

SUMMARY

Automation of oil-and-gas technologies

I.G. Solovyev

CONCEPTS AND METHODS OF CYBERNETICS IN THE PROBLEMS OF NATURE MANAGEMENT

Solution of problem questions of modern nature management on the basis of the developed theses of adaptive observation and control theory is first of all connected with constructing new presentation forms regarding models of exploitation objects which detailed description should correspond to updated goals and broadened regulation resources of management objects; to conditions of identification ability of model's parameters after data of direct or indirect observations regarding evolution of its input-output states.

On-line systems, adaptive management and observation, well systems, bed, identification.

I.G. Solovyev, I.A. Shainurov

TENSION DYNAMICS WITH «TUBING — ELECTRIC CENTRIFUGAL PUMP» HANGER UNDER HOISTING OF THE UNIT

Subject to development being a mathematical model of evaluating tension extent with a hanger of «tubing — submersible electric pump» multi-chain unit under hoisting and disassembling equipment from a well. The paper considers a problem of controlling tension efforts through regulating hoisting speed.

Well, hanger, chains, tension efforts, ultimate tension, weight, friction, breakage, fastening couplings, hoisting dynamics, coordinates of the state.

I.G. Solovyev, R.V. Raspopov

STABLE EVALUATION REGARDING PARAMETERS OF COLLECTORS BASING ON V-ORTHOGONALIZATION

Subject to investigation being questions of improving evaluation stability with hydrodynamic parameters in local zones of oil-bearing collectors basing on methods of quasi-orthogonal reduction.

Oil-bearing collectors, water permeability, identification, orthogonalization, model.

V.A. Vedernikov, O.A. Lysova, R.R. Lopatin

INVESTIGATION AND ANALYSIS OF «DISJOINING» PROCESS REGARDING SUBMERSIBLE PUMPS IN OIL PRODUCTION UNITS

Subject to investigation and analysis being parameters of submersible electric motors under «disjoining» of centrifugal pumps in electric centrifugal pumping units supplied with frequency converters. The paper gives recommendations for accomplishing more efficient «disjoining».

Oil production, centrifugal pump, disjoining, parameters.

D.A. Govorkov, D.A. Vlasov

TECHNOLOGY OF VISUAL-AND-GRAPHIC HYDRODYNAMICS ANALYSIS OF A WELL SYSTEM

Subject to presentation being one of the variants to construct a system of visual-and-graphic analysis of hydrodynamics for a well with a submersible pump, oriented at using in technologies of automatic control of well operation.

Well systems, submersible pump, degassing, operator's interface, observer.

A.A. Kazakov

A SYSTEM OF COMPUTER AIDED ANALYSIS REGARDING HYDRODYNAMICS OF A WELL WITH A CONE OF BOTTOM WATER

Subject to presentation being a structure of an automated system of computer aided analysis for processes in well systems. The paper considers an example of implementation of a system for analysis of hydrodynamics in a well with a cone of bottom water, citing a version of user's interface. They use models oriented at application in on-line oil production systems.

System, computer aided analysis, automatization, user's interface, influx model, hydrodynamics, bottom water, coning, on-line.

A.L. Kolosova

USING METHODS OF indistinct MODELING FOR INTEGRATED EVALUATION REGARDING SPEED OF CORROSION PROCESSES IN GAS LINE

The author suggests indistinct model to evaluate potentially forecasted corrosion speed in gas mains basing on a system of indistinct deduction. The model accounts for variable factors influencing speed of increasing corrosion defects. Subject to development being a corresponding data-base: term-sets of indistinct initial variables and deduction rules. As a tool of indistinct deduction it was Mamdani method used, with a following dephasing to obtain specific evaluations.

Gas line, corrosion, model, reliability, indistinct sets.

S.I. Kovtunenکو

TOOL MEDIUM FOR ANALYSIS AND FORECAST OF OPERATING CONDITIONS REGARDING MULTIPLE BOTTOM HOLE WELL

Subject to consideration being a hydrodynamic modeling of a well draining several beds. The paper presents an iterative algorithm to calculate influx and specific gravity of the liquid in the well's vertical sectors dividing beds, accounting for possible changes in directions of influxes from collectors. The author demonstrates a prototype of software supplement for making computer aided experiments.

Model, well, bed, computer aided models, multiple bottom hole well, programming, interface.

Information technologies

V.G. Petrov, V.I. Kolesov, S.I. Kvashnina

SYSTEMS OF INTELLECTUAL SUPPORT UNDER TAKING DECISIONS IN MEDICINE

The paper considers an algorithmic supply regarding a system of taking decisions in medicine illustrated by choosing tactics of treating gangliar goitre. Subject to development being basic models to solve problems of forecasting and strategic planning as to an amount of medical services for substantiating a budget.

Quality of life, endocrinology, cybernetics, systemic approach, target indication, model, verification of hypotheses, taking decisions, risk evaluation.

V.L. Yakushev, V.R. Tsibulsky, R.R. Khusainov

**NUMERICAL SIMULATION OF LIGHT FLUXES
UNDER INTRAOCULAR PRESSURE MEASUREMENT USING AN OPTICAL METHOD**

Intraocular pressure performs important physiological functions. By its level, one could judge on development of pathological processes, for instance, glaucoma or dimming of serous tumor and vitreous body. Today, subject to wide use being aplanatic methods of its measurement, in particular, an optical one, when the cornea centre is directed by light flux, while its transfer being judged by the reflected light flux. The article gives numerical simulation as to passing of direct and reflected light fluxes under combined deformation of eye's cornea and sclera. The calculation of the optical system is made using notions of geometric optics. Cornea and sclera are treated as asymmetrically deformed rotation shells with rigid fastening at the edges, with the space between them filled with incompressible liquid. In order to describe stressed-and-deformed state of cornea and sclera, they used a system of six nonlinear ordinary first order differential equations. The solution on stress is made using step-by-step method.

Intraocular pressure, pressure measurement, aplanatic methods, optical method, stressed-and-deformed state of cornea and sclera.

M.V. Abramov

APPROXIMATIONS USING EXPONENTS OF TIME CARDIOLOGICAL SERIES BASING ON ECG

The article considers variants regarding a description and approximation of ECG-signal. The author suggests a new variant of applying Gauss impulse and sectionally prescribed function. In order to evaluate adequacy of such an approximation, subject to constructing being reconstructions of real ECG data in the drawing offs of aVR, V2, V5 for different patient's states (normal, infarct, thromboembolism).

Approximation, electrocardiogram, Gauss impulse.

V.E. Borzykh, B.V. Semyonov, S.N. Sokolko

DESIGNING AN AUTOMATICALLY CONTROLLED SYSTEM TO INVESTIGATE PROCESSES OF SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS

The article is devoted to designing an automatically controlled system to investigate processes of self-propagating high-temperature synthesis (SHS). As an example, subject to consideration being a problem of ignition with laser initiation of reaction. Creation of such a system will enable to apply computer facilities for investigating mathematical models regarding SHS-processes and making computer experiments in simulation modeling.

Self-propagating high-temperature synthesis, investigation, automatic control, SADT.

S.A. Okhotnikov, G.P. Bystrai, I.A. Lykov

MASS TRANSFER AND SWITCHING WAVES IN THE SYSTEM OF CONTRACTING MYOFIBRILS IN THE PRESENCE OF SOLUTION WITH IONS OF Ca^{2+}

Using methods of nonlinear thermodynamics, subject to consideration being a model of contracting myofibrils accounting for transformation of calcium ions in sarco-plasmatic reticulum under fixed value of

ATF-concentration. The model is reduced to a system of Lorentz equations added by an equation describing change in the concentration of calcium ions in the solution. The authors obtained an expression regarding the switching wave velocity, dependent on constants of chemical reactions in **the sarco-plasmatic reticulum**.

Myofibril, contractions, model, nonlinear thermodynamics, solution, calcium ions

Sustainable development

M.G. Ganopolsky

ON ONE PROBLEM OF TERRITORIAL SERVICE

Subject to consideration being a problem connected with servicing (tracing) applications located on certain territory. A number of applications is changed from tracing to tracing, while their coordinates represent realization of two-dimensional random variable. It is shown that for a case of uniform distribution of the applications' coordinates on the plane, an average value regarding the length of the path of the applications' tracing is proportional to the square root of their number (a parabolic dependence). For more complex cases, the paper describes an idea of simulation algorithm using Monte Carlo method.

Territorial service, two-dimensional random variable, geometric probabilities, Monte Carlo method.

O.S. Zhelezko

REVIEW OF APPROACHES TO REVEALING REGULARITIES IN SOCIAL AND ECONOMIC DEVELOPMENT OF CERTAIN TERRITORIES

The paper gives a review of basic theoretical approaches to interpreting historical processes of development, noting their imperfections. Subject to picking out being theories which combine mutually complementary ones; together with detailed consideration of two theoretical models on historical development of Russia. The author suggests using a systemic approach under modeling West Siberia, formulating an objective and problems of the future investigation.

West Siberia, review, model, development, XVIII–XIX centuries.

A.A. Skornyakov, I.A. Lykov, S.A. Okhotnikov

SIMULATION OF A COMPLEXLY ARRANGED SUBJECT OF THE RUSSIAN FEDERATION USING METHODS OF NONLINEAR DYNAMICS ILLUSTRATED BY TYUMEN OBLAST

Subject to consideration as a macrosystem being a contemporary Russian region: Tyumen Oblast — a complexly arranged subject of the Russian Federation. The authors compute a correlation function on processing statistic data (Herst method). The paper quotes a revision of approaches to simulation of nonlinear systems, considering variants of similarity between thermodynamic and economic values.

Simulation of nonlinear systems, complexly arranged subject of the Federation, Tyumen Oblast.

G.V. Krylov, S.B. Pertsev

THE WEST SIBERIAN INNOVATION CENTER. THE TYUMEN TECHNOPARK

The work gives technology of creation and structure of the Tyumen technopark. Activity of technopark is focused on creation innovation business-community in the field of service-technologies of oil and gas extraction companies and territories.

Innovation economy, strategy, development, technopark.