

**XXIII-rd International Symposium on
Electrical Apparatus and Technologies**

SIELA 2024



PROGRAMME

12 - 15 June 2024

**Hotel Bulgaria
Bourgas, Bulgaria**

SIELA 2024 is organized by:



Union of Electronics, Electrical Engineering and
Telecommunications (CEEC)



IEEE Bulgaria Section

SIELA 2024 is supported by:

- Technical University of Sofia (within Days of Science of the Technical University of Sofia)
- Technical Universities of Varna and Gabrovo
- Federation of Scientific and Technical Unions
- House of Science and Technology – Plovdiv
- Faculty of Technical Sciences, “Prof. Assen Zlatarov” University – Bourgas
- Ruse University “Angel Kantchev”
- Regional Organization of STU – Bourgas
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Elena KOLEVA, Bulgaria	Sergey ZIRKA, Ukraine

Notes

- Oral presentations – up to 12 min including discussions (laptop and multimedia projector available)
- Invited paper presentations – up to 30 min including discussions
- Poster size: 0.8×1.2 m
- Oral Session O4 will be presented online. All other sessions will be in person.

Venue

The symposium will be held in the Conference Center of Hotel Bulgaria.

Information and registration desk

The Information and Registration desk will be open at Hotel Bulgaria as follows:

- Wednesday, 12 June - from 17:00 to 19:00
- Thursday, 13 June - from 8:30 to 16:00
- Friday, 14 June - from 8:30 to 13:00

Phones: (+359) 896 803 915; (+359) 895 588668

Symposium dinner

The Symposium Dinner will be in restaurant “Bulgaria” on Thursday, 13 June 2024.

Cultural programme

Boat trip to the Island of St. Anastasia – Saturday, 15 June

SIELA 2024 General Schedule

Day	Hour	Event
Wednesday 12 June	17:00 - 19:00	Registration
	19:00 - 20:00	Welcome Cocktail
Thursday 13 June	9:00 - 10:30	Opening Session
	10:30 - 11:00	Invited papers 1
	11:00 - 11:30	Coffee Break
	11:30 - 13:00	Oral Session O1
	13:00 - 14:00	Lunch
	14:00 - 16:00	Oral Session O2
	16:00 - 16:30	Coffee Break
	16:30 - 18:00	Poster Session P1
	18:00 - 19:00	Oral Session O3
	19:30	Symposium Dinner
Friday 14 June	8:30 - 9:00	Invited Papers 2
	9:00 - 11:00	Oral Session O4 (online)
	11:00 - 11:30	Coffee Break
	11:30 - 13:00	Poster Session P2
	13:00 - 14:00	Lunch
	14:00 - 15:30	Poster Session P3
	15:30 - 16:30	Oral Session O5
	16:30 - 17:00	Coffee Break
	17:00 - 18:30	Poster Session P4
	18:30 - 19:00	Closing Session
Saturday 15 June	10:00 - 14:00	Excursion

INVITED PAPERS 1

Thursday, 13 June, 10:30 - 11:00

- 11-1 Wolfgang GRUBER
Don't lose your bearing on bearingless motors: introduction, developments and potentials Austria

ORAL SESSION O1

Thursday, 13 June, 11:30 - 13:00

- O1-1 Edmund MARTH, Wolfgang GRUBER, Stefan MALLINGER, Valentin MATEEV, Iliana MARINOVA
Magnetic-gear bearingless motor unit with central exterior output Austria
Bulgaria
- O1-2 Lukas DOMENIG, Peter RANINGER, Manfred KALTENBACHER, Klaus ROPPERT
A hysteretic finite element model for the identification of magnetic material properties Austria
- O1-3 Alexander SAUSENG, Lukas DOMENIG, Manfred KALTENBACHER, Klaus ROPPERT
Transformer modeling - finite elements vs. Lumped elements Austria
- O1-4 Genadijs KOBENKINS, Nikita RILEVS, Marks MARINBAHS, Andrejs PODGORNOVS, Anatolijs BIZANS, Olegs SLISKIS
The influence of the tension of the MGU casing on its dynamic characteristics Latvia
- O1-5 H. Bulent ERTAN, Erdal BIZKEVELCI, Kemal LEBLBICIOGLU
Switched reluctance motor acoustic noise reduction based on radial forces Turkey
- O1-6 Vultchan GUEORGIEV
Influence of the orientation of PV installations without energy storage on their operational efficiency Bulgaria

ORAL SESSION O2

Thursday, 13 June, 14:00 - 16:00

- O2-1 Marjan BLAGOJEVIC, Slavoljub ALEKSIC
A simple method for determining the offset of vector sensors Serbia
- O2-2 Simeon KOSTADINOV, Ivan UZUNOV, Elissaveta GADJEVA, Dobromir GAYDAZHIEV
Analysis and design of a current amplifier in ultra deep sub-micron technology Bulgaria
- O2-4 Venancio L. SATCHILEMBE, Vladimir Ya. FROLOV and Dmitriy V. IVANOV
Condition of electric arc quenching in an arc extinguishing device Russia

O2-5	Venancio L. SATCHILEMBE, Egor A. BUSHIHIN, Dmitriy V. IVANOV and Sergei G. ZVEREV Development of inductively coupled plasma torch 500 kW for hydrogen sulfide decomposition	Russia
O2-6	Venancio L. SATCHILEMBE, Vladimir Ya. FROLOV Harmonic distortions generated by a wind turbine park: evaluation and mitigation	Russia
O2-7	Andon LAZAROV, Todor KOSTADINOV Bistatic inverse synthetic aperture radar imaging based on 5G NR signal	Bulgaria
O2-8	Andon LAZAROV, Dimitar MINCHEV ISAR imaging algorithm based on L1 norm minimization	Bulgaria
O2-9	Darin PEEV Quantum computing technology - a brief overview	Bulgaria
O2-10	Jawad FAIZ, M.H. RAJABI Evaluation of different radial and axial flux permanent magnet synchronous generators with direct coupling for low power wind turbine	Iran

POSTER SESSION P1

Thursday, 13 June, 16:30 - 18:00

P1-1	Iva PETRINSKA, Dilyan IVANOV LEDs - non-image forming effects and energy efficiency	Bulgaria
P1-2	Iva PETRINSKA, Dilyan IVANOV Illuminance meters – influence of the battery load on the readings – case study	Bulgaria
P1-3	Borislav GANEV, Marin MARINOV, Ivan KRALOV, Anastas IVANOV Experimental setup for study the oscillations of two degrees of freedom spring systems	Bulgaria
P1-4	Dimitar ILIEV, Marin MARINOV A proposal for a new e-waste image dataset based on the UNU-KEYS classification	Bulgaria
P1-5	Kengo SUGAHARA, Akira AHAGON, Yoshiki HANE, Alexander SAUSENG, Lucas DOMENIG, Klaus ROPPERT Comparison of minor loops between H-input and B-input vector play models identified from major loops	Japan, Austria
P1-6	Georgi ENCHEV, Nikolay DJAGAROV Optimisation of MI algorithm for induction motor fault detection on board of vessel	Bulgaria
P1-7	Tomáš KOLENSKÝ, Kamil JAŠŠO Monitoring the proper curing of photopolymer in 3D printing with electrical impedance spectroscopy	Czech Republic
P1-8	Vladimir STANKOVIC, Dejan JOVANOVIC, Nenad CVETKOVIC, Andjela JEVTIC, Dragana ZIVALJEVIC Distribution of electric field intensity inside the child's eyes from mobile phone	Serbia
P1-9	Szabolcs KOCSIS SZÜRKE Procedure for battery module assessment in hybrid vehicles	Hungary

P1-10	György ISTENES, Krisztián HORVÁTH FEM-based analysis of induction machine broken rotor bar detection using extended Kalman filter	Hungary
P1-11	Krisztián HORVÁTH Online inductance identification using extended Kalman filter for adaptive vector control of synchronous reluctance machine	Hungary
P1-12	Maria GEORGIEVA, Luben LAKOV and Mihaela ALEKSANDROVA Nano-technological synthesis of wollastonite for high-efficiency dry pressing of innovative insulating bodies for low voltage apparatus	Bulgaria
P1-13	Ivan HADZHIEV, Valentin MATEEV, Iliana MARINOVA, Stefan VALKOV, Georgi KOTLARSKI and Maria ORMANOVA Modeling of electric impedance of nanostructured EB-PVD coatings	Bulgaria
P1-14	Emil DELINOV, Anita STOYANOVA, Ivanka MARASHEVA An approach to reorganizing ICT services when unbundling a business entity	Bulgaria
P1-14	Emil DELINOV, Daniela OROZOVA, Anita STOYANOVA Audit of the infrastructure as an element of cybersecurity of a business entity	Bulgaria
P1-15	Miglenna TODOROVA, Valentin MATEEV, Iliana MARINOVA, Wolfgang GRUBER, Edmund MARTH, Stefan MALLINGER Modelling of a reluctance magnetic gear	Bulgaria, Austria
P1-16	Yuri KILIBA, Ksenia PETROVA, Aleksandr MIKHAILOV, Roman PETROV, Slavcho BOZHKOVA, Ivan MILENOV, Penko BOZHKOVA Research of cooled element overheating in heat pipes	Russia, Bulgaria
P1-17	Viktor KISELEV, Vasili MISILIN, Aleksandr MIKHAILOV, Roman PETROV, Slavcho BOZHKOVA, Ivan MILENOV, Penko BOZHKOVA Research of multipart structures based on magnetoelectric materials	Russia, Bulgaria

ORAL SESSION O3

Thursday, 13 June, 18:00 - 19:00

O3-1	Angel TSOLOV, Hristo HRISTOV and Bozhidar ZLATANOV Principles for building cyber security in information and SCADA systems	Bulgaria
O3-2	Kristina HADZHIIYSKA, Dimo STOILOV Quantitative estimations of criteria for the evaluation of scenarios for the development of the national energy system	Bulgaria
O3-4	Andon LAZAROV, Svilen KAMDZHALOV Conceptual model of a communication system composed of interoperable radio devices	Bulgaria
O3-5	Milen DUGANOV, Hristian PANCHEV, Nikola MAKEDONSKI Investigating the effectiveness of series compensation of reactive loads in real operating conditions	Bulgaria
O3-6	Hristian PANCHEV, Milen DUGANOV, Nikola MAKEDONSKI Application of a dualistic approach to reactive load compensation and voltage regulation to improve the energy efficiency of power supply systems	Bulgaria

INVITED PAPERS 2

Friday, 13 June, 8:30 - 9:00

- I2-1 Yongsug SUH
Medium-voltage Drive Technology in Large Scaled Wind Turbines Korea

ORAL SESSION O4 (online)

Friday, 14 June, 9:00 - 11:00

- O4-1 Naoto TANIMOTO, Kengo SUGAHARA
Gauging in generating basis functions for three-dimensional Cauer Ladder Network Japan
- O4-2 M.A. RASHEVSKAYA, D.V. DUBININ and S.A. YANCHENKO
Study and simulation of arc faults in low-voltage networks Russia
- O4-3 Nikolai PAUNKOV, Rumen POPOV, Anatoliy PARUSHEV, Angel CHEKICHEV, Daniela SHEHOVA
Modeling filters for harmonic distortion correction Bulgaria
- O4-4 Angel CHEKICHEV, Nikolai PAUNKOV, Rumen POPOV, Anatoliy PARUSHEV, Daniela SHEHOVA
Simulation investigation of passive, active and combined filters Bulgaria
- O4-5 Ognyan ZHELEZOV, Valentina PETROVA
An accelerated SFTessellation algorithm for obtaining a Voronoi diagram Bulgaria
- O4-6 Ivan GARVANOV, Magdalena GARVANOVA, Vladimir IVANOV, Denis CHIKURTEV, Ava CHIKURTEVA
Drone detection based on image processing Bulgaria
- O4-7 Ivan GARVANOV, Magdalena GARVANOVA
Diffraction model of electromagnetic wave Bulgaria
- O4-8 Sefa ERDIM, Taner BILIR, Abdullah POLAT
Design and manufacturability studies on starting and magnetic locking problems for industrial single-phase induction motors Turkey
- O4-9 Alexander VOLOSHIN, Evgeny VOLOSHIN, Andrey LEBEDEV, Ekaterina ASMYKOVICH, Victoria DUBOVIK
Development of a prototype of an automated information system for storing, analysing and exporting ntds based on the representation of requirements and rules in the form of knowledge bases Russia
- O4-10 Aidar ENTENTEEV, Alexander VOLOSHIN
Enhancing microgrid resilience and efficiency through predictive inverter control without communication lines Russia

POSTER SESSION P2

Friday, 14 June, 11:30 - 13:00

- P2-1 Chavdar ALEXANDROV, Dimitar DIMITRAKIEV, Aleksandrina ANGELOVA, Mladen HRISTOV, Milen TODOROV
Application of radar observation on improvement of buoyage system in Bulgarian territorial waters Bulgaria

P2-2	Milen SOTIROV, Valentina PETROVA, Donika NIKOLOVA-SOTIROVA Enhancing student engagement through gamified learning in Moodle LMS	Bulgaria
P2-3	Veselin ATANASOV, Yordan SIVKOV Evaluating YOLOv5 models on thermal imagery for aerial drone applications	Bulgaria
P2-4	Aleksandar IVANOV, Cristina Cerbulescu EEG data processing with machine learning	Bulgaria, Romania
P2-5	Georgi TOMOV, Mihaela SLAVKOVA, Konstantin SHUSHULOV Analytical model for thermal analysis of toroidal chokes and transformers in non-stationary mode	Bulgaria
P2-6	Rosen TSEKOV CFD analysis of the influence of temperature stratification on the storage capacity and heat loss of a water heat accumulator	Bulgaria
P2-7	Rosen TSEKOV Parametric study of thermal processes of an active solar system for indirect heating of water in a water accumulator under simultaneous charging and discharging	Bulgaria
P2-8	Rosen TSEKOV Study of a remote dynamic control system for the heat supply of an educational building	Bulgaria
P2-9	Greta RANGELOVA, Iosko BALABOZOV Challenges in implementing level two of electrical engineering building information models according to the strategy for digital transformation of building sector in Bulgaria	Bulgaria
P2-10	Angelina DIMITROVA Evaluation of methods for reliability assessment of electronic devices in medicine	Bulgaria
P2-11	Radostin DEMIREV, Anton ADAMOV, Miroslav ANGELOV Comparative analysis and options for construction lightning protection and grounding installations of photovoltaic systems	Bulgaria
P2-12	Pavel ANDREEV, Bohos APRAHAMIAN, Eray SHABAN Investigation of the switching and performance speeds of microcontrollers applicable in electrotechnological processes	Bulgaria
P2-13	Dragomir DRAGNEV, Bohos APRAHAMIAN, Maik STREBLAU A study of gear faults in pellet mill electromechanical drive	Bulgaria
P2-14	Tatyana DIMOVA, Bohos APRAHAMIAN and Georgi ZHELEV Experimental investigation of the power required for laser cutting of different materials in laboratory conditions for student training	Bulgaria
P2-15	Pavel ANDREEV, Bohos APRAHAMIAN, Atanas MITSEV Augmented reality in support of the learning process	Bulgaria
P2-16	Viktor DEMIDOVICH Digital twin technology in the metallurgical industry using induction heating systems	Russia
P2-17	Ivan TONEV Investigating the probability density function of the nodal voltage deviations in a low-voltage distribution grid	Bulgaria
P2-18	Ivan HADZHIEV, Iosko BALABOZOV, Ivan YATCHEV Influence of the oil cooling on the heating of an oil-immersed distribution transformer	Bulgaria

POSTER SESSION P3

Friday, 14 June, 14:00 - 15:30

- P3-1** *Marinela PETROVA, Chavdar ALEXANDROV, Veselin ATANASOV*
Assessment of the communication channels reliability for exchanging of hydrometeorological information *Bulgaria*
- P3-2** *Dimitar ARNAUDOV, Krasimir KISHKIN, Kaspars KROICS, Nikolay NEHOVSKI, Vladimir DIMITROV*
Comparison of the characteristics of a Lithium Ion and a Lithium Titanate oxide battery by impedance spectroscopy *Bulgaria*
- P3-3** *Gergana VACHEVA, Plamen STANCHEV, Andrei BORISOV, Nikolay HINOV*
Modelling of PV plant for supplying of medium sized enterprises *Bulgaria*
- P3-4** *Gergana VACHEVA, Plamen STANCHEV, Nikolay HINOV*
Harmonic analysis of CŪK DC-DC converter *Bulgaria*
- P3-5** *Gergana VACHEVA, Plamen STANCHEV, Nikolay HINOV*
Model-based determination of the PV panels orientations for maximum energy yield *Bulgaria*
- P3-6** *Teodora TODOROVA, Dimitar ARNAUDOV, Vladimir DIMITROV*
Study of LLC resonant converter with multi-transformer topology *Bulgaria*
- P3-7** *Nikolay NEHOVSKI, Vladimir DIMITROV*
Analysis of ZVS converter for energy storage in PV systems *Bulgaria*
- P3-8** *Tsveti HRANOV, Dimitar ARNAUDOV, Hristiyan KANCHEV*
DC-DC converter for energy storage system with different inductor implementation *Bulgaria*
- P3-9** *Nicolay MADZHAROV, Desislav ILIEV*
Operation modes of converters with energy dosing through an inductive element *Bulgaria*
- P3-10** *Dimitar YANKOV, Tsvetana GRIGOROVA*
Simulation study of control strategies for a converter-switched reluctance motor system in motoring mode using bipolar modulation *Bulgaria*
- P3-11** *Tsvetozar PETKOV*
Hodographs of the resultant vectors at a non-sinusoidal power supply of a three phase induction motor *Bulgaria*
- P3-12** *Tsvetozar PETKOV*
A simplified mathematical model of an induction motor *Bulgaria*
- P3-13** *Dimitar SPIROV, Yasen MADANKOV, Angel LICHEV, Vasil MIHOV*
Studies of induction motor considering the main flux saturation effect and iron losses *Bulgaria*
- P3-14** *Valentin TOTEV, Vultchan GUEORGIEV, Plamen RIZOV*
High voltage faults conditions of in-house loads of a power station *Bulgaria*
- P3-15** *Valentin TOTEV, Vultchan GUEORGIEV*
Phase failures during starting of high power in-house loads *Bulgaria*
- P3-16** *Velichko ATANASOV, Emil MECHKOV, Dimo STOILOV*
Technical economic analysis concerning connection groups of distribution transformers in Bulgaria *Bulgaria*
- P3-17** *Tsvetomir STOYANOV, Plamen RIZOV*
Investigation of an unsymmetrically loaded high power synchronous generator *Bulgaria*

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| P3-18 | <i>Tatyana RADEVA-STOILOVA, Nikolina PETKOVA</i>
Photovoltaic energy usage for agricultural building: a case study | Bulgaria |
| P3-19 | <i>Martin BOTEV, Dimo STOILOV, Velichko ATANASOV</i>
Use of energy storage systems in electrical distribution networks | Bulgaria |

ORAL SESSION O5

Friday, 14 June, 15:30 - 16:30

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| O5-1 | <i>Dimitar MINCHEV, Ivanka PISAROVA</i>
Technical means for teaching "Computer modelling and information technology" at lower secondary level | Bulgaria |
| O5-2 | <i>Nikolay MATANOV, Plamen NANKINSKY, Petar STOEV</i>
Simulations of control algorithms in intelligent substations | Bulgaria |
| O5-3 | <i>Iliyan DONEV, Irina KOSTOVA</i>
Influence of the elements of the ship's propulsion complex on the energy efficiency of the ship | Bulgaria |
| O5-4 | <i>Milen DUGANOV, Hristian PANCHEV, Nikola MAKEDONSKI</i>
Increasing electrical energy efficiency by optimizing electrical load schedules in the electrical supply systems of industrial sites | Bulgaria |

POSTER SESSION P4

Friday, 14 June, 17:00 - 18:30

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|-------------|--|---------------------|
| P4-1 | <i>Vasilii MISILIN, Viktor KISELEV, Aleksandr MIKHAILOV, Roman PETROV, Slavcho BOZHKOV, Ivan MILENOV, Penko BOZHKOV</i>
Proximity sensor based on magnetoelectric material | Russia,
Bulgaria |
| P4-2 | <i>Yuri KILIBA, Ksenia PETROVA, Aleksandr MIKHAILOV, Roman PETROV, Slavcho BOZHKOV, Ivan MILENOV, Penko BOZHKOV</i>
Electroosmotic pump in power electronics cooling systems | Russia,
Bulgaria |
| P4-3 | <i>Evgeny MENDELEEV, Roman PETROV, Olga ALEKSEEVA, Elena CHISTYAKOVA, Andrey MAKSIMOV, Alexandra NIKANDROVA, Eleonora BELYAKOVA, Svetlana ZAVARINA, Slavcho BOZHKOV, Ivan MILENOV, Penko BOZHKOV</i>
Apparatus complex for monitoring during phygital training | Russia,
Bulgaria |
| P4-4 | <i>Evgeny MENDELEEV, Olga ALEKSEEVA, Elena CHISTYAKOVA, Andrey MAKSIMOV, Roman PETROV, Slavcho BOZHKOV, Ivan MILENOV, Penko BOZHKOV</i>
Apparatus complex for assessment of athlete's functional state indicators dynamics | Russia,
Bulgaria |
| P4-5 | <i>Isidora JOVANOVIC, Natalija IVKOVIC, Mirjana PERIC, Ana VUCKOVIC, Nebojsa RAICEVIC</i>
HBEM and conformal mapping application for characteristic parameters calculation of two-wire lines | Serbia |
| P4-6 | <i>Milena GEORGIEVA, Daniela OROZOVA</i>
Generalized net for a training academy | Bulgaria |
| P4-7 | <i>Iva OROZOVA, Daniela OROZOVA</i>
Multistep model of data processing in smart classroom | Bulgaria |

P4-8	Zlatin ZLATEV, Daniela OROZOVA, Julieta ILIEVA, Nadezhda ANGELOVA Sound-to-color smart acoustic device	Bulgaria
P4-9	Stanislav POPOV Modelling and calculating IV curves of photovoltaic modules using Python	Bulgaria
P4-10	Lenko ERBAKANOV Generalized net model of DSP real-time embedded system	Bulgaria
P4-11	Aleksandar IVANOV Algorithm development using artificial intelligence: an overview	Bulgaria
P4-12	Todor PETKOV A method of intuitionistic fuzzy evaluation of self organizing map neural network	Bulgaria
P4-13	Yavor LOZANOV, Svetlana TZVETKOVA, Angel PETLESHKOV Modeling of power quality disturbances caused by ev charging stations with integration of PV systems	Bulgaria
P4-14	Svetlana TZVETKOVA, Yavor LOZANOV, Angel PETLESHKOV Faults of the electrical equipment of facilities operating in underground mines	Bulgaria
P4-15	Plamen ANGELOV Small solar system design, polynomial transfer function derivation - part 1	Bulgaria
P4-16	Plamen ANGELOV Small solar system design, polynomial transfer function derivation - part 2	Bulgaria
P4-17	Plamen ANGELOV Simulation of a small PV system installed in an urban area	Bulgaria
P4-18	Ginko GEORGIEV Experimental study of the electrical power quality indicators in autonomous power system	Bulgaria



SIELA 2024 Symposium will be held in hotel Bulgaria