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S U M M A R I E S

ENERGY EFFICIENCY OF COMBINED CYCLE GAS TURBINE WITH PARALLEL AND SEMI-WORK SCHEME. *G.Chitashvili, N.Kevkhishvili, N.Javshanashvili.* "Energy". №2(66). 2013. Tbilisi. p. 5-11. rus. sum geo.engl.rus.

Global trend aimed at increasing the efficiency of Thermal Power Plants and reduce their negative impact on the environment is to focus on the construction of gas turbine and Combined Cycle Gas Turbine. It is noted that CCGT with heat recovery boiler is the most effective and promising installation (with an efficiency of up to 55÷60%). Such facilities in the future should also be introduced in the energy sector of Georgia. For efficient use of solid fuels (excluding its gasification) is appropriate to introduce a CCGT and semi-parallel scheme of work, which will involve a combined-cycle technology to coal-fired generating units. It is discussed efficiency of CCGT with a parallel circuit operation. It is noted that the transition to this technology increases the efficiency of coal-fired unit at ~4%.

During the reconstruction of obsolete equipment of TPP should be used with semi-CCGT scheme work. The analysis of the effectiveness of this CCGT and identified factors that affect its efficiency. A specific example of CCGT of $1 \times$ K-300-240 $+1 \times$ TG-110 are designed all the main indicators of the installation. The dependence of the efficiency of the CCGT-PP efficiency base unit has a linear shape, the relative reduction in specific fuel consumption for power generation is a linear decreasing function of the efficiency of the block and the average is about 8%, and increase efficiency of the unit ~ 3,4%. Analyzed the impact on the efficiency of gas turbine efficiency CCGT-PP, showing that reducing decreases linearly, with drops of gas turbines and power CCGT. It is noted that to improve the capacity and efficiency of existing units of Tbilsresi necessary to reconstruct them in a combined-cycle plants with semi-circuit operation. Ill. 5, bibl. 9.

ENERGY PRODUCTION RATES IN GEORGIAN ENERGY SYSTEM. *N.Samsonia, T.Filippidis.* "Energy". №2(66). 2013. Tbilisi. p. 12-17. geo. sum geo.engl.rus.

The paper discusses the conditions of defining rates for energy production in Georgian power system. Energy rate is a system of prices, according to which energy (power) is calculated at stages of its production, transmission and allocation (including export and import).

About 80% of Georgian energy is produced by hydroelectric power stations. Considering that that hydraulic power industry has high capital outputs and low variable expenses, it contributes to economic stability of Georgian energy sector. Ill. 3, tabl. 1, bibl. 6.

ROBLEMS OF THE ELECTROMAGNETIC COMPATIBILITY OF FREQUENCY CONVERTERS WITH THE SUPPLY POWER NETWORK. *G.Tschomelidze. D.Goginava*. "Energy". №2(66). 2013. Tbilisi. p. 18-21. geo. sum geo.engl.rus.

This article discusses issues related to impact of frequency converters on feeding electric network, especially issues regarding determination of levels of harmonic components created by frequency converters and their influence on electric power quality characteristics. In addition, various methods of suppression of the above interferences are reviewed. In conclusion, recommendations on compensation of electromagnetic interferences dependent on frequency converter capacity are provided. Ill. 3, bibl. 4.

ELECTRICITY COMPETITIVE MARKET IMPLEMENTATION POSIBILITY STUDY IN GEORGIA. *Z.Gachechiladze, N.Magradze.* "Energy". №2(66). 2013. Tbilisi. p. 22-28. geo. sum geo.engl.rus.

Structural studies were held to analyze situation in Georgian electric power system with regard to competition on electricity market. Studies have shown that competitive electricity markets, especially in the countries with small power systems, are highly effective, with bilateral Direct Contracts. It provides strengthening of market forces and reduces risks related to the increase in prices and demand. Direct contracts stipulate investment expansion in the field, by providing fixed-term contracts with fixed prices.

Analysis determined that the allowable margin of at least 1 million kWh of electricity consumption increases competition on wholesale electricity market and makes ahuge economic benefit to consumers. Expansion of electricity trade with this kind of contracts is one of the effective ways to reduce electricity tariffs and provide reliable supply to the consumers. Ill. 7, tabl. 2, bibl. 14.

OPTIMAL CONTROL OF THE ARC POWER OF AN ELECTRIC FURNACE. *M. Tsetskhladze.* "Energia". №2(66). 2013. Tbilisi. p. 29-32. geo. sum geo.engl.rus.

The device is investigated, which gives the task performance signal to the arc power regulator of an electric furnace before and after reconstruction. For the optimization of this device, a typical module has been designed, which gives a control signal to the arc power regulator. The typical module is equipped with a digital controller and a feedback signal sensor, and has high specifications of operational speed of a task performance signal given to the regulator. 2 figs.3 references.

THERMAL TECHNICAL ANALYSES OF WATER HEATING BOILER'S EXPLOITATION BY USING EXPRESS METHOD. *G.Ketelauri, K.Chikhvadze, O.Kiguradze.* "Energy". №2(66). 2013. Tbilisi. p. 33-38. geo. sum geo.engl.rus.

The work represents water heating boiler's thermal technical exploitation testing results by using express method, which aims at revealing separate heat loss of aggregate, minimizing of mentioned loss and energy efficiency increase of the work. The method is based on the use of certain constants, those that slightly change by burnt fuel mass elemental composition as well as by its content of ash and humidity.

Objects of study are two water heating gas consumer boilers (type - Ecoflam NC-420) of Georgian Technical University building №8 heating system.

Boilers thermal technical examinations were carried out using a flue gas analyzer – "testo 335". It was ascertained that the boilers are working under profusion of high coefficient of air, which is reflected on theirs energy efficiency. After elimination of detected malfunction repeated measurement showed 4-5% increase of energy efficiency indicators. Tabl. 6, bibl. 3.

ANALYSIS OF SMALL SIGNAL STABILITY IN CASE OF EXISTING SEVERAL REGULATED B2B STATIONS IN SYSTEM. *G.Vakhtangadze.* "Energy". №2(66). 2013. Tbilisi. p.39-40. geo. sum geo.engl.rus.

In the nearest future Georgian system will implement Power transit from Azerbaijan to Turkey through B2B station, which is located in Akhaltsikhe substation. The case concerns three 350 MW blocks, active power of which may be regulated. Thus, it's necessary to provide analysis of small signal stability for each new B2B station in service. Analysis of small signal stability in case of existing 2 regulators of B2B station has been provided in this article. Recommendation about data selection of these regulators is made. Ill. 2, bibl. 2.

ENERGY - A KEY FACTOR IN THE SUSTAINABLE DEVELOPMENT OF THE BLACK SEA COUNTRIES. *Z. Gurielidze.* "Energy". №2(66). 2013. Tbilisi. p. 41-43. geo. sum geo.engl.rus.

The paper discusses the 500/400 kV transmission system construction, which enhances sustainability of the country's energy system, provides opportunities to exportsurplus electricity during summer months, carry out import - export and transit. The system also significantlyreduces energy lossesand substantially strengthens cross-border trade opportunities among theBlack Sea region countries (Turkey, Azerbaijan, Armenia, Russia).

METHOD OF EXPERT ESTIMATION OF FUNCTIONAL RATE OF "NEGATIVE ECOLOGICAL FACTORS SPHERE" FOR HYDRO-TECHNICAL CONSTRUCTIONS OF STORM MITIGATION SYSTEM. *Z.Tsikhelashvili, G.Berdzenishvili, T.Kirimlishvili-Davitashvili.* "Energy". №2(66). 2013. Tbilisi. p. 44-45. geo. sum geo.engl.rus.

The proposed method is based on the processing of the analyzed priori information "fuzzy" appearance, which makes it possible on the basis of expert knowledge to solve a mathematical point of view, hard forming an engineering task of this complex hydraulic structures under stochastic uncertainty and the presence of "adverse environmental factors," the expert analysis to assess the quality of functioning of a single complex in the imitation of short, medium and long waves of the sea. Bibl. 2.

CHOOSING OF THE FILTER COMPENSATING DEVICE FOR DAMPING OF HIGH RANK HARMONICS. *N.Gozalishvili.* "Energy". №2(66). 2013. Tbilisi. p. 46-48. geo. sum geo.engl.rus.

The article reviews the method of choosing of the filter compensating device for damping of high rank harmonics, appeared in case of deformation of curve (sinusoid) of network output voltage of alternative current. Bibl. 2.

THE MANNING FORMULA AND COHERENCE PARAMETERS OF A STREAM. *V. Birkadze.* "Energia". №2(66). 2013. Tbilisi. p. 49-51. rus. sum geo.engl.rus.

The mean flow velocity is determined for uniform motion of fluid in open conduits of complex cross-section. It is shown that when determining the mean velocity, the Chezy formula (5) and the Manning formula (6) ignore such an important property of a stream as vortex motion, i.e. the stream coherence.

In [3], the stream coherence parameters are taken into account: the vortex inertia radius is used to determine the mean velocity and the vortex inertia moment is used to determine the water discharge. Ill. 2, bibl. 3.

NONCIRCULAR CONDUITS WITH CONTINUOUS DISCHARGE IN THE LAMINAR MODE. *V. Birkadze.* "Energia". №2(66). 2013. Tbilisi. p. 52-55. rus. sum geo.engl.rus.

The problem of determining fluid losses in noncircular conduits with continuous discharge in the laminar mode is considered, taking into account the flow coherence parameters, i.e. the vortexl motion of fluid.

The secondary flow in noncircular pipes with a continuous discharge is taken into consideration for the first time in engineering hydraulics. It is shown that if the rectangular pipe is used instead of the circular pipe, then it becomes possible to make in the structure holes of the same diameter for fluid dispensation. The number of holes can be regulated to decrease or increase the specific discharge of dispensed fluid, and so on. Perforated rectangular pipes can be used in many areas of industry. Ill. 1, bib. 4.

DEVELOPMENT OF LAMINAR MOTION OF FLUID IN NONCIRCULAR PIPES WITH STREAM COHERENCE TAKEN INTO ACCOUNT. *V. Birkadze, N. Tavartkiladze.* "Energia". №2(66). 2013. Tbilisi. p. 56-57. rus. sum geo.engl.rus.

The generalized formula for determining the starting area length for noncircular pipes in the case of laminar flow of fluid is obtained, where the Reynolds number and the free cross-sectional area of the pipe are determined by using the stream coherence parameter which is the torsion inertia radius. Bibl. 7.

STUDY OF THE AGGLOMERATION CHARACTERISTICS OF THE FURNACE CHARGE OF A COMPOSITE ALLOY. *M. Siradze, O.Mikadze,T. Buchukuri.* "Energia". №2(66). 2013. Tbilisi. p. 58-61. geo. sum geo.engl.rus.

The compositions of chemical and metallurgical production waste products and the prospects of their utilization are studied. The basic specifications were experimentally refined for briquetted tailings of electrolytic manganese dioxide production, cinder of secondary aluminum production and granular slag of the silicomanganese production. Liquid glass was used as a bonding agent. The coke breeze carbon was used as a reducing agent, and lime was used as flux. The drying conditions for briquettes were established; also, the physical and mechanical properties of briquettes and their dependence on the furnace charge humidity and the bonding agent consumption were studied. Using the charge, the following composite alloy was received in the electric arc furnace, mass %: $Mn - 22.0$; $Si - 44.1$; $Al - 14.5$; $Ca - 8.5$; $Fe - 3.1$; $C - 5.5$.

The metal yield was 22%. The application of the alloy is the out-of-furnace treatment of liquid steel. 3 figs. 1 table, 7 references.

MAGNETIC SUSCEPTIBILITY OF CONDUCTIVE ELECTRONS. *Z.Chachkhiani, L.Darchiashvili, E.Zeragia.* "Energy". №2(66). 2013. Tbilisi. p. 62-63. rus. sum geo.engl.rus.

High concentration of current carriers - electrons in metals with density not very much differing from atoms density leads to the notion about moving electrons, which may be called conductive electrons.

Zommerfeld theory proceeds from the concept of conductive electrons as of free ones i.e. moving in constant potential field. This theory had a great success when calculating magnetic susceptibility of conductive electrons. In order to receive magnetic susceptibility of conductive electrons the effect of diamagnetic ions is subtracted from experimental values, which may become the source of other errors. The electrons themselves have diamagnetic properties because of orbital motion. Tabl. 2, bibl. 3.

IDENTIFICATION OF MODELS AND NATURAL TECTONIC STRUCTURES ON THE EXAMPLE OF SOME REGIONS OF GEORGIA. *L.Basheleishvili, M.Kumelashvili, T.Razmadze.* "Energy". №2(66). 2013. Tbilisi. p. 64-69. rus. sum geo.engl.rus.

Analog modeling of the tectonic structures of some regions of Georgia performed on equivalent materials attests the existing notion on the structure formation mechanism and deformations closely interconnected with general cinematic development of the region. Ill. 9, bibl. 14.

VARIATION OF THE ENGURI ARCH DAM TILTS CAUSED BY THE RESERVOIR REGULATION AND CHANGES IN THE DAM TEMPERATURE. *V.Abashidze, T.Chelidze, N.Zhukova, T.Papava.* "Energy". №2(66). 2013. Tbilisi. p. 70-75. geo. sum geo.engl.rus.

This work includes a temporal analysis of the deformation of the Enguri arch dam on the basis of high precision tiltmeter observations data. In order to determine the correlative links the data of the variation of the water level in the reservoir, tiltmeter data, air temperature, the temperature in the tiltmeter chamber, and the data of the dam concrete temperature in the same place have been compared to each other graphically. Besides visual analysis we carried out a regression correlation analysis of the values of the water level variation and all other values. The result of the correlative analysis is as follows: the coefficient of the correlation between the reservoir water level variation and the tiltmeter data equals to 0.62, the coefficient of the correlation between the concrete temperature and the dam movement is just 0.08, the coefficient of the correlation between the temperatures of the concrete and the tiltmeter chamber is also as low as 0.09. These calculations prove that the main factor for the dam movement (displacement) is the water regulation in the reservoir. In case the temperature data on the pressure faces of the dam are observed it would be probably possible to reveal a relatively higher correlation with the dam tilts. Ill. 5, tabl. 1, bibl. 5.

PHUSICAL CONSTRUCTION AND PAVING STONES – THE STUDY OF THE MECHANICAL PROPERTIES OF MODERN METHODS AND MAIN RESULTS. *N.Bochorishvili, I.Bochorishvili, N.Razmadze, M.Kitoshvili, N.Ratiani, M.Kchabeishvili.* "Energy". №2(66). 2013. Tbilisi. p.76-79. geo. sum geo.engl.rus.

The article deals with and desaibs the cement mixture testing methods in struined conditions; come with the new methods of cement mixture streugh determination with the puro shiftay strained, conditions, also there ave mentions stone models testing, mode of cement liquid, with the side hidrostatical compression and stretching, providicy testing results and analysis. Tabl.2, bibl.6.

PRINTED BENEATH THE RIVER SEDIMENT IN THE RESERVOIR META PRESSING AND RATIONALE ENERGY. *N.Bochorishvili, I.Gabrichidze, K.Kamkamidze, I.Bochorishvili, M.Kitoshvili, M.Kchabeishvili.* "Energy". №2(66). 2013. Tbilisi. p. 80-83. geo. sum geo.engl.rus.

The article presents the well-known concepts and information in the field of hydraulics, fluid mechanics, hydrology, data production processes and operating conditions. For example, the area was part of the river in the catchment area is constantly moving, since changes in water level, the direction of the dam. Ill. 2, bibl. 5.

SOLUTION PREPARED FROM SAMPLES OF CEMENT STONES STRETCHING – COMPRESSIVE HIDROSTATICS PRESSURE TEST. *N.Bochorishvili, I.Bochorishvili, N.Razmadze, M.Kitoshvili, M.Kchabeishvili.* "Energy". №2(66). 2013. Tbilisi. p. 84-87. geo. sum geo.engl.rus.

The article deals with the modern and main methods of research of building and facing materials physical - mechanical features. The stone materials testing method is worked out in strained conditions, moreover there is discussed the method of the stone determination of stone's strength in pure shifting conditions and is determined the theory of strength, considering some ideal full and isotropic materials, which physical and mechanical features are known, the strength three-axis is higher than sing he one stretching and single axis is much more than the strength of pure shifting. Ill. 4, tabl.1, bibl. 6.

FIBROUS MATERIALS IN COMPOSITES. *L. Ugulava.* "Energia". №2(66). 2013. Tbilisi. p. 88-90. rus. sum geo.engl.rus.

Data are presented on the use of natural and artificial fibers for producing composites, and on their influence on the properties of a material. The graphs show the influence of fibers on the mechanical properties of some materials and their positive properties from the standpoint of longevity and strength. 2 figs., 2 references.

ABOUT CRACKING AND REGULARITIES OF CLOSING INTERSECTIONAL SEAMS AND RADIAL CRACKS IN ARCH DAMS. *M.Lordkipanidze, T.Kikava, N.Tabatadze, T.Jojua, T.Turmanidze.* "Energy". №2(66). 2013. Tbilisi. p. 91-93. rus. sum geo.engl.rus.

On of the ways to provide radiation of thermal cracks in the arch dams is to increase correlation between the block length along the dam border and its transverse length equaling the dam thickness. This way of providing natural radial cracking has an important fault which is uncertainty of the exact location of the cracks. In most cases it is necessary to know such locations in advance in order to install antiseismic fittings and anitfiltration keys. More satisfactory requirement for the reliability of the arch dams with the admission of the radial cracks, the way of natural radial cracking in the places envisaged by the project in advance should be recognized. Bibl. 3.

FORMATION OF CRACKS ON THE DOWNSTREAM FACE OF THE ARCHED DAM OFTHE INGURI HES. *Yu. Mikashvili.* "Energy". №2(66). 2013. Tbilisi. p. 94-100. geo. sum geo.engl.rus.

The results of the visual examination of concrete of the downstream face of the arched dam of the Inguri HES are presented. The exmanation was carried out at the levels of observation bridges. 3044 cracks were found, of which 2829 (92.94%) were formed on the arch area, and 215 (7.06%) on the saddle and thrust abutments of the dam. In 1999-2008, the total quantity of cracks increased 3.57 times. These are mainly vertical cracks and near the perimeter joint they radial.

In all probability, along with hydrostatic pressure and seasonal temperature fluctuations which cause alternate stresses, the cause of permanent crack formation on the downstream face of the dam is solar radiation which essentially raises the temperature on the dam surface. The engineering project has been prepared and submitted to the management of the Inguri HES. The implementation of the project will make it possible to prevent crack formation and to monitor the condition of the entire surface of the downstream face of the dam. Ill.4, tabl. 2, bibl. 5.

METHODS FOR MATHEMATICAL MODELING AND IDENTIFICATION TO STUDY GEODYNAMIC SYSTEMS. *M.Nadiradze, E.Leonidze.* "Energy". №2(66). 2013. Tbilisi. p.101-102. geo. sum. geo.engl.rus.

The article provides discussion about the methods of mathematical modeling and identification used to study geodynamic systems. There is given an account of the path that solution of geodynamic problems has to be provided from the position of both complex geodynamic systems and the theory of system analysis. The mathematical component has to be the main part in the theory and methods of geodesy; and, proposed importance to developing the theory and methods. It has been set forth the proposal that during mathematical modeling united natural system of earth has to be accounted. Bibl. 6.

THE STUDY OF STRUCTURE FORMATION IN THE EARLY STAGE OF HARDENING OF SILICATE BINDERS BY HOLOGRAPHIC INTERFEROMETRY. *G.Dalakishvili, G.Mosiashvili.* Energy". №2(66). 2013. Tbilisi. p.103-105 geo. sum. geo.engl.rus.

Consider the use of laser technology in particular the method of holographic interferometry to study the curing process and structures of cement, stone and concrete. Ill.1, bibl. 3.