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STRUCTURAL REDUNDANCY IN AUTO MOTIVE TRANSPORT

Kurganov, Valery M., Gryaznov, Mikhail V.

pp. 6 – 21

The authors examine reliability of technical systems as a scientific category and an object of application of methodological and mathematical tools that help to assess the required performance, to find task relevant criteria and ways to switch on reserves. Priorities are structural redundancy, classification of its kinds, projection of calculated options on the features of automobile transportation. Demonstrated approaches are based on reliability theory, systems theory, laws of logic, Boolean functions.

Keywords: reliability theory, structural redundancy, classification of methods, redundant delivery channels, reliability hypotheses, reliability of transport process, motor transport.

SIMULATION OF THERMAL LOADINGS OF WROUGHT WHEELS

Savrukhin, Andrey V., Neklyudov, Aleksei N., Efimov Roman A.

pp. 22-37

Actually used diagnostic systems do not allow to evaluate fairly enough the background of loading of an object, to identify those states which are characterized by absence of a defect, but at the same time warn of a mature environment for its formation. That is, they do not provide a full assessment of risks and the residual operation life of an object. The main disadvantage is a fact that they do not permit to analyze the kinetics of transient processes related to operational or technological impact. The paper clarifies approaches to evaluation of kinetics of transient thermal processes in a running wrought wheel (the system «wheel-shoe») on the basis of original methodology established by authors and of the results of computer simulation.

Keywords: railway, rolling stock, the system «wheel-shoe», braking, thermal loading, kinetics, wrought wheel, intensity of thermal loadings.

CONFIDENCE LIMITS OF MEASUREMENT RESULTS

Rubichev, Nikolai A., Seydakhmetov, Nurlan B.

pp. 38 – 51

Problems relating to density distribution of estimated probability are solved on the basis of existing theoretical and methodological approaches to the calculation of confidence limits of measurement error. Attention is paid to the diversity of actual occurring distributions, including normal, trapezoidal, exponential Laplace distribution, the t-distribution, and so on. Particular emphasis of the authors is placed on the use of a method based on the simulation of arrays of numbers with a given distribution in the mathematical apparatus for calculating the confidence level. The simulation results with comments are given in seven tables that allow comparing values and justifying advantages and disadvantages of each type of distribution using the criterion of confidence in end values of measurements.

Keywords: probability theory, metrology, measurement errors, law of error distribution, confidence limits, Laplace distribution, t-distribution, modeling.

INTERRELATION BETWEEN EXTERNAL EXPOSURE AND ADAPTIVE SYSTEM OF A PIVOT NODE

Demianov, Alexander A., Pavlitsky, Boris I.

pp. 52 – 58

In a system of a railcar the node «center plate – center pad» is one of the most responsible in the bogies. One of the promising ways to solve the problem of increasing longevity, reducing a wear rate of thrust and bearing surfaces of a center plate and a center pad is to implement the principles of adaptive control in mechanical systems. Theoretical studies were carried out to find an optimal mode of node's functioning, in which the processes of friction will occur in the lubricating layer that provides a minimum value of a coefficient of friction and wear rate. Their results are presented in this article.

Keywords: rail transport, tribology, intelligent control, car, center plate, center pad, kinematic contact, external exposure, wear, adaptive system.

PULSE-RESISTOR CONTROL OF TRACTION MOTORS

Feoktistov, Valery P., Chuverin, Yuri Yu., Htet, Ko Ko (Yangon, Republic of the Union of Myanmar)

pp. 60 – 65

Pulse-resistor control provides smooth contactless control of DC traction motors and makes it possible to virtually eliminate contactor equipment. The article proposes a calculation procedure of such systems for electric trains; control and pulse characteristics were analyzed. The application of control schemes in the modes of traction and electric braking is shown.

Keywords: railway, traction motors, direct current, electric train, pulse regulation, pulsatory current, automatic control.

ADVANTAGES OF ELECTRO-PNEUMATIC BRAKE OF FREIGHT TRAINS

Zolkin, Alexander L., Galiullin, Artiom R.

pp. 66 – 71

A scheme of electro-pneumatic brakes for freight trains is offered, its operating principles, advantages and disadvantages of the design are described.

The comment that is given by the authors reveals the mechanisms of inhibitory processes (braking, overlapping, release action) and management features, existing functional dependencies in the current complex of devices. Regulatory «duties› are highlighted, which are implemented with a digital decoder installed on each car, electro-pneumatic add-on and main line for information transmission by means of digital signals.

Keywords: railway, freight car, electro-pneumatic brake, electro-pneumatic add-on, digital decoder, control unit, digital signal, overlapping valve, braking valve.

CONTROL OF VEHICLE'S DYNAMIC IMPACT ON A TRACK

Zamukhovskiy, Alexander V., Kvashnin, Nickolay M., Zhangabylova, Aigul M.

pp. 72 – 81

Risks of natural and man-made nature force specialists to continuously monitor the state of rails and roadbed, road operating conditions. In this case, the security is dependent on ways and means of technical control of existing loads and physical

influences. The authors propose an experimental method for estimating dynamic impact of a vehicle on a track, based on the spectral analysis of responses of structural elements of a track on a shock pulse. The method used involves a monitoring tracking of the movement of trains using digital measurement systems – vibration sensors converting mechanical vibration, which have an impact on them, into an electrical signal.

Keywords: railway, traffic safety, rails, roadbed, vehicle, impact on a track, risk factors, assessment, monitoring, vibration sensors.

FORECAST OF WEAR OF METAL BRIDGE SPANS

Kos, Oksana I.

pp. 82 – 89

To get an objective assessment of the actual technical condition of a bridge, a mathematical model of the wear of artificial structures is designed. Weilbull law has appeared to be the best instrument between all studied laws of distribution that could be used to describe wear function. The model assesses the technical condition and its prediction in relation to the operating artificial structures on railways. The proposed design scheme, and graphs of wear function of bridge structures create conditions that will ensure maximum reliability of superstructures with a minimum of support costs.

Keywords: railway, bridge structure, wear function, Weibull distribution, time factor, reliability, prediction, mathematical model.

PARTIALLY NON-SELECTIVE PROTECTION SYSTEM OF CATENARY

Subkhanverdiev, Camille S.

pp. 90 – 96

A partially non-selective system of protections is proposed, which provides, as well as non-selective system of protections, fault clearing at any point of the zone between substations without specified time, but with a small amount of non-selective disconnections of switches of traction substations. An algorithm for the identification of areas of nonselective disconnections is given. The reliability of the system and possibility of its use as a model are justified.

Keywords: railway, catenary, zone between substations, protection system, short circuit, selectivity, specified time.

STRATEGIC COMPETITIVENESS OF A TRANSPORT COMPANY

Mikhnenko, Oleg E., Podkopaev, Mikhail Yu., Razumovsky, Cyril A.

pp. 98 – 105

Management of strategic competitiveness is presented by the authors as the management of system of functional subsystems, local goals of which should be harmonized with a global objective of ensuring a growth of resource productivity of a transport company. Development of economically sound decisions requires the use of quantitative and qualitative analysis of a situation in transport services markets and of labor resources in their interrelationship and interdependence.

Local objectives and criteria used for operation of subsystems define local efficiency criteria. However, both here and at the global corporate level a growing productivity capacity is becoming a crucial instrument of achieving competitive advantages. Assessing major resource components and development priorities, the article shows the feasibility of strategies with account for real risks of loss of industrial, economic, financial security, reliability of management structures and relationships.

Keywords: strategy competitiveness, transport company, competitive advantage on the markets, functional subsystems, global and local goals, management practices.

EVALUATION OF INTELLECTUAL CAPITAL OF AN ORGANIZATION

Pismennaya, Anna B., Yarkovskay, Tatiana V.

pp. 106 – 111

The article considers approaches to the definition of«intellectual capital». For measuring and accounting of such capital, an organization is proposed to supplement the existing methods with comparison of estimated objects using cluster analysis. It is shown how the use of this option can improve the integrity and objectivity of the evaluation. An original method for determining the dynamic characteristics of an object is proposed. The article emphasizes economic substance of intellectual capital; features for assessing its value in terms of market capitalization are highlighted.

The study was sponsored by Russian Humanitarian Scientific Fund within the project № 14–02–00095.

Keywords: intellectual capital, intangible assets, knowledge economy, cost estimation, competitiveness of an organization, intellectual resources, cluster analysis method, market capitalization, efficiency.

LOGISTICS BUSINESS: HARMONY OF COSTS AND OUTCOME

Baginova, Vera V., Fedorov, Lev S., Lievin, Sergey B.

pp. 112 – 115

The article investigates issues related to use of logistics in the transport market under the predominance of stream processes. It is noted that along with increase in the share of logistics providers in merchandise forwarding and distribution, many enterprises still do not risk transferring their logistics business to the third parties. The advantages of 4 PL providers are highlighted. The article shows economic efficiency of logistics and reasons hindering its development in Russia and reduction of transport costs by improving logistics services.

Keywords: logistics, competitiveness, stream processes, lean production, logistics services market, outsourcing, providers.

APPLICABILITY OF RAB-REGULATION IN PASSENGER TARIFFS

Efimov, Sergey M.

pp. 116 – 122

In the article the author investigates domestic and foreign practices of tariff formation with account for repayment on invested capital in the activities of infrastructure companies. Application of the scheme of RAB-regulation in passenger tariffs requires adjustment of organizational and methodological principles and legal aspects in the transport sector, in long-distance transportation. The author considers approaches to the solution of an urgent problem of permissible rate of return in the passenger tariff, particularly in the regulated segment, provided that there are increased costs for the maintenance of railway infrastructure, increased cost of energy for traction, which have an impact on the rate of the tariff, which allis independent of a passenger company. When calculating parameters of a new tariff model, it is proposed to take into account options of «evolutionary development», «active development» and «forced restriction».

Keywords: power engineering, railway, economy, RAB-regulation, passenger fares, regulated segment of passenger traffic in long-distance communication, modeling.

CONTINUITY IN THE DESIGN OF A COMPLEX OF TECHNICAL MEANS

Popov, Alexander P., Popova, Tatiana A.

pp. 124 – 129

The article examines approaches to design of a new complex of technical means of a control system. An admissible measure of continuity in creation of parts using previously adopted model solution is described. The article shows systemacity of optimal cost characteristics of products and the conditions of project development, focused on proven processes, operations, quality vectors and operational parameters.

Keywords: technical means, modeling, project, parameters, technology, continuity, cost, design, parts, product, complex, quality vector

INTELLIGENT SYSTEM FOR STRATEGIC DECISIONS

Andreychikov, Alexander V., Markov, Dmitry S., Astashkina, Ludmila A.

pp. 130 – 145

The authors assume that today's theory and practice bring tools of managerial decision-making in line with group methods. The article gives a description of the developed intelligent system to support strategic decision-making processes under conditions of uncertainty and risk. Its mathematical core is shown using a variety of methods of analysis, as well as of assessment of preferences on the basis of multicriteria choice and of given set of alternative decisions. The system can be used to solve a wide range of tasks in the field of analytical forecasting and planning of transport infrastructure development.

This work was supported by Russian Foundation for Basic Research, projects № 14–06–00225; № 12–07–00170.

Keywords: intelligent system, decision-making, transport infrastructure, forecasting, planning, group Methods

AUDIT AND CERTIFICATION OF DEALER AUTO SERVICE STATIONS

Razgovorov, Constantine I.

pp. 146 – 153

The article presents results of research on technical audit of dealer auto service stations and efficiency of their operation. The author evaluates technical and

economic performance of enterprises of this kind, methods of determination of labor and resource use, professional level of employees, identification and elimination of «bottlenecks», support of promising areas for development, transfer of stations to a new technological level. The author proposes certification criteria of dealer auto service enterprises, assignment of respective categories to them, as well as developing motivational system for the short term.

Keywords: automobile transport, automobile service, dealer stations, technical audit, certification criteria, efficiency.

NEW APPROACHES TO MANAGEMENT STRATEGY OF JSC «UBZHD»

Tsagaanbandi, Ganchimeg (Ulan Bator, Mongolia)

pp. 154 – 160

In view of growing needs of domestic and international freight transportation the author assesses the prospects of railway network development in Mongolia, describes in detail the content of modernization programs, elaborated by the Government of the country. The main attention is paid to budget management system, the implementation of which is proposed by JSC «Ulan Bator Railway» (hereinafter – JSC «UBZhD»). By virtue of it, centers of financial responsibility emerge, providing accountability at all levels of formation, adjustment and implementation of budgets. Focused on the experience of large companies such as JSC «Russian Railways», budgeting system is designed to help the efficient use of investments in Mongolian railway industry. Moreover, the expected result is in direct proportion to the degree of controllability of the ongoing processes.

Keywords: railway, modernization, Mongolia, budget management, responsibility centers, financial structure, organizational structure, freight transportation.

ANALYSIS OF OPERATIONAL FACTORS OF OPERATING DOMAINS

Isakov, Mikhail P.

pp. 162 – 169

For centralized control of traction resources on railway it is easy to solve tasks of strategic planning and operational management of the operation of rolling stock under treatment at an operating domain. A certain relocation of locomotive fleet gives its advantages for a variety of positions, including intensification and unification, maintenance of machinery. The author analyzes resulting indicators of operating

efficiency of traction resources, accompanying calculation means and introduces obtained findings.

Keywords: railway, control, locomotive, operating domain, performance indicators, traction resource, productivity, organization costs, centralization.

SIMULATION OF TRANSPORT INTERCHANGE HUB OPERATION

Evreenova, Nadezhda Yu.

pp. 170 – 176

A model of a transport interchange hub, made in simulation environment AnyLogi, is shown in the article. Its main functional blocks, the scope and features of its application are described. Means of optimizing design solutions, analysis and justification of directions, intensity and speed of passenger flows are estimated in a multi-tiered and multi-type urban transport environment.

Keywords: urban transport, electric train, monorail, transport interchange hubs, passenger transportation, passenger flows, simulation, optimization of planning decisions.

EXPERIMENTAL EVALUATION OF PARAMETERS OF ELECTROMAGNETIC FIELDS

Belinsky, Stanislav O.

pp. 178 – 191

The author investigates the situation with valuation of electromagnetic fields, especially sources, the impact of which threatens a human body, especially in a wide range of frequencies where maximum permissible limits of the EU and Russia differ substantially. Results of experimental measurements of the levels of electromagnetic fields in the workplace of electricians are evaluated. Significant risks and bases to enhance safety in the areas of electric traction power supply are revealed. According to the results of experimental data analysis a conclusion was made on degree of harmful effects of magnetic fields in the frequency range of 50 Hz on the staff.

The author is the winner of a grant of the Russian non-governmental organization “Russian Transport Academy” in support of young Russian scientists. The article is published within the framework of the cooperation agreement between Moscow State University of Railway Engineering (MIIT) and Russian Transport Academy.

Keywords: electromagnetic fields, magnetic fields, electrical personnel, traction substations, traction power supply, regulation, maximum permissible levels.

ELECTRIC LOCOMOTIVE CLUSTER IN A BIG CITY: PROBLEMS OF ENVIRONMENTAL COMPATIBILITY

Dvornikova, Tatiana V.

pp. 192 – 201

The author creates a cluster approach to engineering and environmental analysis of traffic problems in a big city (Moscow is taken for prototype). In the center of attention is the impact of electric railways on the environment of a metropolitan city with reference to the totality of harmful effects: acoustic noise, vibrational shock loads, electrostatic and electromagnetic fields. It is shown that a problem of environmental safety can be solved in the interests of population, primarily with compatibility of development purposes of local transport networks and urban areas, as well as the organization of complex research of operation consequences of electric traction on the inner rail lines in residential areas and commuter communication.

Keywords: metropolitan city, railway, electric traction, harmful effects, engineering and environmental analysis, cluster «railway-city», environmental compatibility.

PRESUMPTION OF CONFORMITY WITH TECHNICAL REGULATIONS

Palkin, Sergey V., Kozyrev, Valentine A.

pp. 202 – 208

Adopted in the framework of the Customs Union technical regulation system, according to the authors of the article contains a number of provisions, which, together with the existing technical regulations in the field of railway transport complicate the assessment of their compliance with the requirements received from the producers. This also applies to standards, supporting regulations, and certification processes, and preferred ensuring of the security settings of the transport equipment. Conclusions and recommendations of analysts, made in this context, do not claim indisputability and offer discussion.

Keywords: Customs Union, rail transport, technical regulation, standards, regulations, certification, presumption of conformity, appellate body.

NETWORKING «SCHOOL – HOME OF PHYSICS»

Vinogradov, Valentine V., Nikitenko, Vladimir A., Pautkina, Anna V.

pp. 210 – 215

The article describes a successful approach to interaction of schools and a university, which is implemented in MIIT. Further development of a student is mostly predetermined by his academic scholar level. Special attention is given to physics which has enormous effect on training of further engineering skills. A particular attention is given to special learning opportunities, provided by the House of Physics of MIIT.

Key words: pre-university training, physics, entrant, enrollee, transport education, MIIT.

EVALUATING THE EFFECTIVENESS OF CREWS OF AN AIRCRAFT

Malishevsky, Alexei V., Brovkin, Pavel E., Vlasov, Evgeny V.

pp. 216 – 229

The article provides an analysis of the results of a series of experiments conducted during 2003–2013 years with professional pilots, air traffic controllers and students-pilots of University of Civil Aviation to assess the effectiveness of cooperation in working pairs of crew members of aircrafts. The main criteria were the style of behavior, which served as an integral indicator of a person's readiness to perform joint functions and prognostic socionic criterion based on intertype relations. The article shows correlation of received parameters with data of color sociometry and computer tests.

Keywords: civil aviation, crew, interaction, style of behavior, socionic characteristics, performance criteria, intertype relations.

SAFETY TRAINING: COORDINATION AND ACCOUNTING

Ponomarev, Valentine M., Ulyanov, Vladimir A.

pp. 230 – 234

Preparation of transport security forces, formation of a unified database of experts trained within specially targeted program, a system of certification of railway staff of certain categories of readiness to perform the functions of protecting the population against all kinds of threats and risks in the transport are the tasks of

training of people in the area of transport safety. At the same time the authors put forward a number of proposals for coordination of joint efforts of universities in the certification work, organization of trainings, experimental practice, and research.

Keywords: transport safety, training, unified database, certification, coordination.

BRIGHT BEAM IN FRONT OF A LOCOMOTIVE (FIRST PART)

Grigoriev, Nickolai D.

pp. 236 – 245

Pavel Yablochkov owns one of the most memorable pages in the history of world and domestic electrophysics. In XIX century he became a holder of inventions and patents recognized by the entire civilized world for «Yablochkov candle» and ways to use the effect of «light fragmentation» in the multi-element electric alternating current circuits. Thanks to him, «Russian light» provided a vibrant nightlife to major European cities, gave electric lighting to ships and trains, other public infrastructure facilities. And at the same time the author of the article highlights a dramatic fate of the scientist, early death, unfinished plans and projects. [First part of the article, to be continued].

Keywords: electrophysics, Yablochkov candle, electric lighting, generators, power line, transformer, history, biography.

TOURISM ON JET THRUST

Rappoport, Andrey V.

pp. 246 – 253

Describing the post-war period from 1946 onwards, the author analyzes in parallel the trends in the development of international tourism in the country and vehicles, infrastructure, accompanying intensification and acceleration of tourist exchange.

The author highlights starting points associated with revolutionary changes in civil aircraft construction, manufacturing of locomotive equipment, rolling stock on railways, the emergence of more comfortable and high-speed vessels and vehicles. For large domestic areas combination of the factors described in the article had an undeniable value, and generalization made in the course of review is natural and fair: transport has been and remains the support of tourism.

Keywords: transport, infrastructure, route network, international tourism, cooperation, development trends.

WAY, WHICH THE WAR INTERRUPTED

Belogurova, Tatiana A.

pp. 254 – 264

The author explores production and sociocultural reality of the first post-war years on the Western Railway. Its greatest extent accounted for Smolensk region, subjected to large-scale destruction during World War II. Reconstruction became a key objective for 1946–1950 years. Rail transport embarked on reconstruction of roads, mechanization and automation of heavy works. Implementation of such a labor-intensive program in the personal plan seemed impossible without the full exertion of not only physical but also moral strength. In this connection, attention is focused on social factors, public moods of that period. The study is based on the documents of State Archive of Contemporary History of Smolensk region.

Keywords: rail transport, Western railway, consequences of war, restoration of destroyed, five-year plan, food supply, subsidiary farming.

MUSIC OF ROCKET LAUNCHES

Vladimirov, Yuri

pp. 266 – 269

THE REVIEW OF THE BOOK:

Bodrikhin N. G.; introduction S. K. Shoygu; V. E. Fortov. Chelomey. Moscow, Molodaya gvardiya publ., 2014, 490 [6] p.: ill. – (Life of outstanding people: series of biographies; Iss. 1476).

ABSTRACT OF THE BOOK. Vladimir Nikolayevich Chelomey (1914–1984) – one of the founders of Soviet rocketry and cosmonautics, a prominent Soviet scientist in the field of mechanics and control Processes, general designer of complexes with cruise and ballistic missiles, space systems, stations and vehicles, was perhaps the most secret Soviet scientist, this fact imposed a severe taboo on his public life and work. Grandiosity and versatility of objectives, which he solved, as well as his unique giftedness, often introduced complexity and even drama in his bright creative destiny, which, despite all blows and temptations, was crowned with remarkable achievements. The book is written with the use of materials and documents of JSC MIC Mashinostroyenia, Khrunichev State Research and Production Space Center, Russian State Archive of economics, archives of Russian Academy of Science and Bauman MSTU and supplemented by photographs, some of them published for the first time.

ABSTRACT OF THE REVI EW. The book is devoted to academician Vladimir Nikolayevich Chelomey – one of the founders of Soviet rocketry and cosmonautics, an outstanding scientist in the field of mechanics and control systems.

As a general designer of complexes with cruise and ballistic missiles, space systems, stations and vehicles, he remained among the most secret representatives of science and technology, this fact imposed a severe taboo on his public contacts and professional activities. Published biography, documentary and factual sources used in it, open to a wide readership, many hitherto unknown pages of life and scientific work of this vibrant and unique person.

Keywords: cosmonautics, rocketry, mechanics, academician Chelomey, cruise missiles, carrier rocket, spacecraft, manned orbital station.