WORLD OF TRANSPORT AND TRANSPORTATION
Vol.13 (2015), Issue 2

EVALUATION OF METRO TRAIN SUCCESSION TIME FOR SAFETY SYSTEMS BASED ON RADIO CHANNEL

Baranov, Leonid A.

pp. 6 – 19

Improving safety of metro trains in conditions of growing intensity of passenger traffic requires improvement of management, a combination of automation and systems of information exchange by radio channel. The article substantiates with theoretical calculations the possibility of estimating minimum succession time for trains passing along metro lines, equipped with a safety system and information means of a class Communications-Based Train Control (CBTC).

The base is the author's method that compares values obtained with potential values of a «perfect system».

Keywords: underground, metro, train, succession time, traffic safety system, analytical assessment, methods, mathematical calculation, algorithm, radio channel, information.

ONCE AGAIN ON ADDITIONAL POWER LOSSES OF THE TRAIN IN CURVE

Korolkov, Evgeny P., Koturanov, Vladimir N., Kozlov, Mikhail P.

pp. 20 – 26

The article analyzes feasibility of the idea of forming trains of motor cars, put forward by I. K. Aleksandrov in the article «The Train in Curve: Additional

Power Losses» (Mir Transporta [World of Transport and Transportation] Journal, 2014, Vol. 12, Iss.1, pp. 18–23). It is noted, in particular, that there is no reason for emergence of secondary forces by changing the direction of the locomotive traction and application of Euler's formula for evaluating the efficiency of the train as a «transmission mechanism». According to the authors, there is no evidence to suggest the fact that the use of a motor-car train will reduce power losses while moving on a curve because additional resistance to the movement of trains in the curve does not depend on the types of vehicles, butinstead on the radius of the curve and the value of the unextinguished acceleration. To prove that, the authors analyze interaction of the rolling stock and of superstructure in curves. Basing on the studies the article notes that the bogie with rigid basis finds «natural» standing, whatever position it is, and if wheelsets are rigidly installed within the frame of the

bogie, then one of the wheels of a wheelset is slipping, and another one is rolling. In order to evaluate an additional resistance in the curve, the authors suggest to use the notion of «density of slipping of the surface of wheels» rolling and of their rims and they suggest to evaluate power losses caused by additional resistance by using approach based on density of power of forces of slipping friction.

Keywords: railway, motor-car train, movement on the curve, power losses, Euler's formula, secondary forces, scientific discussion.

SIMULATION OF REGULATING BRAKING MODE OF LONG TRAIN

Pudovikov, Oleg E., Murov, Sergey A.

pp. 28 – 33

From the theory of train longitudinal dynamics it is known that with an increase in length and weight of a train, longitudinal forces grow. In addition, in the course of train movement in areas of rolling grade of the track to perturbations from kinks of the profile, perturbations associated with motion control can be imposed. Adverse overlay can lead to the emergence of longitudinal forces, hazardous under the terms of strength and stability of cars against derailments due to squeezing or pulling [1, 2]. The most unfavorable in this sense is the mode of regulating braking by air brakes, because then rate of change of brake forces remains unregulated. Therefore, when assessing the greatest forces in the train, and even more so in a long train, it is necessary to first take into consideration given control mode – pneumatic braking.

The authors use mathematical and engineering methods, mathematical simulation. In line with the study of longitudinal vibrations of a train a discrete multibody model of trains as a system of rigid bodies is considered. With its help regulating braking mode by air brakes is calculated, which allows to ensure that maximum longitudinal forces in the train do not exceed the level allowed under the terms of traffic safety.

Keywords: railway, freight train, longitudinal dynamics theory, mode, mathematical modeling.

CALCULATION OF THE WARRANTY SECTION OF A MAINTENANCE POINT OF FREIGHT CARS

Ustich, Petr A., Ivanov, Alexander A., Emelianov, Dmitry Yu.

pp. 34 – 42

A verbal model of work of car inspectors and mathematical model of design-based justification of the warranty section of freight cars maintenance enterprise are

considered. At the same time indicators of reliability and safety of the car, the acceptable crash risk level, likelihood that a car inspector will not find them inoperable (foozle in his work) are taken into account. A test example shows the effect of operating parameters on the frequency of the technical control.

Keywords: railway, warranty section of maintenance depot, frequency of monitoring the technical condition of the car, the probability of defect during the inspection, verbal model, mathematical model, security parameters of the car, design-basis justification.

THERMAL AND DEFORMATION PROCESSES IN WROUGHT WHEELS DURING EXTENDED BRAKING

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

pp. 44 – 49

Railway wrought wheels (hereinafter- WW) belong to the most critical elements in the design of rolling stock, the reliability of which largely influences traffic safety. During operation, they are subjected to high thermal effects resulted from braking (system «brake shoe-wheel») and mechanical loading during the interaction of wheel and rail. Continuing previous publications in World of Transport and Transportation journal (Vol. 12, Iss. 5, pp. 22–37; Vol. 13, Iss. 1, pp. 56–62) the authors analyze the studies that were conducted at MIIT to assess the influence of braking parameters on the kinetics of thermal and deformation processes taking into account the geometry of the wheel disc. Modern technical means and methods do not allow for analysis of the distribution of thermal processes throughout the wheel volume during braking and implementation of direct measurements of deformation of WW elements at the end of the freight car braking.

The objective of the authors was to present an analysis of the influence of the wheel disc geometry on maximum values of deformation of the rim at the end of extended braking. In the paper the authors use analysis, mathematical and engineering methods.

The results were obtained by methodological tools, designed at MIIT, and a software complex SANAK, created on its basis. Computer modeling was carried out using volumetric finite element models of wrought wheels with a diameter of 950 mm with rectilinear and curvilinear shapes of the disc with the size specified in GOST 10791–2011 [1]. The features of interaction in the system «wheel-rail», and wheel wear during its operation were not taken into account (thickness of the rim was 70 mm).

Keywords: railway, car, wrought wheel, kinetics, heat input, deformation, braking.

ENGINEERING ANALYSIS OF THE CAUSES OF FRACTURES OF BOGIE'S SIDE FRAME

Shikhanov, Dmitry V., Vronets, Vitaly V.

pp. 50 – 56

The choice of such a subject, not an abstract field of engineering analysis is a confirmation of real possibilities of modern scientific and technical diagnostics. According to statistics in the last ten years there is a steady growth in fractures of bogie's side frames: in 2004 and 2005, such cases were absent, from 2006 to 2009 37 cases were recorded, and from 2010 to 2013 other 92 cases were recorded (Pic. 1). The authors aimed at investigating causes of fractures, which arise in side frames of bogies. To do this, the authors use engineering methods, analysis and modeling.

The authors synthesize causal relationships of structural and technical defects, which relate to production and operation of a bogie's side frame. The results of analysis and modeling in ProCAST entitle readers to assess problem areas and to offer compensatory solutions.

Keywords: railway, car, bogie, side frame, technical parameters, fractures, faults, engineering analysis, modeling, problem solving.

ON POSSIBLE WAYS OF MODERNIZATION OF DOMESTIC DIESEL LOCOMOTIVES

Nerevyatkin, Constantine A.

pp. 58 – 62

The objective of the author is to investigate technical requirements and possible ways of modernization of current freight diesel locomotive fleet. The author uses analysis, comparative method and evaluation method. The author suggests approaches to modernization of diesel locomotives 2TE25K andTEP80 to be further used for freight traffic. The article describes main technical specifications for multipurpose locomotive that can be used both for passenger and commuter train haulage at not electrified railways. The author argues that diesel locomotive TEM21 is suitable for that purpose once it is modernized. Meanwhile, locomotive fleet needs to be replenished with new machines that could effectively replace outdated models.

The article offers three different modernization programs for locomotives of domestic production, designed for different purposes, – freight, passenger, shunting locomotives. Demonstrated options are based on optimization calculations, carried out with the participation of students of MIIT. Changes in locomotives' parameters and related operational benefits are estimated.

Keywords: railway, locomotives for freight carriage, modernization, calculation options, operating experience, design prospects.

PRIVATE INITIATIVE MECHANISM IN CONCESSION LEGISLATION: DEVELOPMENT OUTLOOK FOR RUSSIA

Sokolov Maxim Yu.

pp. 64 – 73

Dynamic development of concession laws according to the author of the article results in growing number of concession projects. The article analyzes effects of recent key amendment to Russian Federal Law on Concession Agreements and Contracts that enhanced legal field for initiative of private investors. The development of legislation takes into consideration market demand and provides for quality enhancement of contracts and implementation tools in the PPP sphere.

Key words: public-private partnership, concession, private initiative, law, legislation, economics, project development, implementation conditions.

EFFICIENCY FORMULAS OF CARGO FLOWS CONTAINERIZATION

Lievin, Sergey B.

pp. 74 - 85

The article considers factors and criteria of economic efficiency of cargo flows containerization, shows its constituent elements, including those related to saving the cost of packaging, loading- unloading operations, acceleration of delivery, increasing safety and security of cargo. It shows effects of containerization, differentiated for cargo owners, transport companies, the country as a whole. The author describes formulas for estimating cost-effectiveness, their projections on the utility function, net profit, net present value, internal rate of return value, and others.

Keywords: multimodal transportation, sea transport, railway, water transport, road transport, economic efficiency, containerization of cargo flows, cost savings, accelerating the delivery of goods, safety, security, utility function, net profit, shadow interest rate, internal rate of return.

BUSINESS PROCESS MODELS IN THE GLOBAL TRANSPORT AND LOGISTICS SECTOR

Iskaliyev, Yerkhat S. (Astana, Kazakhstan), Kenzhebayeva, Gauhar Zh. (Almaty, Kazakhstan), Sydykov, Arkhat A. (Almaty, Kazakhstan)

pp. 86 – 92

In recent years, transport, possessing huge strategic resource, performs a basic function in stream processes. Today more than ever urgent challenges are focused on increasing traffic volumes, increasing economic efficiency of numerous domestic cargo and passenger carriers and freight forwarders (especially on international routes). As evidenced by international experience, high-quality «jump» in the transport sector can only be achieved through the use of new technologies, which meet the highest international standards.

Keywords: transport, economy, transport and logistics market, operator, forwarder, contract logistics, integrated logistics, competition, profitability.

HOLDING COMPANY AND THE STATE: FINANCIAL COUNTERSTREAMS

Khomenko, Georgy A.

pp. 94 – 112

Financial relations between JSC «Russian Railways» and the state require optimization. In this regard, we believe that there is a need for an analytical assessment of trends of dynamics and patterns of formation of cash flows of the holding, including in areas such as public funding, debt financing, tax payments to the budget and non-budget funds. The role of JSC «Russian Railways» in socioeconomic development can hardly be overestimated.

The modern approach to finance rail transport leads to higher tariffs. Change of investment in rail transport at the expense of internal reserves (accrued taxes) will lead to economic growth, and the author's analysis gives a base for this, showing ways of rational organization of counter financial flows.

Keywords: economy, railways, holding, state financial relations, cash flows, taxes, budget, investments, non-budget funds.

METHODS OF ANALYSIS OF FACTORS DETERMINING PASSENGER TRANSPORTATION DEMAND

Efimov, Sergey M.

pp. 114 – 120

Development of passenger transportation market depends on many factors, in particular, level of regional economy and local transport capacity, conditions of labor migration, mobility of population and income level.

The main consumer factors for passenger long-distance rail transportation are:

• improving quality of passenger services;

• ensuring availability of transportation at price parameters of a trip;

• compliance with progressive standards of passenger service and transportation safety.

The objective of the author is to analyze factors, determining passenger transportation demand. To fulfill his task, the author uses comparative method, evaluation method, and analysis. In the article the author presents the results of the study of factors of passenger transportation market development on the basis of influence matrix of its parameters on the need for transportation in the regulated sector. Market indicators can be grouped into three clusters: transport mobility of citizens, population size, economic development of regions. Analysis of relationship between these indicators and the value of passenger turnover allows us to offer an approach to the determination of carrying capacity of long-distance rail transportation market, based on reference values of passenger traffic drivers.

Keywords: quality of transport services, passenger transportation market, long-distance traffic, macroeconomic indicators, drivers of market development.

FEASIBILITY ASSESSMENT OF DEVELOPMENT OF PASSENGER SERVICE LOGISTIC SYSTEMS

Vakulenko, Sergey P., Kopylova, Ekaterina V., Belyankin, Alexey Yu.

pp. 122 - 128

Recent studies show that there is still no clear universal system to assess feasibility of forming a logistics chain of passenger service, which would take into account not only the interests of each individual mode of transport or passenger traffic segment, but would consider the whole transport system of load area (country, region, metropolis, etc.). Approaches to solving this problem are demonstrated by the authors, using analytical methods and logistics characteristics of transport, its consumer properties, reflecting value of a transport product for a passenger and technical and technological capabilities of each carrier.

Keywords: transport, logistics, passenger transportation, evaluation system, logistic principles, indicators of functioning, choice of routes, gravity area.

YAMAL CORRIDOR: BASIS OF TRANSPORT INFRASTRUCTURE OF THE ARCTIC ZONE

Vylitok, Alexander V.

pp. 130 – 141

The Yamal Peninsula, the adjacent Arctic zone in recent years get more and more economic value and at the same time demonstrate the urgent need for forced development of the transport network, infrastructure reforms and state-level policy decisions. The author shows conceptual approaches to program goals and objectives when creating key regional systems, including transport corridors, railway lines and port facilities, transport and logistics center of the Northern Sea Route. Priority measures and steps are highlighted, which can accelerate the implementation of such large-scale projects.

Keywords: Arctic, Yamal, development strategy, geopolitics, resource potential, transport corridor, Yamal Railway running, Northern latitudinal running, the Northern Sea Route, infrastructure, projected traffic flows.

DETERMINING PARAMETERS OF SCHEDULED MAINTENANCE WORKINTERVALS WITHIN THE ASSESSMENT OF FUTURE TRANSPORTATION CAPACITY

Kokurin, Iosif M., Kattsyn, Dmitry V., Timchenko, Vyacheslav S.

pp. 142 – 153

The article contains a description of the simulation method, required for a quantitative study of modernization stages and repairs of the railway infrastructure. Its use is particularly important in the development of growing traffic volumes with the expectation of long-term perspective and subject of lengthy work-intervals (breaks in traffic for maintenance works), reducing the capacity of lines operated.

Keywords: railway infrastructure, modernization, repair, carrying capacity, simulation.

SELECTION OF OPTIMAL VARIANTS FOR ULAANBAATAR RAILWAY DEVELOPMENT

Baturin, Alexander P., Baljir, Munkhdelger (Ulaanbaatar, Mongolia)

pp. 154 – 165

Modern single-track lines allow to develop cargo traffic for up to 16–18 million tons net per year in the same direction. However, with significant traffic flow the delay of trains dramatically increases. This reduces service speed, worsens indicators of rolling stock use, causes additional fuel loss, and ultimately increases transportation costs, reduces productivity [1–3]. Then a moment comes when one track cannot master increased flow of goods and there is a need to strengthen the transport capacity [4]. Design traffic and carrying capacity of communications of transport nodes, as well as priorities for building infrastructure are linked to long-term prospects of development of productive forces, regions, foreign trade [5, 6].

Due to continuous growth of traffic on Ulaanbaatar railway, problems arise related to selection and economic feasibility of its technical equipment in the future. To solve these tasks, it is necessary to analyze conditions of modernization, strengthening of freight (processing) capacity of sections (stations), to choose circuits of staged development and optimization of technical equipment of lines of JSC «Ulaanbaatar Railway».

Keywords: railway, Ulaanbaatar railway, freight traffic, semi- automatic blocking, automatic blocking, transportation capacity, estimated capacity, development of sections, option graph, exhaustion period.

IMPACT OF CAR FLOW DISORGANIZATION ON CAR FLEET MANAGEMENT METHODS

Khodykin, Dmirty A.

pp. 166 – 175

The methodological approach of professor P. A. Kozlov [e.g. 3, 4] to study the interaction of flow and channel is applicable to empty car flows in the transport system. Analysis of the current stage of transport market development in environment characterized by surplus of fleet, shows that eliminating disorganization of empty car flow through their routing by owners of rolling stock will improve the quality of services provided to shippers of Kuzbass region. It is easier to manage organized car flow for both the carrier and the owner of the cars. This article uses an unconventional approach to improve the utilization of rolling stock. The objective of the author is to study stages of transport market development, disorganization of car flows, dependence of routing on disorganization of car flows. To do this, the author uses analysis, comparative method and evaluation approach.

Keywords: disorganization, channel, bunker, three stages of development, car flows, Kuzbass region, car turnover.

ROLE OF SITUATION CENTRE IN SERVICE MAINTENANCE OF TRACTION ROLLING STOCK

Evseev, Dmitry G., Shcherbakov, Cyril G.

pp. 176 – 182

As a form and means of maintenance, this system of service is designed to support service life of rolling stock. Service maintenance in the article is analyzed within the framework of locomotive lifecycle management and on the basis of reliably organized information network. As a decision-making headquarters, the authors consider situation center in which each of action elements has its functions and is evaluated in conjunction with objectives and tasks to improve efficiency of maintenance and repair of rolling stock (equipment of locomotive depot).

Keywords: railway, locomotive, service maintenance, situation center, maintenance, repair organization, information systems.

ON INDUSTRIAL SAFETY IN BRIDGE CONSTRUCTION

Lukianov, Anatoly M., Agapov, Andrey G.

pp. 184 – 199

Industrial safety system evolved on the railways for decades. In new economic conditions, many of its basic principles remain, but also those factors have arisen that require scientific analysis, experimental verification, modern technical and technological means. At the example of construction and maintenance of bridgeworks, the authors examine and evaluate the situation with safety, injury rate, fire hazard in railway transport.

Keywords: transport, safety, bridge construction, cartogram of working conditions, injury rate, fire hazard, environmental factors.

FUZZY PRODUCTION MODEL FOR INITIAL EVALUATING OF THE RISK OF COLLISIONS

Sedova, Nelly A.

pp. 200 – 206

Modern assessment of collision risk has a distinct value for safe shipping. Upon detection of a target vessel, that is, a vessel with which it is necessary to avoid

collision, a ship driver shall promptly determine whether a situation of close approach to them is developing [1], and if it is so to decide on the best maneuver to prevent a possible threat. This paper proposes a fuzzy production model of the initial assessment of collision risk on computed distance and time of approach, in which a mentioned disadvantage is eliminated. Based on the theory of fuzzy sets an assessment model of collision risk is developed. Linguistic variables, used in it, are presented and universal sets for each of them are defined. Implementation of the model was carried out in a software environment FuzzyTECH, performance of the system on several test examples is demonstrated.

Keywords: safety of navigation, shipping, risk of collision, approach distance, approach time, linguistic variable, fuzzy production rule.

ENSURING RELIABILITY OF FREIGHT CARS FOR THE PERIOD OF THEIR TURNOVER

Zykov, Yuri V., Sigileva, Ekaterina I.

pp. 208 - 213

Data of system analysis enabled the authors to identify main factors influencing technical condition of freight cars during their operation and, accordingly, pacing factors of traffic safety. At the same time measures are proposed that would change the existing order of inspection and maintenance of rolling stock, improve technological procedures and reduce the number of failures of car equipment.

Keywords: railway, freight car, security, turnover period, technical diagnosis, continuous monitoring, system organization, trouble-free operation.

MATHEMATICAL MODEL OF AN ELASTOMERIC DRAFT GEAR

Andriyanov, Sergey S.

pp. 214 – 218

When transporting hazardous liquid cargo by rail a need arises not only for immediate protection of people and infrastructure, but also for preventive measures relating to structural, technical features of tank wagons. At the same time improving reliability and safety of vehicles, according to the author, can be realized by the calculated model for damping devices and, in particular, elastomeric coupler draft gear. The objective of the author is to present a mathematical model of an elastomeric draft gear. To do this, the author uses simulation method, analysis, mathematical methods. An issue of traffic safety of tanks is considered. A mathematical model is developed, describing operation of elastomeric draft gear. This model is a

dependence of device reaction and deformation rate, taking into account initial straining of a device and properties of working medium. Mathematical model allows for simulation of elastomeric draft gear operation at any options of shunting collision and transient modes of train motion.

Keywords: railway, traffic safety, tank, liquid cargo, energy absorbing device of a car, elastomeric draft gear, mathematical model.

DEVELOPMENT OF PASSIVE SAFETY DEVICES OF RAIL PASSENGER COACHES

Kobischanov, Vladimir V., Antipin, Dmitry Ya., Shorokhov, Sergey G.

pp. 220 – 226

Active safety systems used in rail transport, do not exclude possibility of accidents involving injury and loss of life [1]. In this regard, in design of modern rolling stock there is a need to develop passive safety systems that can reduce the severity of collisions [2, 3]. Passenger coaches with devices absorbing kinetic energy of a longitudinal collision, acquire the ability for plastic deformation of the structure and thereby reduce the likelihood of loss at critical loads. The authors propose constructive solutions and calculation of energy consumption of absorbing devices, evaluate their effectiveness on the basis of mathematical modeling results.

Keywords: railway, passenger coach, life-saving device, kinetic energy of collisions, plastic deformation, automatic coupling, shock absorbing device, constructive solutions.

SOCIO-ECONOMIC ROLE OF TRANSPORT IN THE MIDDLE AGES

Macheret, Dmitry A.

pp. 228 – 237

As a result of invasions of «barbarian» tribes that have affected the majority of ancient civilizations, movement of goods and people along many routes in the Middle Ages (late V to XV) has decreased dramatically or even has been interrupted. Naturalization of economy occurred primarily in Western Europe, exchange of goods fell sharply. At the same time the geography of communication lines gradually expanded and technical innovations appeared that improved reliability, speed and efficiency of transportation. Thanks to this, nations that used to be on the periphery of the civilized world moved to a broad historical arena, economic, cultural, mental prerequisites were accumulated for further rapid development of commercial capitalism in Europe.

Keywords: history of the Middle Ages, transport links, exchange of goods, economic institutions, civilized development.

ON THE EVOLUTION OF TECHNICAL PROBLEMS

Bolotin, Mikhail M.

pp. 244 – 256

The article systemizes notions of socio-economic formations and civilizations. It demonstrates approaches to the formation of criteria of periodization of the history of society, technology and production, based on indicators defined by the pyramid of quality: quality of goods, quality of production, quality of the enterprise, quality of life. The integrated criterion of periodization (classification) is offered, which takes into account the degree of importance of quality indicators under study. The classification of technical devices is considered as a set of governing mechanisms with the ability to modify any of their properties as conditions change, and as a set of links, replacing a man in the production process. The history of structures of hydraulic, elastomeric and friction draft gears of automatic coupler of freight cars is shown. The conditions are represented, which contribute to the development of devices, the role of scientists, scientific schools and enterprises.

Keywords: technology, history, civilization approach, periodization, historical and technical analysis, labor productivity, material production, wages, quality pyramid, control mechanism, the coefficient of importance, integral criterion.

INTEGRATION OF TRANSIT: ART OF COUNTERPOISE

Fedorov, Lev S.

pp. 258 – 263

REVIEW OF THE BOOK: Larin, O.N., Mirotin, L.B., Goryaev, N.K., Almetova, Z. V. Scientific basis for organization of transit terminals: monograph. Chelyabinsk, publ. centre of SUSU, 2014, 147 p.

ABSTRACT OF THE BOOK. The book considers scientific principles related to creation of transit terminals within boundaries of the region’s transport system for optimal integration of freight flows going abroad. Particular attention is paid to reduction of uneven traffic volumes in areas of transit routes, reduction of empty runs and idle time of equipment. The book is addressed to specialists, scientific and technical staff engaged in development and operation of transport systems, efficiency improvement of transit transportation hubs and terminals, optimization of interaction between different modes of transport.

ABSTRACT OF THE REVIEW. Solving a problem of efficient functioning of transport system elements, provision of coordination and cooperation among various

modes of transport, growth of intermodal freight transportation, and implementation of transit potential of Russia under the conditions of market globalization require fundamentally new approaches. They should be based on the priority of developing logistics infrastructure and formation of integrated transport and logistics systems at all levels – regional, interregional and international. Modern scientific and methodological solutions for improving the efficiency of transit traffic do not fully take into account the totality of relevant factors to justify a sustainable level of freight capacities of transport systems, resulting in significant losses in the form of empty runs of transit transport in the areas of interterminal sections of supply chain. This leads to the need to create transport and logistics centers, able to integrate transit flows. And the main difficulty here is the absence of adequate scientific and methodological basis for justification of such infrastructure facilities and their location. In the monograph the authors analyzed the influence of uneven inter-terminal cargo flows on empty runs of transit transport and the formation of excess freight capacities of transport systems. Designed theoretical principles on expediency of integration of inter-terminal cargo flows in transit terminals are confirmed by experimental data on the low load of transit transport in inter-terminal traffic and considerable empty runs in connection with unevenness of freight flows. The book describes a method of placing a transit terminal in the existing configuration of the transport network of transit region, which enables to take into account the costs of transit transport on empty runs at an appropriate unevenness of inter-terminal traffic. The research findings, presented by the authors have an applied character and can be used in the activities of transport and forwarding companies to improve the efficiency of transit transportation, and the heads of transport hubs and terminals can use them to optimize their work, state transport authorities of different levels – for development and modernization of transport and logistics infrastructure facilities. The proposed models and methods are universal, which suggests the possibility of their wide application in systems of various modes of transport for the purpose of improving transit traffic.

Keywords: transport, transit, freight transportation, terminals, scientific bases, organization, management, infrastructure, logistics.