

MECHANICAL AND THEORETICAL ENGINEERING

I. V. Boyarkina, V. N. Tarasov

The method of obtaining additional power in the bucket loading-transport machines with the help of a pneumatic spring

For bucket loading-transport machines is important to search for ways to reduce and eliminate energy losses when moving the bucket, boom and bodies associated with the work equipment. The article describes one way of eliminating these disadvantages associated with the use of pneumatic springs that allows you to balance all the forces of gravity working equipment. In the dimensioning of the pneumatic spring solved the problem of providing small changes in the volume of internal cavity filled with compressed air, so that when the lift arm to provide a substantially constant force on the stock springs and the constant pressure of compressed air. The change in the force on piston rod of pneumatic springs for lifting the boom depends on the volume changes of the compressed air expansion ratio, the character of changes of this parameter coincides with the nature of the change of forces of gravity of bodies, associated with an arrow, given to the pneumatic spring.

Keywords: power, energy, gravity, counterbalance, pneumatic spring.

Yu. A. Burian, M. V. Silkov

Design and evaluation of vibration isolation of support for process equipment using quasi-null stiffness effect

The research is related to the important direction of applied mechanics – the theory of vibration isolation of vibroactive objects, such as generators, motors, pumps, compressors, fans, pipelines, etc. The design and problems of mathematical simulation of a prospective support structure using the quasi-zero stiffness effect are considered. A mathematical model of the suspension is obtained, which allows choosing parameters for reducing the coefficient of force transfer to the base in a certain frequency range.

Keywords: vibration isolation of process equipment, quasi-zero stiffness effect, spring.

V. R. Vedruchenko, V. S. Shcherbakov, V. I. Surikov, V. E. Shcherba, E. A. Dorofeev

Assessment of decrease of unevenness of an instant theoretical expense of the axial-piston pump due to change of diameters of pistons and angular distance between them

The article is devoted to unevenness of an instant theoretical expense of the axial and piston pump due to change of diameters of pistons and angular distance between them. In work the numerical experiment based on multidimensional nonlinear optimization is made. As a result, the minimum unevenness of an expense is provided at equal values of diameters of pistons, with equal angular distances.

Keywords: Axial-piston pump, unevenness of an expense, cylinder, piston, optimization.

S. V. Korneev, S. V. Pashukevich, R. V. Buravkin, A. A. Anoprienko, N. Yu. Machekhin

The influence of low temperatures on internal losses in transmission units

The paper presents distribution data to equipment failures during the year, typical for conditions of OAO «Surgutneftegaz» and justified demands on drive train lubricants to reduce internal losses. In the operation of automotive vehicles in the off-season there is an increase in the number of failures.

Moreover, the number of failures of transmission components significantly exceeds the number of failures of internal combustion engines. This is especially true for the autumn-winter period. The causes of failures related to the processes of irrigation and transmission oils change their viscosity-temperature properties, which increases internal losses in the transmission units. The use of properly selected transmission oils helps to reduce internal losses and reduce energy consumption in winter of the equipment.

Keywords: transmission oils, power losses, low temperature, transmission assembly, viscosity.

S. N. Litunov, I. A. Sysuev, E. N. Gusak

On the question of ultrasonic cleaning of stencil forms

A method of regenerating a printing paste used in the manufacture of LTCC chips is proposed. A laboratory device for testing has been developed. The experiments show that the best result is achieved with a distance from the waveguide to the surface of the printing plate of 3,5 mm, with a speed of the device in the form of 3–4 cm/s. The best medium for cleaning is distilled water and ethyl alcohol in a ratio of 1:1 at a temperature of 15–17 °C.

Keywords: ultrasonic cleaning, screen printing, LTCC-technology.

A. P. Morgunov, N. A. Matveev, S. P. Bobrov, A. V. Lyamtsev

Technology of increasing of resource of mechanical rubber products by applying of solid lubricants

Rubber products have been widely used as shock-absorbers and seals in pairs of friction. Shock-absorbers based on rubber-cord shells fulfilling their functional purpose operate under extreme operating conditions at elevated temperatures high contact pressures undergoing cyclic alternating and shock loading and also exposure of aggressive environment.

The authors is proposed a number of technological solutions to increase tribotechnical characteristics by using various materials and coatings to improve the wear resistance of rubber, as well as the advisability of using solid lubricants.

Keywords: mechanical rubber products, rubber-cord shells, shock absorbers, seals, wear resistance, solid lubricants, surface.

V. N. Tarasov, I. V. Boyarkina, M. V. Kovalenko

Theory of trimming with pneumatic spring gravity of bodies floating boom

Pneumatic springs of small and medium size are universal and durable, they are light in weight, small in size and dimensions and are used in those cases where comfortable smooth movement of bodies with unstressed fixation on the stop is required. Practical implementation of pneumatic springs is currently limited to springs of small sizes and forces.

In connection with limited theoretical information on the use and improvement of the construction of pneumatic springs for balancing the forces of gravity in which the active force on the rod is created by the rod section, since the volume of the piston and rod spring cavities are interconnected by the holes in the piston. The internal volume of the spring is filled with compressed air under pressure. Theoretical positions related to the reduction of gravity to pneumoimpulse pneumatic springs are considered. It has been established that in order to reduce the unevenness in the variation of the compressed air pressure and to reduce the force on the rod, it is necessary to strive to reduce the expansion of the compressed air in the air spring. The technique of balancing the pneumatic spring of the load with a vertical displacement by an arrow is given.

Keywords: gas springs, the force of gravity, the trim.

L. O. Shtripling, E. G. Kholkin, K. S. Larionov

Development of machine design for implementation of process of neutralization of oil contaminated soil at low ambient temperatures

The article consider a method for efficient elimination of emergency situations consequences, accompanied by oil products spills and installation for neutralizing oil contaminated soil by the method of reagent encapsulation, which adapted for cold conditions. There are determined the main geometric parameters for three types of installations: small, medium and big. The small installations allow to load in the mixer up to 100 kg oil contaminated soil, the medium installations – up to 1000 kg, the big installations – up to 20000 kg. An important distinctive feature of this considered installation's design is that the thermal energy of the exothermic process of chemical detoxification oil contaminated soil, which released at the each stage of the process neutralization, is used (for instance, in cold conditions) to thaw a subsequent portion of frozen oil contaminated soil, and under usual conditions it dissipates into environment. Besides, a short-term forced delivery of carbon dioxide at the final stage of process neutralization to a high concentration directly in the installation allow to replace a long-term process of formation and hardening of the microcapsule shells, which occur in the natural conditions in the open air.

Keywords: equipment for neutralization, oil contaminated soil, reagent encapsulation.

V. E. Shcherba, A. P. Bolshtyanskii

Increase of operational properties of an automobile at carrying out of average and major repairs

One of the modern ways to improve the operational properties of a car is to increase the safety of its movement by improving the control systems of direction and braking properties. The article considers the possibility of using an electromagnetic brake amplifier, which allows for effective braking with engine failure, or when driving with the engine off, for example, when towing a car with a flexible cable. Modernization of the braking system can be carried out during the mid-term or major overhaul of the vehicle in the car service station conditions.

Keywords: automobile, traffic safety, brake system, car service station.

I. L. Chekalin, I. K. Chernykh, E. V. Krivonos, E. V. Vasilev

Methods of upgrading the quality of friction stir welds

Using machines for carrying out friction stir welding allow is to obtain higher quality welds with greater productivity than welds obtained most common method of argon-arc welding. It is thanks to this that this method of welding is currently used in rocket engineering and aircraft building, where it has proved itself well. Nevertheless, the strength of the weld is not always equal to the strength of the parent material, but this can be achieved using various methods of upgrading the quality. In this paper, considering the existing methods, as well as the promising methods proposed by the authors. The possible forms of joints of welded products, schemes of trajectories of tool movement are analyzed. A method of local thermal impact on details being welded by means of external elements is proposed.

Keywords: friction stir welding, thermal impact, schemes of weld, heating elements, productivity, quality, strength, weld seam.

ELECTRICAL ENGINEERING. POWER ENGINEERING

A. V. Bubnov, A. N. Chetverik, A. N. Chudinov

Multifunctional logic comparator with indirect determination of angular velocity error for synchronous-inphase electric drive

The synchronously-inphase electric drive, built on the basis of electric drive with phase synchronization, widely used in thermal imaging and laser scanning systems due to the high accuracy and dynamic characteristics in a wide range of adjustment of the angular velocity. The aim of the article is to develop a classification of methods for the indirect determination of the angular velocity error in an electric drive with phase synchronization and the development of circuit solutions for the construction of the frequency error detection unit, which is one of the main elements of the multifunctional logical comparator. Classifications of methods for indirect error determination by angular velocity (variants for constructing a block for determining the frequency deviation of the compared pulse sequences) and the functional schemes of the frequency error detection unit have been developed, which implement indirect methods for determining the angular velocity error in a synchronous-in-phase electric drive.

Keywords: the electric drive with phase synchronization, synchronously-inphase electric drive, multifunctional logic comparator, discriminator.

V. K. Vasiliev, S. S. Busarov, A. V. Nedovenchany, M. A. Chizhikov, B. S. Sazhin

Analysis of possibility of using low-speed long-stroke dopeless reciprocating compressor stages to compress refrigerant and cryogenic gases

The authors of this article elaborate method of calculating the working processes of slow long-stroke piston stages verified when used as the working fluid - the air. The results obtained allows to show that in the low-speed reciprocating compressor units may compress the gas to medium pressure in a single step in meeting the conditions for permissible temperature of compressed gas. In this connection it is necessary to solve the problem of the possibility of slow stages in compression of different gases including refrigeration and cryogenics.

Keywords: low-speed stage, cryogenic equipment, refrigerants, discharge temperature.

V. S. Klimash, B. D. Tabarov

Principles of construction of push-regulating device for transformer substations

There is proposed magnetic-thyristor ballast on the high side of the transformer substation to replace the mechanical switching device. It ensures controlled switching on and off of the power transformer under load and voltage regulation among consumers at the given level. Research in Matlab environment, staff and the new scheme showed that the apparatus limits the inrush current, voltage and shock drawdown electrodynamic forces acting on the windings of the transformer, and made off without current and arc through the switch contacts.

Keywords: transformer substations, voltage regulation under load, the throughput of the transmission coefficients of power and useful actions.

A. A. Kuznetsov, E. Yu. Kopytov, S. S. Mikhaleva, A. G. Zverev

Research sparking during service of railway carriages

The purpose of the real work is complex studying of process of preparation of cars for definition of possible sparking of both mechanical and static phenomenon with development of technical actions and recommendations about decrease in risks of sparking.

Keywords: washing and steaming station, static electricity, grounding, steam metal pipe, sparking.

V. V. Kharlamov, D. I. Popov, A. P. Afonin

Diagnosis of condition of DC machine's collector-brush unit in terms of commissioning tests using parameters of nonidentity of commutation

The article presents the necessity of considering parameters of distribution law of sparking intensity in the process of diagnosing the collector-brush unit's condition. There are justified vector parameters of diagnosis indicating the nonidentity of switching cycles. There is proposed the form of new parameters in the form of three-dimensional vectors. There are refined bipartite graphs matching defects and diagnostic parameters due to the conditions of commissioning tests. There is developed the algorithm of applying the proposed diagnostic parameters in the process of commissioning tests.

Keywords: brushed DC machine, diagnostic parameters, nonidentity of commuting cycles, acceptance tests, algorithm of diagnosis, distribution law, intensity of sparking.

I. A. Yanvaryov

Structurally functional aspect of thermal analysis of liquefied gas storage tanks

Effective design and operation of storages of the liquefied products in many respects is defined by the quality of thermal analysis of liquefied gas storage tanks, its research generally is as difficult dynamic heat technical systems. In the article the structurally functional analysis of objects of storage is carried out, the concept of thermal efficiency of the tank is entered, expressions and results of the research for product temperature after τ hours of storage for various types of tanks are obtained.

Keywords: tank park, heat technical system, heat exchange system, liquefied gas, fuel and energy efficient usage.

A. I. Antonov, M. G. Vishnyagov, D. A. Zubanov, D. Yu. Rudi, A. A. Ruppel

On the issue of changing values of voltage asymmetry coefficients in reverse order for different values of phase-to-phase resistances

This article describes the processes associated with the appearance of asymmetry of the three-phase voltage system, explains the reasons why this phenomenon is undesirable and must be combated with this phenomenon. The problems of ways to reduce the unbalance coefficient of the voltage in reverse sequence are considered. The dependences of the voltage asymmetry coefficients on the reverse sequence on the values of phase-to-phase resistances are investigated and the main recommendations for the management of these values are given, which allows improving the quality of electrical energy for full compliance with GOST requirements.

Keywords: power quality, voltage asymmetry ratio, electromagnetic interference, phase-to-phase resistances, line voltages.

A. V. Ded, S. P. Sikorskiy, D. A. Rogozina

Review of modern market of measuring of quality indicators instruments for electric power

In the article a review of modern measuring instruments of indicators of quality of electric power presented now at the market of Russia is carried out. The fields of their possible application and feature of design are considered. The comparative analysis of their functional properties and cost which results are presented in the table form is made. The summary table of technical characteristics of analyzers of quality of electric energy of the Russian producers is formulated.

Keywords: quality of electric energy, measuring instrument, methods of measurements, quality indicators, electromagnetic compatibility.

A. V. Ded, S. P. Sikorskiy, P. S. Smirnov

Some questions of certification of electric energy on quality indicators

The article deals with issues related to the quality control (certification) of such goods as electric energy. It is indicated that certification is subject to electric energy transmitted to household consumers. The modern information on organizational issues in the field of certification of electric energy is summarized and presented. The necessity of conducting measures to monitor the quality of electrical energy is substantiated.

Keywords: power quality, certification, voltage deviation, frequency deviation.

F. S. Nepsha, V. M. Efremenko

Evaluation of the influence on level of consumption of active and reactive power of elements of electrical supply system of coal mines not involved in regulation of voltage level

The work assesses the effect of the elements of the power supply system not participating in the regulation of voltage, the level of consumption of active and reactive power in the power supply system of the coal mine. The regulatory effects of these network elements in relation to the overall level of consumption of the power supply system are determined. The main regularities and functional relationships between the parameters of the elements, the characteristics of the load and the level of losses of active and reactive power are established. It is revealed that the obtained regularities should be taken into account when controlling the power supply system regime of a coal mine by the criterion of the minimum of active power consumption.

Keywords: voltage regulation, passive elements, active power losses, voltage level optimization, coal mine.

M. A. Krivoshein

On the question of mathematical modeling of air distribution in building ventilation systems

The main dependencies describing the relationship between air pressure loss and airflow in building ventilation systems in mathematical modeling of their air regime are considered. Formulas are proposed that take into account the characteristics of fans, intake, exhaust valves and other elements of the aerodynamic network of ventilation systems with a higher accuracy. The effect on the results of mathematical modeling of the method for determining the dependence of the air flow on the pressure drop is estimated.

Keywords: ventilation, mathematical modeling, pressure loss, resistance characteristics.

D. Y. Rudi, A. I. Antonov, A. A. Ruppel, E. Yu. Ruppel

Research of decrease in coefficient of asymmetry of tension on return sequence by means of symmetrizing devices of transformer type

This scientific article is devoted to the issues of power quality, the causes and consequences of the appearance of voltage asymmetry in power supply systems of foundry. The main method of calculation and a method of reducing the unbalance factor of the voltage in the reverse sequence with the help of symmetric devices of transformer type are described in the article. In conclusion, it is noted that at the moment the problem of the quality of the electric power industry is a very global problem in Russia and in the world and requires an immediate solution, since the distribution networks are characterized by a significant asymmetry of stresses. This is one of the main reasons for the reduction of the quality of electrical energy and the increase in power losses in the network.

Keywords: the quality of the electric power, coefficient of asymmetry of tension symmetrizing the device, asymmetry.

L. V. Beloglazova

Verification and analysis of a dusty stream model motion in an inertial-vacuum dust collector

The purpose of the article is to analyze the motion of the dusty flow in the flowing part of the ash collecting device IVDC (inertial vacuum dust collector). The main tasks assigned to the author are to carry out a numerical experiment in ANSYS CFX under various boundary conditions and to select the most realistic display of flow dynamics in them with subsequent comments on the occurring physical processes in each. The result of the article is based on well-founded conclusions and conclusions on four pairs of boundary conditions, which can be useful for conducting numerical experiments by subsequent researchers of the motion of a dusty stream.

Keywords: dust collector, dusty flow, IVDC, verification.

V. V. Fedyanin, V. K. Fedorov, D. V. Fedorov, N. V. Rubanov, S. N. Proskuryakov

Investigation of the influence of chaotic carrier frequency of pulse-width modulation on operation of frequency-controlled asynchronous drive

Classical PWM is fairly well understood, while many details relating to PWM with a chaotic frequency have not yet been properly analyzed from practical and theoretical point of view. The work is devoted to the study of the frequency converter with a chaotic carrier frequency PWM. In the first part of the study, PWM analysis is performed using a simulation model with a constant and chaotic carrier frequency. In the second part, the study is carried out on experimental setup of the frequency-controlled asynchronous electric motor. A comparison is made of the energy parameters using PWM with constant and chaotic carrier frequency. Using the chaotic frequency of the PWM carrier, the method for reducing acoustic noise has been developed. The spectra of the output voltage for the classical PWM and PWM with a chaotic change in the carrier frequency are measured and analyzed.

Keywords: pulse width modulation, power electronics, frequency converters, deterministic chaos.

V. Z. Kovalev, A. G. Scherbakov, O. A. Petukhova, A. A. Zyabkin

The influence of deviations of parameters of asynchronous machine its static characteristics under fan load

This article describes the relevance of the problem of energy efficiency in electric drives with asynchronous motors; it provides a study of the influence of deviation parameters of mathematical model of asynchronous machine in its characteristics reflecting the efficiency of the machine; the

description is used to study the mathematical model of the asynchronous machine and the software product created on the basis of the applied mathematical model.

Keywords: asynchronous machine, mathematical model in phase coordinate system, the parameters of the mathematical model, software product, the performance characteristics of asynchronous machine.

INSTRUMENT ENGINEERING, METROLOGY AND INFORMATION MEASURING EQUIPMENT AND SYSTEMS

S. V. Biryukov, L. V. Shchapova

The sensor of electric field strength in form of flat carrying out plate in form of square

Measurement of the level of electric fields exposure to the technical and biological objects for a long time will be an strong task. To solve this problem, the required electric field sensors with specified metrological characteristics. The aim of the study is the establishment of theoretical assumptions for the calculation of the flat electric field sensors. It is proved that the accuracy of the sensor does not exceed 2 % in the spatial range $0 < a < 0,14$ and in the entire spatial range of measurement is negative. Using the methods of calculation of electrostatic fields, this article examines single-axis electromotive disk sensor, which is based on a conducting plate in the form of a square with side L , and the estimation errors caused by the inhomogeneity of the field. The maximum of this error is 2% in the spatial range from 0 to $7L$ to the source field that allows you to design better quality sensors used in different measuring systems of wide application.

Keywords: electric field intensity, the sensor, an error from non-uniformity of a field.

L. O. Shtripling, V. V. Bazhenov, N. S. Varakina, N. P. Kupriyanova

Improvement of air pollution control system in Omsk

This paper aims to consider the issues of community atmospheric air pollution monitoring. The results of the atmospheric contamination analysis performed in Omsk for the period of 2007–2017 are presented. Although gross emissions of pollutants in the city have declined over the past five years, there is an increase in ground level concentrations of certain pollutants. An automated atmospheric air pollution control system for the city of Omsk is proposed. The atmospheric air pollution control system allows performing the atmospheric air computational monitoring over the whole range of emitted pollutants. This system allows receiving consolidated information on the adverse impact sites collected from various open sources of information, identifying sites of possible excess contamination sources where environmental information is insufficient and (or) unreliable

Keywords: atmosphere, air pollution, monitoring, information system, control, search for a pollution source, analysis of atmospheric pollution.

E. V. Leun

Hybrid 3D measuring head for high-precision contact and non-contact coordinate measuring for complex shape details

The article presents a hybrid 3D measuring head that consists of the contact measuring head touch with a hollow ruby spherical cap of radius r -tip and put inside it developed noncontact fiber-optic measuring head. This head can be used for contact measurement with trigger output signal $U_{out1} \sim 1(r-r_{tip})$ and acquires new possibilities for contactless coordinate measurement:

- 1) with a linear change in output signal as the head deviation;
- 2) the trigger output signal $U_{out2} \sim 1(r-r_{hs})$, where r_{hs} is the radius of the spatial-sensitive hemisphere with condition $r_{hs} > r_{tip}$ as head of the touch;

3) a hybrid contact-contactless mode with the two flip-flops of trigger signal $U_{out3} \sim 1(r_{tip}) - 1(r_{rhs})$ for the tolerance control and control of the width of the tolerance admittance control width tolerance.

The article presents principle of operation and describes the main components of this head, calculated the main performance characteristics, shows the technological possibilities for their implementation.

Keywords: measuring head, touch head, head deviation, coordinate measuring machine, coordinate measuring.

G. M. Sidelnikov

Noise stability of demodulator of signals PSK and DPSK in multipath channels

We consider the noise stability of demodulation from in multipath channel with additive Gaussian noise. The analysis of noise stability is based on fluctuation of signal distance through multipath. The detailed analysis allow to compare algorithms of diversity system of diversity. There are calculated curves of noise stability from PSK and DPSK for channels with different structures. The obtained probability characteristics allow to determine the effectiveness of signals in different channels, as well as an analysis of noise immunity at various levels of additive noise, and will determine the possibility of applying such channels as diversity reception and the transmission.

Keywords: signal distance, the probability of error, integral function of probability distribution, loose multipath, additive Gaussian noise.

I. D. Pavlov

Electrodynamic modeling and calculation of wide-band small-sized spiral antenna of millimeter range

The electrodynamic modeling and optimization of compact helical antenna of millimeter range is considered. The main purpose of simulation is to test the possibility of minimizing the dimensions of the antenna while maintaining its basic characteristics. Also, optimization of individual components is carried out, in order to improve some of the antennas characteristics. The results of modeling and optimization presented in the article show that the applied design solutions allow to minimize antenna dimensions while keeping its basic characteristics at acceptable level.

Keywords: wideband antenna, spiral radiating structure, wideband transformer, millimeter band, small-sized, modeling.

INFORMATION TECHNOLOGY

V. N. Zadorozhnyi, E. B. Yudin, M. N. Yudina

The degrees distributions in growing graphs with arcs losses

The problem of calculating the two-dimensional arc (edge) degrees distribution is solved for growing preferential attachment graphs with arc losses. The developed calibration methods for graphs with arc losses allows us to synthesize adequate graphs models of growing networks taking into account the loss of connections between nodes. The opportunities for effective management and modeling of social networks, information, telecommunications networks and cooperation networks are expanding.

Keywords: random graphs with nonlinear preferential attachment rule, vertex degree distribution, edge (arc) degrees distribution, random graphs calibration.

P. A. Batrakov, A. V. Maer, V. A. Simakhin
Confidence intervals for quantiles of distribution

The paper considers the construction of asymptotic confidence intervals for quantiles of parametric, nonparametric and seminonparametric classes of distributions taking into account various a priori information about the initial distribution. As an estimate of the quantile of the unknown distribution function, the solution of the empirical equation is used. Recurrence methods for stochastic approximation are used to solve the equation. It is shown that asymptotic confidence intervals for quantiles of distribution are completely determined through estimates of the distribution function and their variance. In general, asymptotic confidence intervals for quantiles are given. Estimates of confidence intervals for quantiles are given taking into account a priori information on the initial distribution.

Keywords: quantile, confidence intervals, seminonparametric intervals, nonparametric intervals

I. V. Kirgizova, A. M. Gajimuradova, N. B. Kaliyev

Mathematical modeling based on dynamic models of processing series of growth dynamics processes of potato in vitro conditions using various variants of nutrient media

At present time using mathematical modeling techniques for biological processes optimizing is an actual and promising direction. The method of mathematical modeling has found its application in modeling growth processes of plants microclonal multiplication depending on various factors of cultivation. The aim of the research is studying of the influence of the phytohormones and vitamins concentration to the potato morphogenesis processes in vitro conditions – early variety «Ermak», «Alena» and mid-term variety «Khozyayushka».

The article presents the researching on the selection of the most effective component composition of the nutrient medium for microclonal multiplication of Siberian varieties of potato – «Ermak», «Alena», «Khozyayushka». As a result of the research it is found that the best variant for cultivation of micro-races of the studied potato varieties is a nutrient medium with a mineral composition according to the Murasige-Skug formulation with the addition of thiamine 1,5 mg/l, pyridoxine 1,0 mg/l, ascorbic acid 3,0 mg/L, ferulic acid 0,005 mg/l, kinetin 0,5 mg/l, indoleacetic acid 0,2 mg/l, sucrose 30,000 mg/l.

Keywords: microclonal multiplication, approximation, singular spectral analysis, nutrient media, Siberian potato varieties.

V. I. Vasilyev, A. E. Sulavko, S. S. Zhumazhanova, A. A. Nigrey

Evaluation of human capabilities for identification of handwritten images in process of their reproduction on monitor screen

Experiments for the authorship identification of handwritten control words by subjects are conducted. The error rate depends on the number of identifiable signers ranged from 2,6 % to 17,6 %. On results of the experiment, the artificial intelligence significantly exceeds the reliability of recognition of the signatories on handwriting images. It is established that natural intelligence is used to recognize handwriting dynamic graphic images of signs that does not depend on the speed of their reproduction.

Keywords: identification of the signatories, natural intelligence, artificial intelligence, pattern recognition, feature of reproduction of a signature.

G. A. Fofanov, A.V. Eremenko, M. A. Starkov, A. E. Samotuga

The problem of computer systems user identification by three-dimensional facial images

This paper deals with the problem of security of informational resources by the means of carrying out hidden identification of personality of the subject, who is carrying out work functions, according to three-dimensional facial image. Short description of existing and developing 3D capture technologies realized in standard computer and laptop equipment cameras is given. Achieved results in this particular area are noted, range of used identifying facial features is described.

Keywords: analysis, security, biometrics, identification, facial features, recognition.