

**Contents**

01	<b>Amanuel Haftu Kahsay<sup>1</sup>, Paweł Regulski<sup>1</sup>, Piotr Derugo -</b> AI-based control techniques for maximum power point tracking of photovoltaic systems using a boost converter	1
02	<b>Sandra WŁOSTOWSKA, Julia SZABELA, Adrian CHOJECKI, Piotr BORKOWSKI -</b> Comparison of SQL, NosQL and TSDB database systems for smart buildings and smart metering applications	7
03	<b>Bernard WYRWOŁ -</b> 1-Wire interface implementation in embedded system with FreeRTOS operating system	13
04	<b>Anna GOLIJANEK-JĘDRZEJCZYK -</b> Dependence of flow coefficient C on orifice thickness with conical inlet	20
05	<b>Wojciech NITA, Sylwester FILIPIAK -</b> Optimization of field upgrades of MV power lines using evolutionary algorithms	26
06	<b>Andrzej FARYŃSKI, Zbigniew ZŁÓŁKOWSKI, Przemysław SUL -</b> Generation of high-voltage solitons in a non-linear transmission line	34
07	<b>Paweł KĘPA -</b> Review and analysis of publications of theoretical, field and simulation studies on the legitimacy of using dipped beam headlights	38
08	<b>Jacek KOZYRA, Zbigniew ŁUKASIK, Aldona KUŚMIŃSKA-FIJAŁKOWSKA -</b> Increasing transmission potential of 110 kV alternating current lines	43
09	<b>Mateusz SULIGA -</b> Analysis of the properties of a dual-channel three-phase induction machine with regard state of unsymmetrical work	50
10	<b>Mirosław ŁUKOWICZ, Mateusz MYŚLIWIEC -</b> Problems of detection and modeling of high impedance faults in medium voltage distribution networks	55
11	<b>Paweł SZCZEŚNIAK, Piotr POWROŹNIK, Elżbieta SZTAJMEC -</b> Selected voltage control methods in LV local distribution grids with high penetration of PV	62
12	<b>Djamilia CHERIFI, Yahia MILOUD, Mohamed MOSTEFAI –</b> High Performance of Direct Power Control for a Doubly Fed Induction Generator Based on Adaptive Fuzzy Second Order Sliding Mode Controller in Wind Energy Conversion System	66
13	<b>Thirasak PHIANGPRANTHONG, Angkana CHAROENMEE, Adirek JANTAKUN -</b> DVCCTAs-based current-mode MISO filters with separate adjustments for pole frequency, quality factor and amplitude	75
14	<b>Oleh TSURKAN, Ruslan HORBATIUK, Anatolii SPIRIN, Dmytro BORYSIUK, Ihor TVERDOKHLIB, Olena TRUKHANSKA -</b> Research of energy consumption of the vibration machine for surface restoration of working bodies of tillage units	82
15	<b>Ruchika , D.K. Jain -</b> Battery Energy Storage System for Large Scale Penetration of Renewable Energy Sources	88
16	<b>Clement TENGEY, Nnamdi NWULU, Omoseni ADEPOJU, Omowunmi Mary LONGE -</b> Slack-based efficiency assessment of electrical distribution regions in Ghana	94
17	<b>Elbrus AHMEDOV, Elshad SAFIYEV, Sona RZAYEVA, Nijat MAMMADOV, Nigar GANIYEVA, Kubra MUKHTAROVA -</b> Obtaining a graft copolymer of polyethylene by electrodisscharge synthesis	100
18	<b>Abdelhak FLIH, Slimane SOUAG , Leila GHOMRI -</b> A K-NN algorithm based fault locating system for HVDC transmission lines	104
19	<b>Hocine GUENTRI, Abdeldjalil DAHBI, Tayeb ALLAOUI -</b> The impact of the power management technique on the transient stability of the electrical network	109
20	<b>Huda D. Bader, Mohammed S. Jarjees, Bassam T. Ahmed -</b> Invasive and Non-Invasive Glucose Monitoring Systems: A Review and Comparative Study	114
21	<b>Elbrus AHMEDOV, Sona RZAYEVA, Nigar GANIYEVA -</b> Improving the lightning resistance of high-voltage overhead power line	121
22	<b>Hameed G. Juma'a, Thamir H. Atyia -</b> Design a 91-Multilevel Inverter Circuit Using Solar PV System Sources	127
23	<b>Mykola LUKIANOV, Ievgen VERBYTSKYI, Natalia STRZELECKA, Ryszard STRZELECKI -</b> Power converter interface for urban DC traction substations - solutions and functionality	134
24	<b>Rafal Emad, Qais Th. Algwari, Ahmed M. A. Sabaawi -</b> Simulating the Barrier Heights Impact on the Performance of Dissimilar Electrodes Metal-Insulator-Metal Diode	141
25	<b>Marwan R. Abed, Oday A. Ahmed, Ghassan A. Bilal -</b> Protection of DC microgrid using ΔCB	146
26	<b>Jamal JAMAL, Muhammad Ruswandi DJALAL -</b> Effect of Outlet at the Bottom of the Drying Chamber on the Performance of Natural Convection Solar Dryers	151
27	<b>Aicha Moulay, Tarak Benslimane, Othmane Abdelkhalek, Khaled Koussa -</b> Detection and Classification of Photovoltaic System Faults using Neural Network	157
28	<b>Zabouri Abdelhamid, Chenafa Mohamed, Naima khalfallah, Bendjeddou Yacine, Kacimi Abderrahmen, Mourad Boufadene -</b> DC-Bus Voltage Control of Self-Excited Induction Generator for Variable-Speed Wind Turbine Generation Including DynamicSaturation	163
29	<b>Mozhdeh KARAMIFARD<sup>1</sup>, . Hamed GAROOSI<sup>2</sup>, Seyed Mahdi HOSSEINI-JEBELLI -</b> Performance of 2D Photonic Crystal Fiber on Optical Waveguide Algorithm	170
30	<b>Hau Huu VO, Pavel BRANDSTETTER -</b> Modified Fuzzy Logic PI Speed Controller with Scheduling Boundaries of Integral Time Constant for PMSM Drive	153

## Contents

31	<b>Milan Belik, Oleksandr Rubanenko, Olena Rubanenko</b> - Prerequisites for the creation of Digital Twin in the tasks of determining the technical condition of power transformers in specific operating conditions	180
32	<b>D.S.Shylu Sam, P.Sam Paul, Golamari Kiran Kumar Reddy, Nagothu Manideep, Nethikuntla Chakali Venkatesh, Pulikonda Durga Sai Manideep</b> - A new architecture of Thermometer to Binary code encoder for 4 - bit FLASH ADC in 45nm CMOS process	188
33	<b>Oleksandr VOZNYAK, Yurii POLIEVODA, Ihor KUPCHUK, Olena TRUKHANSKA, Ludmila SHVETS, Mykhailo ZAMRII</b> - Development of object detection algorithm in halftone images	192
34	<b>Paweł KIELAN, Jakub KRZUS</b> - The use of hand movement in space to control mechatronic devices - system design	196
35	<b>Adam DĄBROWSKI, Agata DĄBROWSKA, Marcin DĄBROWSKI</b> – Evaluation of the efficiency of photovoltaic micro power plants in Poland based on the analysis of the monitored facility	200
36	<b>Ewa MANDOWSKA, Renata MAJGIER, Wojciech GRZESIAK, Arkadiusz MANDOWSKI</b> - Spectral analysis of radiation-induced luminescence of a ceramic thick-film substrate	204
37	<b>Konrad BRULIŃSKI, Wiesław KLEMBOWSKI, Aleksandra KISILEWICZ, Marcin MACIEJEWSKI, Elżbieta SZUL-PIETRZAK</b> - A multifunctional system for measuring muscle condition assessment parameters	208
38	<b>Krzysztof GÓRECKI, Kalina DETKA, Paweł GÓRECKI, Przemysław PTAK</b> - Nonlinear thermal models of electronic components	212
39	<b>Michał URBANSKI, Kinga WÓJCICKA, Paweł WÓJCICKI</b> - Fuzzy approach with t-norm arithmetic to analyze measurement uncertainty - concept and algorithm	217
40	<b>Krzysztof CHWASTEK, Branko KOPRIVICA, Marko ROSIĆ, Roman GOZDUR, Piotr GĘBARA</b> - Modelling hysteresis loops of non-oriented electrical steel	221
41	<b>Sebastian DUDZIK, Bartosz Kowalczyk</b> - Forecasting of solar energy production using the NEXO platform and VRM Portal	224
42	<b>Marek GAŁA, Kazimierz JAGIEŁA</b> - Cooperation of the modular multilevel converter with the AC arc furnace	228
43	<b>Anna GAWLAK</b> - Forecast of the balance sheet difference	232
44	<b>Mateusz RAK, Mariusz NAJGEBAUER, Jarosław JĘDRYKA</b> - 3D rapid prototyping technologies in the power industry	236
45	<b>Tomasz POPŁAWSKI, Marek KURKOWSKI</b> - Audit of road lighting installation as a tool to improve energy intensity - case study	241
46	<b>Artur WACHTARCZYK, Janusz SOWIŃSKI</b> - Predictive analysis of measurement data used in systems supervising the operation of electric heating devices at railway junctions	245
47	<b>Jakub SUDER, Tomasz MARCINIĄK</b> - Foreign Object Debris detection system using GoogLeNet	249
48	<b>Jerzy AUGUSTYN, Marian KAMPIK, Krzysztof MUSIOŁ</b> - The application of the ellipse fitting algorithm in the measurements of small values of the angular component of the complex voltage ratio	253
49	<b>Damian GONSCZ</b> - The measurement aspects and result estimations in the electromagnetic compatibility tests	257
50	<b>Adam JÓSKO, Wojciech ROMANIK, Mikhail BAHUSLAUSKI, Maciej MAJEK, Maciej SOBCZAK, Maciej ZAKRZEWSKI</b> - System for monitoring the process continuity of the intravenous infusion – development study	261
51	<b>Krzysztof KUBICZEK, Michał GRZENIK, Marian KAMPIK</b> - Measuring systems for testing the basic thermal parameters of AC voltage transducers	265
52	<b>Tadeusz SKUBIS, Adam PILŚNIAK, Anna PIASKOWY</b> - Measurement system for testing the magnetic field uniformity	269
53	<b>Mariusz Talaga, Adrian Halinka</b> - Differential measurements in power system using the synchrophasors	273
54	<b>Ziyad Khalaf Farej, Mohammed Ahmed Hassan</b> - Multi-channel Bonding Effects of the IEEE 802.11ac on the WLAN Performance	277
55	<b>Michał PISKORSKI, Paweł KRUKOWSKI, Witold KOZŁOWSKI, Maciej ROGALA, Paweł DĄBROWSKI, Iaroslav LUTSYK, Dorota A. KOWALCZYK, Maxime Le STER, Karol SAŁAGAN, Aleksandra NADOLSKA, Klaudia TOCZEK, Przemysław PRZYBYSZ, Rafał DUNAL, Wojciech RYŚ, Patryk KREMPIŃSKI, Paweł J. KOWALCZYK</b> - The vibration registration system with the use of a seismic sensor and a real-time spectrum analyzer in the room intended for the TERS-STM system installations	284
56	<b>Michał DOWNAR-ZAPOLSKI, Andrzej KASPROWICZ</b> - Design of a laboratory 3-phase inverter controlled using the PLECS simulation environment	288
57	<b>Zbigniew JĘDRUSIAK, Artur WYMYSŁOWSKI</b> - Review analysis of measurement methods and devices and design of an intelligent electronic system for testing concentrations of harmful chemicals in the air in the food industry	292