ABSTRACTS of D.Sc. and Ph.D. THESES

Selected abstracts of D.Sc. and Ph.D. theses submitted at Russian transport universities

Bobrovnik, A. B. Minimizing the negative effects of lead ions on geosystems with mineral sulfate-containing building and natural products. Abstract of Ph.D. (Eng) thesis [*Minimizatsiya negativnogo vozdeistviya ionov svintsa na geosistemy mineralnymi sulfatosoderzhashchimi stroitelnymi i prirodnymi sredstvami. Avtoref. dis... kand. tekh. nauk***]. St. Petersburg, PSTU, 2018, 16 p.**

The possibility of binding lead ions into a poorly soluble compound, similar to natural anglesite, help of minerals of sulfate-calcium and magnesia nature, as well as the possibility of increasing the geo-protective capacity of sulfate-containing building systems to 27,5 mg/g with formation of a substance similar to natural cerussite, have been justified thermodynamically. It has been established that natural mineral solutions containing sulphate anions and binding lead ions in poorly soluble compounds such as anglesite can be considered as a means of minimizing the negative impact of lead ions on the environment. Formulas are proposed for calculating the mass of mineral building products of sulphate-calcium and magnesia nature and the volume of solutions for a specific (by 1 MAC) decrease in concentration of lead ions in the geosystem.

The work was done at Emperor Alexander I St. Petersburg State Transport University.

Demidov, R. A. Identification of threats of information security breaches in networks with a dynamic topology using deep learning methods. Abstract of Ph.D. (Eng) thesis [*Vyyavlenie ugroz narusheniya informatsionnoi bezopasnosti v setyakh s dinamicheskoi topologiei s ispolzovanim metodov glubokogo obucheniya. Avtoref. dis... kand. tekh. nauk***]. St. Petersburg, PSTU, 2018, 14 p.**

In the thesis, formalization of the problem of detecting threats of security breaches (TSB) as a multidimensional boolean function of existence of a threat is proposed. A method has been developed for detecting TSB on the basis of approximating a boolean function of existence of a threat using a deep learning apparatus that provides real-time detection of TSB. A method for expanding the class of detectable threats by a rational choice of the computational architecture of a deep neural network is proposed. A hybrid architecture is justified, which allows to improve the accuracy of the results of TSB and ensure the work with the input data of the variable structure. A method has been created for forming semantic representations of discrete data of conditions of a training sample of insufficient size.

The work was done at Peter the Great St. Petersburg Polytechnic University.

Frolovichev, A. I. Managing the development of a transport company based on the principle of balanced use of resources. Abstract of Ph.D. (Eng) thesis [*Upravlenie razvitiem transportnoi kompanii na osnove printsipa sbalansirovannosti ispolzovaniya resursov. Avtoref. dis... kand. ekon. nauk***]. Moscow, RUT, 2018, 24 p.**

The scientific novelty of the research consists in development of methodological tools for improving the economic mechanisms for managing the resources of a transport company, ensuring its development within a single transport complex. A hypothesis was formulated and proved about the possibility of managing the development of the transport complex on the basis of the principle of balanced key resources. An integrated approach to analysis, evaluation, modeling of the level of balance of resources for current and strategic management has been developed, taking into account the cost of replacing these resources. The economic and mathematical model of the transport company is used to link the resulting economic indicators with the cost of key resources and the specifics of economic relations in transport. A methodical approach to assessing the impact of scientific and technological progress, as well as of organizational changes on the economic performance of the company, is proposed.

The work was done at Russian University of Transport.

Kaliberda, I.V. Model and algorithms for formation of a complex of means of television monitoring and technical protection of informatization objects. Abstract of Ph.D. (Eng) thesis [*Model i algoritmy formirovaniya kompleksa sredstv televizionnogo nablyudeniya i tekhnicheskoi okhrany ob'ektov informatizatsii. Avtoref. dis... kand. tekh. nauk***]. St. Petersburg, PSTU, 2018, 16 p.**

The set-theoretic model of a complex of television surveillance and technical protection proposed by the author differs by decision-making variability and by the presence of subsets that take into account the 3D characteristics of the protected object's space and three-dimensional spatial-energy characteristics of visual detection and control means. The developed algorithm for determining the range of passive optical-electronic infrared devices is based on the interpretation of the energy ratio in passive location, thermal fields and background noise. An algorithm for selecting and placing monitoring tools ensures non-redundant overlap of the protected 3D model space. The software implementation of the tasks of the complex takes into account the level of criticality (importance) of the protected categorized object, economic factors and probabilistic characteristics of intruder detection, constraints.

Kononov, D. P. Improving performance of solid-rolled wheels of railway rolling stock. Abstract of D.Sc. (Eng) thesis [*Povyshenie rabotosposobnosti tselnokatanykh koles podvizhnogo sostava zheleznykh dorog. Avtoref. dis... dok. tekh. nauk***]. St. Petersburg, PSTU, 2018, 32 p.**

In the dissertation research, indicators are determined that establish the influence of non-metallic inclusions on development of corrosion in solid-rolled railway wheels, as well as on their performance. The stress state of wheels in service is estimated, axial loads, residual and assembly stresses, and thermal loads arising during braking are analyzed. A computational-experimental method for analyzing fractures of wheel steel has been developed, which makes it possible to determine the operational reliability of solid wheels. A new method of increasing their efficiency was proposed and investigated, consisting in turning the surface of a disk to achieve the best indicators of quality of the surface layer, and the requirements for machining modes were established. With regard to the thesis problematic, the methods of mathematical modeling and complex technologies were used productively, the problems of inconsistency of the existing ideas about the magnitude of the elastic modulus of steel with different hardness were revealed.

The work was done at Emperor Alexander I St. Petersburg State Transport University.

Konokhov, D. V. Energy-efficient direct torque control of asynchronous traction motors. Abstract of Ph.D. (Eng) thesis [*Energoeffektivnoe pryamoe upravlenie momentum asinkhronnykh tyagovykh elektrodvigatelei. Avtoref. dis... kand. tekn. nauk***]. Moscow, RUT, 2018, 23 p.**

A method and system for energy-efficient direct control of asynchronous traction electric motors, as well as an energy-saving control algorithm for asynchronous electric drive in the direct torque control system based on the stator current minimum criterion, are developed based on the optimal control of the stator flux linkage setting depending on the ATD torque reference. A logic switching unit of the control system is proposed for an energy-saving algorithm for generating a linkage task for a traction electric drive of locomotives, taking into account the control of the current mode and the conditions of its operation. Based on the criterion of the stator current minimum, optimal dependencies of the flux linkage and the angle between the current and flux linkages of the stator (moment-forming vectors) on the load for asynchronous traction motors of diesel locomotives are determined.

The work was done at Bryansk State Technical University.

Compiled by Natalia OLEYNIK