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MODEL OF SPATIAL OSCILLATIONS OF A FLAT CAR WITH LONG GOODS

Anisimov, Petr S.

pp. 6 – 13

The author has developed a mathematical model to study spatial oscillations of a tetra axial flat car with long goods (the ends of goods exceed limits of frontal bars of carriage underframe for more than 400 mm) leaned on two elastic dissipative supports of a flat car. At the same time the free ends (consoles) of a cargo overhang the floor of two cars. Thus the mechanical system «flat car – long goods' consists of 12 solids: long goods which are elastic in vertical plain, frame of a car which is also elastic in vertical plain, two over spring beams, four lateral beams and four wheel pairs of model 18–100 bogies. There are some allowances that help to elaborate a mathematical model: gaps in pivot plate assemblies are not taken into consideration; lateral rolling motion of side frames of bogies is absent; wobbling, transversal drift of side frames of bogies, as well as wobbling of over spring beams and wheel pairs are equal; rail track is rigid in vertical plain and elastic in horizontal plain. In order to define fundamental function of bending of long goods in vertical plain, the author used differential equation of free motion of a rod with constant crosssection along its length when it is placed on elastic foundation. Three forms of oscillation are composed.

The first and the second forms refer to oscillations of long goods as of solids (bouncing and rocking), the third one refers to oscillations of load as of elastic body.

In order to compose differential equations, describing spatial oscillations of a flat car with long goods, moving along straight and curve track, the author used Lagrange equation. The elastic features of the bogie of a flat car as well as elastic features of long goods are provided for in kinetic energy. Describing the supports for long goods the author takes into consideration elastic and viscous forces and the moment. Generalized forces are defined through the forces in lateral bearers during side drifting that influence over spring beams of bogies and through the forces that result from relative travel of over spring beams and side frames of bogies, as well as through the moments of dry friction during wobbling of the frame of a flat car, through the moment of lateral rocking of the frame and through the moment of edge bearing of center plate on thrust bearing of a bogie. The author also has taken into consideration the forces of interaction between the wheels and the rails, caused by elastic motion of wheels along the rails, as well as the forces caused by conicity of the surface of wheel rolling.

The study resulted in a system of 20 equations which describe spatial oscillations of the mechanical system «flat car – long goods' at the moment when it moves along straight track and track curves (circular curves). While motion in curves

is analyzed, the absolute coordinates are assumed, which are equal to the sum of coordinates in relative and translational motion, the uncompensated lateral accelerations been also considered. Mathematical model assumes clinch, vertical and horizontal harmonic irregularities accounting also for transportation lag of whhel pairs.

Key words: railway, flat car, elastic long goods, elastic dissipative supports, fundamental function, spatial oscillations, straight and curve track with irregularities, mathematical model, differential equations.

PUBLIC INVESTMENTS IN INFRASTRUCTURE: METHODOLOGY FOR ASSESSMENT

Macheret, Dmitry A.

pp. 14 – 19

The article, based on historical approach, reveals methodological problems of assessment of macroeconomic efficiency of public infrastructure investments. The author suggests common criterion of macroeconomic efficiency of public investments and studies conditions of its implementation.

The article substantiates that transport infrastructure is a sphere of most efficient application of publicinvestment.

The features of assessment of practicability of longand short term public infrastructure investments are examined along with interaction between public budget and tax politics and substantiation of necessity to maintain “plain” scale of taxation of individuals.

Key words: transport infrastructure, construction, economic efficiency, methodology of assessment, investment, taxation, public-private partnership.

INTELLIGENT NAVIGATION: GLONASS AND COORDINATE MODELS

Matveev, Stanislav I.

pp. 20 – 27

The article is devoted to further elaboration of theory fundamentals and algorithms of railway intelligent navigation on the basis of GLONASS global satellite system and standard coordinate models of tracks.

The models can be used to monitor geometry of track as well as to control and navigate scheduled trains. Flows of synchronized measuring inertial data are adapted to standard model. In order to fulfil navigation functions the emphasis is put on motion trajectories simulated by linear metric graphs. The article sequentially

analyzes structural and stageby- stage features of simulation models and current and long-term research tasks referring the subject under the study.

Key words: satellite navigation, intelligent system, GLONASS, GPS, standard track coordinates models, theory, technology, adaptive algorithms.

ADAPTIVE SPRING SUSPENSION OF LOCOMOTIVES

Slivinsky, Evgeny V., Klimov, Dmitry N.

pp. 28 – 33

The authors describe the design of adaptive torsion spring suspension equipped with adaptive hydro mechanical damper, technique to assess kinematics of straight motion of diesel locomotive bogie equipped with such a spring suspension. According to the results of analytic study conducted by the authors, the use of suggested model allows to considerably reduce amplitudes of car body oscillations and velocity of its drift in vertical plain, as compared to similar production units.

Key words: locomotive, adaptive torsion spring, adaptive hydraulic and mechanical damper, rigidity, damping rate, assessment method, comparative analysis of designs.

IMPACT OF LONGITUDINAL STIFFNESS OF RAIL TRACK ON THE SLIDING OF LOCOMOTIVE WHEEL PAIR

Novoseltsev, Victor P., Novoseltsev, Petr V., Gordeeva, Anna A.

pp. 34 – 38

Locomotive motion in traction mode is accompanied by wheel pair sliding along the rail, sometimes it results in slippage. This process which is rather dangerous depends on many factors, including, in authors' opinion, longitudinal stiffness of the track.

The article describes an experimental method of determining of track longitudinal stiffness. The results here-of give the possibility to calculate power losses caused by rail inelastic drift.

The procedure includes dynamic analysis of motion of locomotive wheel pair in the case of its run-over the compressed section of track and calculation of wheel pair sliding speed regarding the rail.

The authors also examine auxiliary rotary motion of wheel pair during its interaction with the rails and sliding effect caused by it.

Key words: railway, locomotive, wheel pair, longitudinal stiffness of rail track, rigidity, sliding, slippage, deformation energy, dynamic analysis, kinematics.

SHALLOW WATER IMPACT ON ICE PERFORMANCE OF THE SHIPS

Sazonov, Cyril E., Ryzhkov, Alexander V.

pp. 40 – 47

Russian practices of navigation are familiar with ice shipping, operation of icebreakers and freight ships capable to resist to high ice load. Those conditions are frequent not only in sea shallow waters typical of Arctic seas along long and difficult Northern sea route but also of many Siberian great rivers, where in presence of ice the shallow waters are achieving limit values admissible for navigation.

The article studies design features of icebreakers and large-capacity vessels of ice shipping, results of experiments and full-scale testing referring to engineering of ice performance of designed ships.

Key words: sea transport, icebreaker, ice-shipping vessel, shallow water, ice area, ice-hummock, ice performance, experiment, full scale testing, simulation.

EVALUATION OF POWER INPUTS CAUSED BY UNSCHEDULED STOPS

Sidorova, Natalia N.

pp. 48 – 51

The article introduces the techniques that allow to considerably increase the exactitude of evaluation of electric power inputs caused by unscheduled stoppage and to adjust technological standards and engineering rate of train-running. The author uses method of analysis to determine extremum of target function by specified factor, coefficient of correlation between specific consumption of electric power for motion and the number of unscheduled stops serving as such target function. Its minimum value corresponds to desired averaged value of acceleration speed.

Key words: electric traction, railway, freight traffic, unscheduled stop, specific consumption of electrical power, correlation analysis, engineering rate.

TRAMS AND TROLLEY BUSES WITHOUT EXTERNAL FEEDING

Orlov, Vitaly A.

pp. 52 – 57

The tasks of engineering of wireless electric feeding for urban passenger transport, of storage batteries which ensure prolonged autonomy of rail and trackless vehicles – are rightfully ranked among the tasks of engineering of modern electric cars, hybrid engines for motor cars (see, e. g. Mir Transporta, 2013, Iss.1). The present survey article is a sort of a think piece referring to existing engineering solutions and projects, implemented during past decades, which reflect best practices of countries where tram and trolleybus routes are equipped with sections without external electric feeding.

Key words: urban transport, tram, trolleybus, electric feeding, storage battery, vehicle autonomy.

RESISTANCE OF WINDING DURING PARALLEL OPERATION OF TRANSFORMERS

Grigoriev, Nickolay D.

pp. 58 – 63

The debatable article expresses disagreement with existing opinion that compensating current (also known as balancing, cross, equalizing, phasing, restoring, circulating current – ed.note) which flows through primary and secondary winding of threephase step-down parallel operated transformers of groups 12 and 11 (Y/Y-12, Y/D-11), is valuerestricted by the sum of short-circuit resistances. In particular the inertia of customary approach of assessment doesn't allow taking into account the wellknown factor of coexistence within the same threephase circuit of star (Y, can also be called T – ed.note) and triangle-shaped (Δ or D – ed.note) connections. Taking into consideration exactly this factor the author substantiates that the formulae, suggested by him to replace previously used equations, might reduce inaccuracy of computation during engineering of new transformers. Following the computation of parameters of secondary D-shaped winding of three-phase stepdown transformer, the author, in order to realize computations for Y-connections, has elaborated formulae of determination of balancing current for blank cycle of two parallel operated three-phase step-down transformers with diagrams and groups of windings Y/Y-12 и Y/D-11. Their difference from known formulae consists in the fact that resistance or relative value (in %) of a short-circuit current are reduced by a third. Denominator of formulae, used to determine balancing current, in view of assumed conditions, includes substitutional value of the sum of resistance or of relative values (in %) of short-circuit current of three-phase step-down transformer with Y/Y-12 winding connections or diagrams and 2/3 of the value of resistance or

relative value (in %) of shortcircuit current of three-phase step-down transformer with Y/D-11 winding connections or diagrams. The reliability of suggested formulae is confirmed by measurements of balancing current under blank cycle mode of two parallel operated three-phase step-down transformers TS-2,5/0,5 with Y/Y-12 и Y/D-11 winding diagrams and connections. Difference between calculated value and measured value of current was of 1,93%.

Key words: transport power network, three-phase step-down transformer, winding, Ohm law, compensating current, resistance, impedance, short-circuit, calculated and measured values, new formulae.

BOOSTER TRANSFORMER: COMPENSATION OF LOSSES IN TRACTION POWER NETWORK

Vlasov, Stanislav P.

pp. 64 – 70

The article shows and substantiates with the help of computations and testing data the capacity of booster transformer to overcome the specific shortcoming effects of alternating current 25 kV traction power system widely used in Russia. Particularly the booster transformer is capable to compensate (neutralize) negative effects caused by lagging phase, especially if there are units of capacitive longitudinal compensation in lagging phase of traction substation.

Key words: railway, traction power system, electric locomotive, traction substation, booster transformer, voltage in traction network, booster winding, primary feeding winding, compensating current and its restriction.

STRUCTURAL RELIABILITY OF LOCOMOTIVE'S COMPONENTS

Kiselev, Valentine I., Strokov, Georgy V.

pp. 72 – 76

Reliability of locomotives depends largely on the quality of design of units and components, on their capacity to ensure efficient and faultless operation of rolling stock. The authors participated in designing and engineering of glass-metal armature band of electrical traction motor. Such approach allows combining solidness of metallic band and manufacturability of glass binding.

Key words: locomotive, electrical traction engine, durability, reliability, faultlessness, armature, unit fastening, bandage, manufacturability.

ASSESSMENT OF DEMAND FOR PASSENGER AIR CARRIAGE

Balashov, Victor V., Smirnov, Andrey V.

pp. 78 – 87

The article is devoted to technique of assessment and forecasting of passenger demand that air carriers can attend. It is based on two models. The first one is structural econometric and is used to determine the «effective» part of population who can afford services of air companies. The second one is mathematical and is used to reveal and differentiate by objectives the groups of «frequent» and «rare» passengers. The suggested methods permit to achieve sufficiently substantiated reference points for the market of air carriage referring to adaptive scenarios of economic development of the country. The necessity of mathematical model is explained by deficiency of reliable statistical data on the number of passengers who travel respective times per year. The techniques are intended first of all for the regions with developing markets of air carriage.

Key words: air transport, passengers, air transportation market, demand, assessment, evaluation, forecast, statistics, economic model, mathematical model, methods.

SELECTION CRITERION FOR TRACK DESIGN OF HIGH SPEED RAILWAY

Kovalenko, Nickolay I., Zamuhovsky, Alexander V., Kovalenko, Alexander N.

pp. 88 – 95

Objective function of economic justification of track design for high speed rail is the correlation of total expenditure intended for track construction and for maintenance. This target function is subject to minimization. In order to reduce costs to comparable form it is supposed to use a rate of transport cost per unit. The calculated period of summation of costs and charges is determined by duration of life cycle of the project. Total project efficiency as well as efficiency of participation in its implementation is evaluated by quantity and quality indicators. Taken together they are focused on revealing surplus of the results of project implementation over its costs during a certain period. To achieve study's objective the authors use several methods which could de bene esse be included in two groups: of simple (static) methods and dynamic or discounting methods. The first group includes payback period (PP) and return on investment (ROI) techniques. The second group includes net present value, profitability index, internal rate of return, discounted payback period. The article notes that discounting technique reveals certain shortcoming, particularly it doesn't provide for financial flow after the moment of full cost

recovery till project life expiration. This factor explains the fact that under the long periods of cost recovery the reduced effects are larger than under short periods.

The article also suggests some criteria of technical and economic assessment of current maintenance of HSR rail track, underlining that the traditional approaches aren't effective. For instance, there is no much sense to assess losses caused by reduced train traffic speed, additional costs caused by train acceleration and deceleration.

The authors argue that any fail to respect the HSR schedule results in important financial losses for a rail company, particularly for JSC Russian Railways.

That's why current outlay costs of HSR operation should be assessed as an equivalent of financial losses of a participant of traffic process who is responsible for such costs.

Key words: high speed rail, high speed railway, economics, reduced costs, period of cost recovery, discounted criteria, financial responsibility.

COMPETITIVE PROSPECTS OF CROWD TECHNOLOGY

Tegin, Vladilen A., Usmanov, Boris F.

pp. 96 – 101

The article reviews and studies economic interrelations and market features of network information technology in competitive market environment; changes in cost rates of intellectual products; labor costs changes caused by advance in computer technology and electronic communications; crowdsourcing, crowdrecruiting, crowd-funding and other forms of attraction of Internet customers to team innovation creative research, elaboration of economically efficient, largescaled and promptlu implemented projects.

Key words: crowd technology, market, economics, competitive advantage, intellectual capacity, labor resources, cost, information services, Internet, team creative work, innovation project, profit.

OPTIMIZATION OF RESERVE POOL OF CONTAINERS

Shapkin, Ivan A.

pp. 102 – 106

The article analyzes efficiency of operation of rail cars and containers in freight rail traffic. The author draws attention to the importance of reduction of light running and terminal delay of main and reserve rolling stock. He determines specific values of required rolling stock, calculates parameters of correlation equation between demand for cars and for containers, assesses dynamics of the rate of deadhead run of

containers and of flat cars at the example of leading operating company which is JSC TransContainer.

Key words: railway, economics, efficiency, traffic capacity, reserve rolling stock, required rolling stock, container, operator, business.

CONTAINERS AT THE TERMINAL: BRANCH AND BOUND METHOD

Malikov, Oleg B., Gombosed, Sumkhuu

pp. 108 – 113

Required quantity and performance of liftingand-shifting machines, efficiency of handling operations as well as time of inactivity of rail rolling stock and road vehicles depend greatly on exact placement of containers within the territory of a large terminal. In order to optimize the allocation of containers the article suggests using mathematical methods, particularly the branch and bound method belonging to the traffic flow theory.

Branch and bound method is essentially reduced to targeted exhaustive search of combinations of allocation of containers in train and of addresses of empty stock places at the terminal. The use of the method permits to considerably (tenfold) reduce number of considered v ariants.

The practices show that it is not always necessary to search for absolute optimum solution, approximation of 95–97% is sufficient for practical tasks. If this assumption is used, then it is reasonable to limit the search by «approximately optimum solution» which can be attained in 2–3 steps of iterations.

The results of computational simulation could be used for designing and operation enhancement of container terminal, particularly to determine with more exactitude number of required truck loaders, to estimate the time necessary to handle block container train and for other purposes.

Key words: transportation, container, freight terminal, truck container loader, container train, dead time, branch and bound method, mathematical computation

ONGOING PRIORITIES FOR NEW MOSCOW

Mazurkina, Olga N.

pp. 114 – 117

The adopted decisions on the extension of the territory of Moscow followed by joining of some new territories, previously belonged to Moscow region and now called New Moscow, are unprecedented in the history of Russian capital. The article argues that the part of railways in transport system of the enlarged capital will

increase. As the territory will become almost 2,5 as large, it is quite inevitable that new rail routes will be included into previously centralized traffic structure. Construction and modernization of new railways, stations, and hubs supposes some urgent short-term tasks. The article contains some pointed suggestions as for construction of new tracks, parking areas, new urban transport routes serving as a link from rail stations to highly populated districts.

Key words: urban transport network, New Moscow, railway, passenger flow growth, construction, modernization, development planning.

SIMULATION OF PASSENGER SERVICE SYSTEMS AT RAILWAY STATIONS

Kuhta, Vasily B.

pp. 118 – 123

The article studies structure of models, based on multiagent approach, abstract theory of transportation process, and transport systems, destined to simulate passenger service systems at stations and other transport structures. The author describes algorithms of searching for routes of movement and interaction between simulated passengers and services. The article contains some conclusions on parameters of convergence and stability of transport processes at rail structures under different service modes. The practical implementation is illustrated at example of three simulated types of passenger service in the ticket office (hall of large rail hub station) with 12 ticket desks and entering flow of passengers estimated at 90 pers./min (5400 pers./ hour). The models are simulated with the help of JAVA platform and Repast Simphony 2.0 environment.

Following the simulation the author suggests approach of implementation of the results of simulation, suggesting measures aimed at quality enhancement and service acceleration for analyzed cases.

Key words: transport, railway, theory of transport process and transportation systems, multiagent approach, service systems models, passenger flow, stability of processes.

FORECASTING OF OPERATION INTERACTION AT CONTAINER YARD

Makovsky, Alexey C.

pp. 124 – 129

The article describes a study on simulation of interaction of the main elements of a container yard. The author suggests considering operation of container handling

as an absorbing Markov process. The article contains algorithm and the results of simulation of operations at container yard, recommendations for planning of maintenance works, as well as a scale of assessment of the risks related to delays in container goods dispatch. The contents are deemed to help a manager to determine the real capacity of handling resources, to forecast probable supplementary costs or extraordinary situations.

Key words: transport cargo complex, motor cars, railway, logistics, reliability, container yard, simulation, forecasting, planning, scheduling, faults, Markov process.

RISK MANAGEMENT MODEL TO PREVENT LOCOMOTIVE MALFUNCTION

Lakin, Igor K., Abolmasov, Alexey A., Melnikov, Victor A.

pp. 130 – 136

The article suggests methods of implementation of risk management for the tasks of increasing of locomotives' reliability. The proposed key approaches are based on the methodology of Heinrich's pyramid, correlation analysis and probability theory. This approach, followed by appropriate mathematical apparatus, leads to three circuit model comprising reliability management through accident management, problem management and service quality management. The authors cite the example of continuing implementation of automatic reliability control system with regard to service and based on described model.

Key words: railways, locomotives, malfunction risk, reliability, Heinrich's pyramid method, correlation analysis, risk management, three circuit model.

PREVENTION AND ASSESSMENT OF NATURAL DISASTERS

Shevchenko, Anatoly I.

pp. 138 – 145

The article contains main terms and definitions in the sphere of prevention and neutralization of emergencies, statistic data about natural disasters in Russian Federation, followed by its scientific ranking and regional distribution. The author assesses factors and negative consequences of natural disasters for population. Particular attention is paid to attribution of potentially dangerous sections of railways, exposable to specific threats and risks, caused by natural disasters, as well as to repartition of defaults and deformation of subgrade caused by natural factors' impact.

Key words: railway, safety, emergency situation caused by natural disaster.

COMPREHENSIVE COUNTERACTION TO THREATS

Bochkarev, Alexander N., Bochkarev, Ilya A.

pp. 146 – 149

The article is devoted to innovations in the system of aviation safety and security and briefly reviews tools of prevention of terrorist attacks with the help of explosives, methods of questioning and inspecting of passengers, using modern psychological tests and devices, cynologists.

Key words: civil aviation, terrorist acts, aviation safety, security, threats prevention, explosives, passenger inspection, ICAO standards.

VIDEO SURVEILLANCE AT METRO STATIONS

Zhukov, Victor I., Sleptsov, Vitaly S.

pp. 150 – 156

Metro needs efficient and reliable system of video surveillance to ensure safety and security of passenger flow and of the staff during maintenance works. The use of wireless Wi-Fi networks and IP-technology at the metro stations has some evident advantages as compared to analog surveillance systems. One of those advantages relates to the capacity of IP-system to transmit recorded data by Internet, to use also local wired and Wi-Fi networks. IP-cameras have a built-in movement detector that allows monitoring migration of an observed object within the determined area. The article pays special attention to the choice of placement of Wi-Fi equipment as metro is a territory with utmost number of sources of electromagnetic fields that could interfere with wireless network and influence its quality.

Key words: Wi-Fi, wireless networks, video surveillance, metro, control technique, safety of passengers and staff.

INTERNATIONAL PRACTICES OF TRADE UNIONS' PARTICIPATION IN POLITICAL MECHANISMS OF RAIL SECTOR

Zubkov, Sergey A., Kosolapov, Gennady N.

pp. 158 – 162

Employees create trade unions to protect their interests and to organize dialogue with state and employers. Review of practices of railway employees' trade

unions in different countries allows to describe features of political tools and solidary interaction, but also to underline evident striving of the opponents to get the results they want. Sometimes it takes tough forms and the shape of open anti-union activities.

Key words: trade union, railway, political mechanism, state, employer, employee protection, employee, interaction, anti-union activities.

ON THE COMPETITIVENESS OF HIGHER EDUCATION INSTITUTION

Vlasuk, Galina V.

pp. 164 – 169

The article studies in depth the competitiveness of universities in market conditions; underlining the approach that university's sustainable development supposes continuing accumulation of features that allow university to adapt itself to competitive environment and to occupy the most advanced market position within it. The author refers to broad spectrum of topics that support this point of view. The article deals with the notion of network repartition of expertise, particularly pointing out the importance of approach that is based on impression translation. The author argues that the efficiency of the network should result in functioning confidence. Other topics considered in the article are requirements for higher education, criteria of university and syllabus choice, and diversified factors of competitive environment, network environment as integrative factor of reciprocal interests. The author, analyzing dependencies of educational conditions and existing training services offered by universities, draws one's attention to the necessity to actualize confidence in global information network, as well as in social assessments and impressions on graduates which are shaped out within it.

Key words: transport universities, educational services, competitiveness, choice criterion, assessment, social environment, global information network, universities' ranking, customer values, employers' requirements.

ANALYSIS OF CRIMES ON TRANSPORT

Sudenko, Vladimir E.

pp. 170 – 174

Article refers to critical review of determination of the nature of crimes and offenses on transport, determines interests and goods which are the objects of harm and damage. The author argues his discontent with existing wording of Criminal Code when articles' dispositions address the theft itself, and not the person who

committed it, e. g. in the train. This disconformity distorts understanding of criminal acts classes and of punishability, influences interpretations that result in differentiation of objects of corpus delicti in transport and other crimes cases between principal objects and supplementary ones, and in further differentiation of supplementary objects between mandatory and facultative.

Key words: transport, crimes on transport, criminal code, object of corpus delicti, determination of sociallydangerous act, punishability, blanket rule.

HISTORY OF DESCRIPTION OF THE LAW OF REFRACTION OF THE LIGHT

Volkov, Anatoly A., Khramov, Constantin G.

pp. 176 – 180

The authors demonstrate that the fundamental law of refraction of the light passing through a boundary between two different isotropic media was discovered in 1621 by Dutch astronomer Willebrord Snellius who, in their opinion, treated the experimental data of ancient Roman-Greek scientist Claudius Ptolemaeus, who discovered it in 140. (According to more accepted version the law is named Snell's law or the Snell–Descartes law, René Descartes independently derived the law and described it in his 1637 treatise Discourse on Method – editor note). Modern processes in fiber-optic communication lines are based on that law. The authors argue that it is possible to use it to transmit digital and analog and pulse signals as well, but clipped speech transmission is most efficient from the point of view of frequency efficiency, and taking into account that there is no reduction in interference immunity.

Key words: diffusion of light in media, Prolemaeus, Snellius law, fiber-optic line, complete internal reflection, numerical aperture, dispersion, signal types, interference immunity.

PETERHOF RAILWAY OF BARON ALEXANDER VON STIEGLITZ

Lizunov, Pavel V.

pp. 182 – 190

After the construction of first railways in Russia the relations of ownership also were reshaped. Private investors and public treasury were looking for mutually beneficial forms of cooperation, new corporations and concessionaires tried to begin business in rail sector. Baron Stieglitz was among first private investors in the history of Russian railways.

Key words: railway, history, Petersburg, Peterhof, Stieglitz, treasury, private company, ownership, property, operation.

INSIGHT TRAVEL

Sokolov, Yury I.

pp. 192 – 194

Lapidus B . M., Macheret D . A. Macroeconomic role of railways: Theory fundamentals, historical trends and outlook. Moscow, KRASAND publ., 2014, 234 p.

The reviewed work describes methodology of assessment of impact of transport developments on macroeconomic indicators, studies evolution of rail transport, its actual role in market economics. The authors reveal innovative guidelines that will give impetus to economic growth of Russian railways.

Key words: railways, macroeconomics, development. Evolution, innovative factors, spatial efficiency, economic forecasting.