

**DEPENDENCE OF THE USED RESOURCES ON THE
NONLINEARITY OF THE PRODUCTION FUNCTION**

Sarkisyan, Rafael E., Kobets, Elena V.

pp. 6 – 18

The inherent nonlinearity of production functions and loss of sensitivity generated by it and decreasing effectiveness are investigated in the framework of sensitivity theory. On this basis, the problem of optimization of resources is explored according to the criteria of benefits and costs, as well as the nonlinear nature of the central causation, which is characteristic of natural and artificial systems. The effects, reflecting these features, are spatio-temporal in nature and appear in engineering, economics, management. Attention to them is only increasing.

Keywords: system, nonlinearity, production functions, costs, efficiency, sensitivity theory, theory of the firm, decreasing efficiency, resources, optimization.

SPATIAL OSCILLATION OF A RAIL FLAT-CAR

Anisimov, Petr S., Petrov, Gennady I.

pp. 20 – 29

The article describes design diagrams of four-axle rail flat car with two anti-symmetrically located heavy cargos with elastic dissipative elements (supports), whose common center of mass coincides with the center of mass of a flat car. The authors pose a problem of safety of a flat car's movement, caused by dislocation of the center of mass of cargo, its weight, speed of movement, certain parameters of elastic and dissipative supports, with regard to stability of the wheel against possible derailment and risk of transversal dumping of a car in rail track's curves due to transversal horizontal forces. It is the reason to study, first of all by theoretically, the dynamics of a car, to determine admissible limits of transversal and longitudinal dislocation of the center of mass of cargo with regard to the axis of symmetry of a car, and to find rational parameters of elastic and dissipative supports for cargo that ensure safety of traffic. The developed design diagrams are based on the mechanical system «flat car – cargo» that includes 13 solid bodies (car frame, two cargos, four side frames, two bars over springs, four wheelsets of two bogies). The authors studied bouncing, rocking, rolling, side drifting, wobbling of a car and cargo, as well as bouncing, rocking, rolling of side frames of bogies and wobbling of bogies.

The authors propose algebraic expressions to determine deformation of spring sets and supports for cargo, deformation of the track with determined vertical and

horizontal irregularities, reaction of the rail to the wheels' impact (if there are quenching forces of viscous friction and unilateral relation of wheels and rails), and vertical and horizontal forces influencing spring sets and elastic dissipative supports for cargo. In order to develop differential equations the researchers used d'Alambert's principle. They developed a system of 23 differential equations, describing spatial oscillation of a flat car.

Key words: transport, flat-car, anti-symmetrically located heavy-weight cargo, spatial oscillation, design diagrams, differential equation, mathematical model.

FLOW AND BUNKER-CHANNEL IN THE TRANSPORT SYSTEM

Kozlov, Peter A.

pp. 30 – 37

At an abstract level, the author estimates regularities of interaction between flow and structural elements of the transport system. Preassembled elements are channel (flow processing) and bunker (extinguishing and generating bursts of flow). It is shown that bunker converts a flow from random to partially controlled, thereby increasing the level of possible channel load. The author highlights the necessity to consider as a bound element not a channel, as it is usually done, but «bunker-channel».

Keywords: transport system, flow, channel, bunker, interaction, disorganization.

POSSIBILITIES OF APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN DESIGN TECHNOLOGY AND ORGANIZATION OF CONSTRUCTION OF HIGH-SPEED RAIL

Aleksey V. Polyanskiy

pp. 38 – 44

The theoretical basis of application of methods of artificial intelligence (expert systems, artificial neural networks, genetic algorithms) to organizational and technological decisions in construction of high-speed rail is provided in the article. The author describes an efficient method for implementation of such decisions with the use of information model and system of management decisions on the results of the monitoring of the construction process.

Key words: organizational-technological decisions, railway construction, high-speed rail, construction process, artificial intelligence methods, expert system, artificial neural network, genetic algorithm, project management

MANAGEMENT MODEL FOR CONTAINER COMPANY WITHIN LOGISTICS CHAIN

Lievin, Sergey B.

pp. 46 – 59

The article substantiates a model of management of container handling and forwarding company within a logistic chain consisting of four links. Weighted mean value of mathematical expectation of the arrival of goods to finite logistics link and of mathematical expectation of delivery time constitute an objective function of the model. The expenses of a company are equated to managerial impact.

Key words: containerization of cargo flows, logistics chain, mathematical model, costs for container company, probability of cargo safety.

DEVELOPMENT OF TRACTION DC ELECTRIC MOTORS OF ELECTRIC TRAINS

Inkov, Yury M., Feoktistov, Valery P., Shabalin, Nickolay G.

pp. 62 – 69

Trains with electric motorized coaches prevail in commuter passenger traffic in the areas surrounding large regional centers. The article studies current state of electric commuter trains and analyzes stages of their development including modernization with maintaining of DC traction motors and transition to trains of a new generation equipped with asynchronous motors. Conclusions and comments are aimed at practical implementation.

Key words: motor car trains, traction electric motor, pulse control, DC voltage transformer, brushless electric motor, power saving.

PNEUMATIC AIR DISTRIBUTOR FOR ELECTRIC TRAIN

Mordovin, Evgeny A.

pp. 70 – 75

Electric and (or) electro-pneumatic brakes are used as the main brakes on the multiple unit. Since they are non-automatic, the role of a stand-by brake is taken by pneumatic automatic brake with air distributor. The design of such a device has its

own characteristics, which are estimated in the article both in terms of operating properties, and the novelty of the proposed technical solutions.

Key words: railway, electric train, air distributor, brake control.

TECHNICAL UPDATE OF AUTOMATION AND REMOTE CONTROL

Shevchenkov, Alexey P.

pp. 76 – 80

The article deals with the issues of improving the organization of technical renovation of railway automation and remote control equipment using the concept of lean manufacturing. Uneconomical losses are analyzed. In order to reduce the losses, such a manufacturing process is offered, which involves the formation of teams of employees of existing business units, but excludes the existing boundaries. Expected results at the same time can have a universal character – along with the improvement of technology they can foster innovation and creative process approach, designed for thrift resources, streamlining the production.

Keywords: lean manufacturing, rail transport, uneconomical losses, organization, process automation and remote control equipment, technological upgrade, the speed of the process.

RELIABILITY ANALYSIS OF THE JOURNAL-BOX: EVENT TREE CONSTRUCTION

Kruglikov, Evgeny P.

pp. 82 – 89

To work out measures related to improving safety, reliability and operating availability of cars, it is necessary to have a model that could be used in calculating the parameters of the MaR system (maintenance and repair). Special reliability index characterizing the probability of failure-free operation will be able to play its role in such a model. In the present article the author analyzes the causes of failures of freight cars axle equipment, shows an algorithm for constructing the tree of events that precede them, the transition from the tree-type structure of events description to the matrix one. Mathematically expressed rationale for determining failure-free operation of axle equipment was obtained with the help of paths and cross-sections method.

Keywords: railway, freight car, axle box, failure, reliability, event tree, method of paths and cross-sections.

CALCULATION OF DIGITAL ELECTRICAL SIGNALS SPECTRUM

Kashin, Dmitry I.

pp. 90 – 96

In communications technology for testing of digital channels and links are widely used digital signals with fixed and pseudorandom structures.

The author proposes a method for simulating and analyzing the characteristics of the power spectral density of standard test digital electrical signals for different methods of linear coding. As models of their initial (primary) formations are used standard binary sequences of fixed and pseudorandom structures. As an analytical tool the method is suitable for studying the effect of the linear coding and modulation formats on the quality of data transmission in high-speed networks of transport links.

Keywords: communications technology, digital channels, test signals, test sequences, signal model, the power spectral density.

DIFFERENTIATION OF TARIFFS FOR INDUSTRIAL RAILWAY ENTERPRISES

Shmulevich, Mikhail I., Suvorov, Vyacheslav C.

pp. 98 – 109

Industrial railway enterprises (IRE) perform a large volume of work, the tariffs for which are accepted at the regional level. In this article the authors scrutinize the method of calculation of tariffs, providing their differentiation according to the actual cost of service to every customer. This approach encourages a reduction in transport costs and has been successfully tested in enterprises in Tambov and Belgorod regions.

Keywords: industrial railway, tariffs, calculation methods, principles of differentiation, costs, revenue, approbation.

HOW TO ASSESS THE QUALITY OF OVERHAUL

Korytov, Anton Yu., Kulkov, Anatoly A.

pp. 110 – 113

Considered indicators of quality on the stage of life cycle of rolling stock are divided into design, production and performance. As part of performance indicators should be used reliability and cost. From reliability indicators (parameter of flow of

failures, MTBF, MTTR, the average life, and service life) MTBF is more significant. For cost indicators the costs to eliminate failure and its consequences are taken. To implement the proposed control measures capital expenditure is not required, it is necessary only to determine the operational methods of quality for locomotives and cars. Additional duties assigned on quality inspectors of JSC «Russian Railways» will be a logical continuation of the great work they are currently performing.

Keywords: railway, rolling stock, overhaul, quality indicators, cost indicators.

WE ARE GLOBALIZING ECONOMICALLY –WE ARE ORGANIZING GLOBALLY

Zubkov, Sergey A., Kosolapov, Gennady N.

pp. 114 – 119

In a global economy, the tasks of trade unions acquire a new meaning; require greater consolidation of the organizing forces, and eventually coherent, strategically verified activity of trade unions association at the international and regional levels. On the example of the

International Transport Workers Federation and railway trade unions the authors show trends of cooperation and confrontation between governments, employers, trade unions, forms of cooperation in the struggle for workers' rights and their interests in the labor market.

Keywords: global economy, labor market, rights of workers, employers, transport trade unions, international solidarity, global organization.

ANALYSIS OF BUS PASSENGER SERVICES IN RUSSIA AND ABROAD

Ryabov, Igor M., Nguyen Thi Thu Huong (Vietnam).

pp. 122 – 131

Quality evaluation standards of transport service play an important role in search for means to improve service, facilities and procedures for bus passengers. In many countries these standards consist of a set of indicators or groups of indicators, reflecting the specificity of road transportation and at the same time giving certain regulatory guidelines for the accompanying process. This article presents a comparative analysis of Russian and international practice in this area for a number of parameters and with use of dynamic coefficients to help compare objectively the measure of quality of services and management in real towns and metropolitan cities.

Keywords: urban public transport, quality evaluation standards, bus passengers service, quality indicators, dynamic coefficients, passenger traffic, evaluation of buses users.

TRAIN QUEUING AT RAILWAYS

Levin, Dmitry Yu.

pp. 132 – 141

Insufficient consideration of irregularity of train traffic causes lack of tracks at the stage of designing and reconstruction of stations, underestimation of resources during development of technical specifications, and underestimation of indices during development of technological processes etc. In order to evaluate irregularity of train traffic the article proposes to use the queuing theory that permits adapting necessary documents used for design and establishing of technological standards.

The research used simulation to study real process of train operations, to obtain features of train queuing, to analyze changes of indices that depend on traffic intensity growth. The achieved results can contribute to increase of veracity and validity of decision-making, operation planning and freight and train operation management.

Key words: railway, traffic control, queuing theory, traffic irregularity, trains' flow intensity, saturation and oversaturation of the section, station and section designing, regulations.

THE ISSUE OF CENTRALIZATION AND DEVELOPMENT OF CAR WARRANTY SERVICE

Razgovorov, Constantine I., Bazhenov, Yury V.

pp. 142 – 147

In the article the authors demonstrate practicability of centralized management schemes for additional car warranty services which meet the principles of sustainable development of the after-sales service at the dealership service stations and increase in their profitability optimally, improve customer service culture of car owners by extending the warranty and planning costs for the maintenance of vehicles. The authors propose a tool for the implementation of the project «Extended Warranty» in Russian terms; the management algorithm of additional warranty service and represent the operation process of the proposed technical-and-economic project.

Key words: management, repair, centralization, system, extended warranty, automotive transport, vehicles, dealership auto service stations.

OPTIMIZATION OF SUPPORT OF IT-RESOURCES OF RAILWAYS

Ignatov, Nickolay A.

pp. 148 – 156

In this article the author focuses on peculiarities of providing virtual resources, used in cloud computing systems for guaranteed quality of service, taking into account the requirements of QoS. The article contains the description of adaptive mechanism and comparative analysis of static and adaptive mechanisms to provide resources through simulation models. Moreover it covers such computing figures for models as the average time for request processing, the level of service denial, the significance of general application of system resources with different inbound parameters.

Key words: management, information networks, quality of service, cloud computing, virtualization, modeling, distributed systems.

RELIABILITY CRITERIA OF DIESEL-ELECTRIC LOCOMOTIVES

Abolmasov, Alexey A.

pp. 158 – 166

In the article the author assesses the impact of current reform of Russian railways on locomotive complex, where dramatic changes occur. The most challenging of them is shifting locomotive park service functions to private service organizations. In line with the prevailing trends, the author describes his groundwork (block diagram and aspects of work) to create an Automatical system of locomotive set reliability control (ASUNT). Simultaneously, criteria important for system building of service maintenance and monitoring of technical state of rolling stock are justified. In the analysis mathematical techniques are used, theoretical and methodological materials, quality management standards are reflected.

Keywords: railway, reliability of locomotives, locomotive economy, failure, technical readiness coefficient, monitoring, service maintenance.

BLOCK-MODULAR WASTEWATERS TREATMENT PLANT

Pashinin, Valery A., Kovalenko, Maria A.

pp. 168 – 179

Development of block-modular wastewaters treatment and sanitation plant from the perspective of the needs of the structures of JSC «Russian Railways» has become important in view of attention to the problems of rational use of natural resources. Such a plant comprises a system of automatic operational control of the quality of water in different areas of technological process, improves the efficiency of wastewaters purification from oil products. In addition, it provides an opportunity to reuse the spillway, thereby reducing the need of railway enterprises for natural water, as well as providing a return to natural reservoirs without environmental laws violation. A universal technology of water purification, which contains any quantities of oil products and other related contaminants, is offered.

Keywords: railway, environmental engineering, wastewaters purification from oil products, block-modular plant, electric system, system of automatic operational control of water quality, universal technology.

INVESTIGATION OF ARC-STILLING PROCESSES IN OXYHYDROGEN ENVIRONMENT

Cherneva, Galina Petkova (Sofia, Bulgaria)

pp. 180 – 185

This article presents the results of research of arcstilling processes in oxyhydrogen environment under laboratory conditions. The transient states in admixture with a different volume ratio of hydrogen and oxygen were studied; obtained data were compared with the results of similar tests in a vacuum chamber. To perform research, program laboratory bench was used, which was designed and created by a team of teachers and students of Todor Kableshkov University of Transport.

Keywords: electric transport, arc-stilling processes, high speed rectifiers, vacuum, gas environment

FORECASTING OF RELIABILITY OF SEALED ELECTROMECHANICAL CONVERTORS

Karpova, Nadezhda S., Golokolos, Dmitry A.

pp. 186 – 192

The sealed electromechanical converters' application field is limited by deterioration of heat transfer conditions between active elements and the environment. The theory of strength specifies the qualitative character of external factors impact on hermetic electromechanical converters reliability. The laboratory tests were taken to identify the qualitative characteristics. These tests identified the dependencies of turn and frame insulation from moisture, vibration and temperature for operation of transport vehicles and other devices, intended to have enhanced hermetic features.

Key words: sealed electromechanical converter, moisture, vibration, temperature, frame insulation, turn insulation.

MULTIPARAMETER ASSESSMENT OF INTROSCOPE'S OPERATORS ACTIVITY

Ionov, Vladimir V., Kurchavov, Vladimir V.

pp. 194 – 201

The main feature of activity of an operator of X-ray introscope is that it is carried out not with a real object, but with its information model. The authors propose a variant of a multiparameter evaluation of professional work of an operator-introscopist taking into account perception specificity of visual information from the monitor screen. This method facilitates the creation of certification programs, conducting tests of knowledge in the field of transport safety, as well as the choice of evaluation criteria and principles of simulation of training tools.

Keywords: civil aviation, transportation, aircraft, airport, introscope operator, information model, information field, multiparameter evaluation.

PRODUCTIVITY RESOURCES: THE U.S. EXPERIENCE

Tereshina, Natalya P., Podsorin, Viktor A., Shakhanov, Dmitry A.

pp. 202 – 213

In the context of the dynamic changes in the volume of railway transportation its successful operation depends on the efficient use of all production resources

involved in operational activities. Among them crucial importance is retained by human resources, their ability to achieve goals, high professional efficiency, and ultimately all that is collectively reflected in the index of labor productivity. The analysis in the article makes it possible to compare the experience of the

United States and Russia in the field of railways, to identify development trends and means to improve the resource potential of transport companies.

Keywords: rail transport, efficiency, labor productivity, human resources, personnel management, efficient use of fuel resources, equipment productivity, infrastructure productivity, operational efficiency, capital efficiency.

INFLUENCE OF THE SOCIAL PACKAGE ON STAFFING

Seliverstova, Zhanna V.

pp. 214 – 221

Due to high competition in the labor market, staffing agencies and human resources departments (HR) are literally «hunting» for qualified «brains». In these circumstances, HR managers are designed to create effective programs for recruitment and retention of staff. Social package and its components are becoming the competitive advantage of organizations. The article explores the role of social resources in staffing, the results of public opinion research on the social potential and opportunities for employees offered by employing organization.

Keywords: personnel management, motivation, social package, corporate pension program.

PERSONAL STRATEGY IN SHAPING THE SERVICE-FOCUSED TYPE OF BEHAVIOR

Vorontsova, Natalia N.

pp. 222 – 228

Students of a transport university should realize that they belong to the socially significant normative reference group. This awareness can be formed with the help of educational professional- personal strategy in the general context of formation of service type of behavior of students. The issues of these strategies are constantly put at the forefront in all documents on work with personnel. The solution of these issues influences not only the vector of business process management, but also the requirements for education in the humanities in a technical higher education institution. Furthermore it leads to the particular choice of the path for humanities students in an educational institution with strong dynastic traditions, where there is a

certain corporation focused on a particular mode of transport, a unique brand of the oldest railway university.

Keywords: rail transport, educational professional- personal strategies, business process management, university ranking, educational brand, service type of behavior, person-saving function of a brand.

TRANSPORT FACTOR IN THE ERA OF ANCIENT CIVILIZATIONS

Macheret, Dmitry A.

pp. 230 – 241

Article is devoted to the socio-economic role of transport in the era of ancient civilizations (IV millennium BC – early I millennium BC). Transition to settled life and producing economy in the so-called «Neolithic revolution» made exchange a prerequisite of human life and activity, and its further expansion caused a gradual transition of transport to an independent type of activity, the development of means of communication and transport facilities. Intensive exchange is not possible without regular reliable transport and transport as a special kind of activity can exist only in a fairly heavy traffic of goods and people.

Key words: history, means of communication, ancient civilization, transport, exchange, trade, specialization, development.

SAVED BELL-RINGING (DEDICATED TO 160TH ANNIVERSARY OF BIRTH OF NICKOLAY GAVRILOVICH SLAVYANOV)

Grigoriev, Nickolay D.

pp. 244 – 256

There will be few people who would like to question Nickolay Slavyanov's priority in invention of electric arc welding by consumable cathode (also known as arc welding with consumable metal electrodes, or shielded metal arc welding).

The merits of 38 years old Russian engineer were recognized with formulae «For realized technological revolution» that followed his decoration with medal and diploma of 1892–1893 Chicago World's Fair: Columbian. And the inventions of Nickolay Slavyanov were fruitful not only for locomotives and steamships. The overwhelming majority of welding operations have been made till now with his method. In May, 2014 there will be celebration of 160th Anniversary of birth of this great talent.

Key words: history, Slavyanov, arc welding, transport infrastructure, technological revolution.

HOW TO PROTECT TRANSPORT CYBERSPACE

Gorelik, Vladimir Yu.

pp. 258 – 261

The review of the book:

Railway Information Security and Data Protection [Informatsionnaya bezopasnost' i zaschita informatsii na zheleznodorozhnom transporte]. Textbook. In 2 parts. Part 1: Methodology and the system of providing of railway information security, 440p. Part 2: Firmware of providing of railway information security, 448 p. Edited by Kornienko, A.A. (Adadurov, S.E. et alt). Moscow, Uchebnometodicheskiy tsentr po obrazovaniyu na zheleznodorozhnom transporte [Training and methodological center of railway education], 2014.

ABSTRACT

The first part of the textbook under review is dedicated to systematic description of basic data concerning methodology of information security.

The second part refers to system review of firmware and instruments of information security of railway corporate information, automatic and control.

The textbook describes basic tools of data protection against unauthorized access, instruments of protection of databases, architecture and protective measures within corporate computing systems based on mainframes of zSeries, principles of information security and data protection (control of access, anti-virus tools, protected segment of e-mail, infrastructure of open keys), firmware of data protection within the zone of a railway, instruments of confirming conformity and certification of software. The reviewer notes that the textbook concerns almost all autonomous courses that are included in relevant study courses and syllabus.

The reviewed book gives possibility to reviewer to differentiate the notions of cybersecurity, computer security, information security, data security, cyberspace, cyberthreat, and to offer his proper system vision of the related problems, to underline the need to search of solutions which will be well adapted to each given organization.

Key words: computer security, cybersecurity, cyberspace, data protection, cyberthreat, cyber attack.