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INCREASING SUSTAINABILITY OF LIFE DEVELOPMENT ON THE BASIS OF ECONOMICS OF QUALITY

Okrepilov, Vladimir V.

Pp 6 – 21

The article considers issues of sustainable development of administrative-territorial units on the basis of economics of quality. The author evaluates its role in scientific and technical progress and justifies economic efficiency of the use of its components, which are metrology, standardization, and quality management, at different levels, in various fields of activity. Factors of sustainable spatial development belong to the area of scientific analysis, where interdisciplinary synthesis dominates. This conceptual approach determines depth of expected and planned changes in the quality of human life.

Keywords: society, strategic planning, sustainable development, quality of life, administrative territorial unit, standardization, economics of quality.

DYNAMIC FEATURES OF STANDARD TANK CARS ON CURVED TRACK SECTIONS

Anisimov, Peter S.

Pp 22 - 31

Nature of interaction of wheel sets of four-axle and eight-axle tank cars with rails when driving in curves of railway track is considered, including specifics of longitudinal and transverse elastic ties of wheel sets with bogie's side frames. The results of dynamic performance studies (coefficient of dynamic addition of vertical forces on sprung weight and transverse frame force) of tank cars in curves with radii of 350 and 650 m are provided. It follows that eight-axle tank car design under the terms of traffic safety from the point of view of dynamics is at the same level as a four-axle one, therefore, can be used without restriction on all railways under the same rules of maintenance for undercarriages of tank cars of both types.

Keywords: railway, theoretical mechanics, tank car, wheel sets, rails in curves, dynamic performance, elastic and frictional bonds, unextinguished transverse acceleration, coefficient of dynamic addition of vertical forces, frame force, comparative analysis.

SYSTEM ENGINEERING APPROACH TO OPERATIONAL RELIABILITY OF A RAILWAY

Shepitko, Taissia V., Nak, Grigory I.

Pp32 - 37

The authors justify the use of system engineering approach to evaluation and tasks of improvement of railway line operational reliability. Particular emphasis is placed on interdependence of infrastructure capacity and overall operational readiness of the system «railway» in terms of compliance with criteria adopted in the theory of reliability. An own interpretation of the concept of «operational safety» and factors of maintenance of track in working order is given, as well as regularity in local situations, preventive and remedial actions are suggested.

Keywords: railway, infrastructure, operational reliability, track maintenance, transit capacity, system engineering, reliability theory.

DETERMINING PARAMETERS OF DYNAMIC IMPACT IN THE PLATE OF BALLASTLESS TRACK

Vinogradov, Valentine V., Bykov, Yuri A., Kovalenko, Nikolay I.

Pp 38 - 44

A mathematical model of wave surface propagation in the flat element, which is a carrier plate of ballastless track under dynamic action of wheel set, is demonstrated. An algorithm of accounting different rheological properties of interacting bodies, based on the analytical method of representation of unknown quantities in the form of expansions in terms of spatial coordinates and time, initial and boundary conditions, is offered. The method of constructing a wave pattern in the plate is based on the principle of superposition of two separate tasks: contact problem of initial dynamic load application and wave plate deformation problem over time, including through the dissemination of elastic waves with finite speeds. In the article the wave problem is solved in an analytical form for displacement functions.

Keywords: dynamic impact, plate Uflyand-Mindlin-Reissner, elastic waves, orthotropic properties, spherical functions, ballastless railway track.

CONCEPTUAL BASIS FOR DEVELOPMENT OF 3D STATION ENGINEERING MODEL

Golovnich, Alexander C.
Pp 46 - 53

Fundamentals of development of engineering models of railway stations in 3D format, providing not only a photorealistic appearance of three-dimensional objects,

but also simulation of physical laws of their interaction are demonstrated. The author formulates general methodological requirements at the stage of development of such a model, shows specificity of implementation of design solutions associated with the specificity of simulation tasks and information technologies.

Keywords: railway station, design, the laws of physics, simulation, 3D station model, information technologies.

MODELS OF INTERACTION OF WHEEL AND RAIL AT HIGH SPEED

Loktev, Alexei A., Vinogradov, Valentin V., Buchkin, Vitaly A.

Pp 54 - 60

The authors evaluate the process of dynamic contact «wheel-rail» through analysis of several simulation models of interaction, allowing to take into account different rheological properties of contacting bodies. The research apparatus comprises equations describing the motion of wheel and rail in the vertical direction, which are then solved using initial conditions and numerical iterative scheme, assuming that at small time intervals individual values behave linearly. The proposed algorithm allows to determine that at medium and high speeds of vehicle movement the elastic-plastic dependence of Alexandrov- Kadomtsev is most appropriate to describe the nature of interaction between the wheel and the the rail, as well as to find individual dynamic values.

Keywords: railway, wheel, rail, dynamic effects, viscoelastic contact force, elastic-plastic interaction, mechanical characteristics, interaction patterns, dynamic bending, local buckling

MODERNIZATION OF FANS OF DIESEL LOCOMOTIVES COOLING SYSTEM

Kiselev, Valentin I., Slivinsky, Evgeny V., Radin, Sergey Yu.

Pp 62 - 70

The article introduces a technical solution for modernization of a fan of cooling system of locomotive diesels. The new patented design eliminates imbalance of the fan wheel and increases its reliability during operation. The authors set out operation principle of the device and method to determine a number of rolling elements that perform a function of imbalance loads. The proposed development is the result of cooperation between research departments of MIIT and Yelets University.

Keywords: locomotive, diesel, cooling system, fan wheel, imbalance, modernization.

PROSPECTS OF GRAPHENE NANOELECTRONICS

Zhuravleva, Lyubov M., Nikulina, Yulia A., Lebedeva, Anna C.

Pp 72 - 78

The article with regard to transport developments deals with topical issues of improving electronics engineering and of transition to new technological structures associated with nanotechnology. It is noted that the main direction of evolution of nanoelectronics is linked to new electronics components based on new materials like graphene. Possibility and prospect of replacing traditional and most used silicon materials with graphene are reviewed. Brief information about methods of manufacturing, benefits and advantages of the use of graphene is followed by the arguments in favor of development of technique capable to open the band gap, allowing transition of graphene into semiconductor. Methods of mass commercial manufacturing of graphene semiconductor are discussed.

Keywords: transport, science, functional material, graphene, graphite, electronics, nanoelectronics, nanotechnology.

CHOICE OF SUPPLY CHAIN OPTIONS IN MULTIMODAL TRAFFIC

Lukinskiy, Valery S., Strimovskaya, Anna V.

Pp 80 - 89

To solve market competitive problems Russian enterprises, the authors believe, should implement an integrated approach to the development of supply chains for transportation over long distances (such a situation occurs more often while introducing a new product to the market when it is delivered directly from the manufacturer factory). In this case, the transport component is of particular importance, as it may significantly exceed the share of other logistics costs. Demonstrated approach to the design of delivery of goods takes into account the alternative choice. It is proposed to assess not only the most optimal (in terms of cost and integrated indicators) options, but to take into account those in where a certain benefit or important social aspect with more distant consequences for the production itself is prevailing. Examples of calculations, models and methods of designing logistics systems are presented. It is expected that the developed methodology can be used for individual subsystems – for example, purchasing, transportation, warehousing, inventory management.

Keywords: transport, economy, logistics, supply chain, multimodal transportation, design, transportation, logistics costs.

JUSTIFICATION OF EFFECTIVENESS OF THE CRM SYSTEM

Efimova, Olga V., Murev, Dmitry I.

Pp 90 - 98

The article describes an approach of the method to study effectiveness of modern system of relationships with customers based on information technologies. In addition direct economic effects, indirect effects and effects of reducing risks in the performance of transport and logistics services are considered. Creating such a system in the holding Russian Railways is intended to increase the competitiveness of rail transport, to attract new customers, to increase revenue and reduce unproductive losses, which arise due to unsatisfactory performance referring to fulfillment of contractual obligations in the field of carriage of goods.

Keywords: railway, CRM, holding company, service quality, transportation market, customer focus, logistics, efficiency, system of customer relationship, information technologies.

PROCESS MODEL FOR ECONOMIC INTEGRATION

Chumlyakov, Cyril S.

Pp 110 - 119

The article is devoted to the review of Eurasian integration processes, to the development of transport export-import relations of the Russian Federation, the position of the national transport system in the global transport communications system in the context of the country's participation in international economic associations. The need to find prospects for development of the transport sector is actualized in view of new realities created after the establishment of the Customs Union and Eurasian Economic Union. A model of strengthening transport and transit potential through improvement of customs and transport and logistics management of the transport system is offered.

Keywords: economic integration, EEU, SCO, BRICS, transport infrastructure, international transport corridors, transport and logistical support, process model.

LOGISTICS OF EXPORT SHIPMENTS FROM ECUADOR

Kurganov, Valery M., Morales, Vicente Geovany Jimenez
Pp 120 - 128

The development of economic relations with countries in the Asia-Pacific region, and improving the efficiency of logistics contacts is one of the most promising directions of trade relations for Russia. Among its trading partners in the Asia-Pacific region Ecuador occupies an important place. The authors' analysis gives

a fairly clear picture of transport channels (sea and air) and costly mechanisms in the supply chain used by shippers and transiters of Ecuadorian products. It is proposed to use the concept of «logistics laws» to search for options to reduce costs in the supply chain of goods exported to Russia from this Latin American country.

Keywords: transport, logistics, foreign trade relations, Ecuador, supply organization, exports, logistics costs, reduction of losses.

NOVOROSSIYSK SYSTEM OF TRANSPORT FLOWS REGULATION

Mirotin, Leonid B., Lebedev, Evgeny A., Yamenskov, Alexander I.

Pp 130 - 137

The authors show characteristics of the transport load on the road network of the port city of Novorossiysk, and the reasons for a long stay of road trains within the boundaries of the municipality. Results of study of traffic flows by type of vehicles, traffic intensity on streets, the nature of interaction with port infrastructure, maritime terminal are given. The authors offer a solution to the problem of congestion of municipal roads through introduction of a notification and permitting traffic control system by a single operator and a block diagram of conceptual algorithm of integration of vehicles into its structure.

NEURAL NETWORK CONTROL OF MARSHALLING PROCESSES

Obukhov, Andrey D.

Pp 138 - 147

On the basis of selected factors that determine quality of operational control over technological processes, it is proposed to create an automatic control system of marshalling yard operation with elements of artificial intelligence. Proposed mathematical apparatus could include typical methods, characteristic of artificial neural networks (ANN) and complex simulation models. The basic requirements for ANN models are formulated, designed to solve the problems of current forecasting at marshalling yard, as well as criteria and principles that should be taken into account in the design of neural networks.

Keywords: railway, freight transportation, marshalling yard, control, intelligent technologies, artificial neural networks.

TERMINAL INFRASTRUCTURE OF KAZAKHSTAN AT THE CHINESE PORT OF LIANYUNGANG

Kenzhebayeva, Gauhar Zh., Kisselyova, Olga G.

Pp 148 - 156

Today the Republic of Kazakhstan, a member of EEU, is in the process of active building of its transit policy, market strategy and formation of new vectors of development. Enhancing transport infrastructure is a real step to improve competitiveness of the country's transport complex. Among key projects in that sphere the article names own terminal infrastructure in the Chinese port of Lianyungang wich is built in order to consolidate freight flows in Southeast Asia, to establish and develop related logistics mechanisms, to increase freight transit through the territory of Kazakhstan.

Keywords: logistics terminal, seaport, cargo transportation, international transport corridors, transit capacity, border crossing point.

FREIGHT RAIL CAR FLEET: ANALYSIS OF CONDITION AND PROSPECTS

Tumanov, Mikhail A.

Pp 158 - 165

The article deals with main results of the restructuring of railways in Russian Federation, analyzes dynamics of performance of rail operations under the impact of relevant factors, international (European and North American) models of organization of freight rail transportation, Russian experience, possible guidelines for enhancement of business processes referring to management of freight rail car fleet.

The author's conclusion is that holding company Russian Railways has acquired a huge regulative basis and numerous technical and technological tools to organize efficient transportation process that provides for the requirements of all the actors within the country as well as in the world transportation and logistics market. Meanwhile it is necessary to create effective technological logistics within the market of freight rail transportation provided the conditions of existence of multiple owners of rolling stock and limited infrastructure capacity of the JSC Russian Railways.

Keywords: railway, freight car fleet, privatization, productivity, idle hours, empty runs, management, technology, logistics

LOGISTICS CORRIDORS ON THE BASIS OF CLUSTERS

Ushakov, Dmitry V.

Pp 166 - 173

During the period of economic instability producers of goods even more strongly want to be confident in their product sales at remote and not always controlled markets. The importance of transport component and the role of freight forwarders throughout all links of the supply chain increase. In this situation, the formation of logistics corridors, ensuring sustainable transport links between regional clusters, can be an effective tool for creating favorable conditions for stabilization and increase of goods turnover.

Keywords: region, sales markets, supply chain, cluster, logistics corridor, trade flow, logistics operator, system of logistics clusters.

OPTIMIZATION OF TRANSPORTATION ON URBAN PASSENGER LINES

Penshin, Nikolai V., Titova, Alexandra A.

Pp 174 - 184

The objective of the work is to optimize urban transportation by giving priority to route passenger transport, including by using bus lanes. Methods of study are full-scale observations, statistics, and reporting. Improvement of traffic management can increase safety level, reduce a number of conflict points, increase carrying capacity and speed of communication, ensure application of advanced technologies in the system of vehicle movement regulation. The article continues reports on researches conducted by the authors in the town of Tambov (see World of Transport and Transportation, Vol. 13, 2015, Iss. 3 and 5).

Keywords: bus, trolleybus, bus lanes, route passenger transport, traffic management, carrying capacity, speed of communication

«GREEN» LOGISTICS

Mukhina, Inessa I., Smirnova, Anna V.

Pp 186 - 190

Logistical support for trade flows in the market, which is global at its core, leads to realization of new needs. One of them is intensification of environmental protection, provision of environmentally safe transportation of goods to the customers. The article discusses the need for application, principles and targets of «green» logistics technology, contributing to the environmental safety of transport,

enhancement of social responsibility, competitiveness of economic actors in freight and passenger transportation.

Keywords: «green» logistics, delivery of goods, transport, piggyback transportation, ecology, safety, environmental protection.

JUSTIFICATION OF SAFE DISTANCES FOR TRACK CROSSING

Annenkov, Anatoly M., Volkov, Andrey V., Ptushkina, Lyubov V.

Pp 192 - 201

A considerable number of accidents (collisions with people) on the tracks makes it necessary to study behavior of pedestrians, their reaction, criteria of threat assessment in the zone of «areas of approaching», and of selection of a safe time for themselves within a visually controlled distance. The paper presents results of measurements and calculations of time that pedestrians need to safely cross the tracks under different conditions and in diverse situations. Practical application of obtained dependences suggests the scope of design of safety equipment and the creation of new technical devices in the zone of responsibility of railways, including the rationale for requirements for existing signaling systems at pedestrian crossings.

Keywords: rail track, area of approaching, pedestrian crossing, crossing time, safe distance, train speed.

SCHEME OF CROSSING WITH INTENSIVE VEHICLE TRAFFIC

Lysenko, Nikolai N., Derzhavin, Alexey N.

Pp 202 – 209

Severity and urgency of road safety problem at intersections of highways with railways require not only a sound and long-term control strategy for reducing a number of accidents and a risk of an accident at regulated crossings, but also continuous improvement of technical equipment of control plots by devices intended to prevent possible collision of cars with rail rolling stock. The proposed model of a gateway scheme of a crossing concerns conditions of passage through railway tracks of a motor transport moving with a high intensity (more than 7 thous. vehicles per day). Gateways with barriers and laser sensors-informants are added to standard devices, order of movement is adjusted, causing significant loss of crossing capacity, while safety increases fivefold.

Keywords: railway crossing, safety, gateway scheme, road vehicle, transit capacity

ELECTROMAGNETIC COMPATIBILITY OF HIGH-VOLTAGE ELECTRICAL SYSTEMS

Bader, Mikhail P., Kosyrev, Aleksey M., Kukuyuk, Nikolai A.

Pp 210 - 218

Analysis of performance and reliability of electrical equipment of high-voltage electrical systems (hereinafter – HVES) confirms the need to improve evaluation methods and mathematical modeling of transients in power lines (hereinafter – PL), at substations, and in grounding and protective devices. One of the main problems, however, remains improvement of safety and quality of HVES functioning in accordance with their EMC in modes of overvoltage effects, including determination of evaluation criteria, scientific substantiation of deep forced restrictions of external and internal overvoltage of electrical equipment, optimization of PL protection and substations of the system from different levels of voltage, electromagnetic interference that could cause serious accidents.

Keywords: railway infrastructure, electrical power supply, electromagnetic compatibility, high-voltage electrical systems, lightning overvoltage, neutral of transformers.

AIRCRAFT CREW: RESOURCES OF INTERACTION

Arinicheva, Olga V., Malishevsky, Alexey V., Vlasov, Evgeny V.

Pp 220 - 231

The results of experiments carried out in 2011–2015 with professional pilots and students of St. Petersburg State University of Civil Aviation are analyzed. The aim of the study was to test the efficiency of interaction in the two-member crew of the aircraft using a variety of evaluation criteria. In particular, socionic criteria were considered as well as characteristics of individual styles of behavior, and data of indirect sociometry. Statistical criterial dependences are provided. Article continues previously considered topic (see World of Transport and Transportation, 2014, Iss. 5).

Keywords: civil aviation, aircraft crew, interaction of pilots, style of behavior, inter-type relations, sociometry, CRM.

RESEARCH ON LOGISTICS SPECIALISTS' MARKET

Solskaya, Irina Yu., Freidman, Oksana A.

Pp 236 - 244

The authors analyze the labor market situation prevailing around the profession of logistics specialist, assess the demand from behalf of transport and logistics companies, and in the context of human resource capacity of a region. The article offers approaches to formation of logistics personnel, training programs for logistics

personnel of specialized organizations and future experts in higher schools, as well as performance indicators of professional competencies of logisticians. The example of Irkutsk shows ranking of employers' preferences and structure of demand for the profession. The conclusion on current trends at the regional labor market and on educational services is proposed.

Keywords: logistics potential, human resources, educational logistics, educational logistics tools, labor market.

«FAUST CURVE WITHOUT MEPHISTOPHELES IMPURITIES»

Grigoriev, Nikolai D.

Pp 246 - 255

Being a man of encyclopedic knowledge, a brilliant theoretician and experimenter, academician Sergey Vavilov has received international recognition for his work in the field of luminescence («cold light»), physical optics, became a founder of a branch of science, called microoptics. In the arsenal of his developments there are rangefinders and stereo telescopes, means of aerial photography and optical control, masking of warships and lighting of submarines, he headed for many years at the same time State Optical Institute and Physical Institute of the USSR Academy of Sciences. The last six years of life he headed the USSR Academy of Sciences, played a huge role in post-war reform of Soviet science. The article is devoted to the 125th anniversary of the birth of the scientist, organizer and popularizer of science and public figure.

Keywords: physics, optics, Sergey Vavilov, luminescence, science, history, academy.

SOCIO-ECONOMIC ASSESSMENT OF TRANSPORT ON THE BASIS OF HISTORICAL COMPARISONS

Macheret, Dmitry A.

Pp 256 - 271

Historical analysis made by the author shows that the emergence of new t ransport communications contributes to creation of new major economic and cultural centers, while traditional centers, which turned away from traffic flows, lose their meaning. Research of transport conditions in pre-Columbian America (absence of wheel, horse-drawn, with the exception for the Central Andean region, and horse transport, a lower level of water communications development in comparison with the Old World) allows us to conclude that the lack of vehicles and the lack of private initiative in transport sector essentially limited the possibilities of social and economic growth in ancient civilizations.

Keywords: transport, socio-economic development, communication lines, ancient civilization, economic history, institutions.

SOME HURRY, THE OTHER HASTEN

Usmanov, Boris F.

Pp 276 - 280

REVIEW OF THE BOOK: Lapidus, B. M., Lapidus, L. V. Rail transport: philosophy of the future. Moscow, Prometei publ., 2015, 232 p.

ABSTRACT OF THE BOOK. What should be done for the transport in XXI century, in order that it meets more and more innovative expectations of consumers? Do you believe that in the near future there will be commuter trains- planes, intercontinental overland routes, and the speed of our travels over the ground steps over 1000 km per hour? On the pages of this not fiction book together with the authors we can try to answer the most daring questions, to broaden own attitudes, to get acquainted with breakthrough transport projects and everyday working hypotheses based on actual engineering and economic calculations.

ABSTRACT OF THE REVIEW. The reviewer argues that the form of the presentation chosen by the authors allows to save a flexible boundary between dream-fantasy and a real prospect of development of terrestrial transport, that the book chapters are indeed solid sections, where in the first case five hypotheses (chapters) are put, the second subtitle «Philosopher's vision for the future» indicates sixteen directions and profiles of the industry development in the global and national context, and in the third, «The future starts today» the innovative trends and future projects are assessed. In the third chapter (the final chapter), according to the authors, «only a few projects from the world of innovative collection are offered» (p. 178). But they, it should be immediately noted, will certainly be of interest to the reader, since they combine the past and the future of rail transport. The reviewer summing up his impressions, notes integrative and comprehensive features of the book. Written by two doctors of science, it drew the attention not only by uncommon construction of content and form, but also by a deep knowledge of the material.

Keywords: transport, railway, philosophy, economics, information, management, forecasting, innovation, future.