INVESTIGATION OF THE RATIONALITY CRITERIA OF MULTI-SPAN BEAMS

S. D. Shiraliev, A. A. Boinskaya, A. V. Mishchenko

Annotation. The application of energy, force and deformation criteria in the problems of controlling the parameters of the state of multi-span beams is considered. As an energy criterion, the requirement to achieve a minimum potential strain energy is applied. The strength criterion of rationality is the alignment of bending moments in the calculated sections of the beam. According to the deformation criterion, the angles of rotation of the sections, the points on the intermediate supports should take zero value. The parameters-regulators are the relative lengths of the beam spans. The application and numerical comparison of the results is carried out on the examples of various schemes of two-span beams loaded with distributed and concentrated forces. For adjustable quantities – potential energy, moments and rotation angles using the MathCAD processor, a series of graphs are constructed depending on the variable controllers and the parameters of the design circuits and loads. All the criteria showed a good coincidence of the numerical results, which is explained by their physical validity and correctness. At the same time, the force criterion, due to the presence of a larger number of adjustable values and the need to use the corresponding number of regulators, provided, when they are deficient, a solution in the form of a Pareto-area. It is concluded that the energy and deformation criteria of regulation are simpler, give close results and can be effectively used in the tasks of rational design of multi-span beams.

Keywords: criteria of rationality; regulation of state parameters; Pareto-area.

RAPID ANALYSIS OF MOISTURE ACCUMULATION IN OUTER WALLS

S. V. Korniyenko

Annotation. In order to improve the Russian Codes and improve the quality of the design of buildings the offers to improve the SP 50.13330.2012 was developed. These offers contain the basic for assessing the moisture protection properties of the enclosure structures according to the maximum permissible state of humidification in the annual cycle and are harmonized with the International Standard ISO 13788. Unlike the method of calculation of moisture protective properties adopted in Russian norms, the proposed express method allows to perform analysis of dynamics of moisture accumulation in enclosing structures during the annual cycle. Compared to the International Standard ISO 13788, this method gives a more accurate assessment of the humidity mode of modern multilayer enclosing structures with an increased

level of heat protection. Rapid analysis of moisture protection properties of multi-layer wall structure with face brick layer for humid climatic zone was performed. The calculation was made for two versions of outer wall: with an unventilated and ventilated air layer. Analysis of the annual moisture balance shows that there is no systematic moisture accumulation in a structure with an unventilable air layer during the year, but during the moisture accumulation period there is an increase in moisture in the structure. Use of the ventilated air layer completely excludes moisture accumulation, which allows improving the humidity conditions of the outer wall.

Keywords: building; enclosing structure; outer wall; moisture accumulation; moisture protection; comfort; energy saving.

EXPERIMENTAL JUSTIFICATION OF THE CALCULATED AIR TEMPERATURE IN THE BASEMENT IN THE HEAT ENGINEERING CALCULATION OF A RESIDENTIAL BUILDING

M. S. Kononova, O. O. Andriyashkin, O. A. Zhdanova

Annotation. Modern features of the calculation of buildings that have fence contact with the ground associated with the determination of the calculated air temperature of the buried part of buildings are considered. The relevance of refining the method for calculating heat loss of buried parts of the building is revealed. The basement of an apartment building was chosen as the object of research. Theoretical calculations of the air temperature in the basement at different values of the air exchange multiplicity and the outdoor air temperature are carried out. The results of an experiment on monitoring the air temperature in the basement of the building under study are presented. As a result of processing experimental data, the dependence of the air temperature in the basement on the outdoor air temperature is determined, which has a linear character. Comparison of the calculated and experimental data showed that at positive outdoor temperatures, the discrepancy is minimal, and with a decrease in the outdoor temperature, the calculated values of the air temperature in the basement become lower than the experimental data obtained. The dependence of the temperature difference between the temperature of the basement air and the outside air is also studied, which allows us to offer a simplified method for determining the calculated air temperature in the basement.

Keywords: calculated air temperature; basement; technical underground; heat balance; heat engineering calculation.

ENGINEERING SYSTEMS AND COMMUNICATIONS

ANALYSIS OF STRUCTURAL SOLUTIONS OF COMPENSATORS OF OVERGROUND OIL PIPELINES IN AREAS OF HIGH TEMPERATURE GRADIENT ON THE EXAMPLE OF OIL PIPELINE OF KHARYAGA OIL FIELD

S. A. Maltsev

Annotation. In this work, the analysis of constructive solutions of compensators of over ground oil pipelines in areas of high temperature gradient was carried out. The object of the research is the industrial oil pipeline of the Kharyaga oil field. The purpose of the study: to analyze effective constructive solutions of oil pipeline compensators in regions of the Far North. In the course of work the basic constructive solutions of compensators, their fields of application, advantages and disadvantages are highlighted. As a result, a classification scheme for methods of compensating for temperature deformations of pipelines was drawn up, special attention was paid to areas with a high temperature gradient. The current normative literature in the field of design of compensators was analyzed, it was revealed that in SP 36.1330.2012 there is no method for calculating trapezoidal compensators. The method of force deduced a formula for calculation of the atleness of the trapezoidal compensator, its adequacy with application of SCAD Office software complex is proved. Comparison of compensators flexibility at different angles of inclination with regard to metal capacity is made. A technical and economic comparison with bellows compensators was performed. The effectiveness of trapezoidal compensators in conditions of high temperature gradient and the need to include in the normative literature provisions for their calculation is proved.

Keywords: compensator; trapezoidal compensator; oil pipeline; compensators of oil pipelines; overground oil pipelines; compensation of temperature deformations of oil pipelines.

JUSTIFICATION OF USE HEAT RECOVERY VENTILATION AIR IN THE AIR CONDITION UNIVERSAL FAST-TRANSFORMING BUILDINGS

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Annotation. Various configurations fast-transforming premises multifunctional public buildings are considered. Their features are revealed, which determine the load on the climate system construction object, including the category, duration of operation and capacity of buildings. The multi-purpose concert hall Event-Hall, located in the city Voronezh, was chosen as the object of research. A numerical experiment was performed, which resulted in specifying the minimum consumption of cold in the climatization system, namely, only for the excess of apparent heat in the room. For each type of space represented by the numerical value air flow required for assimilation of the thermal excess in the room, and the values temperature of the outgoing air subject to the building height more than 4 m under the present system of air-conditioning. A solution is proposed to improve the energy saving air conditioning system with the identified characteristics exhaust air, namely, recovery with an intermediate heat carrier and additional heat exchangers. A schematic diagram is

presented and the temperature ranges media circulating in the system circuits are specified.

Keywords: multifunctional building; energy efficiency; recovery; heat surpluses; temperature; air; supply and exhaust ventilation; duration of stay of people; heat exchanger; cold carrier.

PECULIARITIES OF MAJOR REPAIR AND RECONSTRUCTION OF HEATING SYSTEM

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Annotation. A regional program for capital repairs of real estate for the period from 2014 to 2044 has been approved in the Voronezh region. Full or partial replacement of the heating system is carried out during major repairs of the building. During the reconstruction of the building, the heating system involves the modernization of the existing system. The article raises the question of the need to completely replace the heating system during major repairs. The materials of the article discuss the types of laying of main pipelines of heating systems during reconstruction or major repair. It is shown that during major repair and reconstruction of the building it is advisable to use water heating systems with a gasket, supply and return lines at the floor. At the same time heat and materials are saved, and when using modern materials and shut-off and control devices, energy resources are saved during further operation of the building.

Keywords: reconstruction; capital repairs; heating; heating devices giving the highway; the return highway.

INFLUENCE OF CLIMATIC CONDITIONS ON THE EFFICIENCY OF AUTOMATIC CONTROL IN THE SYSTEMS OF CENTRALIZED HEATING

N. A. Drapalyuk, M. S. Kononova, O. O. Andriyashkin, S. V. Bozhko

Annotation. The systems of centralized heating of Russian cities have a considerable potential of energy economy, related to the features of regulating the temperature of the heat transfer medium. The value of potential saving of heat at organization of autocontrol in systems of centralized heating depends on climatic requirements. The outcomes of calculation of number of hours of outside air temperature holding for ten cities of Russia are given, based on data of weather archives for five years. The values of potential saving of heat for the examined cities are calculated on the basis of the annual graphs of heat consuming at different calculated temperature of the heat transfer medium. The influence of a change in temperature during seasons is evaluated and the medial values of the heat saving potential are defined. The average values of relative saving of heat for climatic regions IB and IIB are obtained.

Keywords: energy economy on heating; effectiveness of automatic control; annual graph of heat consuming; number of hours of temperature holding; centralized heating.

CITY. RECONSTRUCTION, RESTORATION AND LANDSCAPING

DEVELOPMENT OF THE PARAMETERS OF AN INTEGRATED SURVEY OF THE BUILDING OF THE URBAN PLANNING MONUMENT STREET OF THE WORLD IN VOLGOGRAD

N. N. Antonova, Yu. A. Goldina, I. G. Ten

Annotation. Mira Street is the first street in Volgograd, restored after the Second World War, which is an example of the ensemble development of the city center and quarter buildings. Given the important urban planning and social status, this territory requires the development of a concept for preserving the architectural appearance, its individuality and historical value. The result of the study is a comprehensive development of building parameters to preserve the ensemble of Peace Street.

Keywords: historical buildings; Mira street; urban planning ensemble; Stalin's empire.

ROAD TRANSPORT, AGRICULTURE AND CONSTRUCTION MACHINES

A STUDY OF PASSENGER TRAFFIC AT THE INTERSECTION OF UNIVERSITY AVENUE WITH THE STREET ARENSKY IN VOLGOGRAD

A. A. Smolentseva, M. A. Bugaeva, S. G. Artemova

Annotation. In large cities, not only the proportion of individual transport, but also public. For example, in Volgograd, the share of buses in the traffic flow is from 2 % to 4 %, taxis from 4 % to 9 % of the total number of all vehicles. Therefore, there is a problem of the organization of safe transportation of passengers. This article is devoted to a comprehensive study of passenger exchange at the intersection of Universitetskiy Avenue with Arensky street. The main attention is paid to the lack of transport infrastructure at the place of the taxi stop. This brings inconvenience for both passengers and drivers. Lack of visibility and a large flow of vehicles exacerbate the situation. The article presents the results of field observations. The dynamics of changes in passenger exchange on days of the week is presented and the most «busy» days in which passenger exchange is highest are revealed. According to the results of observation, it can be concluded that it is necessary to carry out activities

that will be aimed at organizing a stopping point at this site. It will be more convenient and safe for all road users. This problem is poorly understood and requires further research and measures to address it.

Keywords: passenger traffic; bus stop; taxi; passenger traffic.

RESEARCH OF CHARACTER OF REDUCING AN INFORMATION SIGNAL IN THE CHANNEL OF REMOTE CONTROLLING TECHNOLOGICAL MACHINES OF THE ROAD-BUILDING COMPLEX

A. D. Kononov, A. A. Kononov, V. I. Gilmutdinov, S. A. Ivanov

Annotation. The dependence of the factor of reducing of an information controlling signal on distance from the transmitter up to the technological machine of the road-building complex, on the heights of transmitting and receiving antennas, on the polarization state of radio waves, on performances and state of the radio control channel is explored. The analysis of influence of reflectings from a statistically rough surface on transmission of discrete commands and noise immunity of building and road machines control systems is carried out. The estimation of mutual influence of polarizable-orthogonal channels of radio electronic systems operating spatial performances of electromagnetic waves is held in view of the depolarization of signals at interaction with the underlying surface. Theoretical results are compared with data of experimental researches at actual mode of operations of road-building machinery. The problems of technical realization of measuring superhigh-frequency installation are surveyed. In view of the analysis of specificity of distribution of electromagnetic waves of a ultra short-wave range near to the ground surface, the recommendations on application of antenna systems of receiving-transmitting devices installed on the controlled technological machines of the road-building complex, which ensure reliability and stability of radio controlling working processes, are given.

Keywords: Technological machines; road-building complex; radio control channel; signal transmitting.

ECONOMICS AND ORGANIZATION OF CONSTRUCTION

MODERN VECTOR OF DEVELOPMENT OF THE CONSTRUCTION INDUSTRY, REGULATED BY THE STATE

E. A. Kabanova

Annotation. The purpose of this article was to study the main aspects of the construction industry, which are regulated by the state. The «Main directions of budget, tax and customs tariff policy» in the context of the national project «Comfortable environment» are analyzed. It is shown how these areas affect the development of the construction industry. The tax policy directly related to the construction

industry is investigated. The principle of fiscal neutrality and predictability is characterized and priority measures of tax policy are analyzed. The ways of implementation of tax policy measures are proposed.

Keywords: tax policy; national project; program; comfortable environment; tax administration.

DEMOGRAPHICS FACTOR IN PRICING IN THE MARKET OF NEW CONSTRUCTION OF RESIDENTIAL REAL ESTATE

V. A. Sirotkin, A. E. Romanova, A. V. Skorin

Annotation. Primary market of the residential real estate in the functioning faces a number of the common problems connected with economy and also the specific characteristics of the housing market creating obstacles to its development in the future. In this article authors considered a problem of impact of demographic changes on primary real estate market. On the basis of the analyzed results of researches of social and demographic list of potential buyers, the main consumers of primary real estate market and their consumer preferences are revealed. Authors studied the general laws of functioning of market economy and their influence on demand of the residential real estate. Pricing in the market directly depends on supply and demand during the concrete period of time and is expressed as follows: increase in demand causes rise in prices, and its absence, influences their decrease. Also in article importance of accounting of demographic factor is shown by builders when planning construction of housing and installation of the prices.

Keywords: pricing factors; market of the residential real estate; builder; demography.