

620.9(05)

Georgian Technical University
Union "Science and Energetics"

ENERGY

SCIENTIFIC AND TECHNICAL JOURNAL

3(111)/2024

Tbilisi

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SUMMARIES

T.MUSELIANI, B.JINCHVELEISHVILI, A.CAMARAUyli.

Advantages Of Safe Operation Of The Country's Transmission System Using Battery Energy Storage Systems.

“Energy”. №3(111). 2024. Tbilisi. p.5-10. geo. sum geo. engl.rus.

The dynamic stability of the country's electricity system is the basis for the country's overall energy stability, therefore, all factors and elements that contribute to maintaining dynamic stability in a continuous mode are important.

The article discusses battery energy storage systems with a bidirectional semiconductor converter, which reacts to certain disturbances in the system without time delay.

All current automatics that exist today to maintain the dynamic stability of the power system and, in most cases, prevent complete and partial blackouts of the system, require a certain time to respond and operate with a time delay, while modern battery energy storage systems, as already mentioned, have an energy management system that responds to disturbances without any time delay.

Bibl. 13.

E.MACHAVARIANI, IV.BEROSHVILI.

An Innovative Lecture About Energy, Its Forms And Their Mutual Transformations.

“Energy”. №3(111). 2024. Tbilisi. p. 11-20. geo. sum geo. engl.rus.

The article presents well-known historical examples of the use of this or that form of energy by mankind. It has been shown that the use of various forms of energy is a primary necessity for the development of civilization. The definition of energy and practical examples of the manifestation of different forms of energy are given. Qualitative classification of different forms of energy is also presented. For more clarity, we have shown this classification on a specially designed chart as three types of groups consisting of different forms of energy. The names of these groups are exergy, energy and anergy, of which the most valuable forms of energy are included in the exergy group. Less valuable forms of energy are included in the energy group, and completely free forms of energy are combined in the anergy group. Using this scheme, we teach students the first and second laws of technical thermodynamics and prove the impossibility of creating permanent machines of the first and second type.

Long-term practice of conducting lectures with the presented content has shown us that students easily understand and remember the material well.

G. KOKHREIDZE, Z. GACHECHILADZE, G. KHORBALADZE, GOCHA KOKHREIDZE

Theoretical Foundations Of The Development Of Methods For Mathematical And Computer Simulation Of Dynamic Processes In The Integrated System Of Transmission And Insertion Of Electromagnetic Energy By Constant Current In The State Electrical System.

“Energy”. №3(111). 2024. Tbilisi. p. 21-26. geo. sum geo. engl.rus.

This scientific-engineering work presents a solution to a promising problem for the converter system of a two-bridge bipolar direct current transmission line (PPT) with IGBT transistor modules. The task consists of establishing the theoretical foundations of the method for mathematical and computer modeling of the calculation, research, and analysis of electromagnetic and electromechanical transient and steady-state dynamic processes, using a general scheme for the conversion of objects (variables). In this case, the general scheme for the conversion of objects (variables) involves the transformation of instantaneous variable values into resulting complex values, spectral-operator transformations, and accounting for expansions in Fourier and Taylor-Maclaurin series of switching functions for voltages and currents. As a result, for the integrated converter system, we obtain optimal linear equivalent values of complex parameters and relative derivatives of unknown quantities an equation system for the electrical equilibrium of complex electrical quantities.

Ill.. 2, bibl. 4.

G. KHORBALADZE, Z. GACHECHILADZE, G. KOKHREIDZE.

Modeling Georgia's Power System In 2026: The Role Of Wind And Solar In Energy Security.

"Energy". №3(111). 2024. Tbilisi. p. 27-32. geo. sum geo. engl.rus.

The article examines the future of Georgia's power system in 2026, focusing on the integration of wind and solar energy into the electricity market using PLEXOS modeling. With installed capacities projected to reach 5,492 MW, including significant contributions from hydropower, thermal power, and variable renewable energy sources (ვარდგვ), the study evaluates two scenarios. Scenario 2, featuring 500 MW of wind and 250 MW of solar, demonstrates a 15% reduction in electricity generation costs and a 10% decrease in carbon emissions. The analysis highlights the importance of balancing products and infrastructure upgrades to ensure system stability and accommodate higher ვარდგვ penetration. The findings underscore Georgia's efforts to enhance energy security, reduce dependence on imports, and achieve sustainability through innovative energy solutions.

Ill. 4, bibl. 2.

E.MACHAVARIANI, I.BEROSHVILI, V.MUSELIANI.

A Simplified Method Of Calculating Natural Gas Burner Capacity For A Wood Drying Chamber.

"Energy". №3(111). 2024. Tbilisi. p. 33-40. geo. sum geo. engl.rus.

The article presents a simplified method of thermal technical calculation of the thermal power necessary for the operation of a 15 cubic meter wood drying chamber. In particular, the amounts of heat necessary to heat the moist material to the drying temperature, to dry the moisture in the material, and the amount of heat transferred from the drying chamber to the environment during drying, i.e. lost in a way, are calculated separately.

The results of the calculations performed by this method are also given, which are presented in the form of a table and a diagram. It is interesting that the presented diagram correlates the duration of drying and the capacity of the heating furnace. Using the mentioned diagram, it is possible to determine the power of the heating furnace necessary to carry out drying at the desired temperature, and what length of time will be necessary to finish the drying process.

The results of the experimental verification of the calculated quantities are also presented and it is shown that the quantities obtained by the calculations carried out by the presented simplified method agree satisfactorily with the experimentally obtained results.

Ill. 2, tabl. 1, bibl. 8.

K.GIORGADZE.

Analysis Of Methods For Diagnosing The Technical Condition Of Electrical Equipment With Partial Discharge.

"Energy". №3(111). 2024. Tbilisi. p.41-45. geo. sum geo. engl.rus.

The methods for diagnosing and monitoring the condition of electrical equipment of power substations, which are based on detecting and measuring the level of partial discharge in the insulation of the equipment, are discussed, and it is established that in order to ensure high efficiency of partial discharge control systems in the insulation of electrical equipment under load and under normal operation conditions, all of them have their own drawbacks. Therefore, to obtain real results, it is necessary to use several types of partial discharge detectors.

Bibl. 5.

I. SHEKRILADZE, E. MACHAVARIANI, G. GIGINEISHVILI, D. SHEKRILADZE.

Mathematical Modeling And Experimental Study Of The Shock Boiling Process.

"Energy". №3(111). 2024. Tbilisi. p. 46-52. geo. sum geo. engl.rus.

A specific type of boiling process, the so-called Results of mathematical modeling and experimental study of shock boiling. A mathematical model of the process considers shock boiling as a two-stage process in which discrete heat transfer mechanisms are the driving force. The first stage is the heating of the liquid brought to the surface of the roof by the membrane to the boiling point, in which non-stationary heat conduction plays the leading role. The second is the complete evaporation of the liquid brought to the boiling point, in which the percussion boiling mechanism

is the driving force. The experimental research was carried out on the basis of the experimental sample of a new type of low-potential heat-operated vaporization-condensation process based on the heat-driven pulse pump (TPT), one of the stages of the working cycle of which is the shock boiling process. This part of the study included the registration and analysis of the main mode parameters of the process, including the temperature of the closing surface and the pulsating changes of the steam pressure in the working chamber. The results obtained in the experiment confirmed the acceptable accuracy of the developed model in describing the dynamics of the shock fermentation process parameters.

Ill. 2, bibl. 9.

CHIKOVANI A., TSITSKISHVILI Z., CHKHETIA V.

Deformative Properties Of Asphalt Concrete.

“Energy”. №2(110). 2024. Tbilisi. p. 53-58. geo. sum geo. engl.rus.

The most important properties of asphalt concrete are discussed: ductility, plasticity, elasticity, creep and relaxation. The quantitative characteristics of these properties are factors of many functions: the magnitude of the stress, its speed in time, the composition of asphalt concrete. The viscosity of bitumen, the formation of the structure, the degree of aging and temperature. Therefore, the properties of asphalt concrete are evaluated experimentally in each individual case of multiple loading, using a special method.

Ill. 5, bibl. 4.