

## ABSTRACTS

### Section of «Metallurgy»

UDC 669.184.125 Sigarev E., Nedbaylo N., Gurzhiy D. ECONOMY ENERGY WITH THE USE OF TECHNOLOGICAL ROUTE PRODUCTION BECAME FOR PJSC «DMKD». The technological route of production high-quality steel is offered to treatment fusion in Ukraine in the terms of raw materials. Expected total reduction of power expenses on the receipt cast-iron in a high furnace, complex scoop affinage cast-iron on silicon and sulphur, smelting of steel and repair lining of converter on the offered route by comparison to regular technology makes 1,832 GJ/T steel (6,9%).

*Keywords:* converter, affinage of cast-iron, lance, energy, expenses.

UDC 669.184.125 Sigarev E., Sigarev N., Semenova D., Bayduzh U. TOPOGRAPHY SURFACE LINING OF THE CONVERTER. The analysis possibilities using funds topography lining of the converter on the campaign to prevent accidents, save the required profile of the workspace, select the optimal methods for hot repair of refractory brickwork with a reduction in specific consumption of repair materials. The desirability further improvement of the blast and slag smelting and converting the mode input circuit in the slag bath of magnesium supplements with the conditions of raw steel plant.

*Keywords:* scanner, topography, lining, converter, wearout.

UDC 669.184 Chernyatevich A., Sigarev E., Chubina E., Rudenko R. DEVELOPMENT BLOWING AND SLAG MODES MELTING FOR A HEAVY CONVERTER. Original constructions are developed to six nozzle tip of lance on the expense oxygen 1200-900 and 1500-900 nm<sup>3</sup>/min. The construction of tip provides quiet motion blowing out with the speed-up aiming of the made foam slag, absence of the troop landings from a converter and «displacing» of slag. Blowing is developed and slag modes of melting for a heavy converter with the combined blowing out.

*Keywords:* converter, head, lance, slag, modes.

UDC 669.15-196 Autukhou A. PATTERN FORMATION IN CENTRIFUGALLY CAST IRON ROLLS FROM CHROME-NICKEL. In studies of the robot shows the formation of the carbide phase of the working layer of centrifugally cast iron rolls CNS, including its fine structure. The heterogeneity of the carbide phase, which is one of the determining factors in the development of the grid and the height of damage to the working layer of rolls.

*Keywords:* mill rolls, the working layer, centrifugal casting, carbide phase, electron microscopic studies, microhardness phases, microprobe analysis.

UDC 669.182.001.57 Ogurtsov A., Dushkevych D., Koval A. TESTING AND USING THE TECHNOLOGY OF MICROALLOYING STEEL WITH FERROBORON IN THE PRODUCTION OF CONTINUOUS CAST BILLETS. The possibility of using low carbon steel for microalloying such element as boron in this paper. Low carbon steel of SAE 1008 grade was taken for study. Treatment was performed in the ladle furnace. Ferroboron was injected after adding all of the ferroalloys to steel.

*Keywords:* ladle furnace, flux-cored wire, microalloying, ferroboron.

### Section of «Welding»

UDC 676.163.022 Kamel G., Martovitskiy L., Kritskiy M., Savonov Yu. METHODS HARDENING SURFACE SMALL CONE BLAST FURNACE. Methods are described for recovery of small cone blast furnace, which is subjected to intense abrasion and gas abrasion wear during use. Analyzed types of wear small cone blast furnace during operation. The tech-

nological process of hardening the surface of the small cone blast furnace and show that the furnace is the optimum welding method for hardening cone blast furnace.

*Keywords:* small cone, blast furnace, wear, blast furnace gas, hardening, welding, batch distributor, grain relit, wear resistance.

UDC 671.791.927 Kamel G., Volkov G., Makarenko P., Beychuk Ye. ESW POWDER ELECTRODE ROLL HOT ROLLING. Developed technology for producing electro-roll, set the character of wear of the working surface of the rolls after welding. Calculated melting mode, studied performance rolls. The aim is to increase the wear resistance of hot deformation of the rolls, reduce material consumption due to the choice of a rational manufacturing technology and the optimal material.

*Keywords:* roll, rolling, molding technology, mold, microstructure, wear resistance, dial gauge.

UDC 676.791.927 Kamel G., Glushko V., Ivchenko P., Zhmurin D. TECHNOLOGICAL PROCESS OF RESTORATION OF THE PIN CART LOCOMOTIVE. In this paper, an analysis of the operating conditions of the locomotive bogie pivot, the problem of the life of the product. Established predominant type of wear. The technological process of increasing recovery performance by automatic submerged arc welding in the longitudinal magnetic field. Made technical and economic calculation recovery pin trolley locomotive. Joined surfacing equipment and inventory in view of the universality of the installation.

*Keywords:* pin, automatic welding, the longitudinal magnetic field, technology, quality control, wear and equipment.

UDC 621.791.927.5 Milyutin V., Kamel G., Rosdobudko E. RESTORING AND IMPROVING THE DURABILITY OF TIRES COKE CRUSHERS ARC WELDING. Using for growing of coke of the fixed bracers of cokecrusheus shallow from Ct35JI of surfacing by the self-defence powder-like wire of BEJITEK-H.620, instead of bracers from the heat-treated steel of 70XJI without by surfacing, considerably promotes the coefficient of relative wear-proofness of bracers at a shock-abrasive wear and increases the term of exploitation of crushers in 3-4 times.

*Keywords:* bracer of cokecrushers, shock-abrasive wear, powder-like wires, surfacing, coefficient of relative wearproofness.

### **Section of «Engineering. Mechanics»**

UDC 669.054.8 Chernyshov O., Uzbek A. CAPACITY RESEARCH OF METAL CHIPS FOR THE PURPOSE OF FURTHER REPROCESSING. The results of metal chip capacity have been given. The classification of chips depending on types, fouling factor and fractional state has been offered. It has been defined, that in total chip amount forming at mechanical engineering enterprise finely elemental chips make up 60-80% and the rest is flow chip.

*Keywords:* metal chips, classification, density, riddling, trommel.

UDC 621.775.8 Zavackiy V., Vusata O. DESIGN OF WORKING BODY OF CHIP CRUSHER. In this the questions of development and constructing of shaving are in-process considered, workings organs and separate elements, a kinematics chart and principle of action of device is presented, power and geometrical calculations, expedience of his use in industry technical, operating and economic dignities. Recommendations regarding the procedure of calculation of the full-load saturation curves of basic units and components of operating unit are given.

*Keywords:* chip crusher, metal scrap, blades, connecting rods, grabs.

UDC 621.923.2:621.833 Silkin V., Grechanik E. FORMING OF GROUPS OF DETAILS IS FOR TREATMENT IN THE CONDITIONS OF CROWS. The research on the processing modes gear wheels effect by different tool materials has been carried out and analytical wear resistant, power and temperature dependence of the treatment process have been determined, recommendations on the effective application of tool materials for gear cutting heads equipping in bevel gears manufacturing with circular-arc teeth have been given.

*Keywords:* bevel gear, instrument materials, the effectiveness.

UDC 669.02/09:519.28 Ivashenko V., Yasev A. SYSTEM OF CREATING TECHNOLOGICAL RIGGING FOR MAKING OF ABRASIVE INSTRUMENTS. Use of system of creating technological rigging (which includes mathematical modeling, development of is constructive-technological offers, optimization of parameters) at research of possibilities of application of the special technological rigging for making of laps for treatments of the cylindrical opening. The novelty of technical decisions is confirmed by guard documents.

*Keywords:* creating, rigging, modeling, making, lap.

UDC 676.16.052.64.001.76 Kamel G., Ivchenko P., Volkov G., Nevoysa Ya. THE EXPERIMENTAL STUDY OF THE CHARACTERISTICS OF THE DRIVE OF INDUSTRIAL TRANSPORT. The paper discusses the components of the torque of friction in the main nodes of the drive rotary feeder Kamyur industrial transport. Selected two modes of operation of the feeder: 1 – normal, which uses 20% (8 kW) of power and in which decommissioning 10% feeders and 2 – unstable – consumes 80% (32 kW) drive power and in which is disposed 90% of the feeders.

*Keywords:* rotary feeder, torque, drive, transport, power, additive rotor, lubrication, load, boundary friction, the mode of operation, the coefficient of friction.

UDC 681.2 Shkil V., Korobochka O. THE SCALE AND PRECISION OF DETECTION OF SMALL DISPLACEMENTS WHEN USING COMPUTER TECHNOLOGIES. The article considers four options for automated determining the maximum value of the error of the measuring head touch, which should be in the range from 0 to  $1 \cdot 10^{-6}$  m. In each case is analyzed the influence of the scale of settlement schemes and the accuracy of the graphical editor AutoCAD on the results of determination of the estimated error of the head touch, which depends on the accuracy of manufacture of the individual parts of the measuring device.

*Keywords:* scale, precision, measurement, error.

### **Section of «Radioelectronics»**

UDC 539:216.2.536.42 Taran V., Popil O. STUDY OF ION IMPLANTATION EFFECT ON POLARIZATION MECHANISM OF MONOCRYSTALS BaTiO<sub>3</sub>. The effect of H<sup>+</sup> ions implantation layer on the domain configuration, dielectric and polarization properties of BaTiO<sub>3</sub> single crystals in order to obtain samples with predetermined parameters for use in nonlinear optics has been investigated. It has been shown that the implantation of hydrogen ions into the surface of BaTiO<sub>3</sub> crystals lead to preferential formation of c-domains samples, the emergence of single-polarization hysteresis curves and mechanism quenching of domain walls lateral motion when switching samples by electric fields.

*Keywords:* ferroelectric, single crystal, implantation, repolarization, domain walls, dielectric permittivity.

UDC 681.586.72:378.147.88 Gosteva A., Leiko E. A STUDY OF THE ELECTRICAL PROPERTIES OF SEMICONDUCTORS IN LABORATORY PRACTICAL UNIVERSITY. By measuring the Hall effect is studied the possibility of using a semiconductor sensor diverse industrial hall sensors to determine its electrical properties in a laboratory prac-

tical university. The results obtained for sensor ДХК-05 and ПХИ-611 enable the identification of trusted sensor of semiconductor material characteristics.

*Keywords:* semiconductor, Hall effect, hall sensors, mobility and carriers concentration, conductivity.

UDC 621.314 Mihaylenko V., Chibelis V., Kovalchuk D., Nevmoschenkov M. MATHEMATICAL MODEL TWELVE PULSES OF THE SEMICONDUCTOR CONVERTER WITH TEN ZONED REGULATIONS OF THE OUTPUT VOLTAGE. Analysis of the electromagnetic processes is organized in this article in electric circuit with semiconductor commutator. Mathematical model twelve pulses of the converter is created for analysis of the electromagnetic processes in semiconductor converter with width-pulse regulation of the output voltage. The brought graphs, which reflect the electromagnetic processes in electric circuit. Method multivariable function was used when performing calculation. The mathematical model of the converter is created for five zoned regulations of the output voltage. Using method multivariable function was found current and voltage of the load, as well as input currents of the converter. The load of the converter has actively inductive nature.

*Keywords:* electromagnetic processes, output voltage and current, current of the load, method multivariable modulating function.

### **Section of «Electromechanics. Electrical engineering»**

UDC 621:313 Kachura A., Sjanov A. WORKING OUT OF MATHEMATICAL MODEL OF SWITCHED RELUCTANCE MOTOR ON THE BASIS OF A FINITE ELEMENT METHOD FOR SYSTEMS OF EXACT POSITIONING. For research of electric machines the wide circulation was received by a finite element method (FEM). Application of FEM allows to analyze distribution of an electromagnetic field in electrotechnical objects of any configuration taking into account various factors. Leaning on FEM, in work it is investigated switched reluctance motor in dynamic modes.

*Keywords:* magnetic vector potential, finite element method, switched reluctance motor.

UDC 621.313.33 Tsabenko M., Storozhko S., Kluev O. MODELING THE SYSTEM THYRISTOR VOLTAGE REGULATOR - INDUCTION MOTOR. In this paper the mathematical model of thyristor voltage regulator - induction motor, studied its structure. Analyzed transients TVR as the soft starter induction motor and control its speed in a small range of 1.5:1.

*Keywords:* mathematical model, induction motor, thyristor voltage regulator, speed regulator.

UDC 62-83 Derets A., Sadovoy O., Sokhina Y. DEADBEAT-RESPONSE CONTROL ASSURANCE FOR SUBMISSIVE CONTROL SYSTEM BY MEANS OF RELAY REGULATORS SWITCHING POINTS DISPLACEMENT. The article presents version of servo-drive control system optimization in time domain with N-i switches method for medium transference mode. Attuning of position regulator in extremely-aperiodic transient carries out by specific choice of switching points setting.

*Keywords:* sliding mode control; N-i switches method; time-optimal transient.

UDC 621.313.322 Nizimov V., Kolychev C. INCREASE OF STABILITY OF SYNCHRONOUS ENGINES OF DRIVE RESPONSIBLE MECHANISMS. It is set that for the increase stability of synchronous engines management by the modes forcing of tension or extinguishing of the field must come true not only on tension and current of stator but also in

the function of sign derivative from a moment on the corner of loading. Control unit is worked out by the contour of excitation with an enhanceable fast-acting.

*Keywords:* synchronous engine, stability, forcing of excitation, extinguishing of the field.

UDC 621.313.31.075 Zachepa Iu. MODELING OF TRANSIENTS ASYNCHRONOUS GENERATOR WITH POWERED CONSUMERS DC. The paper shows the mathematical model of "asynchronous generator with self excitation – rectifier – DC consumer". The research of transients in the system of the group and the most characteristic cascade connection for DC current. The dependencies handling capacity of autonomous asynchronous generator powered consumer static nature of the motor and load.

*Keywords:* asynchronous generator, DC motor, uncontrolled rectifier.

UDC 681.5.03 Voliansky R., Sadovoy O. DISCONTINUOUS CONTROL INTERVAL LINEAR ELECTROMECHANICAL OBJECTS. For a closed loop control speed dc drive with negative viscous friction are composed interval equations of motion in the form of Cauchy, Luenbergera  $\Phi_{TB}$  Brunovsky. On the basis of a priori selected interval polynomial 2nd order synthesized interval control action with irrational activation function and the function of preassigned range of the parameter of the control object and the current values of its coordinates determined by the maximum and minimum values obtained manipulated. It is shown that the analogy between the systems of control and burst interval system, which will perform deintervalization synthesized control algorithm. Using synthesized control action allows building closed electromechanical systems that are invariant to changes in the parameters of the control object

*Keywords:* closed electromechanical system, irrational activation function, optimal control, interval polynomial, algorithm of the deintervalization.

UDC 62-52,621.165 Krupnik A., Sadovoy O. AUTOMATIC SPEED CONTROL OF A STEAM TURBINE DRIVE BLOWER. Implemented structural and parametric identification dynamic model condensing steam turbine, which is a non-stationary object control, which describes the dynamics of nonlinear differential equations with irrational functions. Synthesized control law speed steam turbine and its structural realization is made with the observer.

*Keywords:* control, steam turbine, blower, observer.

UDC 621.311.1:621.3.026.5 Khmel'nitsky E. OPERATIONAL RESEARCH WORK THE STATIC VAR COMPENSATOR OF REACTIVE POWER IN CASE OF POWER UNIT "FURNACE-LADLE". The results of researches by definition of the quality of electrical energy in case of power for technological unit "furnace-ladle" from the static var compensator with reactor type TCR, as capacitor banks used capacity filters the 3-rd and 5-th harmonics.

*Keywords:* unit "furnace-ladle", static compensator type TCR+FC, the power quality.

### **Section of «Heat-power Engineering. Heat Engineering»**

UDC 658.26 Klimov R. PROCESSES OF FORMING BOILING VAPOR PHASE EMULSIONS. In the article the experimental data to determine the amplitude values change under intense pressure vapor phase growth at boiling easy boiling component emulsion environment.

*Keywords:* steam, thermostat, oscilloscope, pressure, temperature, thermal stream.

UDC 539.377 Chernyi O.A. RESEARCH OF THE TERMOMECHANICAL STATION THE PLATE IN THE SPEED HEATING CONDITIONS. The nonlinear task of applied thermomechanics on determination maximum of the possible mode of the speed heating of plate from the positions of thermostrength is decided by means of the method of equivalent

sources. The assay and calculation of temperature and thermostressed mode of plate are compounded. It allows to analyze the heat part of process.

*Keywords:* thermomechanic, thermostrength, inverse task, speed heating, plate, relaxation.

UDC 536.2 Gorbunov A., Trikilo A., Ukleina S. CALCULATION OF TIME PERIOD OF INERTIA IN KIND BOUNDARY CONDITIONS OF THE III TYPE. Developed engineering technique of analytical calculation of inertial time period in linear problems of heating (cooling) body of regular geometric shape with the boundary conditions of III type. We get enough simple, exact and approximate formulas for the calculation of temperature fields.

*Keywords:* heating (cooling), regular geometric shape, the boundary conditions of III type, temperatures.

UDC 669.162.1 Mnyh A., Ovchinnikova I. TO A QUESTION OF THE STABILIZATION OF THE THERMAL CONDITION OF SINTERING AGGLOMERATED CHARGE WITH THE USE OF THE COMPOSITE FEED. Presents a method for calculating the dynamics of the process of forming a layer of polydisperse mixture when using the composite boot tray. As a result of calculations determined the structural characteristics of the boot tray, presents, obtained by calculation, the distribution of the fractional composition of the material. The proposed modification of the composite boot tray with additional arrow-shaped section designed to reduce the influence of side intake air on the thermal regime of the sintering.

*Keywords:* segregation, boot tray, thermal regime, horizon layer.

UDC 621.181.126 Glushchenko O. METHOD OF DETERMINING THE MAIN CHARACTERISTICS NOZZLES REGENERATIVE HEAT EXCHANGER METALLURGICAL UNITS. The main characteristics of nozzles, namely a specific surface heat, specific volume and living section (Siemens, Bruszkova, Petersen Petersen 65 and 75) using the method of approximation. Developed approximation depends allow calculation without using a graphical method which has restrictions on the size of cells. Verification of the adequacy of this method showed that the error calculating basic characteristics of nozzles is less than 1%.

*Keywords:* regenerator heating wells, cells, living section, secondary energy resources, approximation.

UDC 621.311.004.18 Pabat A. NOVATING SPOB PAVIMENT EFPEKTIVNOST HEAT APPLIANCES. This article is about the technology improvements in energy efficiency utilities with the exception of the ballast nitrogen from participation in the combustion process due to the use of molecular separation of air, which increases the concentration of oxygen and reduces the concentration of inert nitrogen and the removal of part of the thermal energy from the flue gases.

*Keywords:* heating gas-oxygen, molecular filters, zeolite membrane, diluted oxygen combustion.

UDC 666.1.031.2/.6:66.042.882.2 Agyeyev K., Denysova A. JET-VORTEX HEAT EXCHANGER EFFICIENCY INCREASE FOR TECHNOLOGICAL UNITS. The efficiency increase of jet-vortex heat exchanger as the problem of current importance is displayed. It is conducted that efficiency of their work is mainly depends on the jet-vortex heat exchangers operating and design parameters. The process of making decisions on the design parameters of a physical model (a cold aerodynamic experimental unit), its aerodynamic and CFD-simulation parameters selection is considered.

*Keywords:* jet-vortex heat exchanger, physical model, heat exchanger with hydroactive modes.

UDC 621.3.011:621.1.016:513.83 Dolgoplov I., Tuchin V. APPLICATION OF TOPOLOGICAL APPROACH FOR THE DESIGN OF DYNAMICS OF THERMO-CHEMICAL PROCESSES OF FUEL INCINERATION IN HEAT-GENERATOR OF DRYER. Application of topological approach is considered at the design of dynamics of processes of incineration of gaseous fuel in heat-generator of the drying setting. The mathematical model of thermo-chemical processes what be going on in heat-generator is presented. The results of job are used for development of energy-resource-saving technologies and equipment of drying aggregate.

*Keywords:* thermo-chemical process, dynamic, incineration, topology, model, heat-generator, dryer.

### **Section of «Mathematical problems of the technical mechanic»**

UDC 539.3 Banyas M., Galishin O. BACKGROUND OF USE SOLUTIONS AXI-SYMMETRIC THERMO-ELASTIC-PLASTICITY IN THE STUDY OF STRESS-STRAIN STATE PLATE DESIGNS. The paper substantiates the possibility of developing and testing methods for solving problems in termoplastychnosti axisymmetric formulation and then transfer it to the plate design. An example of such opportunities compared stress-strain state long thin-walled cylinder and box design with a square cross-section because of their heating.

*Keywords:* stress-strain state, thin-walled cylinder box design, plate design, thermo-plastics deformation.

UDC 539.3 Bahno O. EFFECT OF INITIAL STRAINS ON THE DISPERSION OF NORMAL WAVES IN THE SYSTEM: A LAYER OF IDEAL FLUID – COMPRESSIBLE ELASTIC LAYER. Problem about acoustic waves propagation in pre-deformed compressible elastic layer, which contacts with layer of ideal compressible fluid, is under consideration. Investigation is done on the basis of three-dimensional equations of the linearized theory of elasticity for finite deformations of elastic layer and the three-dimensional linearized Euler equations for ideal compressible fluid. Characteristic equation is solved numerically and dispersion curves of the Lamb modes for wide range of frequencies for thick layer of ideal compressible fluid are constructed. We analyzed effect of initial deformations, thickness of layers of elastic body and fluid on phase velocities of Lamb waves.

*Keywords:* elastic compressible layer, layer of ideal compressible fluid, initial stresses, Lamb modes.

UDC 539.3 Zelensky V., Bystrov V., Decret V. SPATIAL STABILITY PROBLEM OF ORTHOTROPIC COMPOSITE MATERIAL LAYERS AT AXIAL COMPRESSION. The spatial stability problem with the two-component composite orthotropic and isotropic layers located under uniaxial loading in the plane of the surface layers of the placement. Given the difficulty of obtaining analytical solutions for solving the problem of stability of numerical methods are used. For the construction of discrete models, the corresponding differential problem by using the concept of the basic factors in the framework of object-oriented approach.

*Keywords:* composite, three-dimensional linearized stability theory of deformable bodies, object-oriented approach.

UDC 539.3 Homa I. METHOD REYSSNEROV'S ALGORITHMS IN THE THEORY OF BENDING TRANSVERSELY ISOTROPIC PLATE. A method for constructing equations of equilibrium transversely isotropic plates, based on the method Reyssnerov's algorithms. For the first approximation of the basic functions (Legendre polynomials) obtained differential equations and corresponding boundary conditions on the boundary.

*Keywords:* transversely isotropic body, the method Reyssnerov's algorithms Legendre polynomial equations balance.

UDC 534.21 Kovalenko A., Shekera M. MATHEMATICAL MODEL OF STUDYING NONSTATIONARY THE TRANSITION DYNAMICAL PROCESSES IN SYSTEM SHELL OF REVOLUTION-LIQUID. Mathematical model of studying nonstationary the transition dynamical processes in system cover of revol- liquid longitudinal dynamic loading is building.

*Keywords:* shell of revolution, liquid, longitudinal dynamic loading.

UDC 539.3 Kirilyuk V., Levchuk O. CONTACT INTERACTION OF PIEZOELECTRIC HALF-SPACE WITH RIGID BASE, CONTAINING GROOVE OF CIRCLE SECTION, UNDER COMPRESSION. The problem on the contact interaction of piezoelectric half-space with rigid base, which contain axially symmetric sloping groove was considered. By means of solution representation of couple equations system of electroelasticity and harmonic potentials of special kind the explicit solution was found, geometrical parameters of clearance between bodies under contact interaction was found. Corresponding contact parameters for elastic transversally isotropic and isotropic half-spaces follow from obtained formulae as partial cases.

*Keywords:* piezoelectric half-space, axially symmetric sloping groove, frictionless contact, elastic and electric fields, geometrical parameters of groove.

UDC 539.3 Kirilyuk V., Levchuk O. STATIC EQUILIBRIUM ORTHOTROPIC BODY WITH ARBITRARY ORIENTATED ELLIPTICAL CRACK UNDER TENSION AND BENDING. The problem on the stress distribution in an elastic orthotropic medium with an elliptical crack under tension and bending with taking in account its orientation was considered. There were used the triple Fourier transforms and Fourier image of Green's function for the anisotropic body. Analysis of numerical results was carried out. Regularities of distribution of stress intensity factors (SIF) along crack front were shown. The influence of the crack orientation in the material on SIF was established.

*Keywords:* orthotropic material, elliptical crack, tension and bending, stress intensity factors, orientation effect

UDC 539.3 Bashuk E., Boychuk V. DEFINITION CRITICAL PARAMETERS OF THE PLATE IN THE EXACT STATEMENT AND THE BEAM APPROACH. The plane problem of three-dimensional stability of the hard clamped plate with central crack at uniaxial loading along the crack is considered. In the framework of the exact approach (TLTSDB) and approximate (beam approach) approaches critical parameters of the plate is defined. The comparison of results by TLTSDB and the beam approach is realized.

*Keywords:* three-dimensional linearized theory of stability, plane problem, rectangular plate, beam approach, critical load.

UDC 519.2 Vashchilina O. BUILDING A TABLE OF COMBINATIONS BASED ON PASCAL'S TRIANGLE. In solving many problems of combinatorics and probability theory is necessary to calculate combinations  $C_n^k$  - the number of k-element subsets that can be formed from n data elements. There is a combination of decomposition coefficients binomial theorem. Calculations  $C_n^k$  by the classical formula - quite hard work already in  $n > 6$ . However, even mathematicians antiquity was listed triangular sequence of binomial coefficients. This paper written triangle with combinations to  $n=30$  in the table, more convenient to search a specific value combination. Built table recommended as a supplement to textbooks on probability theory.

*Keywords:* combination, probability theory, Pascal's triangle.



UDC 539.3 Andrusenko E. NONLINEAR BENDING DRILL STRING SUPER-DEEP CURVILINEAR BORE-HOLE. On the basis of the theory of curvilinear flexible rods the problem on the elastic bending of drill strings in the channels of curvilinear deep bore-holes with geometric imperfections of their axial lines is stated. Through the use of numerical methods the analysis of the dependence of the force resistance on the amplitudes, step lengths and localization places of harmonic imperfections is performed. The calculation results are discussed.

*Keywords:* drill string, curvilinear bore-hole, geometric imperfections, resistance forces.

UDC 539.3 Kovalchuk S., Degtyar V. NONSTATIONARY MOTION OF GROUND WATERS TO A BORE-HOLE. In the paper, the problem on regime of elastic filtration to vertical bore-hole in semi-bounded layer with free moving surface is consider. The problem is deduced to determination of a potential of filtration velocity of point sink, located at point  $(0,0,\zeta)$  in lower half-space. To study this effect, the known Green function of the Neiman problem is used. It is the sum of two fundamental solutions of the Fourie equation for two sinks with equal intensities, located symmetrically relative plane  $z=0$ . As the result of the stated problem solving, the expression of the filtration velocity potential is received.

*Keywords:* sink, filtration, potential velocity.

UDC 539.3 Dashko O. A TRANSVERSELY ISOTROPIC LAYER WITH A CIRCULAR CYLINDRICAL CAVITY FOR A GIVEN SPLITTING LOAD. We present the solution of the stress state problem for a transversely isotropic layer with a circular cylindrical cavity, on the surface of which there are no radial movement and a balanced thickness couple (splitting load) acts. The results of numerical calculations are described.

*Keywords:* stress state, transversely isotropic layer, splitting load.

UDC 372.851 Krylova T. THE PEDAGOGICAL CONYROL AT THE HIGHER SCHOOL. The essence of pedagogical control, its appearances, forms, functions, notions «evaluation», «mark» were defined. All appearances and forms of the pedagogical control were considered in detail and illustrated.

*Keywords:* pedagogical control, appearances, forms, functions, scale for evaluation.

### **Section of «Information Technology»**

UDC 004.057.3 Zhulkowska I., Zhulkowskyy O., Nikolajenko Y. CALCULATING RANGE NUMBER DATA IN IEEE-STANDARD. The article describes a machine representation and storage boundary (maximum and minimum) values of floating-point numbers in standard *IEEE 754*. In the formula for the calculation were obtained and calculated boundary values in decimal notation system, subject to various formats of this standard, which increases the correctness results and to minimize the computational errors.

*Keywords:* floating-point number, standard, format, exponent, significand, range number.

UDC 519.8 Kadochnikova I. SOLVING CONTINUOUS LOCATION-ALLOCATION PROBLEMS IN TERMS OF RISK. The classification of location problems were considered. Formulation of the deterministic continuous location-allocation problem with continuous demand without restrictions was presented. A model of the problem in terms of risk was constructed. A method of solution of these problem was developed. For its application is sufficient to know the subjective expectations and variances of certain random

parameters of the problem. Algorithm for solving problem in terms of risk was created and implemented as computer software.

*Key words:* continuous location-allocation problem, optimal partitioning problem, non-differentiable optimization, stochastic programming, in terms of risk.

UDC 004.89 Savchuk T., Petrishyn S. IMPROVED METHOD FOREL FOR CLUSTERING STATES OF COMPUTER EQUIPMENT. The article contains improving of clustering method FOREL, which involves the calculation of the radius of clusters to reduce emissions in these clusters.

*Keywords:* method FOREL, clustering, state of computer equipment.

### **Section of «Biotechnology. Ecology»**

UDC 636.5:579.2 Gulyaev V., Kornyyenko I., Brych K., Holovey O. STUDY OF FEED AND WELFARE OF BROILER CHICKENS TO THE GROWTH OF BODY MASS INDEX WITH DEFINITION MEAT FOR SAFETY BIOLOGICAL, BIOCHEMICAL AND PARASITOLOGICAL INDICES. A recipes for broiler chicken feeding followed by assessment of their quality characteristics influence the growth of body mass index and the safety of meat. A microbiological, biochemical and parasitological study welfare of chickens. The most safe and effective recipes.

*Keywords:* broiler chickens, formulation, symbiotropin, tetracycline, tricalcium phosphate, biochemistry, microbiology, research, salmonellosis, colibacillosis, parasitology.

UDC 637.6:544.1 Gulyaev V., Kornyyenko I., Holovey O., Brych K. STUDY OF FEED AND THEIR CONSTITUENTS THE SAFETY OF MEAT PHYSIC-CHEMICAL INDICES. A recipes for chicken feeding broiler followed by assessment of their quality characteristics influence the physic-chemical properties of meat. A study to determine the concentration of hydrogen ions, the mass fraction of ash, salt content in meat, connecting ability, mass fraction of moisture, protein mass and fat mass fraction. The most friendly recipes.

*Keywords:* recipe, broiler chickens, antibiotics, growth hormone, protein, moisture indicators, weight, weighing, desiccator, centrifugation.

UDC 681.3:65.014.1 Gulyaev V., Kornienko I., Golovey O., Radchenko E. RESEARCH OF MICROBIOLOGICAL INDEXES OF SAUSAGES – BOILED TOP GRADE "DOCTOR" AND HANDWRITTEN MADE HOME CHICKEN. The presence of bacteria of group of collibacilluss (*E.coli*) and bacteria of sort of *Proteus* is set in the boiled sausage of top grade "Doctor". Accordance is set to the norm concordantly SStU 4436:2005 such index as a presence of staphylococcus in both investigated standards of sausages. The common amount of microorganisms is determined in the boiled sausage of top grade "Doctor" (1 g) and in the handwritten made home chicken sausage (1 g) 3200 CFU and 1000 CFU accordingly.

*Keywords:* sausage, colonies of microorganisms, Petri dishes, culture medium, *E. coli*, *Proteus*, Staphylococcus, Nutrient agar.

UDC 664.7:579.1 Gulyaev V., Kornienko I., Radchenko E. RESEARCH OF COMPARATIVE DESCRIPTION OF SAUSAGES – BOILED TOP GRADE "DOCTOR" AND HANDWRITTEN MADE HOME CHICKEN ON PHYSICAL AND CHEMICAL PROPERTIES. An organoleptic analysis is conducted on basic quality indexes (original appearance, color, aroma, taste, consistency, succulence). The estimation of the investigated standards of sausages is given on a fiveball scale. Acidity, content of moisture, is certain, nitrites,

salt and fat in the investigated standards of sausages. Proved that home chicken sausage is handwritten made dietary, so as contains the subzero percent of fats – 4,85%.

*Keywords:* sausage, nitrite of natrium, fat, moisture, extract, weighing bottle, pH-meter, product weight, optical density.

UDC 628.336:661.152 Ivanchenko A. WAYS OF UTILIZATION FALLOUTS PRODUCTIONS CARBAMIDE. Actuality of decision in question utilization of fallouts after biological cleaning of effluents production carbamide and upgrading of the cleared flows this production the basic contaminants that are the nitrogen components is shown. Conformities to law process of dehydration fallouts effluents of production carbamide at the use of vacuum are got. It is shown that using the method of degassing it is possible to promote the degree of dehydration fallouts of effluents on 33 %. Quality composition microorganisms of active silt before and after vacuumizing is studied. The process of biological extraction of ammoniacal nitrogen in gas-free sewer water is investigational. It is set that the preliminary vacuumizing of initial effluents at pressure 60 kPa assists the increase of cleaning efficiency from ammoniacal nitrogen on 1,75 mg/l. To use the method of vacuumizing for intensification biological processes in technology of cleaning the nitrogen flows is recommended.

*Keywords:* carbamide, vacuumizing, active silt, ammoniacal nitrogen, biological cleaning.

UDC 661.152.3 Byelyans'ka A. TECHNOLOGY OF OBTAINING COMPLEX FERTILIZERS USING TECHNOGENIC WASTE. In this work, the composition of water chemical treatment thermal plant sludge was investigated by X-ray analysis. It is found that the sludge consists mainly of  $\text{CaCO}_3$  and  $\text{CaSO}_4$ . The possibility of the use of technogenic waste like the chemical treatment calcium-containing sludge and activated sludge lies on the technology for complex fertilizers. It has been proved that in the cultivation of tomato by adding NPKCa-fertilizers technogenic waste may increase the height of seedlings by 67% and increase yield by 8%. The technological scheme of integrated NPKCa-fertilizers technogenic waste in which first applied dispersion process was developed. Technical and economic calculations show that the index yield in the proposed technology is 1.3 and the discounted pay-back period is 2.4 years.

*Key words:* dispersion, activated sludge, technogenic waste, complex fertilizer.

UDC 502.05 Zberovsky A., A.P. Ohurtsov A., Boginya O. THE ECOLOGICAL ESTIMATION OF THE POLLUTION OF RESIDENTIAL ZONE, WHICH FITS CLOSELY TO THE PRIVATE JOINT-STOCK COMPANY "DNEPROVSK METALLURGICAL COMBINE". The results of investigation of pollution residential areas adjacent to the JSC "Dnieper Metallurgical Plant", in such kinds of pollution like noise pollution, radiation pollution, dust pollution and pollution of the atmosphere with carbon monoxide. Recommendations to improve the ecological condition of the residential areas adjacent to the JSC "Dnieper Metallurgical Plant".

*Keywords:* metallurgical production, emissions, air pollution, dust, noise, carbon monoxide.

### **Section of «Life Safety»**

UDC 629.039.58 Makhovskiy V., Kryukovska O. RESEARCH of DANGERS THAT ESTIMATION of CONSEQUENCES of EMERGENCY SITUATIONS and EMERGENCY ON WAREHOUSE of CAPASITIVE STORAGE of FLOUR in BAKEBREAD ENTERPRISES. The analysis of determination of emergency situations and failures is resulted in the article, and also their consequences, which can happen at a reception, storage and

use of flour in a technological process, values of parameters of technological process, structural features of equipment and equipment of warehouse of capacitive storage of flour, economic and organizational feasibilities of personnel on the whole on warning of emergency situations.

*Keywords:* emergency situation, consequences of emergency, area of destructions, warehouse of capacitive storage of flour.

UDC 629.039.58 Makhovskiy V., Kryukovska O. STUDY AND THE ESTIMATION OF THE DANGER OF THE GAS SUPPLY SYSTEM OF THE BREAD ENTERPRISES. In this work researches are conducted for the purpose determination of dangers, possible failures and their consequences of gas economy of barebread enterprises of, which is intended for tricking into, change and incineration of natural gas with the purpose of making of heat and thermal energy as a pair and hot water from to take into account factors: explosion-firedanger and physical properties of natural gas; construction features of equipment, which to contain presence of dangers, incident to this type of equipment; value of parameters of technological process of tricking into, change and incineration of natural gas. The quantitative estimation of scales and consequences of possible failures, related to the gas economy is executed.

*Keywords:* gas economy, gas air mixture, emergency situation, failure, consequences of failure.

UDC 613.81:663.41 Levchuk E., Romanjuk R. TEENAGE ALCOHOLISM: CAUSES, SYMPTOMS AND CONSEQUENCES. The essence of the concept of «beer alcoholism» and give its feature. Analyses factors which play a decision role in forming of alcohol dependence of young people. Listed the most common reasons first try alcohol and persons who are most prone to alcoholism. Presented symptoms of «beer alcoholism». Described in detail the negative impact of alcohol on health and provides guidelines that should be spent on prevention of «beer alcoholism» among young people.

*Keywords:* alcoholism, teen, beer, symptoms, predisposition, health, prevention.

UDC 534.4 Polyanchikov O., Kizymishyna T. RESEARCH HEAVY METALS IN THE HUMAN BODY AND THE COMPARISON WITH THEIR CONTENT IN FOOD AND AIR. The content heavy metals in human hair and a comparison of their content in foods (vegetables, fish) and dust vacuuming the street. The content copper, iron and zinc in human hair tends to increase with age, although to a limited extent. It is shown that heavy metals in human hair increases in the following sequence: Mn, Pb, Cu, Fe, Zn. Fish contains more lead, especially the gills than other products.

*Keywords:* human hair, content heavy metals, food, air.

UDC 502.3:621.791.754'264 Milyutin V., Rozdobudko E. ECONOMIC EFFECTIVENESS OF THE USE OF A CONCEPT OF ECOLOGICAL RISK WITH THE WELDING. Use of conception of ecological risk and normative information, allows in number to estimate middle life-span and working experience of welder depending on the degree of contamination of atmospheric air of working and areas of residence and also done a damage to the health and environment. Worsening of quality of air of working area reduces the set duration of safe working experience on 3-13 years and lives – on 7-10 years.

At the use of LDV on 82-85% running expenses are abbreviated on GRDV and total expenses on ventilation of workshop, the ergonomics terms of labor are provided, increases

on 10-20% his productivity, substantially the prime price of products down and diminishes on a 90-95% volume of harmful extras in an atmosphere.

*Keywords:* ecological risk, harmful matters, air working area, ventilation, class of terms of labor, working experience, life-span, labor productivity.

### **Section of «Education»**

UDC 004.7 Lytvyn A., Krylovsky I. ORGANIZATION-BASED LEARNING VNC TECHNOLOGY. The approach organizations interactive learning process based on the use of modern information technology network protocol VCN. This approach made it possible to teamwork, operational support and more active learning.

*Keywords:* network technology, client – server, protocol VCN, script, remote access.

UDC 004.7 Lytvyn A., Aliyev E. USING A VPN TECHNOLOGIES IN DISTANCE LEARNING PROCESS. An approach of distance educational process on the example of the interaction of remote computers running on different software platforms Windows, Android, iOS technology with VPN (Virtual Private Network).

*Keywords:* network technology, VPN technology, scenario, remote access.

UDC 378.147 Bochkova T., Truseeva N. DISTANCE LEARNING TECHNOLOGIES IN THE TEACHING OF PHYSICS TO FULL-TIME STUDENTS OF TECHNICAL UNIVERSITIES. Analysis of the application features of distance learning physics of full-time students of technical universities has shown the promise of considered model of learning. The combination of modern didactic and information technologies enhances the quality of education. For the students of technical universities the development of didactic means of distance learning physics should be realized taking account of their future professional activity.

*Keywords:* distance learning, didactic and information technologies.

UDC 378.147.31 Taran V., Pabat A., Belotserkovets S. INTERPRETATION OF THE CIRCULATION THEOREM OF MAGNETIC FIELD VECTOR IN THE CONCEPTION OF CONSERVATION LAWS IN GIVING A PHYSICS COURSE AT THE TECHNICAL HIGHER COLLEGE. It has been shown that the study of the circulation theorem of magnetic induction in the student audience is advantageously carried out on the basis of the concept of physical conservation laws, as logically more adapted to the physical models and the laws of electromagnetism. The proposed factor of conservation in the magnetic field allows making up sets of modular control tests on the calculation of the magnetic induction field currents of different shapes and sizes.

*Keywords:* education technology, physics course, the circulation, the magnetic field, the concept, conservation laws.