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O. Korelin, E. Leonova, P. Tanonov WAVELET TRANSFORM AND HIDDEN MARKOV MODELS IN SPEECH RECOGNITION

Purpose: Create a speech recognition algorithm using a combination of methods.

Design/methodology/approach: The article deals with wavelet transform and hidden Markov models in speech recognition. Considered various options for system configuration using specific results of the wavelet transform and different volume of the dictionary. Dynamic time warping algorithm is used for signal comparison.

Key words: speech recognition, wavelet transform, dynamic time warping, hidden Markov models.

E.A. Nikulin PROCEDURAL NOISE AND MULTIVARIATE TILING

Subject: Creation of procedural seamless textures with non-repeating tiles.

Purpose: Evolution of methods of procedural seamless texturing.

Methodology: A special choice of node elements of the texture lattice.

Originality: Is provided non-periodical tiling of the large multitextures.

Findings: The method is designed for seamless coverage of large areas at low cost resources.

Key words: texture, cellular noise, tiling.

O.P. Timofeeva, S.S. Palitsyna TRAINING OF THE NEURAL NETWORK OF THE INTELLECTUAL SYSTEM AIMED TO CONTROL URBAN TRAFFIC LIGHTS

Purpose: This article deals with the problem of the neural network training. The network underlies the intelligent system that controls traffic lights according to current traffic situation.

Approach: This system includes the neural network approach that provides flexibility in choosing an optimal crossroad state. Also, the considered system uses simulation modeling approach to test the training results.

Findings: The neural network consists of three layers. First part of the neural network was trained by Hebbian algorithms, Kohonen and reinforcement training methods. The other part uses supervised learning method.

Value: After training neural network chooses the most optimal state according to the current traffic flow density. The most suitable training algorithm for the first part of the neural network is Kohonen algorithm.

Key words: neural networks, learning algorithms of neural network.

L.N. Basova, A.V. Mironov QUALITY WORK SYSTEM OF ADDITIONAL EDUCATIONAL INSTITUTIONS FOR CHILDREN IN THE DEVELOPMENT OF HUMAN CAPITAL

Abstract. Municipal budgetary educational institution of additional education for children «Children and Youth centre «Rovesnik»2. The article is devoted to the monitoring system in educational institution of additional education for children for quality educational process in several directions: the general quantitative characteristics value of the institution, the value of the teacher's educational process quality, the teacher's methodical work value and the performance evaluation of the students.

Key words: human capital, monitoring, additional education for children, physical culture, sports.

I.N. Terentyeva
COMMUNICATIVE READING OF ORGANIZATIONAL MANAGEMENT
THE CONCEPT OF G. P. SHCHEDROVITSKY
(CONSTRUCTIVIST COMPONENT IN THE METHODOLOGY)

Abstract. The subject of the article is the communicative component of organizational management concept and practices of the G. P. Shchedrovitsky. In the theme of the work reflects its objectives: to identify managerial potential communicative components of the scheme of thinking activity and thereby find out whether the communication reveals the contents of its constructivist nature. The aim of this work is a theoretical reconstruction of the communicative component of the «scheme of thinking activity», as the consideration of interrelations of its elements and how the application of the principles of this scheme to certain problematic situations. On the material of texts by G. P. Shchedrovitsky, studies of his contemporaries and followers, using the biographical method, system descriptions and theoretical reconstruction concluded the constructivist content of organizational management the concept of G. P. Shchedrovitsky. The results of the work are considered, first, as a methodical basis for working out in the field of management communications, to their organize and use; secondly, as an integral part of developments in the field of theory and technology of communication, i.e. communication studies.

Key words: the act of communication, the scheme of thinking activity, organizational management practice, system, system approach, management, social construction.

V.M. Galkin, E.K. Kitaeva, S.V. Lescheva, L.N. Erofeeva
A NOTE ON L-FUNCTIONS AND THE ORTHOGONAL POLYNOMIALS

Purpose: The series of systems of orthogonal polynomials are constructed. The coefficients of these polynomials are integers.

Design/methodology/approach: For a building taken approach based on application of the continued fraction and theory of moments.

Findings: The built polynomials are new. There some natural questions that require further researches.

Research/limitations/implications: There are some unresolved questions.

Originality/value: Unexpected connections with the analytic number theory are found out.

Key words: weight, orthogonality, continued fraction, Dirichlet character.

I.A. Stepanov
METHOD OF WINNING IN THE ENGLISH LOTTERY DAILY PLAY

Abstract. We found some empirical regularities that allow regular win in British Daily Play lottery 7 of 27. The same method allows to regularly winning in the lottery 6 of 49. The use of the ideal random number generator greatly improves the results. Found regularities are of considerable mathematical interest.

Key words: probability theory, statistics, lottery mathematics, Daily Play, English National Lottery, Lotto Plus 5.

D.A. Kudriashov, E.V. Roschin
PROBLEMS OF ELECTROMAGNETIC COMPATIBILITY OF VARIABLE ELECTRIC
DRIVES WITH IN-HOUSE POWER SUPPLY SYSTEM OF NPP

Abstract. The technical treatments of overcoming the low-frequency conductive interferences that originate in interaction between static frequency converters and in-house power supply system of NPP are described in this article. The results of measuring distortion voltage in-house power supply system of NPP under operating the electric drives of the main circulation pump without filter-damping complex and with it are presented. At the expense of application of filter-damping complex a task in correspondence of supply voltage on the bus bar 6 kV in-house power supply system of NPP to requirements of the standard documents is performed.

Key words: electromagnetic compatibility, electric drives, nuclear power plant, frequency converter, filter-damping complex.

A.S. Steklov, A.V. Serebryakov, V.G. Titov
SYSTEM OF DIAGNOSTICS OF TECHNICAL STATE MARINE
SYNCHRONOUS GENERATOR

Abstract. A mathematical model for diagnostics of the synchronous generator of ship power station in operation. The paper shows the implementation of one of the modules of the expert system with application of fuzzy logic to diagnostics of technical condition of ship's synchronous generator. The obtained surface neuro-fuzzy inference, allowing to establish the dependence of values of the output variable from the values of the input variables for the fuzzy model. The model of estimation of technical condition on the basis of fuzzy logic taking into account equipment failures, providing increase of efficiency, increase of resource characteristics and extension of overhaul period of operation of ship synchronous generators

Key words: synchronous generator, diagnostics, fuzzy logic.

E.N. Sosnyna, A.V. Shalukho, I.A. Lipuzhin, T.A. Alexandrova
FEASIBILITY STUDY OF WIND-DIESEL POWER STATIONS FOR ELECTRIC
POWER SUPPLY OF ENERGY REMOTE SETTLEMENTS

Purpose: The article is devoted to the justification of the economic efficiency of combined energy sources on the basis of diesel generator and wind power plants in the design and reconstruction of local power supply systems of energy remote facilities.

Methodology: The main stages of the design of wind-diesel power station and technique of assessing the economic efficiency of its construction are presented. There are three stages of wind-diesel power station design: evaluation of the feasibility of using wind turbines; determining the power of power plants and diesel generator; developing an electric block diagram; selection of electrical equipment.

Results: The economic efficiency replacing the existing diesel power plants in the wind-diesel power station are calculated on the example of energy remote settlements of the Murmansk region. The construction of a combined wind-diesel power station will reduce the generated electricity cost by more than 40% showed the calculation results.

Key words: wind-diesel power station, energy remote consumer, local power supply system, economic efficiency.

P.V. Arsenov, A.V. Varentsov, D.V. Doronkov, K.S. Konovalov,
E.N. Polozkova, A.E. Khrobostov
INVESTIGATION OF LOCAL HYDRODYNAMICS OF THE COOLANT

FLOW BEHIND THE MIXING GRID HAVING «LARGE SCALE» TYPE OF VANES IN TVS-KVADRAT FUEL ASSEMBLY

Purpose: The main objective of the research was to investigate the characteristics of local hydrodynamics of the coolant flow in TVS-KVADRAT fuel assemblies of PWR reactors.

Design/methodology/approach: The main method of hydrodynamics in the nuclear reactor FA investigation is an experimental research of a full-size cassette model and active zones of aero- and hydrodynamics stands.

Findings: The study investigated local hydrodynamics in the nuclear reactor FA. The study revealed the heat carrier flow features in TVS-KVADRAT fuel assemblies of PWR reactors.

Research limitations/implications: The special databank created on the base of the experiment results. The data used for verifying CFD-codes to reduce conservatism on estimating the PWR reactor heat engineering reliability. Joint Stock Company OKBM Afrikantov now uses the results of the research.

Originality/value: Topically of this article is in local hydrodynamics of the coolant flow in TVS-KVADRAT fuel assemblies of PWR reactors to physical laws. Therefore, we can prove heat engineering reliability of the PWR reactor active zone with TVS-KVADRAT fuel assemblies.

Key words: nuclear reactor, core, fuel assembly, spacing grid, coolant hydrodynamics.

Y.I. Anoshkin, A.O. Kurevin, M.A. Legchanov

COMPUTATIONAL ANALYSIS OF GRAVITY COOLANT CIRCULATION MODES IN THE COOLING CIRCUITS OF THE FLOW PROCESSES RESEARCH STAND

Subject, theme, objective: Presents the main results of computational study the modes of flow processes stand, the purpose of which was to determine parameters of heat removal in the cooling system with gravity coolant circulation.

Method of work: Using and complementing the calculation methods of gravity coolant circulation in closed circuit, we developed a method and program for calculating the cooling system of the flow processes stand, including the heat removal circuit in air coolers.

Results and field of application: If adopted restrictions on coolant temperature, as a result of the study, it was determined heat removal capacity in the circuits of cooling system of the stand, when the geometric design parameters of the circuits. In addition, there were determined the optimal geometrical and circuit parameters of the circuits, that provide the maximum heat removal in the cooling system of the stand with gravity coolant circulation. The results can be used in the programming of experimental studies and also it can be applied in the analysis of normal and emergency modes of operation of the stand.

Conclusions: Optimization of the geometrical and circuit parameters of the cooling system circuits can significantly increase the heat removal capacity of the system in the gravity coolant circulation mode, that have a positive impact on the energy consumption and the safety of the stand. This work has been carried out with support of the Ministry of Education and Science of Russian Federation within the bounds of contract № 02.G25.31.0124 03/12/2014 (Government Regulation № 218 from 09/04/2010)

Key words: Circuit, gravity circulation, thermal capacity, heat exchanger, air cooler.

A.V. Komarov, V.A. Farafonov

THE CHOICE OF THE OPTIMAL SIZE OF THE INNER DIAMETER OF THE ANNULAR FUEL ELEMENT FOR REACTORS WITH SODIUM COOLANT

Purpose: The main purpose of the thermal-hydraulic calculation of reactors with sodium coolant is to set the heat flux and temperature on the reactor core, to find the maximum fuel temperature in order to confirm the impossibility of melting in the fuel elements with high thermal load.

Design/methodology/approach: All the thermal-hydraulic parameters - heat flow, temperature, coolant parameters, hydraulic resistance - are determined for the maximally loaded fuel element (cell). The calculation is carried out for 9 points on the core height coordinates $z = -0,5; -0,37; -0,25; -0,12; 0,00; 0,12; 0,25; 0,37; 0,5$ m. Calculation results are summarized in the table.

Findings: Optimally selected internal diameter allows to get roughly the same coolant flow, speed, temperature inside and outside of the fuel rod, and equal coolant flow areas. The resulting temperature field of fuel rods suggests that thermal loads are within acceptable limits.

Research limitations/implications: The calculation results show that the annular fuel rods with the selected parameters can be used in reactors with sodium coolant.

Originality/value: The originality of this article is in the identification of the benefits of the annular fuel rods in sodium coolant reactors. Also, the working conditions of these fuel rods are determined for the given parameters.

Key words: temperature, fuel, coolant, shell core.

V.V. Biryukov, V.A. Grachev, T.V. Kozhevnikova
A RELATIVISTIC METHOD OF CALCULATION CHARACTERISTICS
OF CIRCULAR AND RECTANGULAR WAVEGUIDES

Purpose: The article presents the method of calculating the characteristics of the circular waveguide.

Design/methodology/approach: The solution of the boundary electrodynamic problem with impedance boundary conditions method, based on invariance of the Maxwell equations relative to the Lorentz transformations is presented.

Finding: The ability to use rigorous boundary conditions is shown.

Research limitations/implications: The article presents application of the proposed method, its comparison with known results.

Originality/value: It is shown that the transition to the moving reference frame and using the Lorentz transformations allows to achieve strict implementation of impedance boundary conditions throughout the frequency range.

Key words: circular waveguide, rectangular waveguide, Helmholtz equation, dispersion equation, impedance boundary conditions, the Lorentz transformations.

P.O. Beresnev, V.I. Filatov, A.A. Eremin, A.M. Belyaev, A.V. Papunin,
V.S. Makarov, D.V. Zeziulin, V.E. Kolotilin, V.V. Belyakov, A.A. Kurkin,
STATISTICAL MODEL OF CHOICE THE GEOMETRICAL PARAMETERS,
MASS OF INERTIA, CAPACITY AND VELOCITY CHARACTERISTICS
OF TRACK TRANSPORT TECHNOLOGICAL MACHINES

Abstract. The article discusses the dependence and draws conclusions about the impact of carrying capacity at the engine power and the movement velocity of track transport technological machines, which affects them agility, performance and efficiency. The statistical model of rational choice of the type tracked vehicle, control systems of maneuverability, ensuring the total power requirement, carrying capacity and maximum of movement velocity are present. The presented results have been obtained in Nizhny Novgorod state technical university n.a. R. Alexeev in the framework of the Federal Target Program «Research and development on priority directions of scientific-technological complex of Russia for 2014 - 2020 years» (agreement № 14.574.21.0089 (unique identifier of agreement - RFMEFI57414X0089)).

Key words: caterpillar mover, tracked vehicle, tracked tractor, tracked skidder, articulated tracked vehicle, power and weight of track transport technological machines.

O.V. Voronkov, V.I. Peskov

SCHEMATIZATION OF BUS FLOOR SANDWICH-PANEL LOADED CONDITION

Abstract. Analytical models for loaded conditions of floor sandwich-panel of future-oriented bus with monocoque body are proposed in the article. Justification of used simplifications is provided, values of significant loads are calculated and formulas for evaluation of internal forces in the sandwich-panel are listed. The proposed theoretical statements are developed in scope of engineering method for development and strength estimate of monocoque bus bodies.

Key words: bus, monocoque body, sandwich-panel, loaded condition, strength.

V.E. Klubnichkin, E.E. Klubnichkin, V.S. Makarov,

D.V. Zeziulin, A.V. Redkozubov, V.V. Belyakov

MODELING MOVEMENT OF TRACKED VEHICLES ON FOREST ROADS

Purpose: Showing an opportunity of research of tracked vehicles with the help of modern means of computer simulation, making possible conducting analysis of kinematics and dynamics of motion.

Design/methodology/approach: The order of modeling track mover and the vehicle in general is presented. There are shown the following principles of formation of the model of roads: path curvature, slopes of topography, microprofile, distribution of discrete obstacles, changes of the movement resistance.

Findings: Illustrative examples of the virtual experiment of motion of the tracked vehicle in different conditions are given.

Research limitations/implications: This study is the basis for further investigation of motion of tracked vehicles on forest roads.

Originality/value: The proposed model allows using modern software packages for modeling tracked vehicles in conjunction with the developed model of ground surfaces.

Key words: tracked vehicle, caterpillar mover, modeling, chassis system

B.F. Balejev

RESEARCH OF CALENDER ROLL SETS

Purpose: Theoretical and experimental research of sheet battery as the oscillating system. Determination of source of excitation of oscillations. Evaluation of uneven wear of the surfaces of system rolls at a variable pressure and the relative velocities of neighboring (adjacent) shafts.

Method: The creation of a theoretical model of the system rolls as an oscillating system. Determination of vibration parameters from a pulse loads. Theoretical estimate of uneven wear. The theoretical conclusions are confirmed by experimental values.

Research/implications: The parameters of oscillation are confirmed by experimental values on theoretical model. Calender roll sets are self-oscillating system that converts the energy from the drive. The reduction of the amplitudes of the oscillations of the shafts and intensity of uneven wear of their surfaces achieve by weakening the feedback.

Value: Researcher has committed the theoretical estimate calender roll sets as oscillation system. The theoretical values of the relative uneven wear consistent with experimental values.

Key words: forced oscillations, self-sustained oscillations, pulse loads.

I.N. Frolova, V.A. Sulin

EVALUATION OF COMPLETENESS OF USE OF TECHNOLOGICAL POSSIBILITIES

OF MACHINE TOOL AND BY COMPARING THEIR MOVEMENTS

Purpose: Considered morphogenetic movements of the machine and tool.

Design/methodology/approach: Formulated the matching rule of the movements of the tool and the machine.

Findings: The possibility of estimating the completeness of the technological capabilities of the tool and the machine.

Originality/value: Evaluation of completeness of use of the technological capabilities of the tool and machine tool.

Key words: machine, tool, formative potential of the movement, the technological capabilities of the tool and the machine.

A.M. Schneiberg, A.E. Malov

PRESSING OF THE CHIPS WITH USING COMBINED LOADING: COMPRESSION WITH TORSION

Purpose: To study the possibility of obtaining a high briquettes density of brittle and ductile chips by the new process providing a intensive deformations.

Approach: Performed an experimental study of the process of compacting chips using a combined method of pressing with torsion.

Findings: There are carried out evaluation of the effectiveness of the new process compared of conventional compressing on the data obtained by measuring the density and hardness of copper and aluminum alloys chip-brick.

Research implications: The present study showed that the new method of compacting provide not only the density to levels close to the density of monolithic material, but also significantly strengthen the material.

Value: Recommend to use this method for compacting loose materials and in particular for the recycling of metal chips.

Key words: compression with torsion, chips, density, hardness.

A.V. Sezemin, L.A. Zakharov, A.V. Degtyarev, I.L. Zakharov, A.N. Tarasov

THE RESEARCH OF FUEL INJECTION TIMING AND ANGLE OF FUEL SPRAY IMPACTING TO ECONOMIC AND ENVIRONMENTAL PARAMETERS OF THE PRODUCED MARINE DIESEL ENGINES

Abstract. The article describes the requirements and ways to reduce emissions of nitrogen oxides from the exhaust gases of marine diesel engines. We developed physical, geometrical and mathematical models to determine the angle of fuel spray when changing timing and duration of the fuel injection. We conducted theoretical research in the software DIESEL-RK and full-scale tests on the engine 8CHN 22/28 production of JSC «RUMO».

Key words: diesel engine, nitrogen oxides, fuel injection timing, angle of fuel spray.

A.V. Loktev, A.V. Malahov, I.S. Mishin

IMPROVING THE EFFICIENCY OF GAS COOLING

AT COMPRESSOR STATIONS OF MAIN GAS PIPELINES

Purpose: Enhancement of heat transfer in gas Air heat exchanger station kompremirovaaniya natural gas.

Design/methodology/approach: Theoretically investigated the processes controlling the supply of gas to the burner connected in parallel, working in pairs.

Findings: An algorithm for modulating fuel gas for the selection of actuators and control system development.

Research limitations/implications: The developed approaches are suitable for automation of such boilers equipped with a group of burners.

Originality/value: In the study used the known laws of hydrodynamics technical, but for this circuit are shown for the first time.

Key words: Gas pipeline, compressor stations, heat, intensification.

M.E. Frantsev

PROJECT JUSTIFICATION OF THE CREATION OF THE COMPOSITE SUPERSTRUCTURE FOR PASSENGER HYDROFOIL VESSELS USING THE PARAMETRIC DESIGN

Abstract. The design of the superstructure made of polymer composite materials for passenger hydrofoils, is a part of the design of vessel. The superstructure enters to subsystem "hull" as a subsystem. Design optimization of superstructure from composites is directly related to the optimization of the entire vessel. The criterion of economic efficiency of the hydrofoil craft is the condition to minimize fuel consumption on the movement of 1 dwt (payload) at 1 km. Minimization of empty displacement of the passenger hydrofoil craft is provided by ensuring minimization of the mass of the body (which includes and superstructure) ceteris paribus other articles weighing load characteristics of the need to ensure its durability. The set design studies to create of the superstructure from composites for passenger hydrofoil crafts using methods are based on parametric design model series, including projects built passenger hydrofoil crafts using similar hydrodynamic models. All calculations were made by method of regression analysis. This article contains algorithms design.

Key words: project rationale, passenger hydrofoil craft, superstructure from composites, regression analysis, parametric design, algorithms design.

T. R. Gilmanshina, V. N. Baranov, S. I. Lytkina, S. A. Khudonogov

DEVELOPMENT OF COMPOSITION NONSTICK COATINGS BASED ON GRAPHITE, ACTIVATED WITH SURFACTANTS

Abstract. The properties of nonstick coatings based cryptocrystalline graphite, activated with surfactants. For studies selected Noginsk graphite deposits in Krasnoyarsk Territory. The surfactants were used as carboxymethylcellulose, water, technical lignosulfonate, synthetic detergent, liquid glass and ethyl silicate. The results showed significant advantages antiburning inks based on graphite, activated with surfactants, which include silfogruppy.

Key words: Graphite, mechanical activation, surfactants, carboxymethylcellulose, water lignosulfonattehnicheskyy, synthetic detergent, liquid glass and ethyl silicate, antiscorching paint.

S.N. Zherebtsov, E.A. Chernishov

FEATURES PHYSICAL AND CHEMICAL PROPERTIES FLUX USED

IN THE TECHNOLOGY OF ELECTROSLAG REMELTING

Abstract. The experimental studies and theoretical data on the physico-chemical properties and functions of fluxes used for conducting sustainable processes remelting, casting, welding in various metallurgical technologies ESR. Discussed energy ties cations and anions in the slag systems of different brands fluxes and their physical properties. The formulas for calculating the density and the basicity of slag melts, depending on the chemical composition of the flux. The physical density, the results of direct measurements of the melting point of the various fluxes and metal alloys at electroslag remelting.

Key words: electroslag remelting, fluxes, chemical composition, physical properties, density, temperature, liquid slag and metal.