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### MANAGEMENT OF ASYNCHRONOUS TRACTION ENGINE ON THE BASIS OF THE DIRECT CURRENT TRACTION SUBSTATION.

*G. Kokhreidze, N. Kekelia, E. Tetunashvili. "Energy". №2(82). 2017. Tbilisi. p. 5-11. geo. sum geo. engl. rus.*

The issues of managing the traction engine of the current alternating based on the current inverter units and arranged on the basis of IGBT transistor modulus obtained as a result of significant changes in the development of semiconductor technology are reviewed. Principal full electronic circuit for the management of a three-phase asynchronous traction engine of the alternating current that includes the modes of motion, traction and recuperative break are presented. Ill. 4, bibl. 4.

### CONTROL OF BATTERIES CHARGING AND DISCHARGING PROCESSES IN THE AUTONOMOUS HYBRID ELECTRIC POWER ENGINEERING SYSTEM.

*G.Kokhreidze, Sh.Pkhakadze, Z.Papidze, E.Tetunashvili. "Energy". №2(82). 2017. Tbilisi. p. 12-16. geo. sum geo. engl. rus.*

The paper discusses the prospects of using battery batteries of autonomous hybrid power systems in the rank of accumulation energy manufactured with different technologies. Their negative and positive properties are shown. Nickel-cadmium (NiCd) and lithium-ion (Li-Ion) curves of the battery discharge are built and shown for the time when the electricity is discharged at different values. Ill. 2, bibl. 3.

### IMPACT OF THE SOURCES OF INDUSTRIAL FREQUENCY ELECTROMAGNETIC FIELD ON HUMAN HEALTH AND THEIR LEGAL REGULATION ISSUES

*T.Museliani, A.Vashakidze, G.Tsopurashvili. "Energy". №2(82). 2017. Tbilisi. p. 17-22. geo. sum geo. engl. rus.*

Electromagnetic field generated by the air transmission line and the issues of legal regulation of the impact of the electric and magnetic components of such field on human health as well as permissible levels of such components in Georgia and Soviet Union are presented. Ill. 1, tabl. 3, bibl. 6.

### TEMPERATURE CONTROL AND SOME ASPECTS OF ITS IMPORTANCE IN PHOTOELECTRIC CONVERTERS. *T.Khachidze, N.Khachidze, L.Rurua. "Energy". №2(82). 2017. Tbilisi. p. 23-26. geo. sum geo. engl. rus.*

The temperature increase sharply worsens the characteristics of photovoltaic transformers of solar energy (possibly even destroy), the generated electric power is reduced. We consider that even silicon solar panels that take not concentrated solar radiation are heated at a maximum of several tens of degrees require cooling. Thus, we will prevent the loss of electricity and extend the life of photocells. This will prevent loss of electric power and increase the duration of operation of photocells. However, in order not to spend constantly electric energy for cooling, it is necessary to control the temperature of the solar battery with a temperature sensor and see that the cooler is switched on when necessary. Ill. 1, tabl. 1, bibl. 4.

### CALCULATION OF THE THROUGHPUT CAPACITY OF THE GAS PIPELINE OF GAS DISTRIBUTION NETWORKS WITH THE HELP OF LOOPING.

*D.Namgaladze, I.Lomidze, G.Baindurashvili. "Energy". №2(82). 2017. Tbilisi. p. 27-32. geo. sum geo. engl. rus.*

As consumption of the natural gas by population and industry is growing, the volumes of gas being pumped are correspondingly increasing. So it is necessary to increase such qualities of gas distribution networks as conductivity. This work explores the method of increasing the productivity gas pipelines of gas distributional networks. Elaborating approximate and analytical methods of pipelines of gas distributional networks represents the task of gas dynamic calculations. The method of analysing and resolving the dependence of the major line has been worked out. There also have been worked out analytical interdependences, the usage of which is important for regulating the regime of gas pipelines. Ill. 3, bibl. 15.

#### **METHOD OF CRENELLATED MAGNETIK CONDUCTIVITY.**

*K.Tsereteli, N.Kereselidze. "Energy". №2(82). 2017. Tbilisi. p. 33-39. geo. sum geo. engl. rus.*

An article describes a new method of calculation for electric machines and it's called a method of tooth magnetic conductivities. It gives us an equally good result while calculating machines of different types, sizes and different working modes.

A result of this method is a solution of optimal calculation and machine design tasks.

An article includes an example of using this method for implicit machine. There are considered boundary value problems for calculation of the field in the gap and its simplest components. Ill. 3, bibl. 5.

#### **TODAY'S CURRENT CONDITION AND TASKS OF THE GEORGIAN ENERGY SYSTEM**

*M.Zaridze. "Energy". №2(82). 2017. Tbilisi. p. 40-44. geo. sum geo. engl. rus.*

The greatest importance of energy sector is analyzed in the sustainable development of the economy of the country and how much of the energy independence affects the economic indicators of the country. Georgia is an energy dependent country (import is 65%). Despite the richness of hydropower resources it is deficiency in electricity in the autumn-winter season. It should be noted that the investment interest in renewable energy has been significantly increased. Construction of wind power plant is planned in Zestafoni, as well as construction of first Kartli wind power plant is completed. Tabl. 1, bibl. 7.

#### **THE HYDROPOWER POTENTIAL OF GEORGIA AND ITS UTILIZATION PROSPECTS.**

*M. Nemstsveridze. "Energy". №2(82). 2017. Tbilisi. p. 45-50. geo. sum geo. engl. rus.*

Georgia is rich with hydropower resources, but their utilization level is still very low. Generation of electricity is mainly performed from hydroelectric power stations. Georgia's electricity consumption growth trends in the future need additional capacity to be circulated in the system. This paper reviews that the optimal utilization of hydropower potential is extremely important for development of the electricity sector. The projected balance of power energy, the future projects and prospects are also represented in the article and the appropriate activities are set. Ill. 2, tabl.1, bibl. 6.

#### **HYDROPOWER DEVELOPMENT TRENDS IN THE WORLD.**

*M.Nemstsveridze. "Energy". №2(82). 2017. Tbilisi. p. 51-56. geo. sum geo. engl. rus.*

In modern conditions the energy sector is the driving force of any country's economics. The development of Energy infrastructure and energy resource utilization is one of the major areas of all countries including Georgia.

The world's energy resources are among the leading position in the development of the hydropower resources, but their development level is still low. Though there are the leading countries such as: China, Brazil, Canada, USA etc., which generate electricity mainly from hydroelectric power plants. The paper deals with the hydropower potential of these countries and the current state of the energy sector. Ill. 2, tabl. 4, bibl. 7.

#### **THERMAL EXPANSION OF POLYCRYSTALLINE $Si_{1-x}Ge_x$ ( $x \leq 0.02$ ) ALLOYS IN THE 20-800°C TEMPERATURE INTERVAL.**

*I.Tabatadze, D.Mkheidze, V.Kuchukhidze, M.Kadaria, G.Aroshvili. "Energy". №2(82). 2017. Tbilisi. p. 57-62. engl. sum geo. engl. rus.*

Study of polycrystalline Si-Ge alloys thermal expansion by means of dilatometric method in the wide temperature range (20-800°C) is conducted. Experiments are performed on dilatometer with quartz gauges, which is equipped with displacement capacitor sensor, featuring information exchange digital port. A special program is utilized for reading data from the sensors and processing algorithms via RS232 interface.

Experimentally is demonstrated non-monotonic changes of thermal expansion linear coefficient in a wide temperature range. A comparative analysis of temperature dependence of the thermal expansion coefficient for SiGe alloys was conducted. It is show that an increase in the concentration of the Ge results into a decrease of critical temperature of non-monotonic decline of linear thermal expansion by 20-30°C. All samples are characterized by clearly manifested non-monotonic temperature changes of thermal expansion, when the temperature changes at the rate of 3-5°C/min.

The experimental results referred above suggest that the non-monotonic thermal expansion of SiGe polycrystalline alloys in the range of 200-500°C could be caused by configuration and concentration transformations in structural defects. Ill. 7, bibl. 4.

#### **VIRTUAL THERMAL DIAGNOSTICS OF TECHNICAL UNITS.**

*O.Kiguradze, K.Chkhikvadze, N.Kezheredze, T.Chkhikvadze. "Energy". №2(82). 2017. Tbilisi. p. 63-66. geo. sum geo. engl. rus.*

Methods of thermal engineering diagnostics of heat power plants and the principle of the virtual laboratory task created for studying these methods are considered. Virtual task is created in Visual Basic. Principle operation of these task is based on the methods of operation of the gas analyzer of testo 335. It clearly demonstrates the operation stages of a real measuring device. Ill. 1, bibl. 3.

#### **INFLUENCE OF ANTISUBLIMATION COATING AND ITS FORMATION PROCESS ON THE STRUCTURE AND PROPERTIES OF THE TELLURIDE BRANCHES OF THERMOELEMENTS.**

*F.P.Basaria, G.V.Bokuchava, G.Sh. Darsavelidze. "Energy". №2(82). 2017. Tbilisi. p. 67-70. rus. sum geo. engl. rus.*

Influence of antisublimation coating created from vitreous enamel on the stability of characteristics and operation duration of the n- and p-types telluride branches of thermoelements is studied. Experimental data analysis established, that thin transition layer on the boundary of vitreous enamel- thermoelectric material improves antisublimation properties of coating and stability of the thermoelements branches characteristics. Ill.1, tabl. 2, bibl.13.

#### **CHANGE OR RESTORATION OF TRANSFORMER OIL?**

*R.Chikhladze, K.Chikhladze. "Energy". №2(82). 2017. Tbilisi. p. 71-74. geo. sum geo. engl. rus.*

The mechanism of isolation system aging in electrical device filled with oil and influence of oil aging products on solid isolation aging and vice versa are discussed.

The priority of restoring (regeneration) aged oil versus changing it with new oil is documented. The issue of necessity of complete liberation of solid isolation from aging products is raised. Ill. 2, bibl. 8.

#### **TO THE CALCULATION OF ALONGSHORE WAVES IN SEA AND RIVER CHANNELS**

*Sh.Gagoshidze, I. Kadaria, M. Kodua, I.Rizhamadze. "Energy". №2(82). 2017. Tbilisi. p. 75-81. geo. sum geo. engl. rus.*

In article are considered the approximate theory of the alongshore movement of waves in triangular and trapezoidal channels. One of the most characteristic properties of alongshore waves is growth of their height near the coastline, or on the contrary, reduction of amplitude recorded along the coast, across the channel towards big depths. On the basis of suitable selection basic functions and applications of a direct method of Kantorovich are received approximate solutions of the three-dimensional wave equations in channels which can be the basis for an assessment of stability of their slopes. Ill. 2, bibl. 4.

#### **DRAWING UP EQUATIONS IMPOSITION OF FICTITIOUS ORTHOTROPIC SYSTEMS FOR SYMMETRICAL THREE-CENTER ARCH DAMS "FIRST APPROXIMATIONS", WITH SOLUTIONS OF SUCH PROBLEMS WHEN THE BODY ARCH DAM ALONG TO THE OTHER UNKNOWN QUANTITIES, ARE AND MODULES DEFORMATION OF ITS FOUNDATION**

*A.Chrelashvili, G.Megrelishvili, D.Gokhelashvili, G.Markarashvili. "Energy". №2(82). 2017. Tbilisi. p. 82-86. geo. sum geo. engl. rus.*

It examines the way of a positive decision problematic issues that arise in the operation of arch dam, using the method of imposition of fictitious orthotropic systems. When the base of the arch dam, in a high filtration effects, significantly increase the value of the displacement arch dam, comparing with designed the value the same the value of the dam. The purpose of research is (for the three-center symmetrically arch dam, located in such conditions, using real value of the components of the body displacement of the arch dam, getting with field observations of this dam), be solved scientific problem and install together with other unknown quantities and value of the modulus deformations of basis arch dam. Ill. 1, bibl. 5.

#### **WAVE CONSTRUCTIVE SOLUTION OF CONTAINING WALL.**

*Sh. Bakanidze, L. Zambakhidze, T. Moralishvili. "Energy". №2(82). 2017. Tbilisi. p. 87-90. geo. sum geo. engl. rus.*

Containing walls of the buildings happen to work on horizontal loads too. Therefore they need to be of proper hardness along traverse direction. Given this, complex contoured rather than foot wall construction solution is reasonable for these walls.

The wave walls are reviewed and efficiency of the material is analysed. Ill. 4, tabl. 1, bibl. 3.

#### **ELASTIC-PLASTIC STRESS STATE OF CYLINDRICAL TUBE IN ELASTIC MEDIUM.**

*G.Bagaturia, M.Losaberidze. "Energy". №2(82). 2017. Tbilisi. p. 91-93. rus. sum geo. engl. rus.*

The elastic-plastic problem for cylindrical tube in elastic medium has been solved. The case, when the constant pressure acts on the inner wall, and elastic body – outside, is considered. It is understood, that there is no displacement along the cylinder axis, according, we have planar deformation problem. Based on the formulas, obtained by Galerkin within the elastic limit, the equation, which establishes the relationship between the boundary of elastic and plastic medium and the pressure, acting on the tube inner wall, has been composed. Bibl. 6.

#### **ELABORATION OF MATHEMATICAL MODEL OF CONTACTLESS CONDUCTOMETER USING MAGNETIC CONDUCTOR PARAMETERS.**

*T. Museliani, N. Lebanidze-Asatiani, I. Shavtvalishvili. "Energy". №2(82). 2017. Tbilisi. p. 94-97. geo. sum geo. engl. rus.*

Contactless conductometer using the magnetic conductor parameters is elaborated based on a theory of linear electric circuits. It allows to produce the desired sensitivity contactless conductometer using the pre-determined self-induction and mutual-induction coefficients. Ill. 1, bibl. 4.

#### **WATERTIGHTNESS OF CONCRETE.**

*I.Klimiashvili, D.Gurgenidze, A.Chikovani. "Energy". №2(82). 2017. Tbilisi. p. 98-104. geo. sum geo. engl. rus.*

The topic concerns the watertightness of concrete, the most widely used material in the world. Dependence of the watertightness to water-cement area, effective porosity, consolidation, reinforcement and exploitation conditions is reviewed. Table of the dependence of the concrete watertightness grade and air permeability factor and impact of quite a few factors on its filtration are provided. Ill. 3, tabl. 7, bibl. 8.

#### **APPARATUS FOR DRYING BULK MATERIALS USING INFRARED RAYS.**

*L.Papava, E.Sadagashvili, G.Gugulashvili, G.Beruashvili. "Energy". №2(82). 2017. Tbilisi. p. 105-109. rus. sum geo. engl. rus.*

The problem of drying of bulk food with infrared rays. It is shown that infrared drying drawback is the small depth of penetration of infrared rays within the product mass which tea is 7-10 mm. Difficult to also tap steam escaping from the product when it is dried. The design of a new device for drying loose foodstuff, which allows penetration of infrared rays the whole depth of the product and thus increases the efficiency of the drying process and machine performance. Ill. 1, bibl. 5.

#### **PHYSICAL-CHEMICAL INVESTIGATIONS OF SOME NATURAL POROUS NATURAL MATERIALS OF GEORGIA.**

*B. Keshelava, R. Skhvitaridze, G. Tsintskaladze, M. Meskhi, N. Eremadze. "Energy". №2(82). 2017. Tbilisi. p. 110-112. geo. sum geo. engl. rus.*

Some porous materials of South Georgia are investigated. Based on the results of conducted physical-mechanical investigations there are selected minerals, those, by our opinion, could be used for manufacturing of the structural light concrete with the strength high enough. Tabl. 2, bibl. 4.

#### **ON THE BASIS OF EXPOSED CONCRETE SCORIA.**

*L. Ugulava, G. Robakidze. "Energy". №2(82). 2017. Tbilisi. p. 113-115. rus. sum geo. engl. rus.*

Experiment results for the production of the exposed concrete using Georgian scoria are reviewed. Materials used were : portlandcement, natural scoria Okami and organic-silicon fluid based hydrophobic additive.

Chemical composition of several Georgian deposits as well as their physical and mechanical features are presented. Percentage of fine and coarse aggregates of certain deposits allowing to use this material for the production of the exposed light concrete are shown. Ill. 1, tabl. 3, bibl. 4.

#### **TWOFOLD CONSTRUCTIVE SOLUTION OF MONOLITHIC REINFORCED CONCRETE RETAINING WALLS.**

*Sh. Bakanidze, L. Zambakhidze. "Energy". №2(82). 2017. Tbilisi. p. 116-122. geo. sum geo. engl. rus.*

Two options of the constructive solution of ground-anchor monolithic reinforced concrete retaining walls placed in two layers are reviewed: foot wall and column wall. Based on technical and economic estimations, the more effective constructive solution – column - has been identified. Ill. 5, tabl. 2, bibl. 3.