MATH MODELING. METHODSAND INFORMATION PROTECTION SYSTEMS, INFORMATION SECURITY

Shterenberg S.I., Shchegoleva D.I., Vinogradova O.M.
SYNCHRONIZED USE OF INFORMATION PROTECTION SYSTEMSFOR CONTROL OF WORKING TIME ACCOUNTING
From the point of view of the employer, the processes of monitoring employees' working time are extremely important. Leaders of organizations often do not have time to personally supervise everyone who is repaired. At the same time, tasks are multiplied in connection with the recruitment of new employees and their supervision in the workplace. One of the options for solving the problem is preactive management, which would help reduce the number of difficult situations in the work of an individual employee, and protect the software itself for monitoring the time tracking. In addition, monitoring data on the use of working time form the basis for analyzing the efficiency of personnel labor, which means that such systems can be directly affected by different types of violators [1].
Keywords: *data protection, big data, time attendance*

Bogdanov A.I.
STATISTICAL STABILITY TESTS OF MATHEMATICAL FORECASTING MODELS
Consideredstatistical criteria for the stability of mathematical forecasting models both based on time series analysis and based on multivariate models. A condition for the stability of multivariate models is formulated, which consists in the preservation in time of the covariance matrix and some expression. A statistical criterion for checking the stability of this expression, the distribution law of which is established using simulation modeling, as well as a simplified criterion with a normal distribution law are proposed. The proposed approach was tested on a specific example.
Keywords: *forecasting, extrapolation, time series, multivariate model, covariance, sample mean, statistical criterion, distribution law, simulation*

Sharikov P.I., Krasov A.V.
RESEARCH POSSIBILITY OF USE JAVA AGENTS FOR EMBEDDING A HIDDEN DIGITAL WATERBAD DIRECTLY BEFORE RUNNING THE JAVA APPLICATION
Protectionsoftware is an urgent task. The article explains the need to protect the bytecode of a java application. The possibility of embedding a digital watermark into the byte-code of a java-application by using java-agents is investigated. Based on the results obtained from the work of java agents, a conclusion is made about the possibility of using the investigated method for embedding a hidden attachment in the bytecode immediately before starting the application.
Keywords: *bytecode, bytecode protection methods, java agent, steganography, executable files*

Levshun D.S., Chechulin A.A., Kotenko I.V.
DESIGN TECHNIQUE AND VERIFICATION OF PROTECTED CYBERPHYSICAL SYSTEMS
This paper describes the architecture of a new methodology for the design and verification of secure cyber-physical systems containing devices based on

microcontrollers. The key idea of the proposed methodology is to form the most rational solution to improve the security of the analyzed system.

Whenthe choice of this solution from the possible alternative is carried out on the basis of functional requirements and non-functional limitations to security and reliability. Moreover, the security and reliability of the obtained solution is subjected to a verification process to check its correctness and realizability.

Experimental verification the design and verification methodology was carried out on the example of improving the safety of a semi-natural model of railway infrastructure.

Keywords: *cyber-physical systems, information security, design, verification, simulation, devices based on microcontrollers*

Makarov A.G., Egorov I.M.
MATHEMATICAL MODELING OF VISCOELASTIC PROCESSES OF MARINE POLYMER ROPES
Considereda variant of mathematical modeling of viscoelastic processes of marine polymer ropes, lines and halyards of various component composition, various diameters, and various weaving. Methods for predicting the viscoelastic processes of these materials based on mathematical modeling of their deformation properties are proposed. The technique of solving the problems of comparative analysis of the properties of materials, studying the relationship of properties with the structure, predicting short-term and long-term mechanical effects is presented.

Keywords: *marine polymer ropes, viscoelasticity, deformation processes, mathematical modeling, relaxation, creep, computer forecasting*

Pimenov V.I., Pimenov I.V.
USING THE MODEL "WHITE BOX" FOR VISUALIZATION OF MACHINE LEARNING RESULTS
Algorithmization of procedures is considered building visualizers of multidimensional data using a decision rule that provides information about classes in the form of interpreted binary codes.

Keywords: *cognitive technologies, multivariate data analysis, clustering, machine learning, binary decision matrix, visualizer*

Ushakov I.A.
DETECTING INSIDERS IN THE CORPORATE COMPUTER NETWORK BASED ON BIG DATA ANALYSIS TECHNOLOGIES
The article discusses the possibility of using Big Data technologies to detect insiders in a corporate computer network and analyzes existing solutions in this area. An architecture is proposed for preprocessing network traffic for the use of cluster solutions and distributed computing to solve the problem of detecting insiders in corporate computer networks. Results are given experiments on real data.

Keywords: *big data, information security, insiders*

Tarasov A.K., Sukhanov M.B.
DEVELOPMENT OF A SOLUTION TREE FOR CHOOSING A PLATFORM WHEN CREATING A SITE OF SPORTS THEME
Built bya decision tree for choosing a platform when developing a sports site, which, among other things, takes into account the level of technical knowledge of a web developer, determined using an online test developed for this. The Deductor Studio software product was used to build the decision tree.

Keywords: *multicriteria choice, data mining, machine learning, decision tree, sports sites, website, web development, web design, cms, framework, web developer competencies*

Pereborova N.V., Egorova M.A., Kalanchuk O.E., Fedorova S.V.
MATH MODELINGAND COMPUTER PREDICTION OF VISCOELASTIC CREEP OF GEOTEXTILE NON-WOVEN MATERIALS

Consideredissues of mathematical modeling and computer forecasting of nonlinear hereditary creep, including complex deformation-recovery processes, geotextile needle-punched nonwovens. The basis for constructing a mathematical model of creep is the spectral-time theory of viscoelasticity, taking into account the smallness of the delay times. The application of the developed methods of confidential forecasting of deformation processes is possible due to their computerization.
Keywords: *math modeling, computer forecasting, geotextile nonwovens, deformation processes, creep, relaxation, viscoelasticity*

Wagner V.I., Ananichev E.A., Egorova M.A., Klimova N.S., Kobyakova Yu.V., Konovalov A.S.
MATH MODELINGAND QUALITATIVE ANALYSIS OF RELAXATION AND DEFORMATION PROCESSES OF POLYAMIDE TISSUES FOR PARACHUTE BUILDING

The article discusses a variant of mathematical modeling and qualitative analysis of relaxation and deformation processes of polyamide fabrics for parachute construction. On the basis of mathematical modeling and computer prediction of relaxation-deformation processes, which are fundamental processes in the theory of viscoelasticity of polymers, further qualitative analysis of the viscoelastic characteristics of these materials is carried out, which makes it possible to identify materials with the best operational and functional properties.
Keywords: *polymeric materials, viscoelasticity, deformation processes, mathematical modeling, relaxation, creep, computer prediction*

Meleshko A.V., Desnitskiy V.A.
AN APPROACH TO IDENTIFYING ANOMALOUS SENSOR DATA IN CYBER-PHYSICAL WATER MANAGEMENT SYSTEMS BASED ON MACHINE LEARNING METHODS

The paper proposes an approach to detecting anomalous data from sensors of cyber-physical systems. The approach is based on the use of machine learning methods and modeling of technical systems. Detection of abnormal data is carried out using the example of a water supply control system. A hardware and software prototype of such a system has been developed, which is used to obtain the initial data for training. Several machine learning methods have been tested and are contained in the scikit-learn library of the Python programming language. Experimentally the teaching method and its parameters are revealed, which provide the highest accuracy of recognition of anomalous situations.
Keywords: *machine learning, cyber-physical system, information security, anomalous data, water management system*

CHEMICAL SCIENCE

Ganiev I.N., Bokiev L.A., Khakimov A.Kh., Saidzoda R.Kh.
ANODE BEHAVIOR OF ALUMINUM ALLOY AZH5K10 WITH CERIUM IN THE MEDIUM OF ELECTROLYTE NACL

The anodic behavior of the cerium-doped AZh5K10 aluminum alloy was studied by the potentiostatic method in the potentiodynamic mode at a potential sweep rate of 2 mV / s. The cerium content in the AZh5K10 alloy ranged from 0.01 to 1.0 wt%. The studies were carried out in an electrolyte medium NaCl with a concentration of 0.03, 0.3, and 3.0 wt%. It was found that the addition of a modifying component (cerium) in the AZh5K10 alloy promotes an increase in the potentials of corrosion, pitting and repassivation in all media, regardless of the concentration of chloride. In this case, the corrosion current density and, accordingly, the corrosion rate of alloys of the АЖ5К10 - Ce system decreases by 50% with an increase in the addition of cerium, and increases by the same amount from the concentration of chloride. The latter dependence is typical for all alloys,
Keywords: *aluminum alloy azh5k10, cerium, potentiostatic method, electrochemical behavior, nacl electrolyte, free corrosion potential, pitting potential, corrosion rate*

Chigirinova Yu.S., Vasiliev M.P.
STUDY OF COLLAGEN STRUCTURING IN FILM FORMATION
The process of collagen structuring during film formation was investigated, the main properties of films obtained from solutions of various concentrations were determined. The chemical, physicochemical and mechanical properties of films have been studied in relation to the processes of structural transformations of collagen.
Keywords: *dry soluble preparation collagen, collagen solubility, collagen films*

Derkacheva O.Yu., Tsypkin D.O., Lyakhovitsky E.A.
ESTIMATION OF HISTORICAL PAPER INHOMOGENEITY FROM IR REFLECTION SPECTROSCOPY DATA
This study is devoted to the study of the capabilities of IR spectroscopy for assessing paper inhomogeneity using the example of three samples of Russian handmade paper of the 19th century. Analysis of IR spectra showed that the investigated papers were made from flax fibers using animal glue. The intensities in the IR spectra of reflection from the paper surface at different frequencies and structural parameters show the closeness of the paper sheets in all spectral parameters, which indicates the similarity of both the structure of cellulose fibers and the similarity of the manufacturing technology of these samples. The performed calculations revealed low errors in the spectral characteristics of the three sheets, the values of which were on average at the level of 2%.
Keywords: *papers, IR reflectance spectra, non-uniformity of sheets, degree of ordering, cellulose, animal glue*

AUTOMATION AND CONTROL OF TECHNOLOGICAL PROCESSES AND PRODUCTIONS

Sigacheva V.V., Maezhov E.G.
INCREASING THE RESOURCE SAVING OF YOUR WEAVING MACHINES WITH THE SCHEDULED USE OF THE AUTOMATED DIAGNOSTIC SYSTEM OF MECHANISMS
The article analyzes the results of the implementation of an automated diagnostic system at LLC "Nevskaya Manufaktura" during the period of the factory of civil cloths as a real example of energy-saving equipment useful for operating weaving factories.
Keywords: *automated diagnostics, tissue-forming mechanisms, measuring unit, microcontroller, program, diagnostic parameters, analysis, technical condition, operating modes*

Turkina N.R., Kulikova V.V.
STATIC STRENGTH ANALYSIS OF A CHEMICAL REACTOR ... WITH Stirring
In the work, static calculations of a chemical reactor from the effect of pressure, stability calculations in the ANSYS program were carried out.
Keywords: *chemical reactor, finite element model, equivalent stresses, stability analysis*

Dyatlova E.P., Remizova I.V.
ALGORITHMS FOR LOADING PAPER AND PAPER INDUSTRY PRODUCTS INTO VEHICLES
The problem of the choice of vehicles and loading of finished products of pulp and paper production into a vehicle is considered. Schemes for loading rolled products into a vehicle are proposed.
Keywords: *pulp and paper mill, vehicles, loading of finished products, loading algorithm*

Golubchikova A.V., Lazurenko S.B., Movshovich P.M., Pavlyuchenko E.V., Razumeev K.E.
INFORMATION BASE OF THE SYSTEM OF ADAPTIVE TEXTILE PRODUCTS FOR CHILDREN WITH DISABILITIES
The article presents computer programs that characterize the selection of products based on the child's life limitations, the automation of the process of calculating the effectiveness of products, as well as an example of the use of CAD for the serial production of developed adaptive textiles.