

**Complex Solutions for the Problems of Infrastructure Development and  
Transportation Resources**

**Borodin A. F.**

**Pp 6 – 17**

The paper presents an approach to justification of complex strategies for organization of rail transportation in conditions of limited investments, classification of operational reserves, methodological principles for integrated solution of the problems of development and use of infrastructure and transportation resources based on the variant technological modes of functioning of the railway network.

**Keywords:** railway infrastructure, transportation, limited investments, methodology, operational reserves, classification, transportation resources, variant technological modes.

**Method of Constructing a Network Graph of the Logistic Object Structure**

**Malikov O. B., Pokrovskaya O. D.**

**Pp 18 – 27**

The quality of solutions in the design and operation of individual logistic objects influences the efficiency of the entire terminal-storage infrastructure of the country's railways. In the proposed research method the structure of a logistic object in the form of a graph of its structure, the positions of the general theory of systems, graph theory, dynamic programming and the search for the shortest distance are synthesized. A distinctive feature is the universality of the method when using indicators of different dimensions (cost, time, relative expression). The theoretical basis of the methodology is a combination of economic and mathematical methods and conceptual provisions that make it possible to find an optimal solution from a set of feasible solutions. The categorization and classification of logistics objects was carried out, a parametric description and a formalized modeling of their structure were given.

**Keywords:** general theory of systems, graph theory, logistic object, logistic district, logistic area, mathematical model, network graph of a structure, parameters of logistic objects, classification, railways, transport, terminal-warehouse infrastructure.

## **Complex Mathematical Model of the Manipulation System of a Mobile Transport-Technological Machine**

**Lagerev I. A.**

**Pp 28 -39**

Manipulation systems are used as executive mechanisms of mobile transport-technological machines. The article offers approaches to modeling of dynamic processes in the operation of such systems. These approaches are based on the complex mathematical model developed by the author, which takes into account the interaction between the elements of the five-component system «Working body – Manipulation System – Basic Machine – Reference Base – Environment». By the method of statistical tests or simulation modeling, combinations of load factor values within each cycle of the system operation are determined. Then, for each combination of factors, a piecewise implementation of the process of changing dynamic forces or mechanical stresses in the elements of the structural steel that are of interest is constructed. For piecewise implementations, the loading of the manipulation system during the entire service life is estimated.

**Keywords:** manipulation system, transport-technological machine, bearing surface, mathematical model, dynamics, loading.

## **Analysis of Electromagnetic Compatibility of Track Circuits and Traction Power Supply**

**Zenkovich Yu. I., Ivanenko A. A.**

**Pp 40 – 46**

The issues of electromagnetic compatibility of traction power supply devices with track circuits are considered in case ice phenomena on the contact wire. The calculated ratios for determining the value of the bias currents of the choke-transformers in the electric arc, which arises from the formation of ice on the contact wire, as well as the reasons for false occupation of track circuits at the station are analyzed.

**Keywords:** electromagnetic compatibility, track circuit, electric arc, asymmetry coefficient, traction current, contact wire, resistivity of rails.

## **Power Supply System with Three-Phase Transformers for HSR**

**Chernov Yu. A., Dmitrieva N. Yu., Kokorina O. Yu.**

**Pp 48 – 62**

The article presents a schematic diagram of a traction substation of the 2x25 kV power supply system with three-phase transformers and a vector voltage diagram for high-speed lines. Power supply systems 2x25 kV with single-phase and three-

phase transformers are compared, the power of three-phase transformers for high-speed main lines is recommended. And all this taking into account the new special technical conditions that are worked out for the design, construction and operation of Russian HSR.

**Keywords:** railway, high-speed railway, traction substation, 2x25 kV power supply system, three-phase transformer, single-phase transformer, special technical conditions.

## **Renewable Energy in Railway Transport**

**Goldenberg Vladimir**

**Pp 64 – 74**

The advantage of using electric energy for rail passenger transport has long been evident. But because of this, more and more importance is paid to saving energy, searching for cheaper and more affordable sources. From this point of view, the author of the article approaches the analysis of the growing opportunities in recent years for the use of renewable energy sources in rail transport and the trends in their development, distinguishing hydrogen fuel cells, photoelectric installations, wind, solar, and our planet. A special place is given to the problems of energy storage, to variants of its rational redistribution on the network. At the same time, research, design and implementation practices of a number of countries are shown.

**Keywords:** railways, power supply, renewable energy sources, search, development, energy culture.

## **Modeling Processes in the Traction Network and the Parameters for Connecting the Interlocking**

**Zatorskaya L. P.**

**Pp 76 – 89**

The process of passing a train under the current along the branches of an insulating air gap of a DC traction network is studied, the reasons for disconnection of the branch to which the train enters are shown. To solve the tasks of increasing productivity and reducing costs in the work of electrified railway transport, a scheme for blocking the unauthorized operation of a high-speed switch is proposed. Using the modeling of the process of current variation in the network, the parameters of the additional coil of the magnetic circuit of the relay-differential shunt for connection of the locking device are determined.

**Keywords:** railway, traction network, relay-differential shunt, blocking scheme, simulation modeling, coil parameters of magnetic circuit.

## **Prospects for Vacuum Magnetic- Levitation Transport**

**Drozdov B. V., Terentiev Yu. A.**

**Pp 90 – 99**

The authors propose a fundamentally new approach to solving the problem of overcoming two technological limits of speed growth existing for rail vehicles. The advantages of vacuum magnetic-levitation transport are assessed in comparison with traditional transport systems. The perspectives of the use of this type of transport as applied to the development strategy of the transport system of Russia are determined.

**Keywords:** vacuum magnetic-levitation transport, specific energy inputs, transit transport resource, magnetic suspension, vacuum pipeline.

## **On the Efficiency of Using Autonomous Locomotives on the Railways of Mongolia**

**Gantumur Buren-Itgel, Prechissky V. A., Sleptsov M. A., Barat A. A.**

**Pp 100 – 110**

The requirements of speed, reliability, safety and cost-effectiveness of cargo transportation pose a number of complex logistics tasks for Ulaanbaatar Railroad (UBZhD), including the choice of optimal train mass, series and number of locomotive sections for driving a freight train of a given weight. The mass of the train selected in the course of the study was checked by the condition of starting from the place on the calculated ascent. Based on the analysis of the longitudinal track profile, a computational profile scheme was compiled. Calculation of the minimum traction force of the locomotive was given by the mass of the train, the series and the number of sections. Using the diagrams of the specific slowing and accelerating forces, the train speed curve was constructed by the method of A. I. Lipets, after which by the method of G. V. Lebedev the total train travel time and the operating time of TED in various modes was found, which allows finding the specific fuel consumption. After considering three possible variants, it is established that the combination of locomotives 2TE116UM-23AGAL allows for faster and more economical cargo transportation. Given the equipment of the UBZhD with these locomotives, the idea proposed in the article can be realized on the most heavily stressed sections.

**Keywords:** railway, locomotive, Mongolia, cargo transportation optimization, calculations, efficiency.

## **Translogistic Platform: Network Cooperation**

**Dunaev O. N.**

**Pp 112 – 126**

In the article, logistics is a technology for managing network cooperation in a new model of economic growth that meets the requirements of people and goods mobility in the 21st century. Analysis of logistics as a factor of the current stage of

economic growth is given. The main trends of formation and development of the translogistic platform as network cooperation in the product creation chain are considered; single / common business process; network interaction of business processes at the territorial level are considered. The conclusion is made about the need for development of logistics as a management technology that provides a synergetic effect on the basis of commercial and industrial network cooperation.

**Keywords:** economy, logistics, translogistic platform, strategic partnership, economic growth, network management technologies, business processes.

### **Problems of Transport Accessibility and Connectivity in the Northern Regions**

**Macheret D. A., Macheret Yu. Ya.**

**Pp 128 – 139**

The article, published in two issues of the journal, addresses the problems of development of transport infrastructure in the northern regions of Russia (Part I: priority of roads, land communications, Part II: how to avoid the «big earth» syndrome). The conclusion is substantiated that in order to ensure their attractiveness, comfort of living, increasing the population density, creating conditions for long-term sustainable social and economic development of the territories, it is necessary to deal more with the infrastructure of land transport and, above all, the railway, which would be of a supporting nature and would strengthen the position of the transport complex in the north. It requires strategic planning for development of each type of transport, taking into account the prospects for industrial development of low-income arctic regions and long-term needs of people in creating a comfortable environment and favorable conditions for active and full-fledged life, in conjunction with the natural and climatic features of the region and their projected changes.

**Keywords:** transport, northern regions, social and economic development, land transport infrastructure, natural and climatic conditions.

### **Estimation of Passenger Transportation Indicators Dependence on Macroeconomic Factors**

**Kagan D. Z.**

**Pp 140 – 149**

The instability of the domestic transport services market, significant fluctuations in demand on the part of the population, make it necessary to evaluate the range of problems under study with particular attention. The author analyzes the impact of macroeconomic factors on passenger traffic. The article reveals the high dependence of the total passenger flow on the economic condition of the country, the population's solvency margin. The change in the strength of the connection between passenger turnover and GDP over the last 24 years is considered. It is suggested that

there is some «inertia» of transportation indicators and, at the same time, the predominant coincidence of the dynamics of the gross domestic product and the total passenger flow is analytically proved.

**Keywords:** transport, macroeconomic factors, passenger transportation, forecasting, GDP, passenger turnover, interdependence of indicators.

### **Japan's Experience in Governing Liner Shipping**

**Rusinov I. A., Gavrilova I. A., Nelogov A. G.**

**Pp 150 – 160**

The article continues a series of publications [1–3] on regulatory framework for linear navigation of the world's major maritime countries. Domestic researchers [4, 5] periodically turned to the topic of functioning of Japan's maritime transport, regulation of its activities and significance for foreign trade. Nevertheless, the authors consider it necessary to return to it again, since there have been serious changes in the world shipping in the past. The new analytical work provides information on the largest Japanese shipping companies, their participation in carrier associations. The activities of the regulator, the principles of its activities and individual cases from practice are considered. An additional relevance of the article is given by the discussion that has unfolded in connection with the discussion of the draft law on introducing amendments to the Merchant Shipping Code of the Russian Federation.

**Keywords:** sea transport, linear conferences, linear navigation, sea transportation in Japan, economy, trade, foreign markets.

### **Fundamentals of Transport System Organization in Northern Regions**

**Belyaev V. M., Filippova N. A.**

**Pp 162 – 167**

Transport is considered as a single object of management (industry), which is part of the general transport complex of the Northern region. The coordinated development and organization of interaction of the sector of freight transportation by road transport with other modes of transport make the transport complex of the region not just the sum of individual industries but a single complex providing for interaction of water, rail, road and air transport (sea, railways, roads and aviation) and providing users of transport services with an additional systemic effect. Management of such a complex can be ensured through logistics centers, which are large operators that organize the work of carriers of goods by road in the context of a common transport-logistics system.

**Keywords:** transport, management, logistics, terminal, northern regions, cargo, transportation services.

## **Development Strategy of Vietnam Railways: Vision to 2050 Year**

**Le Hai Ha**

**Pp 168 -173**

The article presents some of the main objectives of transport policy and measures to implement the strategy for development of Vietnam's railway transport until 2020 and a vision of sectoral prospects until 2050. Among other things, there are preferences concerning investments in modernization of existing networks, construction of speed and high-speed lines, reconstruction of railway stations, railway crossings, introduction of resource-saving and advanced production technologies, and also the dynamics, priority and proportions of planned changes in certain sectors of the industry and transportation activities of railways are determined. The issues of state budgetary and financial policy, planning, international economic relations, functioning of international transport corridors, education and training of specialists are being considered, taking into account the growing requirements for management and the new information environment.

**Keywords:** Vietnam, railways, development strategy, modernization, investment policy, management system, periodization.

## **Factors of Capacity of Transport Corridors of the Far East**

**Kalikina T. N., Serova D. S., Balenko V V.**

**Pp 174 – 183**

The authors analyze the possibilities of the Far Eastern region for further development of international transport corridors, highlighting the discrepancy between the carrying capacity of sea and rail transport. The factors constraining growth of volumes of transportation of export cargoes by railroads and considerably complicating the work of transport corridors are determined. A methodology for determining the efficiency of using parallel norms for the mass of freight trains and measures ensuring reduction in the required capacity of the transport infrastructure due to the phased progressive growth of the mass of freight trains are provided, if there are grounds to avoid additional costs.

**Keywords:** international transport corridor, seaport, railway, carrying capacity, required throughput, train mass, heavy traffic.

## **New in the Design of the Intersection of the Taxiway and the Access Road at the Airport**

**Vinogradov B. A.**

**Pp 184 – 189**

The task of the article is to show the rationale and essence of an innovative solution connected with reconstruction of Sheremetyevo Airport in the capital

aviation hub. Option with inclusion of the third runway into infrastructure and design of its original location in the area near the aerodrome territory, where it is combined with the intersection of the taxiway, the patrol airfield, the motorway road and the Klyazma river, which is located here. Two-level construction of the intersection, four-section closed river collector of reinforced type and other devices do not violate the integrity of the aerodrome and do not interfere with its further development. So far, there is only malfunctioning in the management of construction and the reconstruction process.

**Keywords:** airport, runway, infrastructure, reconstruction, research, design, innovative solutions.

## **Integration of the CIS Roads into the World Road Network**

**Karimov B. B.**

**Pp 190 – 196**

The Intergovernmental Council of Road Workers (ICRW) has become one of the first integrators in the CIS area, which since 1992 has consistently pursued a line for coordinated interaction of the Commonwealth countries in the field of international highways. The article introduces the normative legal and administrative-management aspects of the activities of the road construction council, the technical characteristics of the roads under its control. At the same time, the tasks and problems needing attention of the CIS partners are analyzed, the solution of which will make it possible to form common standards for the CIS roads with the world road network, to become a natural part of the Euro-Asian system of international highways and transport corridors.

**Keywords:** CIS, intergovernmental council of road workers, integration, roads, international corridors.

## **Rails' Quality is Guaranteed by Supply Contract**

**Palkin S. V., Kozyrev V. A.**

**Pp 198 – 209**

Using the example of track circuits operation, the authors consider the reliability factors of technical means in relation to train traffic safety. The dependences of technical requirements for operation and production of rails, reliability and quality indicators, standards and rules, designed to ensure a systematic order at the level of interaction between the producer, supplier and consumer of the product, are assessed. Particular attention is drawn to the possibility of building relations on the basis of a supply contract, which allows to introduce quality guarantees in terms of gamma-percentage service life, to agree special requirements to the operational properties of rails and the operating conditions themselves.



**Keywords:** train safety, rails, reliability, life cycle, quality guarantees, gamma-percentage service life, prevention of defects.

## **Tactics of Inspection of Railway Accident Scene**

**Sudenko V. E.**

**Pp 210 – 222**

The reasons and purposes of inspection of the scene of the accident in the area of responsibility of the railway, the actions for formation of an investigative and operational group, and involvement of specialists of railway transport and other industries in inspection that can provide substantial assistance in establishing the causes and assessing the conditions that contributed to the extraordinary or criminal situation, are set out. The author discusses the need to return witnesses when inspecting the scene of the accident, raises questions that relate to the industry specificity of investigative practice. Attention is drawn to the need to use the latest technical and forensic tools in order to identify and fix traces of the incident.

**Keywords:** railway, accident, investigation, tactics of scene inspection, witness, examination.

## **How to Subordinate Learning to the Tasks of the Industry**

**Baryshnikov S. O., Stepanov A. L.**

**Pp 224 – 230**

The ambiguous nature of the reforms of higher education manifests itself primarily in the goal setting of the educational process, when in a kind of confrontation there are education and professionalism, universality (fundamentalism) of knowledge and applied preparation of the student for the profession. On the example of transport education, the authors of the article show how the Bologna model has violated the traditional forms of education, how school and university programs are combined in content and time, what impact is imposed by all of this on the specificity of the disciplines studied. At the same time, the role of educational standards, international and industry requirements is assessed, the issue of professional-public examination of the quality of education with the participation of employers and in the interests of the transport industry is raised.

**Keywords:** transport, higher education, reform, education, professionalism, quality, expertise.

## **Interaction of Universities and Enterprises in the Field of High-Tech Production**

**Tikhonov A. I., Novikov S. V., Fedotova M. A.**

**Pp 232 – 241**

The article presents a mechanism for managing high-tech scientific and technical projects based on the implementation of Government Resolution No. 218 «On Measures of State Support for Development of Cooperation between Russian Higher Educational Institutions and Organizations Implementing Complex Projects for Creation of High-Tech Production» dated April 9, 2010. In particular, innovative activity in this sphere of the scientific center of special radio-electronic systems and management of MAI is shown and its results are simultaneously projected onto the conditions and requirements of cooperation between universities and enterprises interacting for the sake of creating breakthrough technologies and competitive products.

**Keywords:** university, enterprise, scientific and technical project, high-tech production, innovations, contract system, procurement, cooperation.

## **Problems of Cooperation between Railways and Scientific Organizations**

**Lyapina S. Yu.**

**Pp 242 – 247**

The business needs innovative products, but it doubts the competitiveness of scientific organizations (including university-level industry organizations). The analysis of the contradictions of the interests of science and business in modern Russian conditions is carried out. The shortcomings of scientific organizations (research institutes and universities) are revealed in terms of conformity of their efforts with the conjuncture of innovative inquiries. The key factors that limit the interaction of science and business in carrying out research and development work are identified. An alternative model of cooperation between scientific organizations and business transport enterprises is proposed, based on the expansion of communications and the organization of technological brokerage, taking into account the mutual interests of both sides.

**Keywords:** university and academic science, business, transport, research, competitiveness, technological brokerage, innovative infrastructure, cooperation, partnership.

## **Political Education in the University as an Incentive for Student Civic Engagement**

**Denisenkova N. N.**

**Pp 248 – 253**

In most cases the studies highlight low motivation to study political science among students of non-humanitarian specialties. The article provides strong evidence

of the importance of teaching political science in a technical university. It is shown that it contributes to formation of civic activity of future specialists. It is alleged that the problem of civic education and upbringing of contemporary Russian youth deserves constant and close attention, and at all levels of the power vertical. And it should find an adequate reflection in the educational process of any institution, regardless of its industry.

**Keywords:** higher education, teaching of political science, civic activity, political socialization, technical university.

### **«Compass Tore Around – People Went Wild»**

**Grigoriev N. D.**

**Pp 256 – 268**

To the 120th anniversary of birth of Alexander Chizhevsky – biophysics, founder of heliocosmic biology, aeroionification, electrogeomodynamics, associate of the father of astronautics Konstantin Tsiolkovsky, a member of nearly two dozen foreign academies and an honorary professor at several universities. At the first international congress on biophysics and space biology in New York in 1939, he was elected in absentia a president of scientific forum, nominated for the Nobel Prize, justly called «Leonardo da Vinci of XX century». He was, among other things, a talented poet, philosopher, artist and landscape painter.

**Keywords:** cosmonautics, biophysics, aeroionification, cosmic philosophy, heliobiology, energy of space and terrestrial biological media.

### **The monograph about transport trade unions**

**Panov A. I.**

**Pp 276 – 280**

**REVIEW OF THE BOOK:** Zubkov, S. A., Krainov, G.N. Transport unions as part of the international trade union movement. Monograph. Moscow, INFRA–M publ., 2017, 297 p.

The book, published in the series «Scientific Thought», is devoted to the study of transport unions as components of the international trade union movement. The authors draw attention to the history, current state and problems of the international trade union movement, the processes of globalization, cooperation and coordination of the actions of international transport unions. Particular attention is paid to the analysis of the trade union movement in rail transport, the participation of the Russian trade union of railway workers and transport builders in the international trade union movement.

**Keywords:** trade union, transport unions, international trade union movement, International Confederation of Trade Unions (ITUC), World Federation of Trade Unions (WFTU), International Workers' Association (IWA), Global Federation of Trade Unions (GUF), International Transport Workers' Federation (ITWF), International Committee of Transport Workers' Propaganda (ICTWP), Profintern, International Confederation of Trade Unions of Railway Workers and Transport Builders (ICRW), Russian Union of Railway Workers and Transport Builders (ROSPROFZHEL).