





The Faculty of Electrical and Computer Engineering Rzeszow University of Technology  
and Polish Society of Theoretical and Applied Electrical Engineering (PTETiS)

Polish Society for Theoretical and Applied Electrical Engineering



SELECTED ISSUES IN POWER ENGINEERING,  
ELECTRICAL ENGINEERING

**INDUSTRY 4.0**



30 November  
2022  
9:00 am

Rzeszow University of Technology  
The Faculty of Electrical and Computer  
Engineering  
Building A - room 101

## FINAL PROGRAM

“Selected Issues in Power Engineering,  
Electrical Engineering and Industry 4.0”

November 30, 2022, Poland - Rzeszów



## Welcome

It is our great pleasure and honor to welcome you to the edition of the conference Selected Issues in Power Engineering, Electrical Engineering and Industry 4.0 in Rzeszow, Poland. The organizing committee of SPEI 2022 will continue the tradition established by the previous events. We hope that the meeting in Rzeszow will maintain the high level of technical content of the previous editions and will continue to serve its role as the major forum where university faculty gather together to focus on electrical problems.

Politechnika Rzeszowska, Wydział Elektrotechniki i Informatyki  
ul. Wincentego Pola 2, 35-959 Rzeszów, sala, A 101



In 2022 edition the emphasis will be put on 4 main issues: theme a) Industry 4.0, theme b) Smart electronics, theme c) Electromobility, theme d) Renewable Energy Sources.

## Organiser

Polskie Towarzystwo Elektrotechniki Teoretycznej i Stosowanej

Rzeszow University of Technology  
al. Powstańców Warszawy 12

35-959 Rzeszów

The Faculty of Electrical and Computer Engineering

The aim of the Conference, organized by Rzeszow University of Technology, PTETiS, is the presentation of scientific results, exchange of professional experiences and the integration of interdisciplinary scientific community in working on selected problems of electrical engineering, electronics, automation and mechatronics.

The predicted topics of the Conference include:

- mathematical modeling of electromechanical, electrical and electronic components and systems,
- new construction, technological and material solutions in electrical engineering and electronics,
- generation, conversion and distribution systems of electrical energy,
- control of machines and electric drives
- modeling and analysis of electromagnetic fields,
- models of power electronics elements and systems,
- signal processing and conditioning,
- modern electromobility problems,
- problems of mechatronics and infotronic systems.



## The topics of the Conference include:

### Industry 4.0:

- Connecting machines, systems, processes and products in “intelligent” networks that supervise themselves, automated and robotic production systems,
- Diagnosing technological processes in real time,
- Methods and tools for modeling and simulation of selected automation systems,
- Design, construction, modeling, simulation and control of mechatronics systems
- Mechatronics measurement systems and sensors
- Actuators and servo-systems
- Unconventional electromechanical devices and drives
- Robotics and their applications
- Transportation and automotive
- Artificial intelligence and machine learning
- Intelligent buildings
- Systems engineering
- Bio – mechatronics and MEMS
- Material engineering and smart materials
- Smart Industry and Industry 4.0
- Rapid prototyping and 3D printing
- Trends in engineering education of mechatronics

### Smart Electronics

- Synthesis and testing of microelectronic properties of MEMS and NEMS mechatronic systems,
- Implementation research of new electronic materials,
- Studies of static and dynamic temperature fields in electronic systems,
- RFID,
- Sensors in IoT
- Smartcity
- Processing, Optimization and processing of signals,
- Implementation of micro- and nanoelectronic structures

### Electromobility:

- Electric cars,

- Ergoelectronics,
- Designing drives and control,
- Smart Grid – intelligent electrical grid,
- Energy storage,
- EV Charging i Blockchain,
- Electromobility in Poland,
- Infrastructure for electromobility (E-car i E-bus) – plans and challenges,
- Mathematical models of ergoelectronic elements and systems,
- Methods and tools for modeling and simulation of selected electrical engineering systems,
- New design, technological and metrological solutions of electrotechnics,
- Control of electric machines, lighting, optical fibers.

### Renewable Energy Sources:

- Photovoltaics,
- Wind energy,
- Heat pumps,
- Geothermal energy,
- Remote monitoring and anomaly investigation systems using AI,
- Cybersecurity of energy and ICT networks,
- Forecasting prices in the context of RES auctions



### Organizing committee:

Damian Mazur  
Mariusz Korkosz  
Piotr Bogusz  
Bogdan Kwiatkowski  
Grzegorz Drałus  
Jacek Bartman  
Mateusz Daraż  
Grzegorz Podskarbi  
Krystyna Krzywdzińska-Kornak

### Steering Committee

1. BEŃA LÚBOMIR, TECHNICAL UNIVERSITY OF KOSICE-TECHNICKA
2. BOGUSZ PIOTR, POLITECHNIKA RZESZOWSKA
3. BOLANOWSKI MAREK, POLITECHNIKA RZESZOWSKA
4. BUDZIK GRZEGORZ, POLITECHNIKA RZESZOWSKA
5. BURLIKOWSKI WOJCIECH, POLITECHNIKA ŚLĄSKA
6. CHRISTIAN KREISCHER HELMUT-SCHMIDT-UNIVERSITÄT
7. DOROZHOVETS MYKHAYLO, LVIVSKA POLITECHNIKA
8. GOŁĘBIEWSKI LESŁAW, POLITECHNIKA RZESZOWSKA
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17. KWATER TADEUSZ, PWSTE JAROSŁAW
18. ŁUKANISZYN MARIAN, POLITECHNIKA OPOLSKA PRZEWODNICZĄCY SEKCJI MEIT KOMITETU ELEKTROTECHNIKI PAN
19. MACHOWSKI WITOLD, AGH KRAKÓW
20. MALINOWSKI MARIUSZ, POLITECHNIKA WARSZAWSKA
21. MASŁOWSKI GRZEGORZ, POLITECHNIKA RZESZOWSKA

22. MAZUR DAMIAN, POLITECHNIKA RZESZOWSKA
23. PAŁKA RYSZARD, ZACHODNIOPOMORSKI UNIWERSYTET TECHNOLOGICZNY
24. PASZKIEWICZ ANDRZEJ, POLITECHNIKA RZESZOWSKA
25. RÓŻOWICZ ANTONI, POLITECHNIKA ŚWIĘTOKRZYSKA
26. SĘP JAROSŁAW, POLITECHNIKA RZESZOWSKA
27. SIKORSKI ANDRZEJ, POLITECHNIKA BIAŁOSTOCKA
28. SMUSZ ROBERT, POLITECHNIKA RZESZOWSKA
29. SUŁOWICZ MACIEJ, POLITECHNIKA KRAKOWSKA
30. STRYCZEWSKA DANUTA, POLITECHNIKA LUBELSKA
31. WESOŁOWSKI MARCIN, POLITECHNIKA WARSZAWSKA
32. WĘGIEL TOMASZ, POLITECHNIKA KRAKOWSKA
33. WINCENCIAK STANISŁAW, POLITECHNIKA WARSZAWSKA
34. ZAJDEL ROMAN, POLITECHNIKA RZESZOWSKA

### Publication of the Conference Papers

The articles must be written in English according to the Przegląd Elektrotechniczny, the AEE journal or in Springer ISI Proceedings, Lecture Notes in Electrical Engineering pattern. Articles will be reviewed by the Scientific Committee of the Conference and after qualification will be forwarded for publication.

### Instruction for authors

Abstract paper length (up to 2 proceeding pages), Full paper length (up to 6 proceedings pages), including figures, are allowed for each paper.

### Official languages of the conference: Polish and English



Guidelines for Presentations All papers will be orally presented. The authors are requested to prepare a Power Point presentation. Please be aware that the computer equipment only supports standard Windows fonts, and that video clips often cause trouble in a presentation. The presentation has to be transferred to a notebook computer which will be available in each of the session room. The presenting authors are expected to upload their Power Point presentations 10 min. before their respective session starts. There will be technical staff for support. Please use a memory stick to transfer your presentation to the computers. However, your presentation will be erased from the session computer right after the session, so we do not keep your presentation. The oral presentations are scheduled to last not longer than 10-12 minutes. There is an additional 5 minutes for discussion. The session chairs are requested to maintain the session schedule.

Guidelines for Session Chairs The session chairs should be present in the session room 10 min. before the session starts so that they can meet the authors. The presentations are scheduled to last not longer than 10-12 min. There is an additional 5 min. for discussion. The session chairs are requested to maintain the session schedule.

SESSION No. 1

Wednesday 30.11.2022, 9:00-11:00

Chairs: Damian Mazur, Mariusz Korkosz

Cezary Worek KEYNOTE SPEAKER	Wybrane zagadnienia energoelektroniki w projektach badawczych	AGH
Bartosz Zieliński	Optimisation of Optical and Electrical Properties of Interdigitated Back Contact Silicon Solar Cells	ML SYSTEM
Tadeusz Chmiel	Uwarunkowania i skutki potencjalnego wprowadzenia ograniczeń w dostarczaniu i poborze energii elektrycznej	STOWARZYSZENIE ELEKTRYKÓW POLSKICH ODDZIAŁ RZESZOWSKI
Marcin Surma	Transformacja energetyczna w praktyce	WAGO
Dariusz Knapik	Zastosowanie termowizji w energetyce	EC Test System
Daniel Jamróz	Wpływ elektronicznych systemów bezpieczeństwa na ciągłość działania przedsiębiorstwa i infrastruktury IT	Centrum Systemów Bezpieczeństwa Sp. z o.o.

SESSION No. 2

Wednesday 30.11.2022, 11:15-13:00

Chairs: Piotr Bogusz, Mariusz Korkosz

Piotr Gierlak	Pomiary geometryczne na maszynie CNC wspomagane przez adaptacyjny neuronowo-rozmyty system wnioskowania	Politechnika Rzeszowska
Bogdan Kwiatkowski, Damian Mazur, Jacek Bartman (projekt PCI) FANUM - the leading European CNC manufacturer	Układ redukcji drgań mechanicznych w firmie FANUM	Politechnika Rzeszowska, Uniwersytet Rzeszowski
Jacek Bartman, Twaróg Bogusław, Kwiatkowski Bogdan (projekt PCI)	Bezinwazyjna identyfikacja urządzeń elektrycznych na podstawie analizy stanu ustalonego	Uniwersytet Rzeszowski, Politechnika Rzeszowska
Grzegorz Budzik, Andrzej Paszkiewicz, Łukasz Przeszłowski, Marek Bolanowski, Joanna Woźniak, Mateusz Przytuła	Możliwości integracji drukarek 3D z wykorzystaniem narzędzi struktury Industry 4.0	Politechnika Rzeszowska
Tomasz Dziubek, Grzegorz Budzik, Bartłomiej Sobolewski, Małgorzata Gontarz, Konrad Pawłowski	Systemy CAx w procesie inżynierii odwrotnej	Politechnika Rzeszowska
Dariusz Krajewski, Mariusz Oleksy, Rafał Oliwa, Katarzyna Bulanda, Kamil Czech, Grzegorz Masłowski	Methods for enhancing the electrical properties of epoxy matrix composites	Politechnika Rzeszowska

SESSION No. 3

Wednesday 30.11.2022, 13:15-14:45

Chairs: Andrzej Kolek

Piotr Grzejszczak	Mikrosieci prądu stałego w systemie elektroenergetycznym – możliwości i wyzwania	Politechnika Warszawska (zdalnie)
Mateusz Daraż, Piotr Bogusz	Ograniczenie Tętnień Prądu Zasilania Maszyny Reluktancyjnej Przetączalnej	Politechnika Rzeszowska
Elżbieta Sztajmec, Mariusz Korkosz	A study of multichannel brushless generator with permanent magnets	Politechnika Rzeszowska
Kamil Parfianowicz, Mariusz Korkosz	Analysis of Multichannel Brushless Permanent Magnet Motor	Politechnika Rzeszowska
Grzegorz Podskarbi, Mariusz Korkosz	Analysis of selected fault states of switched reluctance motors	Politechnika Rzeszowska
Mateusz Suliga Mariusz Korkosz	Analysis of Multichannel Induction Motor	Politechnika Rzeszowska
Rafał Chorzępa	Modelowanie sygnałów losowych o zadanych charakterystykach dla badania warunkowego uśredniania sygnałów - badania symulacyjne	Politechnika Rzeszowska
Marek Nowak	Pasywny filtr harmonicznych przekształtnikowego układu napędowego	Politechnika Rzeszowska
Nikita Bailiuk	Labirynt zależności energetycznej	Koło Naukowe Elektroniki i Technologii Informacyjnych

SESSION No. 4

Wednesday 30.11.2022, 15:30-17:00

Chairs: Tomasz Binkowski, Piotr Bogusz

Dušan Medved', Ľubomír Beňa, Michal Kolcun	Use of Electric Vehicle Chargers with Constant Power	Technical University of Kosice
Samuel Bucko, Marek Pavlík, Michal Kolcun	Impact of Electric Vehicle charging on Distribution Network Safety	Technical University of Kosice
Jozef Király, Zsolt Čonka	Influence of DC Electric Vehicle Charging to Distribution Grid	Technical University of Kosice
Marek Pavlík, Samuel Bucko	Evaluation of the Efficiency of Photovoltaic Cells with Changing Parameters	Technical University of Kosice
Ľubomír Beňa, Rikin Tailor, Dušan Medved'	Electric Vehicle Charging Management System in the Industrial Zone	Technical University of Kosice
Zsolt Čonka, Róbert Štefko, Jozef Király	Research of Protective Relay Communication for Microgrids and Active Distribution Networks	Technical University of Kosice
Paweł Dymora, Mirosław Mazurek, Kamil Łyczko	Analiza efektywności wybranych narzędzi informatycznych w prognozowaniu pandemii Covid-19	Politechnika Rzeszowska