

MATHEMATICAL MODELING.**METHODS AND INFORMATION PROTECTION SYSTEMS, INFORMATION SECURITY****Voronov M.V.****ANALYSIS AND SYNTHESIS OF TECHNOLOGIES**

The issues of formalization of the description of technologies presented in verbal form are considered. The method of the constructive process of describing technologies is described. Questions of automated solution of problems of analysis and synthesis of technologies are discussed.

Keywords: *knowledge, technology, process, action, frame, analysis, synthesis*

Drozdova E.N., Savelyeva T.A.**VOICE CONTROL TECHNOLOGY IN VIDEO GAMES**

The features of the implementation of the mechanics of a video game with voice control are considered. The concept of game mechanics is described. The description of the architecture of the game is presented. The architecture and algorithm of the voice control module are proposed. The creation of scripts for interacting with game objects and the voice control module is considered. The structure of the game levels, the creation of the scheme and the implementation of the game level are described. The results of testing on various machines are presented. Prospects for the development of the project are proposed. The created game level demonstrates the technology of voice control in video games.

Keywords: *video games, indie game, unity, game engine, video game logic, video game mechanics, voice control*

Bogdanov A.I., Mongush B.S.**MATHEMATICAL MODELS FOR OPTIMIZATION OF PRODUCTION-TRANSPORTATION-WAREHOUSE PROCESSES**

The analysis of literature sources in the development of integrated (production, transport and warehouse) mathematical models for optimizing business processes has been carried out. A mathematical model is proposed that allows to solve the problem of determining the optimal location of plants from the point of view of minimizing transport costs in both deterministic and stochastic versions. An iterative algorithm for solving the problem has been developed. The proposed algorithm was tested on a specific example.

Keywords: *production-transport-warehouse model, transport costs, fixed costs, optimization, Newton's method*

Drozdova E.N., Makarov A.A.**DEVELOPMENT OF AN AUTOMATED APPLICATION RUSIFICATION SYSTEM FOR DEVICES ON THE ANDROID PLATFORM**

The article is devoted to issues related to the development of an automated system for providing multilingual applications for Android devices using the example of the Russian language. The main stages of development of an automated complex for language translation of the software interface for devices on the Android platform are considered. The creation of the graphical interface of the client application and the software component is described. The creation of a database of internationalization files is analyzed. The results of testing on a focus group selected by the free recruitment method and including 450 people are presented. Prospects for the development of the project are proposed.

Keywords: *android, operating system, framework, compilation, decompilation, android studio, root access, internationalization*

CHEMICAL SCIENCES**Aminov F.M., Ganiev I.N., Aliev D.N., Safarov A.G.****INFLUENCE OF TITANIUM ON SPECIFIC HEAT CAPACITY AND CHANGE IN**

THERMODYNAMIC FUNCTIONS OF ZN55AL ALLOY

Heat capacity is the most important characteristic of substances, and from its change with temperature it is possible to determine the type of phase transformation, the Debye temperature, the energy of vacancy formation, the coefficient of electronic heat capacity, and other properties. In this work, the heat capacity of the Zn55Al alloy with titanium was determined in the "cooling" mode from the known heat capacity of a reference copper sample. For this purpose, polynomials describing their cooling rates were obtained by processing the curves of the cooling rate of samples made of the Zn55Al alloy with titanium and the standard. Further, according to the experimentally found values of the cooling rates of the standard and samples from alloys, knowing their masses, the polynomials of the temperature dependence of the heat capacity of the alloys and the standard were established, which are described by a four-term equation. Using the integrals of the specific heat, models of the temperature dependence of the change in enthalpy, entropy and Gibbs energy were established. The obtained dependences show that with an increase in temperature, the heat capacity, enthalpy and entropy of alloys increase, while the values of the Gibbs energy decrease. In this case, titanium additives increase the heat capacity, enthalpy, and entropy of the initial Zn55Al alloy. In this case, the value of the Gibbs energy decreases.

Keywords: alloy zn55al, titanium, heat capacity, cooling mode, heat transfer coefficient, enthalpy, entropy, Gibbs energy

Dashchenko N.V., Kiselev A.M.

THE APPLICATION OF HYDROPHILIC NANOEMULSIONS FOR A TARGETED CHANGE IN THE PROPERTIES OF SYNTHETIC TEXTILE MATERIALS

The process of modification of synthetic textile materials with hydrophilic aminosilicon-organic nanoemulsions has been studied. Recommended preparations and treatment mode for polyester and polyamide fabrics with the formation of nanocoatings in order to regulate the hydrophilic-lipophilic properties of the fibrous material and impart improved consumer and special properties to textiles.

Keywords: synthetic material, hydrophilic nanoemulsion, modification, nanocoating, hydrophilic-lipophilic properties, finishing effects

Semikhina L.P., Karelin E.A., Shtykov S.V.

THE INFLUENCE OF THE DETERGENT ACTION OF AQUEOUS SOLUTIONS OF SURFACE-ACTIVE SUBSTANCES ON THE REMOVAL OF OIL FROM THE FORMATIONS

Using the example of several surfactants (surfactants), their ability to extract oil from bulk core and wash off oil films from the surface of a solid was investigated. It was found that in the area of low oil saturations (less than 50%), the effect of using surfactants during waterflooding significantly depends not only on the interfacial tension σ at the oil-water interface, but also on the washing ability of their solutions. An expression is obtained for the generalized parameter on these two properties of surfactant solutions, on which a linear dependence of the oil recovery factor is observed.

Keywords: enhanced oil recovery methods, washing action, surfactants, interfacial tension

Lysenko A.A., Tsybuk I.O.

PAPER ASH BASED ON HEAT-RESISTANT AND FIRE-RESISTANT POLYMER FIBERS

The article analyzes information on technical papers based on heat-resistant synthetic fibers. Various ways of obtaining papers are considered. Investigated one of the most important characteristics of the paper - ash content.

Keywords: heat-resistant fibers, heat-resistant papers, technical papers, autohesion, ash content

Melnikova E.A., Kornakova V.G., Korobeynikova E.V.

PHYSICAL AND CHEMICAL PROCESSING OF A PHOTOGRAPHIC IMAGE AS AN OPTION FOR INCREASING THE QUALITY OF THE SOURCE MATERIAL

Methods for the processes of attenuation of a photographic positive image of increased density using an attenuator in which iron-cyanide potassium is used as an oxidant are considered.

Keywords: photographic image, weakening, restoration, additional processing, film

Kryuchkova A.V., Susanin A.I., Sashina E.S.

MIXED MATERIALS BASED ON POLYACRYLONITRILE WITH INCREASED

HYGROSCOPICITY AS A POSSIBILITY OF UTILIZATION OF Poultry down waste

The possibility of utilizing poultry down waste by obtaining materials based on mixtures of keratin with polyacrylonitrile has been studied. The solubility of down keratin in ionic liquids has been investigated. The compatibility of the studied polymers was evaluated by vibrational spectroscopy.

Keywords: fluff keratin, mixed films, IR spectra, hygroscopicity, ionic liquids, polyacrylonitrile

AUTOMATION AND CONTROL OF TECHNOLOGICAL PROCESSES AND PRODUCTIONS

Suzdalov E.G., Kravets T.A.

JUSTIFICATION METHOD FOR THE NECESSARY NUMBER OF RECEPTION AND DISPENSING WINDOWS IN A MULTIFUNCTIONAL CENTER

The process of receiving and issuing documents in a multifunctional center was investigated by the method of mathematical modeling. A method has been developed to substantiate the required number of windows for receiving and issuing documents using the software packages MS Excel, Mathcad.

Keywords: criterion, performance indicator, mathematical model, modeling, justification method

Drozdova E.N., Margolin A.L.

DEVELOPMENT AND IMPLEMENTATION OF AN APPLICATION FOR MANAGING A GROUP OF ENTERPRISES AND AUTOMATION OF INTERNAL PROCESSES OF A PRINTING COMPLEX

The development and implementation of an automated control system for a printing complex is considered. An overview of existing software solutions is given. The main stages of development are described. The procedure for interacting with the database is described. Marketing support of the sales department is being considered. Sections-catalogs of the system are presented: segment "Editions" and segment "Production".

Keywords: information system, automation, control

Sigacheva V.V., Maksimov V.O.

ROBUST FOOTWEAR DRYER CONTROL SYSTEM

A control system for the drying chamber has been developed, which takes into account the uncertainty of drying parameters - temperature and humidity, and performs simultaneous control of two actuators, taking into account the general change in input parameters according to a program written on the basis of fuzzy modeling.

Keywords: robust system, drying chamber, temperature, humidity, fuzzy modeling, measuring unit, program, microcontroller

Krasnikova K.M., Litvinchuk V.L.

THE NEED FOR INFORMATION SUPPLY OF THE MANAGEMENT SYSTEM OF THE TECHNOLOGICAL SECTION FOR SEWING DUPLICATIONS

The tasks of information support in the sewing industry, namely, at the sewing area for sheepskin coats, are considered. The necessity of information support at several stages of production, including at the stages of working with raw materials and equipment, is explained. In addition, it is considered how information support affects the quality of the product and the technology of its production.

Keywords: information support, sewing production, sheepskin coats

ENGINEERING AND ENGINEERING

Egorov V.V., Denisenkova A.A., Blokhin M.Yu., Markovets A.V.

DETERMINATION OF KINEMATIC EXTERNAL EFFECTS ON NEEDLE THREAD IN A HOOKSTITCH SEWING MACHINE

The problem of identifying the kinematic external influence on the needle and shuttle threads during the tightening of the stitch is considered. A technique is proposed that makes it possible to

identify the period and nature of the impact on the needle thread at the moment of time corresponding to the winding of the needle thread from the spool. In the process of winding the thread from the spool, the frictional forces created by the tension regulators must be overcome, which in the future will make it possible to evaluate the quality of tightening the shuttle stitch.

Keywords: *sewing machine, lock stitch, cyclogram, stitch tightening*

Malinovskaya G.K., Litvinova L.V.

DEVELOPMENT OF AERODYNAMIC METHOD FOR RESTORING THE PAPER BASE OF DOCUMENTS

The results of restoration of colored drawings made on coated paper are presented. The color perception of the designs is preserved by using a limited amount of water in the airfoil paper method. A device for filling the missing parts of the sheets of documents is proposed, representing a technological line where all operations for the restoration of documents are performed and the possibility of damage to the structure of the sheets due to the careless actions of the restorer is maximally excluded.

Keywords: *restoration of documents, aerodynamic forming of paper, filler, compositional composition*

TECHNOLOGY OF MATERIALS AND PRODUCTS OF TEXTILE AND LIGHT INDUSTRY

Pereborova N.V., Ananichev E.A., Antonova I.A., Korobovtseva A.A.

AN OPTION FOR Predicting Shrinkage and Recovery of ARAMID TEXTILE MATERIALS

Aramid textiles have a unique shrinkage property not found in all polymers. The shrinkage phenomenon is explained, first of all, by the conformational structure of macromolecules of aramid polymers, which, when heated, tend to shrink, assuming the most favorable energy form. The article also discusses the reducing properties of aramid textile materials.

Keywords: *aramid textile materials, mathematical modeling, systems analysis, shrinkage, restoration, forecasting*

Pereborova N.V., Abramova I.V., Ananichev E.A., Antonova I.A., Korobovtseva A.A.

MODELING OPTIONS OF DEFORMATION AND OPERATING PROPERTIES OF POLYMER FIBROUS MATERIALS OF COMPLEX STRUCTURE

Methods of nonlinear hereditary polymer mechanics using the relaxation-deformation function "normalized arctangent of the logarithm of the reduced time", covering extended relaxation and creep spectra, solve the problems of predicting the deformation-operational properties of fibrous materials of complex macrostructure belonging to the class of textile materials.

Keywords: *fibrous materials of complex structure, mathematical modeling, system analysis, deformation-performance properties, forecasting*

IN MEMORY OF A SCIENTIST, TEACHER, FRIEND. STANISLAV VASILIEVICH BURINSKY

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