

## ABSTRACTS

**Mathematical model of the process of electrical explosion of cylindrical conductors / V. Yu. Baklar, N. I. Kuskova, D. I. Chelpanov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 3-7. – Bibliogr.: 14. – ISSN 2079-0740.**

The mathematical model of electrical explosion of cylindrical conductors which is based on representations of evaporation wave was developed. Analytical expressions for temporal dependences of resistance, current, voltage and pressure on the parameters of electrical equipment and characteristic sizes of conductor in the process of the homogeneous heating by the impulse current of cylindrical conductors were obtained. Temporal dependences of resistance, current and voltage were experimentally obtained. Qualitative comparison of the developed mathematical model with the results of experimental researches was conducted. Analytical expressions, establishing a connection between impulse pressure in an exploding conductor and electrical power parameters, properties of material and sizes of conductor and external terms, were obtained.

**Keywords:** mathematical model, electrical explosion of conductors, matched regime of electrical explosion, evaporation wave.

**Application of powerful high-voltage generator of GICL-10/350 for an estimation electro-thermal resistibility to lightning send-offs and cables of electric chains of objects of industrial electroenergy / M.I. Baranov, S.V. Rudakov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 7-12. – Bibliogr.: 12. – ISSN 2079-0740.**

The results of experimental estimation of resistibility of standards of row of send-offs and cables are resulted with copper (aluminium) tendons, by the polyethylene (PET) and polyvinylchloride (PVKH) isolation of electric chains of objects of industrial electroenergy to action of aperiodic impulse of current 10/350  $\mu$ s of artificial lightning with rationed on the requirements of international and national standards peak-temporal parameters (PTP) and admittances on them. Maximal numeral values maximum of possible and critical closeness of the indicated impulse of current of artificial lightning are certain with rationed PTP and admittances on them in the examined send-offs (cables) of power electric circuits of power objects with PET and PVKH by an isolation.

**Keywords:** powerful high-voltage generator of current of artificial lightning; wires and cables of electric chains of objects of electroenergy; resistibility to lightning of cable-explorer products of power objects; maximum possible and critical closeness of impulse of current 10/350  $\mu$ s of artificial lightning in send-offs and cables of power objects.

**The requirements to blocking devices routine switching of design and making new production / R. K. Borisov, D. I. Kovalev, G. M. Koliushko, O. S. Nedzelskiy, H. G. Ponuzhdayeva // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 12-16. – Bibliogr.: 7. – ISSN 2079-0740.**

The requirements to blocking device of high voltage routine switching devices, used on power facilities, were considered. The research and design work of blocking device's creation for new electric equipment were described. This electric equipment is designed for staff's reliability improvement and electrical safety during the execution of routine switching in distributing gear with 6–750 kV voltage, situated in power plants and power substations. The electrical drawing is presented and the design of experimental model with completed acceptance trials within the set of electric equipment is described. The devices that have been developed are appointed to complete the new "intellectual" systems to provide the safety blocking of operative commutations.

**Keywords:** blocking device, routine switching, switching devices, electrical safety, high voltage, distributing gear, power plants

**Testing of a grounding systems and lightning protection system of power industry objects on present days / O. Y. Glybov, S. V. Kiprych, D. G. Koliushko, G. M. Koliushko, A. V. Plichko, O. L. Rezinkin // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 17-24. – Bibliogr.: 11. – ISSN 2079-0740.**

The main rule of electrical safety assurance are shown on the ground of function and structures of grounding systems and lightning protection systems. General defects of grounding systems, lightning protection systems and cable works are described. The main rule of electromagnetic compatibility assurance of devices, which is used by energy objects, is formulated. The list of normative electromagnetic influence immunity tests is presented. The list of testing procedures of grounding systems and lightning protection systems also for determination of electromagnetic environment factors for the objects, which are operated, are given. General recommendations for renovation of grounding systems and electromagnetic compatibility assurance are given.

**Keywords:** electrical safety, grounding systems, contact voltage, lightning protection systems, immunity tests, electromagnetic compatibility, electromagnetic environment.

**Lightning protection terms and definitions ДСТУ EN 62305- X:2012 / O. Y. Glybov, S. V. Kiprych, D. G. Koliushko, G. M. Koliushko, M. M. Rezinkina // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 24-40. – Bibliogr.: 6. – ISSN 2079-0740.**

Translation from English to Ukrainian and Russian languages of lightning protection terms and definitions of International Standards IEC 62305-X:2010 is presented in the paper. Total amount of terms is 112. Misfits of terms and definitions in different parts of International Standard are shown. It is proposed for interested specialists and organizations to take part in discussion, correction and addition of proposed formulations. It is shown, that operating Ukrainian standards in lightning protection are significantly differ each other both form and content. It is proposed to abate the Ukrainian standard ДСТУ Б В.2.5-38:2008.

**Keywords:** lightning protection standards, internal and external lightning protection system, air terminations, down conductors, earth terminations, surge protective devices.

**The comparative analysis of the methods of estimation the number of lightning strikes in the object / V.V. Kniaziev, V.M. Dronov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – C. 41-44. – Bibliogr.: 7. – ISSN 2079-0740.**

The results of the estimate of the expected number of lightning strikes in the construction of the hangar-type conducted in two ways: using the application "Likelihood", developed by the authors, and formulas "3H" of existing standards. The program is implemented electro geometrical method (EGM), which is the base for assessing the protection zone lightning rods. The calculations were performed taking into account the statistical distribution of the amplitudes of lightning currents in accordance with the parameters specified in the standard IEC 62305-1: 2010. Considered a range of the lightning current (2 - 200) kA, which corresponds to the I level lightning protection. The likelihood that the force of the lightning current exceeds 200 kA is not more than 1%. Formula "3H" used to assess "the area contraction" gives inflated several times (for the considered object 2.67 times) the result, because it does not take into account the real shape of the object and the statistical distribution of the lightning current, which determines the radius of the rolling sphere in EGM method.

**Keywords:** lightning current, the statistical probability distribution, electro geometrical method, the number of lightning strikes, the application software.

**Analysis of the influence of external electromagnetic fields on the working capacity of semi-conductor devices / V.I.Kravchenko, A.A.Serkov, V.S.Breslavets, I.V.Yakovenko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 45-49. – Bibliogr.: 11. – ISSN 2079-0740.**

The influence of pulsed electromagnetic radiation on electric radio apparatus is often accompanied by currents arching on inner current – conducting elements as well as by the distortion of their internal fields have been determined. The development of theory of interaction of microwave electromagnetic oscillations and charged particles in bounded plasma-like media and the study of kinetic and hydrodynamic beam instabilities in solid –like structures applied in the present microwave electronics is proposed. The power losses of the flow of charged particles caused by such an interaction due to excitation of surface polaritons in the semiconductor superstructure have been determined. A new mechanism of initiation of surface at uneven of the conducting solid bodies is proposed. A theory of collisionless damping of surface plasmons in quantum and classical approximations is elaborated and the conditions of its conversion are determined. The effect of inhomogeneous properties of surface of open radiating structures on the spectral characteristics of transition radiation is studied. It is found that the energy losses related to excitation of volume helicons are equivalent to the energy losses of a magnetic moment created due to the charge rotation. New mechanism of excitation of surface magnitoplasma oscillations by the moving radiation source are suggested.

**Keywords:** electromagnetic fields, oscillations, plasma, semiconductor superlattices, collisionless extinction, kinetic and hydrodynamic instability, generation, cherenkov and transition radiation, helicon, charged particles, surface waves.

**Influence of the roughnesses of the solids surface on the electrons spectrum and plasma fluctuations / V.I.Kravchenko, A.A.Serkov, V.S.Breslavets, I.V.Yakovenko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 49-51. – Bibliogr.: 11. – ISSN 2079-0740.**

The mechanism of occurrence of surface electron states at periodically uneven border conductive solids are determined. Mechanisms of instabilities of the natural oscillations of semiconductor superlattices has been studied. Due to their interaction with streams of charged particles under the influence of the external electromagnetic shown that the effect of pulsed electromagnetic radiation accompanied by the emergence of currents in conductive products and the emergence of elements of their internal fields. agnitogo radiation. A new mechanism for the appearance of surface Electronical states on an uneven surface conductive solids. The effect of inhomogeneous surface properties of conductive solids emitting structures on the spectral characteristics of Cherenkov radiation and transition The theory of collisionless damping poverhnostnih polaritons in quantum and classical approximations.

**Keywords:** electromagnetic fields, oscillations, plasma, semiconductor superlattices, collisionless extinction, kinetic and hydrodynamic instability, generation, cherenkov and transition radiation, helicon, charged particles, surface waves.

**Physical models of reversible refusals of semi-conductor devices under an electromagnetic / V.I.Kravchenko, A.A.Serkov, V.S.Breslavets, I.V.Yakovenko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 52-55. – Bibliogr.: 11. – ISSN 2079-0740.**

A new mechanism of initiation of surface at uneven of the conducting solid bodies is proposed. The development of theory of interaction of microwave electromagnetic oscillations and charged particles in bounded plasma-like media and the study of kinetic and hydrodynamic beam instabilities in solid –like structures applied in the present microwave electronics is proposed. The power losses of the flow of charged particles caused by such an interaction due to excitation of surface polaritons in the semiconductor superstructure have been determined. The influence of pulsed electromagnetic radiation on electric radio apparatus is often accompanied by currents arcing on inner current – conducting elements as well as by the distortion of their internal fields. A theory of collisionless damping of surface plasmas in quantum and classical approximations is elaborated and the conditions of its conversion are determined. The effect of inhomogeneous properties of surface of open radiating structures on the spectral characteristics of transition radiation is studied. It is found that the energy losses related to excitation of volume helicons are equivalent to the energy losses of a magnetic moment created due to the charge rotation. New mechanism of excitation of surface magneto plasmas of oscillations by the moving radiation source is suggested.

**Keywords:** electromagnetic fields, oscillations, plasma, semiconductor superlattices, collisionless extinction, kinetic and hydrodynamic instability, generation, cherenkov and transition radiation, helicon, charged particles, surface waves.

**Modeling of physical mechanisms of the occurrence of irreversible refusals of semi-conductor devices under an electromagnetic influence / V.I.Kravchenko, A.A.Serkov, V.S.Breslavets, I.V.Yakovenko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 56-59. – Bibliogr.: 11. – ISSN 2079-0740.**

The power losses of the flow of charged particles caused by such an interaction due to excitation of surface polaritons in the semiconductor superstructure have been determined. New mechanism of excitation of surface magnitoplasma of oscillations by the moving radiation source are suggested. The development of theory of interaction of microwave electromagnetic oscillations and charged particles in bounded plasma-like media and the study of kinetic and hydrodynamic beam instabilities in solid –like structures applied in the present microwave electronics is proposed. The influence of pulsed electromagnetic radiation on electric radio apparatus is often accompanied by currents arcing on inner current – conducting elements as well as by the distortion of their internal fields. A new mechanism of initiation of surface at uneven of the conducting solid bodies is proposed. A theory of collisionless damping of surface plasmas in quantum and classical appreciations is elaborated and the conditions of its conversion are determined. The effect of inhomogeneous properties of surface of open radiating structures on the spectral characteristics of transition radiation is studied. It is found that the energy losses related to excitation of volume helicons are equivalent to the energy losses of a magnetic moment created due to the charge rotation.

**Keywords:** electromagnetic fields, oscillations, plasma, semiconductor superlattices, collisionless extinction, kinetic and hydrodynamic instability, generation, cherenkov and transition radiation, helicon, charged particles, surface waves.

**Thermodynamical analysis of heterogeneous chemical reactions in "Fe – Ti powder mixture – hydrocarbon liquid" system under the impact of high voltage electric discharges / Ye. V. Lypian, O. M. Syzonenko, A. S. Torpakov, O. O. Zhdanov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 59-65. – Bibliogr.: 14. – ISSN 2079-0740.**

Thermodynamical analysis of chemical equilibrium for Ferrum and Titanium powders mixture in hydrocarbon liquid medium under the impact of high voltage electric discharges is given. Possibility for obtainment of carbides and intermetallic compounds from components of initial mixture in different phase state is theoretically justified. It is found out that synthesis of Fe<sub>2</sub>Ti and TiC is thermodynamically possible at temperatures higher than 300 K and synthesis of Fe<sub>3</sub>C and FeTi is possible at temperatures higher than 1100 K. Obtained theoretical results are experimentally confirmed by synthesis of TiC, Fe<sub>3</sub>C and Fe<sub>2</sub>Ti in Fe – Ti powder mixture after high voltage electric discharge treatment in kerosene.

**Keywords:** thermodynamics, Gibbs free energy, partial pressure, high-voltage electric discharge, hydrocarbon liquid, synthesis, metal carbides, intermetallic compounds, powders, powder X-ray diffraction, heterogeneous reactions, dispersed system.

**Research of electrophysical properties of polymethylsiloxane fluid in contact with film elements of high-voltage pulse capacitors' dielectric systems stability under the elevated temperatures influence / A.P.Malyushevskya, S.O.Toporov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 66-69. – Bibliogr.: 8. – ISSN 2079-0740.**

Change of electrophysical properties of polymethylsiloxane (PMS) liquid as the impregnative liquid for film dielectric systems of high-voltage pulse capacitors is researched. The aim of this investigation is the ascertainment of factors, which have an influence on the functionality of polymethylsiloxane liquid as the impregnant electrical insulating component of high voltage capacitors' dielectric systems during their thermoaging. The low level of thermostimulated interaction between polymethylsiloxane liquid and both polypropylene and polyethyleneterephthalat films is defined. By way of the PMS-20 liquid example high thermostability of electrophysical properties of the organic-siloxane liquids is demonstrated, except of high sensitivity of its short-time electric strength to the electrical discharge phenomena origin. It is necessary to limit the strength of electric field in the specific impregnant dielectric system by the determination of initial partial discharges' voltage in case of polymethylsiloxane liquid usage.

**Keywords:** film impregnated dielectric, organosiloxane liquid, short-term electrical strength.

**Generator intended for testing of the BAO on susceptibility to fast transient/burst, caused lightning ("multiple strokes" of the form 5A) IGLA-MKU-5A / Y.S.Nemchenko; V.V.Kniyaziev, I.P.Lesnoy; S.B.Somhiev // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 70-73. – Bibliogr.: 7. – ISSN 2079-0740.**

The construction and the testing of the attestation of the generator intended for testing of the on-board aircraft equipment on susceptibility to fast transient/burst, caused lightning, according to International standards are described. The apparatus generates the mission profile of the test current of the form 5A on five levels. Every character of change consists of proof-test packages of impulses from 1 to 999, and in every proof-test package are 14 proof-test impulses, interval between proof-test impulses in a proof-test package from 10 ms to 200 ms, duration of proof-test package to 1,5 s; thus, amplitude of 1th impulse exactly in two times more than at 13 subsequent. The generator of IGLA-MKU-5A well went primary attestation with participation the representatives of GP «Kharkovstandartmetrologija» on worked out in NIPKI «Molnija» NTU «HPI» to the corresponding program and methodology of attestation. The generator of IGLA-MKU-5A brought into operation and participated in the tests of on-board aircraft equipment on susceptibility to fast transient/burst, caused lightning, by a method «Input in grounding» by the proof-test currents of form of 5A.

**Keywords:** test, on-board aircraft equipment, susceptibility, lightning, transients, generator, attestation.

**Methods of ensuring the integrity of information in info-communication systems / V.Ya.Pevnev // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 74-77. – Bibliogr.: 21. – ISSN 2079-0740.**

The problem of integrity of information as the most vulnerable link in information security is justified. Threats of the integrity at different stages of the life cycle of information are considered. Basic methods for ensuring the integrity of information are presented. The reliability of technical means used to ensure the integrity of information is considered in details. The possibilities of building redundant systems, taking into account both technical and informational components are discussed. Particular attention is paid to the possibility of countering the electron magnetic pulse using various remedies. In each of the methods the main threats and their solutions are identified. Integrated use of the considered organizational, technical, software solutions ensures the integrity of information as a fundamental component of the information security systems.

**Keywords:** integrity of information, threats, life cycle, methods of providing, information security.

**Modeling defeat plane long spark discharge using a multi-step model / A. A. Petkov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 78-82. – Bibliogr.: 12. – ISSN 2079-0740.**

The relations for determining the angle of the random motion of the long spark. A multistage model plane defeat long spark. The model includes simulation and minimization procedure. The model used to describe the distribution of points defeat long spark endless flat surface. The comparison of the simulation results and experimental data. Checked the adequacy of the model using the Kolmogorov test. Adequacy of the model for the discharge gaps length from 0.78 m to 5 m. The model allows to predict the distribution of points defeat for discharge gaps length more than 5 m. Materials of the work can be used to construct models of the long spark destruction facilities that are situated on a flat surface.

**Keywords:** mathematical model, distribution function, random variable, long spark discharge.

**Simulation electromagnetic environment in control rooms cinema and concert hall / V.V. Pilinsky, A.S. Chupakhin, R.A. Sirota // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 83-86. – Bibliogr.: 15. – ISSN 2079-0740.**

Objective: development of a software module, as the basis of an automated system for monitoring the electromagnetic space of cinema and concert complexes for decision-making EMC functional equipment. The estimated levels of an electromagnetic field inside hardware equipment of the cinema and concert complexes. To analyze cinema and concert complex equipment hardware: both the source and the receptor of unintentional electromagnetic interference. The proposed algorithm describes electromagnetic environment of a cinema or concert complex, equipped with functional equipment for various purposes. To implement a computer simulation program, which represents the results of simulation of electromagnetic fields in indoor cinema and concert complex hardware. To identify areas in rooms with high levels of electric field strength, which significantly affects the total aggregate level of the electric field strength and the formation of different sources of unintentional electromagnetic interference. To describe electromagnetic environment inside the room using the iterative modeling method. The peculiarity of the proposed method is based on: the floor area is divided into a grid of individual cells, and the simulation results can be the electric field modeled inside each cell. The program implements the calculation of the total level of the electric field strength from all the sources of emission located in hardware according to the principle of superposition for the same frequency, also provides information about the impact of each source separately in the form of a pie chart. The results allow designers to make informed decisions about the need for additional funds to ensure the electromagnetic compatibility in each room, such as: physical separation equipment, the use of protective screens etc.

**Keywords:** electromagnetic environment, electromagnetic compatibility, cinema and concert hall, program, interference source, interference receptor, emission limits, susceptibility, forecasting, simulation.

**The comparative analysis of the measurement means of electrostatic field of atmosphere in before thunderstorm situation / I. O. Postilnyk, S. P. Shalamov // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 87-91. – Bibliogr.: 8. – ISSN 2079-0740.**

The measurement means of electrostatic field of atmosphere in before thunderstorm situation are described. The conditions of appearance the lightning the bound with electrostatic field of atmosphere are shown in paper. The Law of the electrostatic induction is reviewed. Advantages and disadvantages of the measurement means of electrostatic field based on electrostatic induction were analyzed. A MEMS-based electric-field meter is considered for measuring electrostatic field. The opportunity of the application of measurement means in local warning system of lightning storms is shown. The rotary voltmeter was described and designed. Its main advantages allow to chose technique for measuring electrostatic field of atmosphere in before thunderstorm situation.

**Keywords:** electrostatic field, the rotary voltmeter, voltmeter vibration, MEMS technology, lightning, charges, electric induction.

**Research of metrological characteristics of measuring transducers in the form of a stepped coaxial resonator for inhomogeneous dielectric measurement of liquids in the UHF range / V. V. Rudakov, A. A. Korobko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 91-95. – Bibliogr.: 14. – ISSN 2079-0740.**

The researches of electromagnetic processes in inhomogeneous stepped coaxial resonator have been investigated. Investigations are carried out for the case of ideal lines, which covers only the T - type electromagnetic waves. A generalized expression for the spectrum of resonance frequencies, which allows you to determine the frequency of resonance with any combination of geometric parameters and electrical characteristics of the resonator elements, is obtained. The resonator design is optimized in order to obtain the minimum value of the first resonant frequency by its the minimum size. The first resonance frequency has a minimum value when length of a short-circuit and open at the end lines are equal. An exact expression for the first resonant frequency of the optimized resonator is received. The ratio of the impedances of short-circuits and open at the end lines has the most impact on the first resonant frequency. With an increase in this ratio the value first resonance frequency decreases. Full match research results with previous simulation results shown. The metrological characteristics of the resonator are determined as the first resonance frequency dependence of the dielectric constant of the liquid sample, so that it can be used for liquids dielectric measurements in the UHF range.

**Keywords:** inhomogeneous stepped resonator, T - type electromagnetic waves, resonance, range, resonant frequency, wave resistance, dielectric permittivity.

**Thunderstorm hazards early warning system / A. A. Serkov, S. A. Nikitin, V. I. Kravchenko, V. V. Knyazev // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 95-99. – Bibliogr.: 11. – ISSN 2079-0740.**

The algorithm was proposed for recognition and automatic input of cartographic information and satellite maps into the database with dynamically overlay of relevant measuring zones and measuring results. Each zone is shaded in different colors according to the level of storm danger. It was proposed the method for transmission of distributed information about the storm danger to the central computer via the mobile communication system. Transmitted data are accumulated in the database. It was created the information retrieval system based on queries to a database hosted on the server, access to which is carried out from any computer of the global network.

**Keywords:** thunderstorm hazards monitoring; lightning strike; intelligent data analysis; visualization; stand-alone module.

**Electric and power characteristics of the series - parallel conversion unit of magnetic - semiconductor of high-voltage pulse generator / A. I. Khristo // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 99-106. – Bibliogr.: 10. – ISSN 2079-0740.**

The numerical simulation of electromagnetic processes in magnetic semiconductor generator of high-voltage pulses with series-parallel conversion unit in the input circuit is conducted. Electrical and magnetic characteristics of the compression units for the symmetric regime of oscillations of the generator are given and describes a process that leads to increased the voltage across the longitudinal capacitor of parallel conversion unit. Electric and power characteristics of the generator in dependence on the input voltage and the equivalent load resistance are shown. It is shown that a family of characteristics of the peak values of voltage and current through the transducer element and the stored energy in the longitudinal capacitor have a similar character and are described by a nonlinear increasing dependence. The input voltage limits of the magnetic pulse generator which achieve the highest efficiency of the conversion unit are defined. It is shown that the linearity characteristics of conversion unit in the appropriate range of load resistances at a definite value of the input voltage, is explained by agreed energy transfer from a capacitor parallel conversion unit in the high voltage capacitor.

**Keywords:** magnetic semiconductor generator, conversion unit, switching choke, electric and power characteristics.

**Synthesis of carbides of molybdenum by electrodischarge method / P. L. TsoLin, Kuskova N. I., Terekhov A. Yu. // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 106-112. – Bibliogr.: 13. – ISSN 2079-0740.**

Processes of synthesis of nanodispersed powders of carbides in the process of electrical explosion of tungsten and molybdenum conductors in the paste containing carbon nanomaterials are experimentally investigated. The paste is obtained by the method of electric discharge treatment of liquid hydrocarbons. It is established that the main factor influencing the dispersed phase and the compositions of the synthesized powders of carbides of tungsten and molybdenum is the ratio of the energy released in a conductor to the energy of conductor's sublimation. It is shown that the output of carbon-saturated phases and dispersion of carbides increases and the content of residual metal in explosion products decreases with increasing magnitude of input energy.

**Keywords:** electrical explosion of conductors; metal carbides; nanosized carbide powders; paste with carbon nanomaterials; x-ray diffraction analysis.

**Pulse discharge initiation of self-propagating high-temperature synthesis processes in some powder systems / D. I. Chelpanov, N. I. Kuskova, A. A. Smalko // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 113-118. – Bibliogr.: 18. – ISSN 2079-0740.**

The parameters of pulse discharge initiation of self-propagating high-temperature synthesis (SHS) in the powder systems of aluminum + polytetrafluoroethylene and aluminum + F4K20 composite were calculated. Laboratory facility of pulse discharge SHS initiation was designed and constructed. Experimental studies of some patterns and main parameters of the SHS process in selected powder systems were conducted (typical ignition and combustion temperatures, wave front propagation velocity, rate of the substance heating in a wave, the width of the heating zone etc.). The results of X-ray diffraction analysis of the synthesized powders showed the presence of carbon nanomaterials in them.

**Keywords:** self-propagating high-temperature synthesis, pulse discharge initiation, aluminum, polytetrafluoroethylene, carbon nanomaterials.

**Studying the influence of voltage and frequency deviations on the electric energy metering devices indications / S. Yu. Shevchenko, V. V. Volokhin, S. M. Lebedka, I. M. Dyahovchenko, M. V. Kachan // Bulletin of NTU "KhPI". Series: Technique and electrophysics of high voltage. – Kharkiv: NTU "KhPI", 2015. – № 51 (1160). – С. 119-125. – Bibliogr.: 10. – ISSN 2079-0740.**

Shown that voltage and frequency could be considered as quantities that are random and obey a Gaussian distribution law. This statement is confirmed by the results of Pearson's chi-squared test. With help of statistical methods of data analysis the studying of the influence of voltage and frequency deviations on electric grid parameters and electric energy meter's indications was made. The research conducted with use the simulation of electricity meter's work in software environment Borland C++. The deviations of voltage and frequency were considered within the limits stated in HOST 13109-97 and also out of these limits. The conclusions about advisability of voltage and frequency regulation in electrical network were made.

**Keywords:** voltage, frequency, meter, electric energy, electrical network, resistance, inductance, capacitance, mathematical expectation, variance, standard deviation.