

**METHODS OF FORECASTING PROSPECTS OF INVENTIONS’
COMMERCIALIZATION**

**Andreychikov, Alexander V., Andreychikova, Olga N.,
Tabunov, Evgeny V.**

pp. 6 - 21

New approaches are given to forecasting based on decision support systems, the mathematical core of which is analytic hierarchy process with dynamic judgments and analytical networks method, allowing to prioritize alternatives in terms of mutual influence. Examples of forecasting prospects for spring suspension systems for high-speed rolling stock are considered. The dependences of dimension of information and tasks related to assessment of decisions complex on their consequences are identified.

Keywords: management, decision theory, information, criteria, consequences intelligent systems, forecasting, analytic hierarchy process, analytical networks method, high-speed transport.

**THE IMPACT OF URBAN MASS RAPID TRANSIT ON URBANIZED
REGIONS**

Fedorova, Maria V.

pp. 22 – 35

The author identified the main shortcomings of existing urban transport modes, described a new form of urbanized region – conurbation, refined the concept of «urban mass rapid transit transport» and «innovative transport project», proposed the technique to evaluate external effects of such projects. The need for creation of new types of passenger transport in terms of strategic and socio-economic problems of development of St. Petersburg, including on the basis of magnetic levitation technologies, is substantiated. The purpose of innovation is to significantly improve transport services for the population, reduce time and money expenses to travel, to remove some load on the highway, to reduce environmental pollution.

Keywords: transport market, demand, settlement environment, conurbation, rapid urban transport, magnetic levitation, socio-economic efficiency, innovative project.

CAR MOVEMENT AT HUMP YARD UNDER TAIL WIND

Turanov, Khabibulla T., Gordienko, Andrey A.

pp. 36 - 48

Mathematical modeling of the first intermediate section of a hump yard at the impact on the car of tail wind of small value is presented. The applied method is D'Alembert principle in coordinate form with non-ideal bond. Simple in appearance, analytical formulas were obtained for determining time of car movement at a hump yard, according to the value of which speed of its rolling into the end of the settlement area is determined. It was revealed that the time, during which the car rolling at this section of the hump yard depends on inclination angle, initial speed and acceleration of the car, as well as controlled length of movement.

Keywords: railway, station, hump yard, car, tail wind, intermediate section, time and speed of car rolling.

TRACTION ELECTRIC MOTORS FOR HYBRID AND ELECTRO-CHEMICAL LOCOMOTIVES

Kalugin, Sergey P., Belyaev, Alexey S.

pp. 50 - 61

In Russia prototype locomotives of new battery and hybrid types have been built, operation modes of power equipment of which have a number of features. In this connection there is a possibility of applying in them commercially available traction motors. The article shows that it is possible, but subject to certain limitations. In order to justify their conclusion, the authors analyze different ways of solution; compare design and performance of power equipment, locomotive traction motors.

Keywords: hybrid locomotives, storage-battery locomotives, fuel cells, operation mode, traction electric motors, engine cooling system.

INNOVATIVE PROSPECTS FOR TRACTION ELECTRIC ROLLING STOCK

Vorotilkin, Aleksey V., Mikhalchuk, Nikolai L., Ryabchenok, Natalia L., Alekseeva, Tatiana L.

pp. 62 - 76

Rail transport performs serious strategic tasks concerning needs of state, commodity market, transportation process. In the context of far-reaching activity of

the industry the authors assess prospects of innovative development of one of the directions of this series – energy saving technologies in production and operation of traction rolling stock. Researchers associate the problems attributable to the topic with achievement of equality of work in generation and consumption of electric energy, relevance of clarifying mathematical essence of energy conservation law, which helps to take into account objective physical processes in the power supply system of railways.

Keywords: railway transport, power supply system, traction rolling stock, energy-saving technologies, energy conservation law, power control modes, recovery, innovative development.

DESIGN AND ANALYSIS OF TRACK PACKING MACHINE MODERNIZATION

Shubin, Alexander A., Vitchuk, Pavel V., Smolovik, Andrey E.

pp. 78 - 87

Variants of comprehensive modernization of mass-produced electric packing machine are given that improve vibration performance and mobility, increase productivity and labor safety when performing repair work on tracks. As an optimal design a new model is proposed that combines wedge-like swage and gasoline engine.

Keywords: railway, repair operations, electric packing machine, modernization, performance, safety, vibration, design with a gasoline engine.

HARMONIC INTERFERENCE OF TRACTION CURRENT IN METRO POWER SUPPLY SYSTEM

Shevlyugin, Maxim V., Dang Viet Phuc

pp. 88 - 101

Harmonic interference of traction current in the power supply system of Moscow Metro is considered. Simulation model of traction power supply system for rolling stock is presented, which was created under MATLAB / Simulink. The results of simulation and experiment on evaluation of harmonic interference of traction current are given. The spectral analysis data were compared with norms for assessment of interfering effect of interference on devices of signaling, centralization and blocking (hereinafter – SCB) and automatic train signaling with automatic speed regulation (hereinafter – ATS ASR). According to the results of modeling and experimental measurements conclusion was drawn that exceeding the traction current at a frequency of 50 Hz is possible.

Keywords: metro, traction power supply system, harmonic interference of traction current, normalized level, simulation model, experiment, comparative analysis.

METHODS OF INTERFERENCE IMMUNITY CHECKING OF TONE TRACK CIRCUITS RECEIVERS

Kravtsov, Yuri A., Antonov, Anton A., Bakin, Mikhail E.

pp. 102 - 109

The article considers a technique to study impact of interference from electric rolling traction current on operation of tone track circuits receivers. Measurement scheme is given, functional diagram of the laboratory bench to verify parameters that affect the appearance of failure is provided. The sequence of test track receiver immunity to normalized sinusoidal interference is considered. The values of current in the circuit are determined, which enable to achieve frequency balance.

Keywords: electric rolling stock, traction current harmonics, electromagnetic compatibility, noise immunity, track circuit operation modes, operating frequency band, track receiver.

DYNAMIC PROPERTIES OF METRO CAR'S BOGIE

Vakhromeev, Aleksey V.

pp. 110 - 114

The article is devoted to development of computational finite element model of trailer bogie of a metro car, which is not contrary to the actual design. The necessity of finite element method application is considered, as it takes into account elastic, inertial and dissipative properties of dynamical systems. With the stated model normal vibration modes are calculated and bogie behavior is studied as a dynamic system with forced vibrations.

Keywords: metro, car, trailer bogie model, finite element method, normal vibration modes, frequency response, dynamic system.

THE ROLE OF TRANSPORTATION TAX IN REGIONAL SOCIO-ECONOMIC DEVELOPMENT

Lavrentieva, Elena A.

pp. 116 - 123

An analysis of road vehicles fleet in the country was conducted, rates of availability of cars for citizens in Russia and abroad were compared, the dynamics of structural formation of consolidated and regional budget due to tax revenues by types of transport was studied. Tax preferences for transport tax were systematized for categories of transport and taxpayers, attention was also focused on tax requirements for rented vehicles, which do not contribute to reduction of applied tariffs and stimulation of entrepreneurial activity. Foreign taxation experience was generalized at the example of Germany, Ukraine, the USA, Denmark, Japan. Arbitration practice of tax disputes on transport tax was assessed. Proposals for improving regional taxation of vehicles in the interests of the state and taxpayers were formulated.

Keywords: economy, budget, social and economic development, region, transport, tax, arbitration proceedings.

CALCULATION OF EXPENDITURE AND NET COST OF TRANSPORTATION PER TRAIN- SECTIONS

Inozemtseva, Svetlana M.

pp. 124 - 135

The article presents a brief history of establishment and operation features of Small Circle Line of Moscow Railway from an economic point of view. The methodological issues concerning definition of expenses and net cost of transportation on train-sections with mixed organization of cargo and passenger traffic are considered. The proposed method takes into account the current procedure for registration of aggregated types of work, industry and tariff components. The economic impact of assessment of quality indicators of rolling stock on the net cost of transportation of goods by Small Circle Line on a dedicated section is given, including the transition from diesel to electric traction.

Keywords: railway, economics, calculation methods, operating costs, freight transportation, net cost of transportation, tariff components, dependent costs, semi-fixed costs, train-sections.

TRADE RELATIONS BETWEEN RUSSIA AND VIETNAM: LOGISTICS MANAGEMENT OF MATERIAL FLOWS

Pavlova, Elena I., Leonova, Victoria V.

pp. 136 – 143

The authors show features of organization of transportation using the logistic approach. The prospects of development of trade relations between Russia and Vietnam are underlined. The basic directions of material flows in export of Vietnamese goods, the specificity of transportation of fruit and vegetables are highlighted. The importance of creating logistics complexes in Moscow region aimed at expanding trade relations is emphasized.

Keywords: economy, trade relations, material flow, logistics, transport and logistics complexes.

ECONOMIC CRITERIA IN DESIGNING PRODUCTION SYSTEMS ARCHITECTURE

Malinovskaya, Zhanna V., Popov, Alexander P.

pp. 144 - 151

Architecture of integrated automated production systems is considered, its definition as a structural and functional model is given. The substantiation of economic efficiency indicators of production systems is provided. The relationship of architecture with an open system concept is shown. An approach to design systems based on functional structuring is demonstrated. Economic criteria are developed; the quality of system management is analyzed in terms of minimizing product lifecycle costs.

Keywords: management, design, architecture of integrated production systems, economic efficiency, structural-functional model, composition, object-oriented approach, automation.

MODEL OF RISK MANAGEMENT IN LOCOMOTIVE COMPLEX

Sheptukhina, Yulia A.

pp. 152 - 158

Development of methodological fundamentals of a model of risk management, put forward by the author, focuses on maximal accuracy of identification of specific industrial risks in the corporate units. Requirements to the contents of the model are

determined at the example of locomotive complex. The author suggests classification of external and internal risks, as well as an approach towards economic evaluation of risks described in terms of responsibility of each corporate locomotive business unit for direct and implicit damage caused by rail accidents. Criterion is selected, being a part of safety expenses of a company, and not a profit fluctuation.

Keywords: railway, locomotive, traffic safety, risk, risk management, model, economic assessment.

OPTIMAL PLACEMENT OF TERMINALS IN THE SYSTEM OF TRANSPORT CARGO FLOWS

Eliseev, Sergey Yu., Volkova, Svetlana G.

pp. 160 - 171

Irrational geographical location of network of terminals for processing and temporary storage of goods on the network of the country's transport complex, increases the time of their arrival at final destination, results in accruing net cost of transportation and processing, reduces safety level of the final product. The authors propose the principles of optimal placement of cargo terminals with a focus only on the place of technological processing of cargo flows in accordance with the general scheme and plan of their progress, configuration and structure. Measures are formulated, which aim at acceleration of implementation of author's ideas.

Keywords: transport, cargo, processing, storage, cargo terminals, organization of placement, net cost, delivery time, safety, logistics centers.

SATELLITE NAVIGATION AND RIVERBOATS' SHIPPING CONTROL: CONCEPTUAL APPROACHES

Solyakov, Oleg V.

pp. 172 - 179

The article shows one of the main areas of technical modernization of the sector, based on the introduction of the most advanced technologies and scientific achievements in the field of global navigation satellite systems, without which safe operation of inland waterway transport is impossible nowadays. The central place in this case belongs to the development of conceptual approaches to solving a strategic task – to ensure reliable control of navigation through the use of continuous high-precision radio navigation field of differential subsystems GLONASS/GPS/GALILEO throughout the controlled waterways, including rivers, lakes and reservoirs.

Keywords: inland water transport, global navigation satellite systems, inland waterways, safety of navigation, riverboats' navigation control.

REGIONAL LOGISTICS HUB AND ITS MARITIME ALLIES

Musalieva, Roza D.

pp. 180 - 188

The article deals with creation of a regional logistics hub and maritime infrastructure in western Kazakhstan, namely in the Caspian Sea area, which will include in particular the seaport Aktau, large-scale ferry crossing from the port of Kuryk, railway line Borzhakty–Ersai. The implementation of infrastructure projects will attract foreign freight traffic and investments by reducing distances and delivery times. This in turn will help to increase the amount of taxes and fees available for the state budget, will create new production capacity and jobs in a number of sectors of the economy, as well as the conditions for full participation of the Republic in Shanghai Cooperation Organization and Eurasian Economic Union.

Keywords: transport, logistics hub, transit potential, region, marine infrastructure, railway, SCO, EEU, international cooperation.

MARINE FUEL: MODERN REGULATORY FRAMEWORK

Troitsky, Aleksey V.

pp. 190 - 195

The article considers current state of regulatory framework governing fuel production for ship power plants, and its use on vessels. The presented paper does not seek to be fully complete, that's why it is necessary to use primary source documents for detailed information, however, in a concise form, it gives an idea of innovation, which are already in force, and expected in the near future. The particular attention is given to problems of pollution of water and atmosphere with ship emissions, to ecological quality standards of applied fuel products.

Keywords: marine fuel, marine engineering, MARPOL, environmental safety, ecological standards.

EVALUATION OF REMAINING SERVICE LIFE OF PARTS ON THE BASIS OF FAILURE DATA

Ustich, Petr A., Ivanov, Alexander A., Mazhidov, Firuz A.

pp. 196 - 205

Remaining service life of parts is one of the main indicators of reliability. The authors obtained an analytical expression for evaluation of such a service life at the example of the side frame of the car's bogie. The technique, used in this regard, is based on operational information of system of centralized accounting of freight cars by their numbers. The dependences and nomograms are obtained relating to possibility of safe operation of bogie's sidewall, the likelihood to evaluate in a depot remaining service life of a part, taking into account the details of required (managed) risk of the most dangerous failures in the period between scheduled deep diagnostics of cars.

Keywords: railway, car, safety, reliability of parts, remaining service life, failure, risk, statistics, law of distribution of time to failure, reliability tests, probability of events.

REFERENCE SYSTEM AS A TECHNIQUE OF TRACK GEODETIC SUPPORT MEASURE

Denisov, Alexander V., Ryzhik, Ekaterina A.

pp. 206 - 215

The article is devoted to the method of geodetic support of current maintenance of railway track associated with the use of a reference system. The authors give interpretation of concepts and functions involved in the system, evaluate structure and content, procedure and parameters of measurements in the spatial environment of the object under study. The created reference system is in some kind an alternative to the traditional type of geodetic works.

Keywords: railway, reference systems, geoinformation, satellite technology, track control, safety, risk prevention.

INTELLIGENT ELECTRICAL ENGINEERING UNIT FOR TRANSPORTATION PROCESS

Krylov, Aleksey V.

pp. 216 - 224

The author deals with the problem of creating intelligent electrical engineering unit (hereinafter – IEEU), which provides, while protecting transported cargo, control

over a variety of parameters and functions by continuous monitoring. Years of research, engineering development and testing allowed to get IEEU, capable of solving the problem of self-protection and self-control in case of unauthorized tampering with its work. The whole process from inception of the design idea to its realization is shown, as well as cumulative effects, resulting in implementation of innovation.

Keywords: transport, intelligent electrical engineering unit, locking and sealing device (LSD), control over parameters, software, security, monitoring, freight transportation.

SYSTEM SAFETY FACTORS AT PEDESTRIAN CROSSINGS

Zhukov, Viktor I., Ptushkina, Lyubov V., Timoshenko, Evgeny N.

pp. 226 -235

The authors have considered the main causes of citizens' hitting by rolling stock followed by injuries, the role of human factor, analyzed statistics on violations at pedestrian crossings over railway tracks, showed calculation of response time of automatic signaling. With the help of an expert survey method technological factors are evaluated, which are ranked according to the degree of their influence on the risk of collision cases, conclusions and recommendations are given.

Keywords: railway transport, pedestrian crossing, human factor, safety, warning system.

FERROPROBES FOR RAPID DIAGNOSTICS OF SWITCH MACHINES

Dubrovin, Lev M., Nikishechkin, Anatoly P., Davydenko, Vladimir I.

pp. 236 - 242

According to experts, the shortcoming of traditionally used electric switch mechanisms is the lack of reliable diagnostics of operating and pre-failure status of the device in real time, which greatly degrades security settings and increases operating costs for maintenance of track automation. The article offers a simple way to diagnose the state of switches, based on measurement values of intensity of magnetic field of DC motor using ferroprobes.

Keywords: railway, safety, electric switch mechanisms, DC motors, permanent magnetic field, magnetic field intensity, ferroprobes, diagnostics.

JOINT PROGRAMS OF TRANSPORT HIGHER SCHOOLS AS A FACTOR OF EDUCATION INTERNATIONALIZATION

Glazkov, Vladimir N.

pp. 244 - 249

Globalization trends have a direct impact on higher education system. Those trends can be implemented by student mobility, through reasonable internationalization of university programs, organization of partnerships of universities and institutions in different countries on the basis of strategic cooperation agreements. At the example of MIIT and Dalian University of Informatics «Neusoft» (China) the article shows internationalization of higher education with the use of joint educational programs, the practice of double diplomas, bilingual education has been flexibly organized.

Keywords: higher education, transport universities, internationalization, joint educational programs, dual diploma, partnership.

HOW TO TEACH TO TRANSLATE A TRACK SIGNAL INTO ACTION

Razinkin, Nikolai E., Voronova, Nina I., Soloviev, Vitaly N.

pp. 250 - 257

Against the background of intellectualization of control systems, emergence of satellite navigation the authors consider problems of implementation of technological compatibility of electronic means of communication and control process of rolling stock, using electronic map of train sections, into teaching process. The features of electronic maps, stages of its creation with the help of the service unit, layout content, process of reflecting coordinates of objects and their relation to the coordinates of track section are shown. Methodological assessment is done concerning observable managerial realities, conditions of reproduction of «sign of action» in «action itself».

Keywords: railway, education, intelligent system, electronic map of the area, satellite navigation, technological dichotomy, software, syllabus, functions, methodology.

NETWORK FORM OF EDUCATIONAL PROGRAMS AT NORTHERN RAILWAY

Vasina, Lyubov I., Eparkhin, Oleg M., Ulyanovsky, Vyacheslav M.

pp. 260 - 270

The article shows methodological approaches, laying fundamentals of a network form of educational programs in the framework of a pilot project with the participation of MIIT, some railways and foreign partners. At the example of a polygon of the Northern Railway, Yaroslavl branch of MIIT, local units of the Northern Training Centre of professional qualifications the current system of target training of students is demonstrated, that offers enlarged access to modern educational technologies and learning means used in the production. Implemented project has both practical and scientific value, opens prospects for close cooperation between employers and educational institutions, which goal is to get a competent and skilled professional with the help of high and higher school.

Keywords: railway transport university, educational programs, network form, methodology, interaction with an employer, pilot project, experience of implementation.

«TO FLY FROM THE STATION TO THE MASQUERADE ...»

Vladimirov, Yuri V.

pp. 272 - 279

REVIEW OF THE BOOK: Kreinis, Z. L. Stations of our expectations ... – Moscow, Autograph publ., 2015, 483 p.

ABSTRACT OF THE BOOK. The book describes more than a hundred most famous railway stations built in different countries over the past two centuries. It presents their history, biographies of architects and builders from Russia, USA, Europe and Asia, who have created station complexes, and at the same time interesting facts, numerous illustrations, retrospection of railway development. (The cover of the book reproduces the painting of Eugène Galien-Laloue (1854–1941) La Gare de l'Est).

ABSTRACT OF THE REVIEW. The merit of the author according to the reviewer, was to give us a well known but systematized description of the emergence of the notion of the rail stations, and of its semantic differences in different languages. The author pays tribute to cultural dimension of early stations, as well as to engineering and artistic creations related to the stations. This is of special interest as the stations are considered not from engineering or architectural point of view but as a system works combining best contemporary achievements at the dates of their development thus transforming them into cultural heritage. And certainly there are

many interesting facts, geographical travels through routes and countries linked together by the history of rail stations.

Keywords: railway, stations of the world, history, architecture, biographies of the authors of the projects.