ABSTRACTS

Complex Problems of Power Systems Based on Renewable Energy Sources

BEKIROV E., KARKACH D., ABIBULAEV A., VOSKRESENSKAYA S., ASANOV M. (Simferopol). **Reducing environmental risks caused by atmospheric pollution when using renewable energy sources.**

Possibilities to optimize energy supply of Balaklava resort city are considered with the use of renewable energy sources – heat and power solar systems workings in parallel with boiler rooms. The solar radiation over solar collectors comes from the surface water pool of an exhaust quarry. The use of renewable energy sources provides environmental safety and reduces the risk of diseases by reducing harmful emissions during boiler rooms operation.

BAIRACHNYI B., TULSKYI G., ZHELAVSKA Y., BAIRACHNYI V., OLIYNYK A. (Kharkiv). **Prospects of using solar panels in hydrogen power for autonomous thermal energy supply.**

The features of the electrosynthesis of hydrogen in diaphragm and membran cell with using solar batteries have been studied. Specific electrical parameters of solar batteries, providing the preset mode electrosynthesis of hydrogen have been calculated as well. The data of dependence of hydrogen consuption and the resulting heat from unit pover solar batteries are presented. The expediency of using hydrogen produced from renewable energy sources in the energy sector is substaniated.

DOBROVOLSKYI V., YERSHOVA O., SOLONIN Yu. (Kyiv). **Investigating the impact of obtaining MgH_2 and its exposing in the open air on its thermal stability and hydrogen desorption kinetics.**

Isobaric thermal desorption spectroscopy method (TDS) has been applied to study the effect of a method for producing and exposing to air on hydrogen desorption thermal stability and kinetics from hydride phase of MgH_2 composites. The composites were obtained by different ways: by reactive mechanical alloying (RMS) and the direct hydrogenation of the gas phase (GGF). By XPS to investigate the mechanism of this influence and the role of surface hydride. It has been established that an increase in grinding time and the degree of dispersion of the powder Mg mechanical deterioration kinetics and decreases the temperature rise from the start of hydrogen desorption of the hydride phase of the composite due to exposure to air. The greater the degree of poisoning the catalytic surface of particles poisons hydride MgH_2 during exposure to air, the greater the thermal resistance and increase the temperature of hydrogen desorption starts to be expected when it is heated.

KUZNIETSOV M. (jr.) (Kyiv). **The influence of renewable sources semiconductor converters on network power quality parameters.**

The paper presents the characteristics of semiconductor converters for solar and wind power stations and analyzes the factors of influence on quality parameters of electricity network. That fact allows fully appreciating the impact of renewable energy plants on the grid. The analyzed factors are divided into deterministic and chaotic. Their impact analysis on the network for single converters in normal conditions shows that the power quality parameters stay within the permissible limits of normative documents. However, the cumulative effect of random factors in a real power system can increase significantly which actually requires further research.

Solar Energy

RYEZTSOV V., SURZHYK T., SHCHOKINA V. (Kyiv). **Possible reasons for the formation of inhomogeneous structures when drying moisture containing mediums by solar energy.**

The article presents examples of various inhomogeneous structures formed during natural interaction of solar radiation with moisture containing mediums of different origins of their volume or on the surface. The reasons and occurrence mechanism of such inhomogeneous structures have been considered. The analysis method to form spatially interaction structures in cylindrical and spherical coordinate systems and the analysis of dispersion equations structure for cylindrical and spherical coordinate systems have been made.

PUKHOVYI I., KHANDUS' M., KHRULENKO O. (Kyiv). **"Wall Trombe-Michel" solar heating system with an extended buffer zone and transparent ceiling in the house with no traditional heating system implemented.**

There has been studied the temperature regime of a passive solar heating system with extended up to 1,2 m buffer zone between the glazing and the south-western wall with holes on it. The temperature of the wall in early May reached 46°C, floor surface – 58°C. In the operation process enters the adjacent room receives about 2 kW•h of heat per square meter of wall. The highest air velocity in the holes is 1,6 m/s and the efficiency of the system is about 0,5-0,6.

SURZHIK T., GAMARKO A., MATYAKH S., SHCHOKINA V. (Kyiv). **Features of Poynting's theorem application for the analysis of electrothermal condition of photo batteries and solar collectors.**

The article discusses the features of using the Poynting's theorem in differential and integral form for the analysis of averaged over the volume of temperature photo batteries and solar collectors on the basis of using divergence theorem for vector integrated operations.

Wind Energy

KUZNETSOV M. (Kyiv). **Guaranteed levels of wind farms participation to cover grid power**.

Wind farms operation has got natural instability due to its dependence on the wind speed. However, to organize power system operation there should be known possible levels of wind farms participation to cover loads that are guaranteed with a certain probability. The calculation of such levels may be performed both analytically and by methods of mathematical modeling. Results confirm sufficient predictability of power in wind farm integration to the grid especially for dispersed group of wind farms on a large territory.

Hydroenergy

IBRAGIMOVA M. (Kyiv). **Weighted average coefficients of variation and skewness of annual streamflows for small rivers of Ukraine defined on behalf of small scale hydropower tasks**.

The weighted average coefficients of variation and skewness of annual streamflows have been determined for small rivers of Ukraine according to the basin type hydrographic zoning scheme.

Geothermal Energy

KHVOROV M. (Kyiv). **Forming the quantitative characteristics of geothermal waters in complex use.**

The structure and the system of parameters for the base of preliminary data for further feasibility report of complex geothermal waters use has been developed.

KRAVCHENKO I. (Kyiv). **Mathematical model of planned-radial filtration of the geothermal fluid as part of its flow continuity equation.**

The paper analyzes the algorithm for constructing the known differential equation of continuity flow filterable in the porous space of aquiferous underground collectors. The ultimate goal of this analysis is the interpretation of the working mathematical apparatus used to define geothermal resourses and parameters of intake structures. Unlike existing reviews in monographs and textbooks this analysis is presented in an accessible way and consistently starting from the unit element of hydrodynamic field to working formula.

BARYLO A. (Kyiv). **Evaluating optionse to use depleted gas fields in geothermal energy.**

The resource potential of Ukraine has been analyzed in terms of using depleted gas fields in geothermal energy. Based on examples of specific depleted gas fields there has been estimated their forecasted energy potential for two types of flooding.

BIOENERGY

KOVALKO A., NOVOSETSEV O., EVTUKHOVA T. (Kyiv). **Energy-economic estimation of scenarios of transboundary cooperation between energy service companies on the rapeseed and biodiesel markets.**

Energy-economic aspects of different scenarios implementation of transboundary interaction between energy service companies in the rapeseed and biodiesel markets have been considered. There have been shown advantages of using energy technology systems where interacting subsystems are located in different cross-border areas (countries) thus allowing to identify new opportunities to introduce energy-saving innovation projects and improve the competitiveness of energy-intensive technologies via expanding borders and increasing the extent of attracting investments in renewable energy sector.

KOVBASENKO S., SYMONENKO V. (Kyiv). **Road tests of a bus running on traditional fuel and biodiesel.**

The article describes the method and results of testing on the road PAZ-32054 with diesel engine 4CH11,0 / 12.5 (D-241) when running on traditional fuel and biodiesel. The expediency of using methyl esters derived from rapeseed oil as a fuel for diesel vehicles has been determined.

GOLUB N., LEVTUN I. (Kyiv). **Increasing lipids content in Chlorella vulgaris cells.**

The influence of ultrasonic radiation on the development of culture and the accumulation of cell lipid fraction in *Chlorella vulgaris* as being the raw material for biodiesel has been considered. The wavelength of ultrasonic radiation for which there is no growth inhibition of algae biomass has been determined. Rational parameters of the cultivation process (lighting, CO_2 supply, mass transfer) that leads to 4 times biomass growth increase and the accumulation of lipid cells Chlorellavulgaris to 70%, relative to standard medium for the cultivation of Gromov number 6 have been stated.

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