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The Journal «Vestnik of Ivanovo State Power Engineering University» is included in the List of Leading Reviewed Scientific Journals and Publications, which are approved by the State Commission for Academic Degrees and Titles for publishing the main scientific results of the dissertations on the candidate and doctoral degrees.

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HEAT AND POWER ENGINEERING

UDK 621.321

DEVELOPING STEAM-CONSUMPTION DIAGRAM OF TURBINE TP-115/125-130-1TP PO TMZ WHILE OPERATING IN HEAT-EXTRACTION MODE WITH SINGLE-STAGE HEATING OF DELIVERY WATER BASED ON HEAT RUN RESULTS

G.V. LEDUHOVSKY, A.A. POSPELOV, M.Y. ZORIN, Candidates of Engineering,
N.S. ASTASHOV, I.B. VOLKOV, G.B. KOMISSAR, Engineers

The authors present development peculiarities of the steam-consumption diagram of Turbine Tp-115/125-130-1tp PO TMZ operated in the heat-extraction mode with a single-stage heating of delivery water based on the heat run results obtained at Heat Power Plant 2 in Yoshkar-Ola.

Key words: steam turbine, extraction turbine, steam extraction, heat run, steam-consumption diagram.

UDK 621.311.22

CALCULATION RESEARCH OF RECONSTRUCTION FACILITIES OF STEAM BOILER SB-41 WHEN INCREASING POWER UNIT ELECTRICAL POWER TILL 330 MW

B.L. SHELYGIN, Candidate of Engineering, S.A. PANKOV, Candidate of Engineering

The authors describe the modernization method of steam boiler SB-41 on the basis of the developed calculation boiler model aiming at rectifying the constructive and operational defects. The technical solution allows us to raise the coefficient of the boiler efficiency by 2.5 % and increase electrical power of power unit till 330 MW.

Key words: steam boiler, calculation model, heat surface composition, furnace waterwalls, convection tube bank, circulation velocity, hydraulic resistance, water temperature, coefficient of the boiler efficiency.

UDK 534.24.001.573

EXPERIMENTAL RESEARCH OF HEATING SYSTEM WITH INFRARED EMITTERS

V.V. BUKHMIROV, Doctor of Engineering, Yu.S. SOLNYSHKOVA, Post Graduate Student, M.V. PROROKOVA, Engineer

The results of experimental research of the heating system with gas infrared emitters installed in the workshop of an industrial enterprise are given.

Keywords: infrared heating, gas emitters, experimental research.

ELECTROMECHANICS

UDK 621.928

MECHANICS OF PARTICLE SEPARATION FROM CONCENTRATED SUSPENSION UNDER NONHOMOGENEOUS MASS FORCE

Yu.B. KAZAKOV, V.E. MIZONOV, E.A. BARANTSEVA, Doctor of Engineering, V.A. PHILIPPOV, Engineer

The article considers a cell model for describing particle separation kinetics at high particle concentration under nonhomogeneous mass force. The model is based on the theory of Markov's chains with the state dependent matrix of transition probabilities. The process of particle motion blockage at their local concentration close to the limit one is described. The comparison of separation rates for some mass force distributions is presented.

Key words: separation, mass force distribution, Markov chain, state vector, matrix of transition probabilities, separation rate.

UDK 66.096.5

MECHANICS AND HEAT EXCHANGE OF PARTICLE ENSEMBLE IN FLUIDIZED BED

V.E. MIZONOV, Doctor of Engineering, L.N. OVCHINNIKOV, Doctor of Engineering, A.V. OGURTSOV, Candidate of Engineering, A.V. MITROFANOV, Post Graduate Student, K. TANNOUS, Doctor of Engineering

The article presents a new mathematical model and experimental study of mechanics heat transfer in a particle ensemble in fluidized bed. The model is based on the theory of Markov's chains, for which appropriate correlations to calculate transfer coefficients are selected. In all cases comparison of model predictions with experimental results is made, it allows us to conclude that the model can be used as a computational method to calculate fluidization.

Key words: particle ensemble, fluidization, state vector, transition matrix, heat exchange, experimental temperature distribution.

UDK 621.313.8

DEVELOPMENT OF MATHEMATICAL MODELS FOR TEMPERATURE FIELDS CALCULATION IN WIND-POWERED AXIAL FLUX GENERATOR

Yu.B. KAZAKOV, Doctor of Engineering, V.P. SHISHKIN, Candidate of Engineering, D.S. KORNILOV, Post Graduate Student

The description of the front magnet electric generator of the original construction for work in low power wind-energetic units is represented. Research results of thermal and aerodynamic processes in the generator, carried out with the usage of the developed chain and finite-element models are presented.

Key words: wind-energetic unit, front generator, slotless core, toroidal-winding of anchor, permanent magnets, heat calculation, simulation of cooling conditions.

AUTOMATION CONTROL SYSTEMS

UDK 681.513.3

FUZZY CONTROLLER IN SERVO DRIVE CONTROL SYSTEM WITH SPEED LIMITATION

A.A. USOLTSEV, Candidate of Engineering, N.A. SMIRNOV, Post Graduate Student

The authors consider the problem servo drive speed limitation within the permissible values rates in condition of different impacts types. Control System with a fuzzy logic controller included an additional input is offered as a solution.

Key words: fuzzy logic, servo drive, speed limitation.

UDK 621.314

ELECTROMAGNETIC PROCESSES IN POWER SUPPLY SYSTEM OF TRANSMISSION DEVICES OF RADAR STATIONS

S.V. Khvatov, Doctor of Engineering, V. V. Vanyaev, V. F. Strelkov, Candidates of Engineering

The authors investigate the electromagnetic processes in the following system: semiconductor converter – capacitive storage – transmission device of radar station (RS). The analytical dependences for current and voltage definition in system were received. The qualitative converter indicators influencing the tactical-technical characteristics of RS are defined.

Key words: power supply system, radar, transmission device, semiconductor converter, electromagnetic processes, mathematical model.

UDK 681.5

DIGITAL ADAPTIVE REGULATOR FOR INDUSTRIAL CONTROLLER WITH MULTITASK POSIX PLATFORM OPERATION SYSTEM

A.A. STAROVEROV, Doctor of Engineering, V.V. OLONICHEV, Candidate of Engineering, M.A. SMIRNOV, Post Graduate Student

The article is devoted to the program digital self-adjusting system of average capacity furnaces automatic control on the basis of the programmed logic controller with Linux. The described approach allows us to considerably reduce expenses for control process and raise efficiency of technological installations. The presented system is notable for its flexibility and universality.

Key words: recursion least-squares method, digital control, realization in C programming language, the programmable logic controller, identifier, electric furnace, multiprocessing complex.

METHODS OF MATHEMATICAL SIMULATION

UDK 621

ON SIMULATION OF AIR MASS FLOWS DURING PHYSICAL AND CHEMICAL PROCESSES WITH A LARGE NUMBER OF REACTING SUBSTANCES USING GRAPHICS ACCELERATOR

A.V. EVSEEV, Post Graduate Student

The article describes the flow simulation of the air mass over the forest fire with the large number of reactants. The mathematical model is based on the Navier-Stokes equation, dynamic concentration of agents and chemical kinetics equations. The first and the second equations are solved using the projection method. The latter group of equations is computed by using the Gear method. CUDA Parallel system is used to speed up computations.

Key words: numerical simulation, computing hydrodynamics, Navier-Stokes equation, Poisson equation, sweep method, CUDA technology, Gear method.

UDK [677.021:533.6]:519.755

METHODOLOGIES OF PASSIVE COOLING SYSTEM MODELING FOR CONTROL PROCESSORS OF THE DYEING TRIMMING PRODUCTION EQUIPMENT

E.E. KOROSHKINA, Candidate of Engineering, M.A. KORNILOV, S.A. ZUEV, Post Graduate Students

The models of cooling motherboard of mini-ITX form-factor are developed on the basis of COSMOS Works CAD SOLID Works applications.

Key words: motherboard, optimization algorithm of parts placement on the board, computing simulation of heating mode, thermal fields, passive cooling systems, gilled radiator.

UDK 519.673

PREDICTION OF ENERGY CONSUMPTION WITH HYBRID ALGORITHM AND CUDA TECHNOLOGY

A.V. EVSEVA, Post Graduate Student

The article describes a new hybrid power system load forecasting method, gives the analysis of this new method, and the possibility of time costs decreasing by application of CUDA technology.

Key words: forecasting, power system load, time series, Wiener filter, neural network, evolutionary modeling, parallel algorithm, hybrid algorithm, CUDA technology, High-Performance Computing.

681.3

VEKTOR-RASTER MODELS OF AN ESTIMATION OF TERRITORY PROPERTIES

A.B. GNATYUK, Candidate of Engineering

Ways of construction of the vektor-raster models used in spatial modeling of properties of territory are considered. It is offered to use the theory of cellular automatic machines for the account of obstacles to distribution of influences from objects of considered territory.

Key words: objects and factors of territorial influence, model of spatial influence, cellular automatic machines.

ECONOMICS

UDK 336.58

CHARACTERISTICS OF PROGRAM-TARGET PLANNING AND FINANCING BUDGET EXPENDITURES

I.F. SIDORINA, Applicant

The article considers the features of program-target planning. The author considers tax and nontax budget revenue, results of budget performance in the Ivanovo Region and the financing system of innovative sphere.

Key words: budget, tax and nontax budget revenue, program-target planning, innovative sphere.

UDK 330.332

PROJECT FINANCING IN ELECTRICAL POWER ENGINEERING

A.A. ANDREEV, Candidate of Engineering

The article is devoted to the basic issues about specific features of project financing implementation in Electrical Power Engineering. Recommendations for credit application coverage and criteria which capital investment project should have are marked out in the article.

Key words: project financing, electrical power engineering, investment.

UDK 338.28

METHODICAL ISSUES OF INCREASING POWER EFFICIENT IN TEXTILE BRANCH NOWADAYS

V.I. KOLIBABA, Doctor of Economics, E.O. KUTUMOVA, Post Graduate Student

In the article the authors consider the questions of classification and the choice of power efficient innovative projects at the enterprises of textile branch. They prove the necessity of rationed capital and develop the regulations of energy-efficient projects initiation.

Keywords: power efficiency, textile branch, innovative projects, the analysis, classification, initiation, rationed capital.

UDK 658.562

POTENTIAL OF USING UNIFORM TECHNOLOGIES OF DIFFICULT OBJECTS OF EQUIPMENT

D.S. PIOTUKH, Candidate of Economics

The article considers the questions of necessity to develop a management method for a new intellectual property object – the united technique of a complex object.

Key words: united technique of a complex engineering object, intellectual law, competence, management.

SOCIAL AND HUMANITIES RESEARCH

UDK 82-7 (091)

NATURE OF PHENOMENON OF *COMIC* IN HISTORICAL-LITERARY AND PHILOSOPHICAL DISCOURSE

N.S. BANDURINA, Post Graduate Student

Historical, literary and theoretical discourse of aesthetic-philosophic treatises that determine the nature of *comic* as aesthetic category are discussed in the article. The article proves that the phenomenon of *comic* is a complex system and entity, and it is presented as a peculiar culture-historical phenomenon

Key words: aesthetics, comic, laugh, aesthetic category.

UDK 811.133.1

APPLYING POSITIVE TRANSFER FROM ENGLISH WHILE STUDYING FRENCH AS A SECOND FOREIGN LANGUAGE

N.V. VETROVA, Senior Teacher

The author considers the psycholinguistic features of the second foreign language acquisition. Language material, collected by students is presented as a result of applying positive transfer from English while studying French as a second language.

Key words: positive transfer, similarity in lexical structure, similarity in syntax, similarity in morphology.