ABSTRACTS

Section of «Metallurgy»

UDC 669.162 Sigavev E., Kochmola D., Sigarev N. THE FORMING OPEN ZONE ON A PHASE-TO-PHASE'S BORDER AT THE AFFINAGE HOT METAL IN A LADLE. For results analysis experiments from research hydro- and gas dynamics bath in the ladle installed, that when rotated submersible lance around the axis best dispersion and dispersal by volume formed gas bubbles is provided at the speed rotation, which does not exceed 2,17 s^{-1}, at specific gas consumption up to 0,018 m^3/min.

Performed by authors current article calculations of values specific power mixing using the expressions given (under constant conditions regarding bath temperature,mass of melt and gas consumption showed that the quantities vary greatly among themselves. This does not allow you to recommend expressions for mechanical transfer on condition of ladle processing of a melt, including using a rotary lance.

From the analysis results calculations by expressions, it follows that the power mixing, mainly determined by the work Archimedes taking into account the forces on isothermal expansion of the gas bubble.

With increasing speed submersible lance the gas saturation of the bath is reduced, which may be related with the formation exit channels gas volumes on the surface bath. It affects both the power mixing, and on all processes that accompany the blowing bath with gas.

Impact of size, lifting speed and the trajectory movement up to the surface bath bubbles the power mixing is determined by the power Archimedes.

To take into account the impact rotation submersible lance around the axis is necessary quantification dissipated energy gas jet which depends on its length and the speed lance. When using two nozzles submersible lance, with nozzles located at an angle 90^0 to the axis lance the length jets decreases in accordance with the increase rotational speed lance.

Proposed expressions to calculate the power mixing the bath in the ladle with a rotary submersible lance. It is shown that condition increase in mixing power there is an increase in size pop up to the surface bath bubbles, which in turn can negatively affect on the degree assimilation reagents to remove impurities at ladle refining hot metal. Dependence is determined dissipation energy gas jets from the rotational speed the submersible lance.

The way to increase stirring intensity may be combined use mechanical stirring with additional dispersion gas volumes. Under such circumstances should be expected increase in intensity mass-exchange processes in a bath.

Keywords: ladle, bath, mixing, rotating, lance, hot metal, stirring.

UDC 669.162 Sigarev E., Chernyatevich A., Gurzhiy D., Chubina E. THE CONCEPT OF TRANSITION TO LOW-SLAG CONVERTER TECHNOLOGY (message 2). The concept introduction low-slag is substantiated converter technology using resource and an energy efficient route «blast furnace – converter with combined purge» in raw material conditions Ukrainian metallurgical industry. Provided technological advantages preliminary refining hot metal in the filler bucket by injection deep into the melt powder mixtures of reagents in the flow gas-carrying through the nozzles submersible rotary lance. For results high-temperature experiments defined rational refinement regimes, type and ratio in mixtures low-cost cheap reagents.

The concept is proposed energy efficient training slag cast iron to low slag converter melting through implementation desulfurization, desiliconization and dephosphorization of hot metal in the ladle injection deep into the melt powder mixtures reagents in the stream carrier gas through the nozzles submersible rotary lance.

Abstracts

At smelting in Ukraine in accordance with the raw material base pig iron, containing 0,86-1,43% Si, 0,08-0,68% Mn, 0,022-0,065% S, 0,035-0,065% P, at the first stage technological route using elements low-slag technology converter melting it seems actual development energy efficient integrated technology refining hot metal in the ladle with the removal of silicon, sulfur and phosphorus with the use of cheap non-reagents.

The use of integrated technology will allow depending on the specific conditions work of metallurgical enterprises and metal assortment to provide: improvement quality and cheapening production of pig iron in blast furnaces, including in transition conditions to injecting coal-pulverized fuel; melting in converters with combined purge for low-slag technology cheaper high quality steel; rational charges of magnesian modifiers for preparation and use the final converter slag for application on lining in order to create a protective.

The authors of the work the principle opportunity is shown the use cheap non-deficit fluxes on the basis of lime (CaO) or soda (Na_2CO_3) as flux for complex refining of hot metal with high oxidation potential and high sulfide and phosphate capacity.

Done experimental test a one-step removal method silicon to 0,15-0,20% and phosphorus to ≤0,008-0,010% by purging previously desulphurized hot metal through the submersible rotary lance oxygen jets bearers powder mixtures low-cost cheap reagents.

Keywords: converter, rotary lance, hot metal, refining, blowing.

UDC 669.184.125 Nedbaylo N., Sigarev E., Bayduzh U. RESEARCH HYDRAULIC AND GAS DYNAMICS CONFORMITIES TO LAW OF BLOWING-FREE SLAG WITH THE USE TWO TIER LANCE. Using the experiment planning methods investigated the influence mutual arrangement of tiers nozzles and the position a two-tier lance over the bath in the course the boil on hydro- and gas dynamic laws patterns formation covering and efficiency use prepared slag. Received mathematical models to describe the connection between the design the lance and the effectiveness operation blowing slag defined rational parameters blowing slag to ensure the symmetry the converter working space.

Rational parameters are set operation blowing slag bath with using the two tier lance by principle redirection part reverse gas slag flow in definite "problem" zones on the walls converter. Defined directions further improvement design two-tier lance.

To stabilize phase dynamics in the oxygen converter and blowing mode melting the necessary condition is ensuring the symmetry working space regardless campaign period of the unit for lining. Practically all modern metallurgical enterprises of Ukraine already apply modern methods hot repair lining of converters including by dispensing the final modified slag using special lance.

The purpose of the current research is determination of mutual influence location of the main and additional nozzles and the provision garrison two tier lance over a slag bath on the way of blowing the last on regularities formation garrison slag coating and efficiency of use prepared slag.

To determine the character and the degree of exposure to the depth slag bath, the height lance over the bath and the distance between the tip of the lance and the side cylindrical nozzles on the size of the zone "slag" of the trunk lance, the thickness slag layer on the walls converter and the width slag zone in "problem areas". The experiment planning technique was used. A complete factorial experiment is planned and implemented. The given mathematical models, received on the results of processing of experimental data, in natural values are given.

By the results experiments we can conclude about expediency further improvement the proposed design two tier lance in the following directions: replacement of a six nozzles for four nozzles with grouped in directions trunnion zone nozzles Laval increased diameter; making tip a lance of ordinary steel and the transfer of a lance on gas cooling; use the gas-

cooled lance with the possibility change distance between tiers during the lumber converter campaign.

Keywords: converter, lance, slag, nozzles, blowing, modified slag, coating.

UDC 669.162 Lebid Yu., Kryachko G. INFLUENCE OF PELLETS CONTENT IN FURNACE BURDEN ON BLAST-FURNACE OPERATION AND PULVERIZED COAL CONSUMPTION. At the blast furnace of the Dneprovsky Iron&Steel Works with the volume of 1,500 m^3, it was studied the effect of pellets content in the charge on the consumption of pulverized coal. During the observation period of 158 days, it was found that an increase in the content of low-fluxed pellets in the total mass of iron-ore part of the charge up to 35% was accompanied by a decrease in FeO content in the charge by an average of 4%. In the specific charge conditions, the increase in content of pellets in the charge up to 20% resulted in a significant reduction in slag output - on average of 15 kg / tonne of pig-iron per additional 10% of pellets in charge. Consideration of the effect of pellets content in charge along with the concentration of oxygen in blast blowing showed that the increase in pellets content with all concentrations of oxygen was accompanied by an increase in the cost of pulverized coal. Thus, it was shown that the introduction into the iron-ore part of the blast furnace charge of low-fluxed pellets in the limits that increase the enrichment of the charge with iron and reduce the slag output, contributes to the increase in the cost of pulverized coal. The estimation of the influence of pellets on the gas distribution has emphasized the feasibility of using measures to improve the gas permeability of the central part of the furnace. In particular, the index $\Delta P / Qd$, kPa / m^3 / min, increased from 0.040 when working on an agglomerate to 0.043 when working with a 20 % pellets content in the charge. The dependence between the pellets content and the gas permeability index was moderate (R = 0.368). The dependence analysis of the distribution of the gas flow from the pellets content showed the undeniable influence of pellets on gas parameters whixh are under study. The temperature of the furnace mouth with increasing pellets consumption was reduced (R = 0.707) due to the influence on the process of two factors - the loading of cold pellets, along with hot agglomerate and the pellets themselves. The nature of the change in the ratio of the temperature of the periphery to the temperature of the furnace mouth showed an increase in the degree of peripherality of the gas stream with an increase in pellets content in charge (R = 0,458).

Keywords: pellets, blast furnace, slag ratio, consumption, pulverized coal, gas flow.

Section of «Rolling production»

UDC 539.374.001.8 Chygyrynskyi V., Kosminenko S., Khalyavka M., Levitskaya V. INVESTIGATION OF THE STRESSED STATE OF THE ROLLING PROCESS WITH USING HARMONIC FUNCTIONS. On the basis of the method of harmonic functions, a general mathematical model for the different loading of the deformation focus in the conditions of the plane problem of the theory of plasticity is developed. The problem is posed and solved in a closed form. It is assumed that the solution is of a universal nature, both from the point of view of finding a given class of functions, as well as methods of force action on the deformation center. Under the conditions of the proposed method, for the first time a solution of the applied problem connected with asymmetric loading was obtained. In this case, a complex solution for the entire deformation zone shows that the zones of different metal flow exert a significant influence on each other, which was not taken into account earlier when the deformation center was examined separately. From the point of view of boundary conditions, a region of acceptable solutions was determined under asymmetric loading conditions. Calculations showed that the proposed method can be used not only in solving problems of metal working with pressure with different external effects on the deformation center, in particular

during rolling, but also for analyzing the stress state of the metal at each point of the deformation center under the conditions of new technical developments. There is a multifactor effect of different rolling conditions on the power parameters of the process. Values such as coefficient of friction, shape factor, angle of capture change the magnitude and distribution of normal and tangential stresses along the length of the deformation zone. It should be noted that the ratio of the parameters coefficient of friction - angle of capture is the determining factor of the entire rolling process. The process can lose stability, on the verge of slipping, at the same time the circuit of contact stresses changes dramatically, from convex it turns into a concave or partially concave-tuyu.

It is determined that the model adequately reacts to changes in technological parameters of the forming process. The distribution of contact normal stresses is characterized by a significant unevenness in length for the thin and medium strips. For medium and high poles, there is a decrease in the effect of contact friction, a more uniform distribution of stress along the length of the arc of contact. It is shown that the stress state of a metal is determined by unified expressions for the entire focus of plastic flow.

Keywords: plasticity, solutions, harmonic, asymmetric tension.

UDC 539.374.001.8 Chigirinsky V. BOUNDARY CONDITIONS IN SOLUTIONS OF APPLIED PROBLEMS OF THE THEORY OF PLASTICITY. The processes of metal working with pressure are characterized by unified equations of plasticity theory, but different boundar Generalizations for boundary conditions and solutions of the problem are shown, which are a trigonometric connection of tangential stresses and plastic shear resistance. At the level of the boundary conditions, one can see the possibility of simplifying the closed problem of the theory of plasticity, both with respect to stresses and strain rates. This is due to the complete realization of the plasticity condition in the generalized equation of equilibrium and the revised condition for the continuity of the strain rates. The last two differential equations refer to equations of hyperbolic type, which determines the same approaches to their solution, hence the possibility of formulating and obtaining the final result of the closed problem of the theory of plasticity. The universality of the solution of the problem in the analytical form is shown in the paper. On the basis of the obtained identical mathematical expressions using different conditions of applied problems, working formulas for different processes of metal working with pressure are considered and determined. In this case, processing conditions with asymmetric and symmetrical loading of the deformation center (sediment, rolling) were considered. In contrast to the solutions of the linear problem of plasticity theory, the characteristic of the deformation focus was determined by unified formulas without splitting the treatment zone into several blocks. The obtained approaches make it possible to broaden the class of solved applied problems under different loading conditions. Multivariance and multicomponent problems are solved, taking into account the influence of a significant number of technological factors of production. The reliability of the obtained result is confirmed not only by qualitative and in many respects quantitative coincidence with literary theoretical and experimental data, but also by confirmation of the solution of the kinematic problem, which was noted by many authors as an element of the reliability of the result.

Keywords: boundary, plasticity, closed, rolling, sediment.

UDC 621.771.01 Maksimenko O., Loboyko D., Gorbatenko Yu. INFLUENCE OF TENSION STRIP AT THE TOTAL MOMENT FOR CONTINUOUS ROLLING. The studies presented in this paper are based on the fact that the basic equation of continuous rolling shows that all components of the total balance of works under unchanged boundary conditions depend on the nature of the distribution specific frictional forces in the deformation zone of all cages of the state. The frictional force in the zones of lagging and advancing strongly

depends on the band tension. The paper paid attention to determine the effectiveness of the effects of friction and tension band size to reduce energy consumption in the process of rolling.

As a result of theoretical research, the energy-saving technology of continuous rolling was constructed by rationalizing the tension and compression modes. The simulation of power-supply parameters of the continuous rolling process with the tension of the head at different friction conditions on the contact, taking into account the internal longitudinal forces of plastic-deformed metal, is fulfilled. The estimation of the effect of tension, specific forces of friction, compression of the headquarters at the moment on the barrel of rolls and its total value on all cages of a continuous mill was given. A relationship is established between the tension regime of the strip and the longitudinal stability of the deformation process.

The results of the work showed that with increasing tension on the cages at the total moment in the barrels of the continuous state decreases. The proportion of the first rolling mill in the general decline is the largest since. But at the same time, the longitudinal stability of the metal in the deformation cell is reduced. At a considerable tension of the strip in some cells, the process can proceed under conditions close to the boundary. Such relationships occur for different models of friction at the contact between the metal and the rolls. Redistribution of squeezing on cages in conditions of continuous rolling with the tension of the headquarters also affects the total moment in the roll barrels.

Keywords: continuous rolling, tension, moment, energy saving.

Section of «Engineering. Mechanics»

UDC 621.891   Solod V., Nikulin O.   APPROXIMATE INTEGRATION FOR DETERMINING THE SURFACE ROUGHNESS.   Measurement of surface irregularities, forming in aggregate its relief, belongs to linear-angular measurements. Their main feature is the smallness of the measured values. Measurements at production are subject to values: the heights of inequalities R of 0.025 μm and steps S – starting from 2 μm. A quantitative approach in analysis allows us to identify the optimal surface structure, which most closely meets the conditions of service material. It is worth noting that it is roughness, which has the strongest impact on the performance of engines of machines, as well as parts and components of various equipment. In case of roughness, as a rule, the parameter of the arithmetic mean deviation of the profile R_a is used. Consideration of the mathematical aspects of data processing profilograms aimed at increasing the adequacy of the results. In the work the well-known formulas for determining the roughness of the surface of metals and alloys are analyzed, additional criteria for estimating microgeometry of surfaces are determined based on the methods of approximate integration, and the proposed correction of the formula for determining the mean arithmetic deviation of the investigated profile is determined. It is proposed to use the corrected formula, using the form factor k for practical calculations $R_a = \dfrac{k}{n} \cdot \sum\limits_{i=1}^{n} |y_i|$, where $|y_i|$ – amplitude values of deviations from the middle line of the profilogram, $k = 0{,}5 \dots 0{,}67$ – is chosen depending on the predominant form of the protrusions and depressions on the profilogram (triangles or curvilinear trapezes). The facts confirming the correctness of the correction of the calculation formula R_a using k are the relation between R_a and R_z. The process of determining the roughness of parts surfaces in the analysis of work profilograms based on the use of approximate integration, the application of the coefficient of form k for projections and concaves on the profilogram in the formula R_a for increasing the adequacy of determining the surface roughness by values R_a and R_z in a range of nominal values is investigated.

Keywords: surface roughness, approximate integration, coefficient of form

Abstracts

UDC 621.923 Molchanov V. RAISING AND DECISION OF NON-STATIONARY BORDER TASK OF FILTRATION OF LIQUIDS IN POROUS ENVIRONMENT. The analysis of researches of mechanism of formation of profile of the processed surfaces is resulted polishing taking into account influence of particulate matters, contained in a lubricating-cooling liquid (LCL). For the exception of origin of being slightly burnt at polishing and diminishing of roughness of surface, muddy liquids must be purged from the particulate matters of metal-workingness. Utillizing of filtration for cleaning of technological liquids most effectively, because during filtration through the layer of porous materials it is possible to attain complete extraction of particulate matters from liquids. However features of structure of porous space generation row of the specific phenomena, arising up at motion of liquids in ductings of porous environment. A research purpose is a study and establishments of conformity to the law of process of filtration of technological liquids through porous materials. During filtration of technological liquids through the layer of porous materials the porous environment of filter partition is deformed with a change its porosity. A change porosity takes a place due to diminishing of volume of pores of porous space, because particulate matters together with a liquid get to the pores of ductings of porous space and hang up in them. In the examined model, the process of filtration of slime suspensoids flows with the permanent stoppering of pores of filter partition. Conformities to the law of process of filtration of technological liquids are investigational through porous materials. During filtration of liquid with particulate matters the porous environment of filter partition is deformed with a change its porosity. The conducted researches allowed to expose and study conformities to the law of process of filtration and set the law of change porosity of porous environment. On the basis of the set law differential equalization which allows at the set initial and scope conditions to decide the task of filtration of liquid through the layer of particulate matters of the deformed porous environment of filter partition is shown out.

Keywords: technological liquids, particulate matters, filtration, porous materials, discrete great number.

Section of «Electromechanics. Electrical engineering»

UDC 62-83 Derets A., Sadovoi O., Sokhina Y. A COMPARATIVE STUDY OF THIRD-ORDER SLIDING MODE CONTROL SYSTEMS WITH OPTIMAL AND MODAL REGULATORS SYNTHESIZED BY THE N-i SWITCHING METHOD. Electric servo drives are characterized by the restriction of intermediate coordinates in transient modes. Such restrictions are implemented by a system with cascade controllers. The N-i switching method, which has a relatively simple mathematical apparatus, provides optimization for the speed of cascade sliding mode control systems. At the same time, the N-i switching method makes it possible to justify such pole placement of relay-modal control systems, which ensures a minimum deviation of their transition trajectories from the optimal ones in terms of speed. In this paper, a comparative study of typical dynamic regimes of sliding mode control systems with optimal and modal settings, synthesized on a single methodological basis, is performed. In this case, as an ideal control object, a cascade of integrators was considered, and a servo drive was used as the real one. The study revealed a number of advantages of modal regulators over optimal ones. Modal settings of the sliding mode control system of point-to-point control provide an aperiodic nature of the final stages of positioning without increasing the total duration of the process and less oscillation in the modes of compensation of disturbances compared with the optimal settings. This conclusion extends both to a system with ideal, and with real dynamic objects. The results obtained in the work are supported by specific numerical examples. Due to the simplicity of the computational procedures, the N-i switching method provides real-time adaptation of the control system settings to the shape of the optimal transient

trajectory. The results of the research open the prospect of integrating modal settings into adaptive algorithms for the synthesis of cascade sliding mode control systems based on the N-i switching method.

Keywords: N-i switching method, relay-modal controller, position electric drive, speed optimization.

UDC 658.26:621.316.1 Khmelnitsky Ye., Kluyev O., Sychkov V, Chepurniy O. IN-FLUENCE OF FILTERS OF HIGHLY HAGMONY ON VOLTAGE LEVEL AND ENER-GY PARAMETERS OF NODE THE ELECTRICAL SUPPLY. The energy indicators of the substation 150/10 kV, equipped with the filter-compensating devices (FCD), installed on each tire section in the filters 3-5-7-11 harmonics are studied. For each of the load options, the optimal combination of switching filters is selected, the voltage is calculated for 10 kV tires and the power consumption in the equipment. The normal power circuit assumes the independent operation of the main transformers, but in some cases, three workshop substations are powered by a single transformer, which leads to its overload. For the purpose of studying the degree of unloading of the main transformer, one-minute values of the primary current of the transformer T-3 were recorded, as well as two-month control measurements of the daily electricity consumption in the case switching on of power filters with capacitor banks (CB) of increased power. It is advisable to select such CB for the filter F-11, which will effectively limit the harmonics of order $n \geq 21$. In case of unloading of the main transformer at full power by 20-25% simultaneously the problem of increasing the power factor from 0,65-0,7 to 0,95-0,98 at the switching of power filters is solved. Proposals for improvement of the voltage mode of the power supply unit are proposed, namely: to dismantle the F-3 filters to their low efficiency and to install semiconductor power stabilizers on each section of the tires. The thyristor compensator stabilizes the consumed reactive power and voltage on the bus 10 kV substation deep input, and 5-7-11 harmonics filters will work in normal mode.

Keywords: tire voltage, power filters, transformer power, semiconductor power stabilizer.

UDC 621:313 Kachura A., Roenko E., Polyakov R. INVESTIGATION OF ELEC-TROMAGNETIC PARAMETERS AND ELECTROMECHANICAL CHARACTERISTICS OF A DC MACHINE BASED ON THE FINITE ELEMENT METHOD. The field of application of DC electric drives is quite extensive: metallurgical equipment, ground transportation, precise positioning systems, instrumentation, etc. In this connection, the problem of studying the electromagnetic parameters of DC machines and improving their characteristics in different operating modes is topical.

Important factors that must be taken into account in the design of MAT are their reliability, economy, compliance with modern standards and technical requirements. With this in mind, a number of techniques have been developed and are being applied, in which an analytical apparatus is used, supplemented by empirical relationships and graphical dependencies obtained experimentally. As a rule, these methods are oriented to general industrial series of machines having standard sizes and design. Modification of the design and use of new materials often cause difficulties in the design. In connection with this, an important tool for the analysis of MWT is numerical methods that make it possible to investigate the characteristics and parameters of MAT, taking into account new design solutions in static, quasi-static and dynamic modes of operation. To solve the problems of designing MAT, it is possible to distinguish the finite element method (FEM).

Based on the MCE, the electromagnetic parameters and electromechanical characteristics of the serial MPT MUN-2 manufactured by the Ostrovsky Plant of Electrical Machines (Ostrov, Russia) were investigated. Taking into account the features of the local engine opera-

tion, the excitation system of the serial machine is changed from sequential to independent in the absence of structural changes in the anchor chain.

As a result of combining the field model of the MPT and the chain model of the brush-collector assembly, a chain-field model is obtained, for which the finite element method is applied. The model takes into account the design features of the engine components and allows to investigate electromagnetic and electromechanical characteristics in dynamic operation modes. Verification calculation of MPT MUN-2 with modified excitation system based on MCE allows to study characteristics and electromagnetic parameters of MFT in dynamic modes of operation.

Keywords: DC machine, finite element method, electromagnetic parameters, system of equations, dynamic mode of operation.

UDC 621.35 Protsenko O., Trykilo A., Musienko K., Kolychev S., Tkalenko D. ALTERNATIVE VERSION ON THE NATURE OF THE ANODE EFFECT IN ELECTROLYSIS OF CRYOLITE-ALUMINOUS MELTS. The paper gives prove the new hypothesis concerning the causes of the anode effect, which is manifested in the electrolytic production of aluminum. The nature of the anode effect is contradictory. The first version of the causes of its origin is based on the notions of the determining influence of the surface tension change on the boundary of the melt with a graphite electrode. The second version explains the increase in the operating voltage and sparking on the electrolyzer by the formation of the low conductive layer of the non-fluoride compounds with low wettability on the electrode surface.

The new hypothesis is based on the taking into account the composition change of the electrolyte anode layer and the formation of cryolite-aluminous melt layer on the surface of the electrode. For its substantiation, the estimating calculations taking into account the density of the anode current in electrolysis and the dynamics of voltage increase on the electrolysis bath in the period between two anode effects have been carried out in the paper.

Based on the provisions of the theory of mass transfer in near-electrode layers at the direct current flow, as well as Maxwell relations, describing the electrical conductivity of heterogeneous systems, the possibility of a heterogeneous phase formation at the electrode surface with electrical conductivity which is at least two orders lower than that of the initial cryolite-aluminous melt has been shown.

The considered version does not contradict the phenomenon of the "gaseous shirt" formation around the anode, because the determining factor of this is not the wettability of electrode in the melt, but the consistency of the near-electrode layer of the electrolyte. Unlike other versions, it also explains the progressive voltage growth on the electrolysis just before the anode effect.

Keywords: electrolysis of cryolite-aluminous melt, anode effect, surface tension, anode layer, electrical conductivity.

UDC 621.313.322 Nizimov V., Kolychev S., Donchenko A., Khomenko V. DYNAMIC STABILITY INCREASE OF THE SYNCHRONOUS GENERATOR OF THE AUTONOMOUS GENERATING SYSTEM. The article considers the use of autonomous generating systems (AGS) on the basis of synchronous generators (SG) for the consumers of the first and second categories.

To increase the SG AGS stability and the output voltage regulation on the stator clamps, the relay or parametric forcing of the excitation voltage and the system of automatic regulation of excitation (ARE) are used. However, in cases of natural disasters, when connecting consumers of comparable power, for example, asynchronous motors with short circuit rotor, the SG lose its stability due to the inertia of the excitation circuit, a significant dynamic voltage drop and its duration, which causes the disconnection by the protection of the mini-

mum voltage of the preconnected consumers. Therefore, the speed of forcing modes increase is achieved through the application of a leading phase of the voltage excitation and its multiplicity increase. In addition, an increase in the speed of the forcing mode can be achieved by reducing the inertia of the measuring lines and voltage control.

However, the application of known methods and devices for accelerating the voltage excitation does not reduce the inertia of the excitation circuit itself, that is, the current in the exciting winding (EW) always has an aperiodic lag to the accelerating voltage, following the stability determination of the SG.

The authors proposed to compensate the electromagnetic inertia of the excitation circuit by activating capacitive energy storage devices (CES) in order to increase the dynamic stability of SG.

The mathematical model of SG in Koshy form and the control system of the excitation circuit has been given. The calculations have been made to assess the influence of the CES and the control system of the excitation circuit on the AGS output parameters. The analysis of transient processes shows that the stabilization time of the output voltage SG without CES is $t \approx 0.6$ s, and with CES is $t \approx 0.2$ s. In addition, the voltage drop is $= \Delta U$ 40% and $\Delta U = 10\%$ respectively.

In order to confirm the theoretical statements, the experimental research has been carried out using a synchronous generator of MCA-72 type / 4A: $P_n = 12$ kW; U = 230 V; $n_n = 1500$ rpm in the mode of excitation current speeding up with the proposed device and with serial thyristor exciters with connected consumers of comparable power.

It is proved that the time to reach the forced value by the excitation current with the uncompensated circuit is 1 s, and with the capacitive energy storage device – 0,01 s. In this case, the voltage drop is 39%, the compensation of electromagnetic inertia in the same conditions provides a voltage drop of no more than 11%.

Keywords: synchronous generator, excitation circuit, capacitive energy storage.

Section of «Radioelectronics»

UDC 534-29 Meshaninov S., Voloshin R., Avdeenko K. MODIFIED GEOMETRICAL METHOD OF HUMAN BLOOD FLOW PARAMETERS DETERMINATION BY DOPLER ULTRASOUND DIAGNOSTICS. The results of the development of a modified geometric method for ultrasound Doppler study of human vessels have been presented. Numerical modeling of the Doppler signal spectrum and testing, as well as experimental testing of the modified geometric method, have been realized, which convincingly proved the advantages of the developed method to the already existing ones.

To date, the scope of ultrasound medical diagnostic equipment is constantly expanding. At the same time, ultrasonic techniques do not replace traditional diagnostic methods, but only refine and complement them.

Modern complex diagnostics of vascular diseases is based on the common use of radiation methods and ultrasound diagnostics. However, ultrasound Doppler blood flow in the arteries occupies a leading position as the most mobile method of dynamic monitoring and monitoring of blood supply to patients.

Interest in the application of ultrasound in medicine is due to the possibility of active action on living tissue, as well as the information acquisition about the tissues themselves.

Echography allows you to get information not only about all organs of the human body, but also about their functions, to visualize many pathological processes and their formation in the body. Ultrasonic methods are very informative means for studying the structure of biological tissues and the physiological processes occurring in them.

Abstracts

Unfortunately, the current situation in the field of vascular diagnostics is such that existing Doppler methods for finding the maximum spectrum frequency, some of which have been described above, do not take into account the influence of these effects, which leads to incorrect results: errors in determining the maximum frequency of the spectrum lead to a large error in calculation of diagnostic indices, and the result of this is an incorrect making out of the diagnosis. In this regard, the development of the acoustic Doppler-study method of human blood flow parameters is important and timely.

Keywords: vascular diseases, ultrasonic methods, ultrasonic Doppler study.

UDC 519.246:52 Ihnatkin V. EVALUATION OF THE SIGNAL POWER SPECTRUM IN DIRECTED RECEPTIVE SYSTEMS. An algorithm which allows to estimate the capacity spectrum for a discrete sample of values of N for a time interval (- T / 2, + T / 2) using a filter with the same narrow spectral band as in a rectangular time window, but with the level of lateral petals, smaller by 4,3 db has been considered. Examples of several «energy» filters have been given. This shows the response of the «energy» filter in comparison with the filter based on traditional time windows. There are possibilities to control both the width of the filter band and the shape of its peak. Also, the dimension of the variable variation increases considerably.

In the case of spectral analysis, the Fourier transform is said to be performed with two different time windows in time. The result is based on the factors of the real and unreal parts of the first and second transformation. It does not require any optimal qualities from each of the time windows separately, only the final result is optimized. This is effective if one of the time windows resembles the Kaiser-Bessel window. In this case, the convolution after the Fourier transform becomes labor-intensive one, requires a lot of computational operations, and it is better to use the time window directly to the signal being analyzed before the Fourier transform.

For such time windows, the construction of «energy» filter increases the analysis time by about twice. But the speed of computing is not always a decisive factor, and the combined use of two different windows instead of one expands the ability to analyze.

The results of the work can be used for angular filtration of the input signal strength for various antennas, in particular, to suppress noise disturbance from the excitement of the sea surface.

There are great possibilities in optimization of the receiving system with a horizontal working direction of reception. The task of optimization in this case is solved taking into account the working range for both the average and for maximum interference.

Keywords: Fourier transform, time window, filter, spectral analysis.

Section of «Information Technology»

UDC 004.934 Yalova K., Yashyna K., Vasyleva A. RESEARCH OF SPEECH RECOGNITION SYSTEMS AND METHODS. Use of the speech interface for computer devices and systems control at distance is one of possible methods of physical and psychological distance abbreviation between users and computer equipments, based on the user's voice signals. The research of automated speech recognition systems, methods and algorithms using in input speech message recognition is carried out. The classification of automated speech recognition systems is formulated in the article. This classification takes into account such features as: the dictionary size, the dependence on the speaker, the speech type, systems designation, recognition algorithm etc. The results of modern speech signals processing methods analytic review are given, namely: linear prediction of speech signal, neural networks, latent Markov models and the method of dynamic time wrap. The main objective of the linear pre-

diction method is to define a set of prediction coefficients which provide a recognition error minimization. When using neural networks for recognition of a speech signal it is necessary to build an appropriate neural network and select of the synapses weight coefficients for minimization of errors. The method of dynamic time transformation is a method of elastic comparing of the observation vector with the saved template. The advantage of hidden Markov processes is the ability to process sequences and signals of different lengths that is a difficult task for operation with neural networks. The given review allows to estimate possibilities of the existing speech signals processing methods and to determine prospect of their mathematical apparatus application in speech signals processing tasks in systems of automated speech recognition. The article has survey character.

Keywords: automated speech recognition systems, SILK-interface, speech recognition methods.

UDC 004.42 Demchenko Y., Babenko M. USE OF COLORRGB MODEL AND LSB METHOD FOR STEGANGOGRAPHIC PROTECTION OF INFORMATION IN OFFICE OPEN XML FORMAT FILES. This article represents some aspects of steganographic information protection. The article focuses on an overview of existing methods of hiding information, especially that allow you to embed hidden data into a text file. To create a software tool, the authors chose the LSB method. The preferred method uses the RGB color model for effectively hiding information in the OFFICE OPEN XML format files.

The principle of the LSB method (Least Significant Bit) is replacing the least significant bits of the container (audio, video file, image or text file) with the bits of the message. The possibilities of the human eye are limited in distinguishing the shades of the same color. That is why this substitution is imperceptible to the human.

This method can be used while developing an algorithm for embedding secret data into a container. We have a hidden message in the *.docx document. The document isn't empty. The amount of data that we can fulfill depends on the amount of the information. The more text the report contains, the more data we can hide there. We add the data itself to the RGB color channels of each text character from the file. First, we need extract from the Word document all the necessary data. The text and information about the colors of each character in the RGB format. Then the resulting color components need to be converted into a binary number system and replace the younger bits of the component colors with the bits of our message.

The software tool that implements the described algorithm is developed at the Department of «Software Systems» of the Dneprovskiy State Technical University. Also, it is created its own docx documents parser that fully satisfies the requirements of the task and contains only the necessary functions, such as reading text with preservation of formatting, reading the color of the characters used in the file, etc.

Keywords: steganographic protection, LSB method, RGB color model, OFFICE OPEN XML format file.

UDC 004.52 Miniailo Y., Babenko M., Zhulkovskyi O. SOFTWARE DEVELOPMENT FOR RECEIVING MUSICAL NOTATION FROM MUSIC MIDI FORMAT FILES. This article focuses on the choice of the optimal way of converting MIDI music files into musical notes.

MIDI (Musical Instrument Digital Interface) is a standard for transmitting information between electronic musical instruments. It was developed in 1983, which makes it possible to communicate electro music instruments, computers, and other MIDI-compatible equipment, carry out one management tool for others.

MIDI does not transmit audio information, but it works with "messages," such as the height and dynamics of the notes on the instrument, control signals for parameters such as

volume, panorama, timing signals for tempo synchronization, etc. MIDI is marked by an extremely widespread.

In this article, an algorithm of receiving musical notes from MIDI music files is implemented. The algorithm works fast, allowing the musicians to convert any melody into a noted instrument with the possibility of printing in real-time. With the development of the technology of musical programming arose a new object-in method of studying creativity. It calls modeling (reproduction or imitation) of some aspects of the objects studied or processes. It gives you the ability to start learning a musical instrument because you can simulate the process of playing any melody in the application. It is convenient for professional musicians because of the availability of music notes from music files with the ability to adjust tonality, time signature, duration, playback speed, with the possibility of transposition and modulation, etc.

The developed software allows to get a musical interpretation of any melodies in MIDI format in real time with possibility to simulate playing these melodies on a musical instrument.

Keywords: software, musical instrument, MIDI format.

Section of «Chemical. Chemical technology. Biotechnology»

UDC 548.736: 546.562: 541.49   Kovalenko A., Kizimishina T.   CATALYTIC ACTIVITY OF COMPLEX COMPOUNDS OF COPPER (II) WITH ALIFATIC AMINES IN REACTIONS OF THE PLANNING OF HYDROGEN PEROXIDE. Complex compounds of transition metal ions with different ligands are active catalysts for many oxidation-reducing processes. The most active catalysts are transition metals elements. The complex ion of cuprum (II) is very important as a catalyst of many oxidation-reducing processes. For the decomposition of H_2O_2, ions of manganese, ferrum, cobalt, and potassium are used, although not the metal ions salts have a catalytic effect, but their complexes. The pair of Cu (I) -Su (II) is involved in many oxidation-reduction processes. The catalytic activity of complex compounds of cuprum (II) nitrate with mono-, di- and tri-substituted aliphatic amines at a temperature of 28 ° - 30 ° C under heterogeneous catalysis of the decomposition of hydrogen peroxide has been studied. The catalytic activity of complexes is strongly influenced by the nature of the molecules that are part of the coordination sphere of the ion.

Active models of catalysts in the reactions of the decomposition of hydrogen peroxides are complexes with amines and some heterocyclic amines.

Synthesis of coordination compounds of cuprum (II) with mono-, di- and tri-substituted aliphatic amines was carried out from non-aqueous solutions. The obtained compounds of cuprum (II) with aliphatic amines have a polymer structure, adsorption of hydrogen peroxide occurs on the surface of the catalyst. It has been established that complexes with tertiary amines have higher catalytic activity than complexes with mono- and di-substituted amines. This pattern is due to the spatial difficulties that arise in the coordinate plane.

The catalytic activity of the compartments of cuprum (II) with aliphatic amines increases from the primary to the secondary and tertiary amines. The resulting complexes of cuprum (II) with amines are not soluble in water, so we can assume that they have a polymer structure. Primary and secondary amines do not have such cumbersome substitutes and form more stable complexes with cuprum (II) than tertiary amines.

Greater catalytic activity was found in complexes of cuprum (II) with tertiary amines. Thus, the resulting coupling (II) coordination compounds with tertiary aliphatic amines can be used in heterogeneous catalysis of the decomposition of hydrogen peroxide, which is directed to biological treatment plants.

Keywords: hydrogen peroxide, catalysis, aliphatic amines, cuprum (II) nitrate.

UDC 661.152.4 Ivanchenko A., Grom A., Sudakova D. THE USE OF DAIRY MILK IN THE TECHNOLOGY OF RECEIVING BIOMINERAL FERTILIZERS FROM WASTE. The relevance of finding new methods for intensifying the process of obtaining biomineral fertilizers in the anaerobic digestion reactor has been pointed out. The efficiency and effectiveness of milk whey for intensifying the process of anaerobic digestion and improving the quality of biomineral fertilizers obtained from waste products have been suggested and experimentally confirmed. In studies for the production of biomineral fertilizers, the following wastes were used in conjunction with milk whey: phosphate containing precipitate after adsorption of phosphates from urban liquid wastes by a natural sunflower husk and condensed active sludge; cattle manure with addition of precipitates after coagulation of phosphate extraction; household waste (%: flour – 11, potatoes – 29, apples – 27 and beets – 33) with the addition of precipitates after the coagulation of phosphates; beet pulp. It was found that with an increase in the ratio of "serum: raw materials" in the substrate from 1:4 to 1:1, the content of mineral substances rises from 5,53 to 12,15%. It has been shown and experimentally proved for the first time that the addition of milk whey to raw material (beet pulp) at a ratio of 1: 1 allows shortening the time spent by the products of processing in the reactor for the production of biomineral fertilizers by 1,5-2,2 times. The highest content of nutrients (%: N – 5,2; P – 5,02; K – 10,1; Ca – 9,85) was found in biomineral fertilizer obtained from a phosphate containing precipitate after processing of urban liquid waste with a natural sunflower based adsorbent husk and sealed active sludge ferrum(III) chloride. The production tests of the obtained biomineral fertilizers in the technology of growing barley of the spring type «Stalker» and «Tsarevich» varieties are carried out.

It has been shown that biomineral fertilizers obtained from waste with the addition of milk whey correspond to the current standards of Ukraine on the content of macro- and micronutrients.

Keywords: biomineral fertilizer, enzyme, serum, waste, biogas, anaerobic digestion.

UDC 347.433.3.+347.474.3 Kornienko I., Holovey O., Lashkova A., Kryvonos O., Zatsarenko S. STUDY THE EFFECTIVENESS OF GROWING SOILS BY MICROBIOLOGICAL PROPERTIE. After research the State of soils m. Kamyanske, it was found that antropogenno-technogenic influence on the environment will worsen the properties of soils, growing area of degraded lands, polluted atmospheric emissions and wastewater, chemicals and radionuclides. To improve the fertility of contaminated soils used modern approaches in the use of microbiological fertilizer to improve soil fertility and renewal. Defined the ecological state of soils m. Kamyanske, developed its own recipe of the fertilizer and the comparative analysis of the effectiveness of application of mineral, organic and mineral and microbiological fertilizer.

Anthropogenic and man-made impacts on the environment are steadily increasing and reaching critical values, which has greatly affected the degradation of soil cover. The physical and chemical properties of soils are determining, the areas of degraded lands contained by atmospheric emissions and sewage, chemical rechovins and radionuclides increase.

The residential area is a land intended for the construction of residential and public buildings, roads, streets, squares within cities and urban-type settlements. It occupations an area of about 50-60% of the city's territory. The industrial zone includes an entity plot of land, transport interfaces and co-munitions. On this site there may be built industrial premises or it may be empty.

The composition of the fertilizer is distinguished: mineral, organic, organo-mineral, microbiological, green.

In order to improve the fertility of the earth, mineral, organo-mineral and complex microbiological fertilizers are used more often.

In order to improve the species diversity of fats and fertility, an improved formulation of a complex microbiological fertilizer was developed, which was tested in practice of growing wheat together with mineral and mineral organic fertilizers. On the basis of research results a comparative characteristic of the etiquity of application of the specified types of fertilizers was obtained.

Keywords: geobìocenoz, microbiota, fertilizer, symbiosis.

UDC 628:218   Kornienko I., Gulyaev V., Bondarenko S., Lukovkina Y.   PROMOTION OF EQUIPPED TECHNOLOGY OF STEEL WATER TREATMENT WITH INTEROPERABILITY OF BIOSORBENT AND BIOFLOCULATION.   One of the sources of pollution that leads to deterioration of the quality of surface water, drinking water and the environment are sewage. Physico-chemical methods of research have established the poor quality of wastewater treatment at the Kamyanskyi treatment facilities for such indices as ammonium nitride, nitride, nitrate, petroleum products, iron and suspended matter.

In the course of the research, it was found that the low quality of wastewater treatment from biogenic elements and suspended matter is associated with secondary contamination, which is due to the decomposition of the bioactivities of the walls of the structures and the increase in the number of filamentous bacteria, low dose of active sludge and overload. The purification technology consists of the following steps: mechanical cleaning (rake, gratings, primary settling tanks), biochemical purification (aerotanks and secondary sedimentation ponds), disinfection of waste water in contact pods with chlorine.

To solve the problem, an improved scheme of biochemical wastewater treatment with the use of biosorbent (active sludge) and bioflocculant was proposed. In the developed scheme of wastewater treatment, it is suggested that the clarified waste water from the primary tanks be sent to the preaperatore to be cleaned, in which the waste sludge with a dose of 1.0 g / l is directed, which serves as a biosorbent.

A laboratory plant for biological wastewater treatment (aerotank, secondary sedimentation tank) was developed on which the effectiveness of simultaneous application of a biosorbent and a biofloral agent during the preliminary purification process was tested. Thanks to the proposed technology, bioaccumulation of iron has been increased by 3 times, and the efficiency of purification by physico-chemical parameters has been improved by 30%. Also, the effectiveness of bioaccumulative action of inactivated sludge in relation to heavy metals such as: iron, cadmium, manganese, copper, cobalt and zinc has been proved.

Keywords: biosorbent, bioflocculant, active sludge, bioaccumulation.

UDC 631.4+624.131.4   Pikarenia D., Bohynia O., Polishchukova V., Maksimova N. MATERIAL COMPOSITION OF BOTTOM SEDIMENTS UPSLOPE OF A SMALL RIVER.   To date, the acute problem is the sharp deterioration of the ecological state of small rivers in Ukraine. Therefore, a number of measures are being taken to improve them, including clearing river channels to restore the natural flow. After dredging works, bottom sediments are formed which are alluvium in the form of sand of various composition and organic matter - silt. These deposits can accumulate a variety of pollutants, including heavy metals. However, despite the possible ecological danger, they are stored in the dumps along the coast. In these dumps there are processes of dehumidification of sludge through filtration, changing chemical composition, the possible migration of chemical elements into the soil. Such bottom sediments can act as a secondary source of environmental pollution. In the article the material composition of bottom sediments and their dumps is considered on the example of the river Mokra Sura. For the study, samples from ten control points were selected. Selected samples are moist soil from dark gray to black. To assess their material composition, studies have been

conducted to determine the content of organic matter in the analyzed soils and bottom sediment, the mineral composition of the ozonated samples and their chemical composition.

Studies show that the bottom sediments of the Sukra River contain a high amount of organic matter, which could be favorable for improving the soil quality, but they are contaminated with toxic substances, mainly in a soluble form, which may lead to deterioration of the natural properties of soils. The obtained results indicate that the material of dumps can be a source of secondary contamination of the river and surrounding soils, so it can not be left on the shore. It also can not be used as fertilizer or substrate for agricultural purposes. It must be utilized in other ways. The given data show that it is necessary to conduct detailed research of bottom sediments formed during dredging works and only then decide on their further use. It is also advisable to group the small rivers in the composition of the bottom sediments with the degree of their environmental hazard.

Key words: bottom sediments, small rivers, mud, pollution of the river.

Section of «Life Safety»

UDC 613.2-057.87:378 Levchuk K. RATIONAL FOOD OF THE YOUTH AS AN ELEMENT OF THE HEALTHY SAFETY TECHNOLOGY OF TEACHING. Human health depends on many factors, but the most significant are: the genotype of a person 20%, the state of the environment (living conditions) 20%, the level of development of the health care system 10% and lifestyle 50%. Thus, we can argue that the greatest influence on the health of a person is made by his lifestyle, one of the elements of which is nutrition. Rational nutrition is a nourishing quantitative and balanced quality food that provides normal growth, physical and psycho-physiological development of the organism, its high working capacity, active longevity and resistance to adverse natural, man-made and social factors of the environment. Scientists believe that the complete elimination of cardiovascular diseases would lead to increase in the life expectancy of a person for 10-12 years, oncological diseases – for 7-10 years and the balanced nutrition to extend to 4,5% healthy years of life.

The youth spends approximately 6-8 hours per day in the educational institution. High demands on the body of schoolchildren and students lead to a rapid rhythm of life, the modernization of the educational process and information overload. Therefore, it is impossible to ignore the fact that most of children who graduate school already have a variety of diseases that had been occurring during their education.

The author analyzed 53 educational institutions of the Dnipropetrovsk region and their hostels on the availability of any items for providing them with food. 185 young people were interviewed about their food habits and preferences in the city of Kamensky. As a result of this survey, it was found that in the majority of the population, especially young people, there is a disturbed diet, there are almost no first dishes in their menu, a lot of by-products and dry fast-food concentrates, sandwiches, potatoes, pasta, tea, coffee, increased amount of food intake and its volume. The young people prefer cheap products with low biological value. Besides they don't eat enough meat, dairy, fish products, vegetables and fruits. The recommendation are made to eliminate the negative effects on the health of the young people in this article accept analysis and survey. In addition, the educational work carried out in the educational institutions of the Dnipropetrovsk region in relation to raising the level of the culture of health is analyzed.

The article also identifies the main competencies that promote health and skills which students should have: stress management, motor activity and hardening, organization of work and rest and rational nutrition.

Keywords: student, nutrition, health, diet, educational work.

UDC 613.6.027:669.296 Romaniuk R., Tolok A. SAFETY WORK BY MANUFAC-TURE POWDERED ZIRCONIUM. Paper it is devoted working out of provisions on safety work of workers on sections manufacture of powdered zirconium. The thin chip and zirconium rasping's easily light up. At presence in air of certain concentration of a dust from zirconium and a heating source there can be an ignition and explosion. Therefore it is widely used in fireworks at manufacturing of lamps for flashlights, caps-detonators, and a nitro powder and for fireworks.

By working out of processes manufacture of a powder from zirconium, at designing of industrial installations and their maintenance it is necessary to consider, as it is told above, tall explosive and fire danger of this product. Therefore production processes a powder of zirconium should be mechanized and automated.

All works (restoration, flushing out, treatment, crushing, screening and another) should be carried out in the separate premises rigged with system of plenum-exhaust ventilation.

The metal powder in the form of a mix with water is stored in an incombustible room with constant temperature a little above a freezing point. The powder relative humidity should be in limits of 15-20 %. Separately packed portions of a powder are recommended to be kept separately for decrease quantity of zirconium which can be annihilated fire in case of a fire.

Burning rather zirconium small amounts can be stopped a considerable quantity of the lather, applied so that not to call powder inflating. In these cases it is possible to apply dry sand and feldspar also.

If in circulation there is a small amount of zirconium in the form separate portions properly packed in case an ignition one of them it is better to give the chance to burn down easy to it up to the end.

Workers in production areas and premises storing of a powder should be in special shoe without metal nails and in overalls from a fire-resistant material, for protection against fire to wear goggles or the shield for the person from a high-melting material.

Keywords: zirconium, powder, danger, burning, explosion, individual defenses means

Section of «Education»

UDC 372.851 Derets E. COMPUTER TECHNOLOGY IN TEACHING MATHE-MATICS STUDENTS SHORT FORM OF TRAINING. In this work the methodical features of the use of information and communication technologies during the course of higher mathematics students of technical specialties students who are studying at the shorter term of training are researched. The use of blended learning technology is proposed, which is to combine traditional face-to-face learning with computer-mediated activity. In the work, the following features of the methodology of the use of information and communication technologies, related to the specifics of learning in a shorter term are determined.

Part of the course is common to educational institutions of different levels. It is suggested to use the basic electronic notes for a concise repetition of the corresponding basic sections of higher mathematics. The contents of the notes are clearly consistent with the work programs of the two educational institutions. Electronic methodological materials should include examples of solving typical tasks. In the part of the examples, the explanation is opened step by step after the additional user command. The student is able to independently conduct each stage of the decision, checking with an electronic manual.

The new training materials are grouped into short themed blocks and contain an automatic links to reference materials. In each section some of tasks have a professional orientation. Students with shorter term training have additional professional knowledge. It simplifies the processing of tasks whose content is associated with other disciplines.

In knowledge control, a combination of test tasks with a computer rewrite of responses with open-ended tasks is required. The teacher checks the open-type task and carry out a short examine. The current student results for each of them are determined on a 100-point scale. This allows you to visually reflect the dynamics of the results of each particular student.

The paper also identifies certain disadvantages associated with the use of information technology in the learning process. These include, in particular, the considerable expenses of the teacher at the stage of development and testing of teaching materials and the need for a high level of self-control of students in the use of ICT.

Keywords: higher mathematics, teaching with a shorter term, combined training.

UDC 378.016:004 Karimov I. SOME ASPECTS OF THE MATHEMATICAL TRAINING BACHELOR OF MANAGEMENT AND ADMINISTRATION. According to the law of Ukraine "On higher education" Bachelors is conducted for educational-professional programs, which are developed by higher educational institutions. The formation of the educational-professional programs accompanied by a redistribution of time studying those or other subjects, a certain accent radiates in the direction of strengthening professional training of specialists. Insufficient study of questions clarifying the content of fundamental disciplines (including math) with a decrease in allocated to their study time naturally leads to deterioration of the quality of training. Based on the analysis of the present status of higher education it is proposed to differentiate the mathematical training of specialists in management and economics, the educational levels of the bachelor and master of business administration.

Considered the concept of teaching the subject "Optimization methods and models. For prospective Bachelor specialty 07 "Management and administration" offers technological approach. The theoretical part of the discipline is reduced to a reasonable minimum. The focus is transferred to the technology to solve specific problems. The main stages are: 1) the awareness of the problem; 2) create logical and/or mathematical models; 3) method of implementing the model using the appropriate software; 4) interpretation of the obtained results.

For future masters are encouraged to leave such questions: 1) the theoretical substantiation of methods; 2) an in-depth analysis of the intermediate and final results; 3) problem solving innovative character.

The use of the proposed approach in the learning process promotes better mastering of program material, raises motivation and interest in applying the methods of mathematical modeling. Detailing the content of the subject "Optimization methods and models" for specialties in 07 "Management and administration" needs further research.

Keywords: bachelor, mathematical training, competence, management and administration.

UDC 378.147.31 Taran V., Gubarev S., Kalinina T., Terentieva O. COMPETENCE APPROACH TO THE TRAINING OF ELECTRICAL AND RADIO ENGINEERING SPECIALISTS IN THE STUDYING OF THE GENERAL PHYSICS COURSE. The method of the competence approach in the study of some issues of electrodynamics and the key patterns of its applied nature of use is considered in the paper, not based on the mathematical formalism of the analysis of differential Maxwell equations. Proceeding from the many years of experience in teaching the theory of electromagnetic field at the technical university, it is highly recommended, in the authors' opinion, to apply didactic technology of visual representation and graphic modeling of the processes of formation of electrical oscillations in the LC- circuit, as well as the formation and propagation of electromagnetic waves in space.

A visual technique of the comparative characteristics of the electrostatic and vortex (induction) electric fields and the graphical interpretation of the causes of the electromotive force induction and self-induction origin are proposed. The presented variants of the visual mechanism of the formation of an electromagnetic wave as the propagation in the space of the

process of mutual generation of alternating electric and magnetic fields. In the context of the competence teaching methodology, a variant of the complex task for independent consideration of the properties of electromagnetic waves is presented that stimulates students' ability to independently analyze the problem, formulate the problem, and solve it, on the basis of the independent use of informational tools and self-education as key components of the professional competence of the respective direction.

Keywords: electrostatic field, electromagnetic induction, oscillatory circuit, electromagnetic wave.

UDC 621.771.04 Gupalo Yu., Pyshnyi M., Gulesha O., Krylova T., Steblyanko P. ANALYSIS OF THE RESULTS OF THE PASSAGE OF PEDAGOGICAL PRACTICE IN THE TECHNICAL UNIVERSITY. The purpose of the article is analysis and research of various forms, methods and methods of teaching. In modern pedagogy at the moment, three forms of interaction between the teacher and students have become widespread, namely: the passive method, active and interactive. Passive method of teaching is that the teacher takes a central role in the learning process, and students act as passive listeners, subject to the directives of the teacher. Active learning implies the organization of an educational and cognitive process, which is aimed at comprehensive activity with the use of various pedagogical tools. Under the interactive method of teaching, understand the form of learning, which stimulates the development of the student's personal qualities and understanding between the teacher and the student while solving interactive tasks and exercises through dialogue between them.

During the pedagogical practice in the Dneprovsky State Technical University in the group of ES-14-1 in the discipline «Digital automata» an experiment was conducted using all three teaching methods. A methodologically substantiated and situationally motivated combinational method was developed and introduced into the practice of teaching students. The combination method combines a combination of passive, active and interactive methods, since the specificity of instruction requires a change in activity during classes. The results of the pedagogical experiment on the use of each method are presented. The results of the pedagogical experiment on the use of each method are presented. When holding a passive method, the students' memory level remains weak: during the independent work, out of 17 people, only 13 people correctly coped with the II level of complexity, while the active method of 17 solved correctly both the I and II levels of complexity of 15 people . By an interactive method, 16 people could correctly find the solution of I, II and partially III levels of complexity. Based on the results of a written survey, it can be argued that, using the combination method, the level of knowledge sustainability increases by 17.27%, while with the active method – by 11.47%.

It is established that a modern specialist should be able not only to reproduce already existing knowledge, but also creative activity, to non-standard thinking, the ability to self-education and self-realization, and therefore it is suggested to use a combination method that (ensuring high quality of the trainees' professional competencies) and should be so in the conditions of the changed education paradigm.

The conclusions formulated in the work are sufficiently substantiated and can be used in the practical activities of educational institutions.

Keywords: teaching methods, pedagogical practice, lecture and practical exercises, digital circuitry, graphs of digital automata.