket, if not done in advance.

After the Welcome Party you are invited to join indoor evening swimming pool party in the hotel wellness center. Charming night atmosphere, Champaign and music will help us to keep a high spirit and rest after hard-working day. The swimming dress is mandatory, do not forget it!

Do not miss this unique and traditional experience! For the hotel guests there is free access to the wellness center during the day (but without serving any Champaign).

Insurance

The Organizing Committee do not accept any responsibility for personal accidents, damage and loss of private property of the participants or any other unexpected occurrences.

Participants are advised to make their own insurance arrangements. During the conference trip we shall be hiking in a mountain environment, although on tourist paths, but we strongly recommend to be insured against any mountain accident.

Parking

Parking for all hotel guests in front of the Atrium Hotel, Nový Smokovec is free of charge.

Climate and Weather

The conference venue lies on a slope of the rocky mountains at the altitude over 1000 m above sea level. In September the weather in the High Tatras is usually stable (but exceptions are possible). In the second half of September the morning temperature reaches 5 °C but also it can fall to zero and in the afternoon it reaches 12 – 15 °C. Warmer clothes are necessary.

Conference Trips and Equipment

It is already a tradition that to know more about the surrounding country we organize a trip in afternoon of the second conference day, Tuesday 26 Sept. 2023. This year we keep the slogan: when in the High Tatras, you should know the mountains closer.

We plan to divide participants in four groups to visit four different parts of mountains. Each group will be accompanied by a guide.

Bring necessary mountain equipment: hiking shoes (hiking trails are quite rocky), Anorak, warmer clothes, cap, and rain-wear (for every reason).

In case of bad weather we plan to visit several attraction in surrounding – Poliankovo (a digital gallery: https://www.poliankovo.sk/en/ – virtual reality, 3D projections, augmented reality, holograms…) in Tatranská Polanka (4 km), Tricklandia in Starý Smokovec (1 km, http://www.tricklandia.sk/en/home-en/), Ski Museum and TANAP Museum in Tatranská Lomnica Museum of skies in Tatranská Lomnica. Or you can stay in the well-equipped hotel wellness center. For those who like swimming a big aquapark AquaCity in Poprad is advised.

We recommend you prolong your stay in the hotel after the conference in order to rest, to hike in the High Tatras valleys and peaks or to go on bike tours (there is a mountain-bike rent directly in the hotel – ask the receptionist).

For every case: emergency mountain rescue phone number is **18 300.**

Tourist Information and Some Important Links

The High Tatras

The High Tatras Mountains (http://en.wikipedia.org/wiki/High_Tatras) extend over the north of the country, along the state border between Slovakia and Poland. The peaks rise steeply over Liptov, Poprad and Spiš basin. The main ridge is 26 km long and more than twenty peaks are higher than 2500 m above the sea level. Although total area of the TANAP (TAtra NAtional Park) has only 260 km^2, a very characteristic alpine world exists there: there are 32 Tatra valleys, all of glacial origin. In most of them there is at least one tarn, called "pleso", greatly enhancing the charm of the wild rocky valleys. The tallest peak is Gerlach (2655 m). For tourist 10 chalets are opened (https://www.tatryportal.sk/typ_tury/vysokohorske-chaty/) and 7 peaks are accessible by tourists (https://www.tatryportal.sk/typ_tury/tury-na-vrcholy/). The

High Tatras offers many facilities for hiking - tours into valleys, to mountain chalets and peaks along well-marked paths.

Useful and interesting links

- Online search of trains and buses in Slovakia ..... www.cp.sk
- Online maps of Slovakia ..... mapa.zoznam.sk
- Information about Slovak mountains ..... www.hory.sk
- Basic map and trips consult at ..... www.vysoke-tatry.sk/mapy/mapy/ciele.html#bod2.
- Find some tours at: ..... https://www.tatryportal.sk/turistika-vo-vysokych-tatrach/
- See virtual panoramas here (Polish Tatras) http://panoramy.biernawski.com.
- Weather forecast – The High Tatras https://www.tatryportal.sk/predpoved-pocasia/
  – Starý Smokovec weather directly at
  http://www.shmu.sk/sk/?page=1&id=meteo_num_mgram&nwp_mesto=31500&changed=1&picSelector=5
- Mountain rescue service ..... https://www.hzs.sk/

Credit Cards and Exchange of Currency

In the Atrium Hotel it is possible to pay by credit card. Visa and MasterCard are the most widely accepted credit cards. In case of need there are two ATMs (in Slovak language: "Bankomat") in Starý Smokovec. Current exchange rates are e.g. at: https://www.nbs.sk/en/home.

Payment information

Account Holder	Slovenská elektrotechnická spoločnosť, Branch FEI TU Košice Letná 9, 042 00 Košice, Slovak Republic Business ID: 12665037 Tax ID: 2020767925 IBAN: SK55 0900 0000 0000 8212 8234 Variable symbol: 010 Constant symbol: 0308
Bank	BIC (SWIFT) Code: GIBASKBX Slovenská sporiteľňa, a.s. Tomášikova 48, 832 37 Bratislava, Slovak Republic