

COMPLEX PROBLEMS OF POWER SYSTEMS BASED ON RENEWABLE ENERGY SOURCES

LUDANOV K., BRATANICH T. (Kyiv). **Hydrogen accumulation. The kinetics of hydrogen absorption in metals.**

The paper developed analytical methods to calculate kinetics parameters of hydrogen absorption by metals. A brief derivation of the process and methods developed by the joint determination of integral parameters of hydrogen absorption has been presented. The integral parameters of hydrogen absorption are maximum specific hydrogen capacity, reduced diffusion resistance of H_2 uptake and surface "activation time" based on a limited sample (2-3 points) of experimental data. This method is implemented by solving systems of two transcendental equations where experimental data of hydrogen absorption are used as coefficients.

KUZNIETSOV M. (Kyiv). **Modeling common work for wind and solar power plants.**

Considering the total capacity of wind and solar power requires their descriptions and mathematical modeling in the same parameters, taking into account the random nature of the energy source. The mathematical model of solar radiation level considers its characteristics such as rate and magnitude of random fluctuations, average and maximum achievable value. Identification of possible solar power plants parameters allows us estimating their possible use in conjunction with the wind for effective renewable energy implementation.

NAKASHIDZE L., GABRINET V., TROFIMENKO A. (Dnipropetrovsk). **Factors affecting the heat balance facilities with the use of alternative energy sources.**

The article identifies factors influencing the distribution of heat flows in the building using energy active protections. Energy active protections convert incoming solar radiation energy, thermal energy of the environment, thermal energy of venting discharges and redistribute heat fluxes. Accounting the above factors while composing heat balance of a building helps to optimize energy supply system of the selected buildings thus helping to reduce energy consumption in 2-3 times.

SOLAR ENERGY

GAEVSKY A., USHKALENKO O. (Kyiv). **Determining optimal angles of photovoltaic panels.**

The analytical method for calculation of the optimal PV panels tilt angle has been proposed. The monthly global and diffuse radiation experimental values and reflection coefficient are input data in this method. An example of calculation with different combinations of beam, diffuse and reflected radiation components for various working periods have been presented.

GUBIN S., GONTAR M. (Kharkiv). **Dynamic equation modeling of a PV battery operation considering panel temperature variation.**

Connecting consumers to the centralized network does not guarantee the supply of high-quality electricity and continuous electricity supply. Using alternative energy

sources as a back-up source is particularly important at the moment. The article shows how the mathematical model of a PV battery operation is implemented in the simulation environment. Basing on mathematical equations a block diagram has been developed and the operation correctness of the model has been analyzed.

GAMARKO A. (Kyiv). **Methods of numerical approximations of current-voltage curves of a photovoltaic module.**

The paper examines the existing mathematical models of photovoltaic modules (FM). To create a mathematical model of a FM the linear approximation has been suggested.

BONDARENKO D. (Kyiv). **Smart digital photovoltaic systems.**

The paper outlined the idea and implementation of smart photovoltaic systems. Possible operation modes have been shown and various systems have been described. The paper states the principle and the approach to set-up universal smart system which is based on micro-controllers that collect and process information and make commands. The generalized chipset for setting-up this system has been selected and a possible communication protocol has been outlined.

WIND ENERGY

GOLOVKO V., KOKHANEVYCH V., SHYKHAILOV M., BUDKO V. (Kyiv). **The influence of rotor orientation parameters of the constructive scheme "tail oblique hing" over static characteristics of wind turbines.**

There has been suggested a mathematical model of a rotor orientation system by means of a feathered plane and with a constructive scheme "tail oblique hinge" Based on this system the static characteristics and power curves considering construction parameters have been obtained. This allows choosing the parameters of the system on the design stage, and these parameters should provide minimum energy losses.

HYDROENERGY

IBRAGIMOVA M. (Kyiv). **Determining design parameters for small hydro power plant when controlling the power by watercourse.**

There has been grounded the selection of design capacity and the number of HPP units when controlling the power by watercourse and environmental restrictions for water use in power production process.

GEOHERMAL ENERGY

MOROZOV Yu., NIKOLAYEVSKA N., KUSHNIR I. (Kyiv). **Geothermal heat pumps application in decentralized heating systems.**

There has been analyzed world experience in using geothermal energy sources for heating supply and other ways of thermal waters utilization. Geothermal heat pumps have got the highest growth rates in geothermal heat use. The data regarding geothermal heat pumps use in Ukraine have

been presented. There have been conducted calculations of geothermal heat pumps' operation efficiency together with underground heat batteries and the use of night electricity rate tariff.

SADOVENKO I., INKIN A. (Dnipropetrovsk). **Mathematical model verification of thermal energy transfer in flooded rocks of a combusted coal seam.**

The article aims to test previously developed mathematical model of heat transfer and establishment of the dynamics of forming hydrothermal fields in the aquifer, which lies above the coal seam combusted. The problem was made based on the data obtained in the course of the largest research project on underground coal combustion at the field Hanna in the US. Certain provisions relative error levels and groundwater temperatures did not exceed 5%, indicating the possibility of using the proposed model in practical calculations to assess the operational reserves of geothermal energy and the establishment of geotechnical parameters of its selection.

BIOENERGY

KUCHERUK P. (Kyiv). **Study of kinetic parameters in the periodical anaerobic co-digestion of manure and maize silage mixtures.**

There has been suggested a method to determine kinetic parameters based on data about biogas volume and composition resulted from periodical methane fermentation. The effect of adding different proportion of maize silage on biogas output intensity has been studied. The kinetic

parameters during periodical methane fermentation of a mixture of manure wastes and maize silage have been determined.

SALYUK A., ZHADAN S., SHAPOVALOV E. TARA-SENKO R. (Kyiv). **Ammonium nitrogen inhibition of methane production from chicken manure.**

There has been considered ammonium nitrogen inhibiting of methane production from chicken manure, namely ammonium nitrogen sources, inhibition mechanism, sensitivity of different methanogens groups, control factors impact, inhibition degree and adaptation to negative impact.

BUDKO M. (Kyiv). **Studying the design parameters impact of a batch reactor over temperature mode for biomass-to-diesel energy conversion process.**

The article studies design parameters impact of a batch reactor over temperature mode for biomass-to-diesel energy conversion process by means of Matlab software. The temperature change dynamics of a reaction mixture in the course of time has been analyzed and evaluated. This dynamics considers the material of the overestirification reactor shell. The material for reactor shell as well as reactor radius have been suggested aiming to improve the biomass-to-diesel energy conversion process.

**XIV МІЖНАРОДНА СПЕЦІАЛІЗОВАНА ВИСТАВКА
ЕНЕРГЕТИКА В ПРОМИСЛОВІСТІ-2016**
ЕЛЕКТРОТЕХНІЧНЕ, ЕНЕРГЕТИЧНЕ ОБЛАДНАННЯ, ЛІНІЇ ЕЛЕКТРОПЕРЕДАЧ, КАБЕЛІ, ПРОВІДИ,
ПРОМИСЛОВА СВІЛОТЕХНІКА, ГІРНИЧІ МАШИНИ ТА ОБЛАДНАННЯ, АВТОМАТИЗАЦІЯ, КВПІА

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СЬОГОДЕННЯ ТА МАЙБУТНЄ**

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