

**THE FUTURE OF TRANSPORT IN THE CONTEXT OF  
MEGAECONOMIC CHANGES**

**Macheret, Dmitry A.**

**pp. 6 – 13**

Economists disagree as to what the world expects in future – a return to a more dynamic and relatively sustainable economic growth or a greater slowdown of the development as compared with the global crisis of 2008– 2009. In any of these scenarios we can expect an increase in the role of transport. Firstly, it may occur by virtue of the law of accelerated growth of goods exchange. Secondly, it may appear due to the starting of «new commercial revolution», which is based on global trading networks and supply chains, which are converted into the main organizing force of the world economy. Transport aims to become a driving element in the global supply chains, to participate meaningfully in the formation of a new profile of the economy, including through the integration of transport and logistics systems and global trade networks in the system of global product distribution.

**Keywords:** megaeconomy, modern economic growth, the law of accelerated growth of goods exchange, transport, logistics, global product distribution system.

**THEORETICAL ASPECTS OF INTERACTION MECHANISMS IN  
TRANSPORT SYSTEMS**

**Vakulenko, Sergey P., Larin, Oleg N., Lievin, Sergey B.**

**pp. 14 – 27**

The article investigates fundamental mechanisms of the functioning of transport systems. Interaction of participants of transport processes is predetermined by competition and coordinated activities. They can lead to different economic outcomes, but they are always based on interdependent connections and relationships – mechanisms of systemic effects. The authors propose a conceptual model of display of interaction mechanisms that characterizes methodological principles of competition and integration of various transport modes at the transportation market.

**Keywords:** transport system, interaction of transport modes, concept, system properties, transport services market, competition, coordinated activity, modeling.

## **DATA PROCESSING CENTER IN TRANSIENT MODE**

**Zotova, Marina A.**

**pp. 28 – 32**

The article provides an investigation of transient (non-stationary) mode of data processing center (hereinafter- DPC). The center, subject to certain assumptions and conditions, is considered as a queuing system of M/M/1/∞ type. Numerical integration of Kolmogorov equations shows that the stationary mode is reached in 1,5 seconds after the start of operation.

**Keywords:** queuing theory, data processing center, corporate network, request, input stream, integration, o system of Kolmogorov equations.

## **SELECTION OF PARAMETERS FOR DUAL-SYSTEM FREIGHT ELECTRIC LOCOMOTIVE**

**Inkov, Yuri M., Litovchenko, Viktor V., Nazarov, Dmitry V., Feoktistov,  
Valery P.**

**pp. 34 – 46**

The paper presents a classification of parameters of electric locomotives with comments about existing restrictions and a block diagram of a dual-system electric locomotive. Variants for formation of a train of freight electric locomotives (multiple locomotive section) are shown based on a flexible type, taking into account different groups of parameters.

The authors underline that locomotive's reliability is assessed by a number of parameters but availability index is most important. This index is calculated for a given period of time between overhauls and is now considered to be normally equal to 0,95. The authors consider this value effective for future as well.

**Keywords:** dual-system electric locomotive, parameters, block diagram, flexible type, railway.

## **POWER CONTROL OF SHUNT COMPENSATION INSTALLATION AT SECTION PILLAR**

**German, Leonid A., Kishkurno, Constantine V.**

**pp. 48 – 54**

The complexity of power control of shunt capacitive compensation installation at the section pillar of AC catenary has its causes and consequences, which are

connected with the incompleteness of information on the traction load. It is proposed to assess the load degree of traction network and therefore control the compensation installation by voltage drop between traction substations and section pillar. The authors consider the possibility of increasing the accuracy of power control of shunt capacitive compensation installation by transmission of busbars' voltage data of 27,5 kV traction substations.

**Keywords:** catenary, railway, traction energy, shunt compensation, section pillar, reactive power, voltage loss, algorithm.

## **NON-DESTRUCTIVE CONTROL: ANALYSIS OF ROLLING STOCK RELIABILITY**

**Vorobiev, Alexander A., Karpov, Valery A., Sokolov, Sergey A.**

**pp. 58 – 67**

In the article the authors evaluate critically the existing calculation method of reliability and durability of rolling stock's component parts basing on the results of non-destructive control and propose corrections which can make it more effective. Probability of failures at different running time, their empirical correlations were determined taking into account the distribution function. Results of testing of wheel set axles reliability calculations are given at the example of locomotives VL80 using the described technique. For calculations the authors used data obtained during maintenance of electric locomotives at locomotive depots of Privolzhskaya railway in 2010-2011. The calculations show that the running time to failure of wheel set axles obeys an exponential distribution law, the failure rate is constant, which means that the deterioration of their technical condition with increasing operating time of up to 4.5 million km does not occur, and failures are of random (sudden) character.

**Keywords:** railway, traction rolling stock, non-destructive control, wheel set, locomotive, reliability, method of calculation.

## **CONTINUOUS MEASUREMENTS OF VERTICAL FORCES OF TRACK AND ROLLING STOCK INTERACTION**

**Shulman, Zinovy A. (Dnepropetrovsk, Ukraine)**

**pp. 68 – 77**

The article highlights issues related to developed and implemented techniques of continuous measurements and dynamometering wheel sets, allowing with a sufficiently high degree of accuracy to determine dynamic vertical loads of railway rolling stock on the track (interaction of components of the system «vehicle- track»).

**Keywords:** railway, system «vehicle-track», interaction forces, measurement technique, magnetoelastic sensor, dynamometric wheel.

## **WAVELET ANALYSIS IN VIBRO-ACOUSTIC CONTROL METHOD**

**Kvashnin, Mikhail Ya. (Almaty, Kazakhstan), Kvashnin, Nikolai M., Bondar, Ivan S.**

**pp. 78 – 84**

The article shows advantages of continuous wavelet analysis in comparison with fast Fourier transform in the vibro-acoustic control of multilayer constructions. Evidence of above mentioned advantages was obtained, in particular in laboratory conditions using a model in the form of a marble slab and supporting marble cubes. Wavelet spectrum makes it possible to investigate in detail all high-frequency components, which are located at the beginning of the timeline and quickly die out, while the amplitude of the oscillations of the slab significantly reduces on the dominant mode.

**Keywords:** transport construction, multilayered structures, vibro-acoustic control, Fourier spectrum, Fourier transform, wavelet transform, wavelet analysis.

## **STRUCTURAL FEATURES OF OPERATING COSTS**

**Korolkova, Natalia V., Inozemtseva, Svetlana M.**

**pp. 86 – 99**

The article presents the system distribution of operating costs, their structure and grouping according to the nomenclature adopted by the JSC «Russian Railways» for each type of selected activities. Items for aggregate activity types are highlighted. Detailed examples of calculations related to the accounting and expenditure items for freight transportation and the provision of infrastructure services for them, including sectoral units, groups and elements of costs are given. Analysis of the used typical schemes and the results obtained on simulated railways makes it possible to evaluate the potential of existing methods in terms of growing demands for cost management, improvement of regulatory framework of budget sector of the railway holding.

**Keywords:** economy, railway, operating costs, freight transportation, type of activity, cost structure, classifier, aggregate activity types, calculation methods, system distribution.

## **SUPPORT POINTS FOR THE FAR EASTERN TRANSFORMATIONS**

**Efimova, Lyubamira V.**

**pp. 100 – 106**

Interdependence of social and economic development of the Far Eastern regions of Russia and of prospects for construction of transport infrastructure is considered in the article as one of national strategic objectives. In addition the author justifies a particular importance of economic transformation of the Republic of Sakha (Yakutia), which has the largest area in the Russian Federation and the richest mineral resources, and assesses its transport-transit capacity,, taking into account a possible expansion of a railway network and its integration with the system of international transport corridors.

**Keywords:** economy, transport infrastructure, the Far East, Eastern Siberia, Yakutia, railways, projects, construction, international transport corridors, socio-economic prospects of the region.

## **TIME COST AND FARES FOR TRAVEL ON URBAN HIGHWAYS**

**Reshetova, Ekaterina M.**

**pp. 108 – 115**

Public funds and resources are insufficient for development of a country's road network. In this regard, the idea of attracting private investment for the construction (including through public-private partnerships) and further exploitation of automobile and road infrastructure for a fee has got significant popularity. However, business is interested not only in covering vested assets, but also in getting a certain rate of return, so road toll, set by investors on a particular route, may exceed the expectations of potential users. As a result, the highway would be attractive only for those who highly appreciate own time, the others will prefer a free travel. The question of the real cost of time for Russian motorist has not been till now object to consistent sociological study. Accordingly, traffic risks of investor increase. Using statistical material the author provides recommendations for determining the amount of the fare and draws a conclusion on the possibility of using toll roads.

**Keywords:** car, urban highway, toll roads, public-private partnership, time cost, generalized cost of travel, fare size, transport demand.

## **LOGISTICS OF FREIGHT CARS REPAIR**

**Bykov, Anatoly I., Petilava, Ruslan A., Saveliev, Cyril O.**

**pp. 116 – 122**

The authors provide an analysis of the situation with surplus of freight gondola (open) cars in different regions of the country and in different seasons, as well as of concomitant schedule of repairs and their costs. The authors pay special attention to the situation at the «extreme points» of Russian railway network which are associated with October (Oktiabrskaya), Far Eastern and West-Siberian railways. Mathematically reasonable change in the tariff policy of JSC «Russian Railways» is proposed, which makes it possible to distribute cars, that accordingly to standard terms, established by mandatory regulations, should soon be subject to scheduled repair, evenly among all car-repair enterprises of the railway network. Some results have universal character and can be adapted to different rail networks.

**Keywords:** rail fare, repair of freight cars, costing, price list, uniform loading of car-repair enterprises, logistics of repair.

## **COLLISION AVOIDANCE ACTIONS IN THE AREA OF EXCESSIVE APPROACH**

**Sedova, Nelly A.**

**pp. 124-132**

A fuzzy model is proposed for collision avoidance actions of ships in the zone of excessive approach, consisting of four input linguistic variables – line of bearing, course of the vessel- operator, course of the vessel- target, speed of the vessel-target, and one output linguistic variable – course of the vessel- operator. The article provides a technique of forming fuzzy production rules, the base of which contains 525 rules, using maneuvering board.

The author is the winner of the contest for the right to 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 to promote achievements of young researchers.

**Keywords:** maritime shipping, control automation, collision avoidance actions, linguistic variable, fuzzy set, line of bearing, vessel course, vessel speed, fuzzy production rule.

## **INTEGRATED RISK MANAGEMENT SYSTEM**

**Kopylova, Anastasia V.**

**pp. 134- 141**

In the context of the proposed topic the author confirms the relevance of creation of the risk management systems on rail transport. The article is focused on modeling processes using proven management techniques. The priority is given to the risk management system based on the integration of international standards ISO 31000: 2009 and IEC 622 + 8: 2002 (RAMS). Its presentation is accompanied by a description of risk assessment techniques and their correspondence to appropriate stages of the life cycle of railway rolling stock.

**Keywords:** risk management, reliability, security, life cycle, rail transport, rolling stock, technical regulation, international standards.

## **MARKETING APPROACH TO THE STUDY OF URBAN PASSENGER FLOWS**

**Salnikov, Alexander M.**

**pp. 142-151**

The article is devoted to the organization of passenger flows of public transport in Yaroslavl. A new method for the study is proposed, based on the marketing concept. The field portion of the program was accomplished in May 2012. The results of the study on the transport situation allowed offering correction methods that optimize the route network of the city.

Despite localization of problems under review, which was determined by the necessity to apply and verify the methods in real situation, the approaches and techniques suggested by the researcher can be generalized and used for other locations.

**Keywords:** public transport, passenger management, flight network, optimization, marketing approach.

## **FIRE EXTINGUISHING FROM A HELICOPTER IN THE CITIES**

**Vestyak, Vladimir A.**

**pp. 154- 159**

The author considers various ways of fire extinguishing by means of aviation equipment, the most environmentally suitable and efficient under different

conditions. It is suggested to alter a helicopter fire extinguishing system in the cities and to adapt it for «not volley» operation and a fast intake of water from the reservoir, which is the closest to the seat of fire. The work is based on R&D work realized by MAI University and implemented into the practices, is substantiated by relevant mathematical apparatus.

**Keywords:** aviation, fire extinguishers, helicopter, hanger, fire-extinguishing agent, slide damper, water disperse mixture, vacuum pump, city, environmental ecology.

## **TRANSPORT IMMERSED TUBE TUNNELS**

**Kurbatskiy, Evgeny N., Nguyen, Van Hung (Thanh Hoa, Vietnam)**

**pp. 160- 173**

The article shows advantages and disadvantages of immersed tube tunnels used in the transport passage across extensive water obstacles (straits, lakes, wide rivers). An immersed tunnel project for the passage at the intersection of a strait, which may be the most cost-effective, reliable and affordable in terms of costs, time of construction and choice of technologies, is evaluated. The authors propose a method for calculating the tunnels with account for seismic impact.

**Keywords:** transport passage, water obstacles, tunnel, immersed tubes, beams on elastic foundation, Fourier transform, seismic impact, methods of calculation.

## **CONTAMINATION OF ROADSIDE AREAS WITH HEAVY METALS**

**Zhuravleva, Margarita A., Zubrev, Nikolai I., Kokin, Sergey M.**

**pp. 174-181**

On the basis of conducted studies the authors analyze the distribution of heavy metals in the soil of areas adjacent to railway at the example of two railway hauls in the Northern Administrative District of Moscow. Conclusions allow to reveal existing environmental regularities, assess the degree of influence of roadside pollution on the environment, evaluate peculiarities of background anomalies, and determine prospects of similar studies with regard to the task to reduce man-caused impact on the urban area.

**Keywords:** ecology, pollution with heavy metals, railway, right- of- way, possibilities of monitoring, sample areas.



## **SAFETY ON A BRIDGE AT HIGH SPEEDS**

**Polyakov, Vladimir Yu.**

**pp. 182-188**

The article investigates a problem of steady movement of wheels of rolling stock of high-speed rail in the area of bridge crossing at speeds up to 350 km / h. The author justifies the use of a mathematical model that considers as elements the rolling stock, track superstructure, spans and adjoining track on the roadbed. It is shown that high-speed rail specifically requires an integrated approach to structures of both bridge spans, and track superstructure to ensure the safety and preservation of the dynamic properties of engineering structures and the machinery used.

**Keywords:** railway, high-speed rail trains, bridge spans, roadbed, traffic safety, mathematical model, engineering calculation.

## **UNIVERSITY RESOURCES IN INNOVATION CYCLE**

**Lievin, Boris A.**

**pp. 190-200**

The author assesses a current state of Russian transport education system, touches upon the history (genesis) of domestic higher school of railway engineers, formulates the essence of the integrated mission of transport universities at the stage of market reforms. Particular attention is paid to the quality of the training of students, formation of professional competences of future specialists, the role of transport university complexes in the innovation cycle, total research and educational activities of university researchers and lecturers.

**Keywords:** system of higher education, university, transport, development strategy, quality of engineering education, competence, innovation cycle, international cooperation, integration of resources.

## **TRAINING OF ECONOMISTS AND MANAGERS IN GLOBALIZED ENVIRONMENT**

**Lapidus, Larisa V.**

**pp. 204-209**

Modern railway industry requires economists and managers, knowing foreign languages, thus having a quick access to new knowledge, original sources of information, and capable to establish barrier-free communication in professional

world networks. Improving the quality of training of such specialists, as stated in the paper, enhances chances to reconcile interests of industry and higher education institutions. Particular attention is given to an innovative study course in English, which is developed by the author, «Passenger rail transport: Economics and Management» and methods of its teaching with account for growing requirements as for the competence of personnel.

**Keywords:** higher education, economists, managers, railway transport, methods of teaching, learning in English, innovative educational technologies, training of masters.

## **WORKING LIFE OF DIESEL ENGINES: A RETROSPECTIVE ANALYSIS**

**Sirotenko, Igor V., Gogrichiani, Georgy V.**

**pp. 212 – 221**

This published review article shows that diesel engines of the first post World II generation were characterized by inherent structural deficiencies of new developments, unfinished ideas. The results of studies carried out in that period are considered, technical solutions taken at that time are critically analyzed, including those that aimed at addressing identified problems. The analysis allowed the authors, in particular, to draw conclusions that there were brands of used metals, wear resistance and fatigue strength of cast iron, features of bearing fillets, cylinder block group, the quality of welded joints that had fundamental importance for that generation of diesel engines. As follows from the obtained data, engine components are not equivalent in their impact on its reliability and working life, form a certain hierarchy as for their importance for design of the engine structure as a system. (To be continued)

**Keywords:** railway, history, diesel locomotive manufacturing, diesel locomotive, working life, failures, retrospective analysis, regularities of the postwar generation.

## **BRIGHT BEAM IN FRONT OF A LOCOMOTIVE**

**Grigoriev, Nickolai D.**

**pp. 224 – 237**

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 of «Yablochkov candle» and ways to use the effect of «light fragmentation» in the multi-element electric

alternating current circuits, etc. 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. (End. Beginning in a previous issue of World of Transport and Transportation Journal)

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

## **PASSENGER CAR PASSED ITS WAY SMOOTHLY**

**Tarasova, Valentina N., Efimova, Galina N.**

**pp. 238 – 244**

This article continues the theme of passenger car building (see Mir Transporta [World of Transport and Transportation] Journal, 2006, Iss.2 and Iss.3 [4]). It provides a retrospective analysis (1865–2000) of ways of improvement of bogies, describes major historical and technical stages and types of modernization, outlines the story of creation of devices to ensure the movement smoothness of bogies. The representatives of scientific schools are named, who were involved in the development of units of nonautomatic coupler without side buffers, as well as of two-axle bogies with single and triple suspension. A special role is given to the participation of employees of MIIT in the justification of rational installation angle of inclined hydraulic dampers in the central spring suspension, replacing the wedge friction dampers in the pedestal level with rubber gaskets.

**Keywords:** history, rail transport, passenger car, spring suspension, movement smoothness, bogie construction, body, scientific schools.

## **THE TARIFFS AND STORM REEFS**

**Nikolaev Alexander**

**pp. 246 – 249**

**THE REVIEW OF THE BOOK:** Effective Tariff Regulation and Stimulation of Investment in Railway Infrastructure. Collective monograph. Sc.ed. Rezer, S. M. Moscow, VINITI RAN publ., 2014, 368 p.

**ABSTRACT OF THE BOOK** (English text which follows is reproduced with slight corrections from the original book). The book considers problems of effective tariff regulation of the railroads and investment questions in infrastructure of railway transport during an era of globalization of world economy when questions of pricing and tariffs are put in the forefront. Methods of regulation of transport tariffs become

the most important factor of development of the competition in Russia and in the world. The book considers questions concerning optimization of investment methods of regulation of tariffs taking into account saved up domestic and international experience, especially in Europe and in Central Asia, experience of reforming of transport and tariffs. The problems presented in the book and ways to solve them were discussed at the 1st International scientific and practical conference «Effective Tariff Regulation and

Stimulation of Investments into Infrastructure of Railway Transport» held in October, 2013 in Moscow with participation of representatives of regulators of transport of the countries of Europe, Latin America and Asia. The materials of the Conference formed a basis for preparation of the present monograph. The book is addressed to a wide range of experts, scientists and rail managers from various countries who work in the sphere of regulation of transport. In preparation of materials of the monograph participated: Kirillova A. G., D. Sc.Tech., Federal Tariff Service (FST) of Russia, Rezer A. V., Ph. D. (Econ.), associate professor of MIIT, Ababilova A. V., NP «Guild of Forwarding Agents». Executive Editor was Penyaz I. M., Scientific Employee. The monograph is compiled on the basis of full texts and theses of reports, and presentations of participants of Conference. Reports are published according to the originals received by organizing committee of the Conference. Headings of reports are given in Russian or English languages. Reports are located in the same order as speeches of their order were presented during the Conference.

**Keywords:** railways, infrastructure, transport market, tariff regulation, pricing, investment, modernization