

Rudenko International Conference "Methodological Problems in Reliability Study of Large Energy Systems" (RSES 2024)

E3S Web of Conferences Volume 584 (2024)

Arkhangelsk, Russia
15-19 July 2024

Editors:

**Valeriy Stennikov
Sergey Senderov
Alexander Michalevich
Husein Guliev**

ISBN: 979-8-3313-0871-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 4.0 International License. License details:
<http://creativecommons.org/licenses/by/4.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2025)

For additional information, please contact EDP Sciences – Web of Conferences
at the address below.

EDP Sciences – Web of Conferences
17, Avenue du Hoggar
Parc d'Activité de Courtabœuf
BP 112
F-91944 Les Ulis Cedex A
France

Phone: +33 (0) 1 69 18 75 75
Fax: +33 (0) 1 69 28 84 91

contact-edps@webofconferences.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Taking into Account Balance Reliability in Planning of Power System Development	1
<i>Chukreyev Iurii, Chukreyev Mikhail</i>	
Transformation of the Model of the Design Scheme of the Power System in the Problem of Ensuring Balance Reliability	5
<i>Chukreyev Iurii</i>	
Impact of the Market Model in the Electric Power System on Its Reliability	9
<i>Chukreyev Mikhail</i>	
Reproduction of the Mineral Resource Base of the Energy Sector as the Most Important Component of Ensuring Russia's Energy Security	14
<i>Senderov Sergey</i>	
Finding Ways to Minimize Gas Shortages for Consumers in the Context of Large-Scale Emergencies in the Gas Industry	19
<i>Senderov Sergey, Khamisov Oleg, Vorobev Sergey, Danilov Gleb</i>	
The Impact of Changes in Gas Consumption on the Selection of Critical Gas Industry Objects.....	24
<i>Vorobev Sergey, Edelev Alexey</i>	
Assessment of the Level of Energy Security in the Regions of the Northwestern Federal District Under Emergency Conditions in the Gas Industry	28
<i>Smirnova Elena</i>	
Use and Failure Cause Analysis of Gas-Turbine Units at Distributed Generation Facilities.....	36
<i>Ilyushin Pavel, Shavlovskiy Sergey</i>	
Energy Storage Use Efficiency in the Context of Belorussian Power System Technological Limitations.....	41
<i>Kashyn Mikhail, Molochko Andrey, Novikov Nikolay, Novikov Alexander</i>	
Battery Energy Storage System Placement and Sizing in Distribution Networks.....	45
<i>Sorokin Dmitry</i>	
Markers of Cellulose Insulation Ageing: Calculation of Total Methanol Quantity in the Internal Insulation of Power Transformers	50
<i>Darian L. A., Obratsov R. M., Maksimchenko A. V., Verakso D. E., Polishchuk V. P., Logunov V. A.</i>	
Problems of Fuel and Energy Complex Management: Increasing Vulnerability of Intelligent Elements of Information and Control Systems to Electromagnetic Influences	55
<i>Grabchak Evgeny, Grigoriev Vladimir, Loginov Evgeny</i>	
Digital Technologies for Managing the Turnover of Fuel and Energy Resources Within the Framework of an Expanded International Energy Association	59
<i>Grigoriev Vladimir, Loginov Evgeny, Shkuta Alexander</i>	
Development of Effective Algorithms for Calculating Current Distribution Coefficients of an Electric Power System.....	64
<i>Akhmetbaev Dauren, Dzhandigulov Abdygali, Akhmetbaev Arman, Bystrova Svetlana</i>	

Application of Static Thyristor Compensators to Increase the Reliability of Distribution Networks.....	69
<i>Akhmetbaev Dauren, Akhmetbaev Arman</i>	
Modification of Control System Based on Virtual Synchronous Generator with Feedforward Control for Power Converters of Distributed Generation.....	75
<i>Askarov Alisher, Ufa Ruslan, Suvorov Aleksey, Kievets Anton</i>	
Control Algorithm of Energy Storage System Based on Virtual Synchronous Generator.....	80
<i>Suvorov Aleksey, Askarov Alisher, Rudnik Vladimir</i>	
On Reliability of 110-500 kV GIS: Operational Experience.....	85
<i>Korotchenko Evgeniy, Galiaskarov Irek, Misrikhanov Misrikhan, Ryabchenko Vladimir, Shuntov Andrey</i>	
Placement of Controlled Shunt Reactors in 330 kV Electrical Networks and Study of Their Operating Modes.....	89
<i>Hashimov Arif, Guliyev Huseyngulu, Babayeva AYTEK</i>	
Determination of Optimal Dimensions of Hybrid AC/DC Distributed Generation System with Renewable Sources for Autonomous Power Supply of Remote Locations.....	95
<i>Rahmanov Nariman, Guliyev Huseyngulu, Ybtahimov Famil, Mammadov Zaur</i>	
Issues of Risk-Oriented Approach to Electrical Networks Reliability Management.....	101
<i>Vanin Artem, Gabdushev Dmitry, Tulskey Vladimir</i>	
G Factor of the ESG Agenda in the Context of Sustainable Development of Russian Electric Power Companies.....	107
<i>Sheveleva Galina I.</i>	
Methodology for Analysis of System Reliability When Planning States and Balances of Electric Power Systems.....	112
<i>Krupenev Dmitry</i>	
Model for Minimizing Energy Consumption of Electric Power Systems Taking into Account the Balance of Active and Reactive Power.....	116
<i>Iakubovskii Dmitrii, Krupenev Dmitry, Boyarkin Denis</i>	
Methodological Aspects of Reliability Assessment of Asynchronous Motors Under Current Operation Conditions at Mineral Resources Enterprises.....	121
<i>Romanova Victoria, Batukhtin Andrey, Khromov Sergey, Alzakkar Ahmad</i>	
Improving the Reliability of the Power System in Postfault Condition.....	126
<i>Solovyev Ivan, Motovilov Alexey, Hvizuzov Mikhail, Emelyanov Alexander</i>	
Methods for Calculating the Resistance of Grounding Devices with Backfilling Special Compositions.....	131
<i>Drako Mikhail, Pavlovich Ivan, Baraishuk Siarhei</i>	
Measurement and Analysis of Electric Power Quality Indicators with Targeted Identification of the Perpetrators of Non-Compliances on the Example of the Belarusian Energy System.....	136
<i>Drako Mikhail, Maisyenko Aleh, Kolik Viachaslau</i>	
Research on Impact of Solar Power Plants on 110 kV Line Current Differential Protection Operation.....	141
<i>Navolochny Alexander, Onisova Olga, Salmin Alexander</i>	

Influence of the Temperature Schedule of Heating Network and Using Differential Pressure Regulators on the Reliability of Heat Supply Systems.....	146
<i>Zvonareva Julia, Vankov Yuri, Sabirov Irek</i>	
Improving Protection of Medium Voltage Networks.....	151
<i>Piskunov Sergey, Mokeev Alexey</i>	
Transformer Protection, Automation and Monitoring Systems	156
<i>Piskunov Sergey, Mokeev Alexey, Ulyanov Dmitry</i>	
Methods for Ensuring the Efficiency and Safety of Energy System Facility Equipment Based on Digital Technologies.....	161
<i>Sultanov Mahsud, Boldyrev Ilya, Ivanitskii Maxim, Menshikov Pavel</i>	
Prospective Power Systems Models Development Algorithms.....	166
<i>Mashalov Eugene, Neuymin Vladimir, Snegirev Denis, Mihajlenko Andrej, Teplukhin Daniil, Klassen Viktor</i>	
Development of a Vector Control System Based on the DFSMC for the Study of Transients in the Conditions of Creating a Digital Twin of the Power System.....	171
<i>Suprunov Igor, Novikov Nikolay, Novikov Alexander</i>	
Medium Voltage Digital Instrument Transformer.....	177
<i>Ulyanov Dmitriy, Plakidin Roman</i>	
Low-Frequency Oscillations Analysis and Big Data	181
<i>Popov Aleksandr, Butin Kirill, Rodionov Andrey</i>	
Practical Experience in Monitoring Low-Frequency Oscillations at Electric Power Station of United Power System of Russia	186
<i>Govorun Mikhail, Zhukov Andrey, Satsuk Evgeniy, Dubinin Dmitriy, Karimov Nikita</i>	
Experience in Implementing the Algorithm for Emergency Control System of Unloading in Case of Overload in Terms of Power Based on Synchrophasor Angle.....	190
<i>Govorun Mikhail, Satsuk Evgeniy, Luzhkovskiy Yuriy, Dubinin Dmitriy, Titov Sergey, Khokhrin Aleksandr</i>	
Fault Location with Increased Reliability for Overhead Transmission Lines.....	194
<i>Lachugin Vladimir, Podshivalin Andrey, Ismukov Grigory, Lvov Alexandr</i>	
Monitoring of Medium Voltage Distribution Networks by Balance Smart Meters	198
<i>Golub Irina, Voitov Oleg, Boloev Evgeny, Buchinsky Anatoly</i>	
Optimization of Data Processing Schemes for Locating Low-Frequency Oscillation Sources.....	204
<i>Butin Kirill, Popov Aleksandr, Rodionov Andrey</i>	
Neural Networks and Damage Pattern Recognition in Power Transformer Diagnostics	209
<i>Khrennikov Alexander, Aleksandrov Nikolay, Mikhailov Konstantin, Mikhailov Sergey</i>	
Principles of Controlling Intersystem Power Flows in the Conditions of the Electricity Market.....	213
<i>Yusifbayli Nurali, Alizade Rana</i>	
Operation Modes of the Power System of Azerbaijan Under Conditions of Penetration of Large Volumes of RES	217
<i>Alizade Rana, Nasibov Valeh</i>	

Method of Identification and Operational Control of Unauthorized Electricity Withdrawal in Distribution Networks	222
<i>Omorov Turatbek, Zakiriaeov Kubnychbek, Takyrbashev Beishenaly, Zholdoshev Tolkunbek</i>	
Automated Experimental Complex on the Platform of Modern ASCME	228
<i>Omorov Turatbek, Asiev Abai, Osmonova Rima, Takyrbashev Beishenaly, Imanakunova Zgenishkul, Suerkulov Manas</i>	
The Use of Information and Computing Technologies in Solving Problems of Monitoring and Managing the Condition of Cable Equipment to Ensure Their Reliability and Efficiency.....	233
<i>Ivanova V., Tsipkina V., Mamadalieva U.</i>	
Ensuring the Reliability of Energy Systems Through the Application of a New Method for Introducing Soil-Replacement Mixtures During the Installation of Deep Grounding Devices	238
<i>Pavlovich Ivan, Baraishuk Siarhei, Murodov Muzaffar, Abdulkhayev Khurshed</i>	
Efficiency Evaluation of Evacuated Solar Tube Collectors in Sakha Republic (Yakutia).....	242
<i>Prokhorov Dmitry V., Vasilev Semen S.</i>	

Author Index