

# Contents

## BUILDING AND ARCHITECTURE

### ARCHITECTURE, URBAN PLANNING, DESIGN

- M. E. Bazilevich.* Influence of professional activity of the graduates of Saint Petersburg architectural and engineering higher schools on the development of the architecture in the Far East in the pre-revolutionary period..... 5
- L. P. Lavrov, A. F. Krasnopolskiy, E. G. Molotkova.* Problems of intra-quarter territory development in St. Petersburg historical center..... 15
- M. N. Rybalkina.* Low-rise residential complex at Stachek Avenue: the specificity of spatial planning solutions ..... 30
- O. P. Fedorov, I. D. Volkova.* Media facades in architecture. The role and place in the information society ..... 40

### BUILDING DESIGNS

- Phan Van Phuc.* Calculation of axisymmetric thick plates freely supported on conical surface (with possible vertical displacement) .... 47
- S. V. Fedosov, S. A. Malbiev.* Structural designs from polymer materials for coverings of buildings and structures subjected to chemically aggressive environment. Part 1. Strength and deformability in a stationary thermal field..... 54

### STRUCTURAL MECHANICS AND CALCULATION OF STRUCTURES

- D. E. Bondarev.* Estimation of the influence of seismic rotations on dynamic response of the seismically isolated structure ..... 62
- D. N. Nizomov, I. K. Kalandarbekov, I. I. Kalandarbekov.* Numerical modeling of the «platform–model of the building» dynamic system ..... 66
- V. D. Kharlab.* To the elementary bending theory..... 73

### GEOENGINEERING

- S. A. Knyazeva.* Solution for one-dimensional problem of saturated clayey soil filtration consolidation with consideration of the threshold pressure gradient..... 77
- R. A. Mangushev, V. M. Kirillov.* Analysis of regularities of foundation settlement development of steel cylindrical tanks on soft soils ..... 84

### TECHNOLOGY AND ORGANIZATION OF CONSTRUCTION

- S. V. Bovteev.* Calculation of the parameters of the streamline work organization by the critical path method ..... 90
- E. I. Rybnov, A. N. Egorov, Z. Hejducki, N. G. Ghadimian.* Organization and planning of production structures' work at large-scale housing construction..... 98

### BUILDING MATERIALS AND PRODUCTS

- M. V. Akulova, T. E. Slizneva.* Polystyrene concrete on Portland cement binder with the addition of liquid glass and chamotte ..... 103
- S. G. Golovina, Yu. V. Sokol.* To the issue of studying the joint performance of building materials of enclosing structures in the former profitable houses of the historical center in St. Petersburg ..... 112
- Yu. V. Pukharev, V. V. Inchik, D. A. Panteleev, M. I. Zhavoronkov.* Designing of poly-fiber-reinforced concrete compositions ..... 118
- E. E. Shalyy, S. N. Leonovich, L. V. Kim, V. E. Rummyantseva, N. A. Budrevich.* Probabilistic model of the combined effect of carbonization and chloride aggression on structural concrete..... 123

# Vestnik grazhdanskikh inzhenerov 2018 3 (68) June

# Bulletin of Civil Engineers

### Scientific-technical peer reviewed journal

*The Founder* — the Federal State Budgetary Educational Institution of Higher Education "Saint Petersburg State University of Architecture and Civil Engineering" (SPSUACE)

### The Editor-in-Chief

*Ye. I. Rybnov*, Dr. Sci. Ec., Professor, Honorary Worker of Higher School of the Russian Federation (SPSUACE)

### Assistants to the Editor-in-Chief

*Yu. P. Panibratov*, Dr. Sci. Ec., Professor, Winner of the State Award of the Russian Federation and the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (SPSUACE)

*V. I. Morozov*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation (The Senior Editor) (SPSUACE)

### Editorial council

*A. A. Akaev*, Dr., Prof., Foreign Member of the RAS (Lomonosov Moscow State University, Russia)

*L. Ungvari*, Dr. Sci., Professor, (Technical University of Applied Sciences Wildau, Germany)

*N. V. Kazhar*, Dr. Arch., Professor (Częstochowa University of Technology, Poland)

*G. Kipiani*, Dr. Sci. Tech., Professor (Georgian Technical University, Georgia)

*H. V. Tokmajyan*, Dr. Sci. Tech., Professor, Rector of SEUA (State Engineering University of Armenia)

*J. Eberhardsteyner*, Dr. Sci. Tech., Professor (Vienna University of Technology, Austria)

*S. N. Leonovich*, Dr. Sci. Tech., Professor (Belarusian National Technical University, Belarus)

*Y. Iwasaki*, Dr. Sci. Tech. (Geo-Research Institute, Japan)

*T. Tanaka*, Dr. Sci. Tech., Professor

(University of Tokyo, Japan)

*A. Zh. Zhusupbekov*, Dr. Sci. Tech., Professor

(L. N. Gumilyov Eurasian National University, Astana, Kazakhstan)

### Editorial Board

#### 05.23.00 – Building and Architecture

*G. V. Yesaulov*, Dr. Arch., Professor, Academician of RAACS

*Yu. V. Zaytsev*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Extraordinary and Plenipotentiary Ambassador

*F. V. Karmazinov*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation (SUE "Vodokanal of St. Petersburg")

*N. I. Karpenko*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (NIISF RAACS)

*L. S. Lyahovich*, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (TSUAB)

*V. Sargsyan*, Dr. Sci. Tech., Professor

(National University of Architecture and Construction of Armenia)

*V. I. Travush*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Academician of RAACS (RAACS)

*V. S. Fedorov*, Dr. Sci. Tech., Professor, Academician of RAACS (MSURE)

*S. V. Fedosov*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (IVGPU)

*E. M. Tchernyshov*, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (VSUACE)

*M. I. Alekseev*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS

G. I. Belyy, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation  
 B. G. Vager, Dr. Sci. Phys.-Math., Professor, Honorary Worker of Higher School of the Russian Federation  
 T. A. Datsuk, Dr. Sci. Tech., Professor  
 S. P. Zavarikhin, Dr. Arch., Professor, Honorary Architect of the Russian Federation  
 B. N. Karpov, Dr. Sci. Tech., Professor  
 L. N. Kondrat'eva, Dr. Sci. Tech., Professor  
 L. P. Lavrov, Dr. Arch., Professor, Honorary Architect of the Russian Federation, Correspondent Member of RAACS  
 R. A. Mangushev, Dr. Sci. Tech., Professor, Honorary Worker of the Higher School of the Russian Federation, Correspondent Member of RAACS  
 A. M. Maslennikov, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation  
 S. N. Nikiforov, Dr. Sci. Tech., Professor  
 Yu. V. Puharenko, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Correspondent Member of RAACS  
 S. V. Sementsov, Dr. Arch., Professor  
 V. D. Kharlab, Dr. Sci. Tech., Professor  
 V. M. Ulyasheva, Dr. Sci. Tech., Professor  
 V. M. Petrov, Dr. Sci. Tech., Professor (SPSUACE)

**05.05.00 – Transport Engineering, Mining Machinery Manufacturing, Construction Machine Building**  
 V. V. Verstov, Dr. Sci. Tech., Professor, Honorary Builder of Russia  
 S. V. Repin, Dr. Sci. Tech., Professor  
 V. E. Gordienko, Dr. Sci. Tech., Professor  
 S. E. Maksimov, Dr. Sci. Tech., Professor  
 I. I. Vorontsov, Dr. Sci. Tech., Professor  
 A. E. Pushkarev, Dr. Sci. Tech., Associate Professor  
 A. N. Lyalinov, Dr. Sci. Tech., Professor  
 V. N. Gorshkov, Dr. Sci. Tech., Professor (SPSUACE)  
 P. V. Druzhynin, Dr. Sci. Tech., Professor, Honorary Worker of the Higher School of the Russian Federation (KMAL)  
 V. A. Kuz'michev, Dr. Sci. Tech., Professor (SPbPU)

**05.22.00 – Transport**  
 S. A. Evtyukov, Dr. Sci. Tech., Professor, Honorary Worker of Higher School of the Russian Federation  
 P. A. Kravchenko, Dr. Sci. Tech., Professor, Honorary Worker of the Higher School of the Russian Federation  
 V. N. Dobromirov, Dr. Sci. Tech., Professor  
 Yu. G. Kotikov, Dr. Sci. Tech., Professor  
 A. V. Bondarenko, Dr. Sci. Tech., Professor  
 A. A. Kapustin, Dr. Sci. Tech., Professor  
 B. D. Efremov, Dr. Sci. Tech., Professor  
 R. N. Safiullin, Dr. Sci. Tech., Associate Professor (SPSUACE)  
 V. S. Lukinskiy, Dr. Sci. Tech., Professor (HSE in St. Petersburg)  
 V. N. Lozhkin, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation (Saint-Petersburg University of State Fire Service of EMERCOM of Russia)

**08.00.00 – Economics**  
 A. N. Asaul, Dr. Sci. Ec., Professor, Honorary Builder of the Russian Federation, Honorary Worker of Sciences of the Russian Federation  
 I. V. Drozdova, Dr. Sci. Ec., Professor  
 G. A. Tokunova, Dr. Sci. Ec., Professor  
 A. A. Petrov, Dr. Sci. Ec., Professor  
 N. G. Pletneva, Dr. Sci. Ec., Professor  
 A. P. Dolgov, Dr. Sci. Ec., Professor  
 A. I. Solodkiy, Dr. Sci. Ec., Professor  
 V. V. Asaul, Dr. Sci. Ec., Professor  
 E. G. Guzhva, Dr. Sci. Ec., Professor (SPSUACE)  
 G. F. Shcherbina, Dr. Sci. Ec., Associate Professor  
 CEO (AO SSMO "LenSpetsSMU")  
 L. M. Kaplan, Dr. Sci. Ec., Professor  
 (St. Petersburg Union of Construction Companies)  
 R. A. Faltinskiy, Dr. Sci. Ec., Professor,  
 Adviser to CEO (OJSC Gazprompromgaz)

The address of the Founder and the Editorial Office:  
 2<sup>nd</sup> Krasnoarmeyskaya St. 4, 190005, St. Petersburg, Russia  
 Ph./ Fax: (812) 575-09-17  
 E-mail: [vestnikspb@mail.ru](mailto:vestnikspb@mail.ru)  
 The contents and abstracts of articles are presented on the site: <http://vestnik.spbgasu.ru>

The journal is registered by the Federal Service for Supervision of Communications, Information Technology and Mass Media (Roskomnadzor). The registration certificate of the mass media organization is ИИ № ФС77-69753, of 05.05.2017.  
 The journal is included by the Higher Attestation Commission (HAC) of the Russian Federation into the List of leading reviewed scientific journals and editions in which the major scientific results of theses on competition for the academic degree of the Doctor of Science are to be published.  
 In case of reprinting, the link to the "Vestnik grazhdanskikh inzhenerov – Bulletin of Civil Engineers" is obligatory.  
 On the cover one can see the monument to Nicholas I, the Emperor, in honour of whom the Institute of Civil Engineers (nowadays SPSUACE) was named on December 17, 1892.

## SANITARY ENGINEERING AND ECOLOGY

I. I. Ivanenko, A. M. Novikova. Cr(6+) biological recovery by denitrifying pseudomonades in the presence of nitrates in cultural medium.....132

## ENERGY SAVING AND ENERGY EFFICIENCY

S. V. Shilkina. Economy of electric power industry development on renewable energy sources in Russia taking into account the world tendencies .....137

## TRANSPORT ENGINEERING, MINING MACHINERY MANUFACTURING, CONSTRUCTION MACHINE BUILDING

O. K. Bobobekov. Development of technique for determining the terms of service for land transport technological machines .....147

I. I. Vorontsov. Multi-operational technical appliance for spreading sand-salt mixture onto the surface of snow-ice formation on sidewalks and highways.....153

N. T. Sandan, S. A. Evtyukov, S. V. Repin. Effect of wear on the change of operating properties of ground transport and technological machines in the operation process.....161

## TRANSPORT

S. A. Evtyukov, E. V. Tyulkin, P. A. Stepina, V. A. Bezgina. Determination of friction coefficient of pedestrian's body in road accident investigation.....166

Ju. G. Kotikov, A. I. Ivanova. Substantiation of economic efficiency of the multiport multimodal system of the Leningrad Region.....171

N. V. Podoprigora, V. N. Dobromirov, P. A. Stepina. Methods of assessing the influence of moisture content in the brake fluid on the efficiency of the braking action .....179

## ECONOMICS

V. L. Asanov. Taking into account the influence of intellectual capital on the efficiency of construction companies.....184

N. L. Breus. Perfecting the methodology for capital cost calculation at realization of investment-construction projects in transport infrastructure field based on the principles of public-private partnership .....190

S. A. Ershova, T. N. Orlovskaya. The concept of economy digitalization as a basis of economic security in the Russian Federation.....197

P. B. Lyulin. Features of the state registration of rights to real estate assets.....205

S. B. Sborshchikov, T. V. Khripko. Basic provisions for forming the parameter-oriented model of contractor selection in the conditions of engineering management scheme.....212

## IN THE COURSE OF DISCUSSION

A. E. Stakhov, S. Yu. Kadokova, A. A. Andreenko. Evaluation of constructive solutions on thermal protection of buildings by economic methods.....219

Abstracts.....223

Submitting materials requirements.....237

Subscription rules .....238