

International Scientific Conference "Construction and Architecture: Theory and Practice of Innovative Development" (CATPID 2020)

IOP Conference Series: Materials Science and Engineering
Volume 1083

Nalchik, Russia
16 - 17 December 2020

Editors:

**Batyr Yazyev
Stepan Litvinov
Anastasia Lapina**

**Anastasia Kotesova
Oksana Akay**

ISBN: 978-1-7138-4586-7
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Preface	
Peer review declaration	
Experimental assessment of solar radiation effect on the stress-strain state of a span with an orthotropic slab.....	1
<i>S Yu Gridnev, I S Podlesnykh, N A Barchenkova</i>	
Review and comparative analysis of computational algorithms for modeling the dynamics of elastically supported structural systems.....	10
<i>Yu I Skalko, S Yu Gridnev</i>	
Calculation of the triangular panels' orthotropic covers for the retained domes.....	17
<i>S V Skuratov, V N Samsonova</i>	
Buckling of compressed rods taking into account their own weight under different boundary conditions.....	22
<i>A S Chepurnenko, S B Yazyev, D.A Vysokovskiy, G B Verzhbovskiy</i>	
Energy method for solving the stability problem of an elastic rod with variable stiffness taking into account its dead weight.....	28
<i>S B Yazyev, L Sh Akhtyamova, V S Chepurnenko, A A Reshetnikov, A D Ziganshin</i>	
Comparative analysis of typical and reinforced support parts' design parameters for reinforced concrete roof beams.....	35
<i>G V Degtyarev, S K Saida, Ahmad Al Hajal</i>	
The design parameters' analysis of typical support parts for the ferro-concrete roof beams reinforced with unweighted frame.....	40
<i>G V Degtyarev, M R Salloum, S G Abo Arraj</i>	
Technical and technological aspects of ensuring seismic stability during the construction of buildings and structures.....	46
<i>A N Sekisov, N A Shipilova, V N Bortsov, D M Dolbnya, O Kavkazi</i>	
Proposals on calculating the differential properties of concrete.....	53
<i>L R Mailyan, S A Stel'makh, E M Shcherban', A P Korobkin, E A Efimenko</i>	
Investigation of the volumetric fractal structure shaping.....	61
<i>G M Kravchenko, L I Pudanova</i>	
Algorithmic method for modeling a parametric surface.....	67
<i>G M Kravchenko, E V Trufanova</i>	
Trihedral lattice towers with optimal cross-sectional shape.....	73
<i>A S Chepurnenko, L S Sabitov, B M Yazyev, G R Galimyanova, L Sh Akhtyamova</i>	
The use of composite glass-fiber reinforcement (CGFR) in construction.....	79
<i>N I Zakieva, A P Lapina</i>	
Research of the additional building influence on the foundation in a stress superposition existing along the radius zone.....	85
<i>Al-Bukhaiti Ali Yahya Nasser, Yaya Keita, V V Ledenyov, Ya V Savinov, O V Umnova</i>	

Stress-strain state of the soil mass under the uniformly distributed load action adjacent to a vertical excavation.....	93
<i>Z G Ter-Martirosyan, I N Luzin, Yu V Vanina, A Z Ter-Martirosyan</i>	
The technical state experimental studies of construction with free support in the non-stationary oscillations' analysis.....	98
<i>M N Grigoryan, T V Polyakova, Ya A Kokareva, I A Parinov, A V Cherpakov</i>	
Determination of stress-strain state of short eccentrically loaded concrete-filled steel tubular (CFST) columns using finite element method with reducing the problem from three-dimensional to two-dimensional	104
<i>V S Chepurnenko, B M Yazhev, P M Urvachev, A A Avakov</i>	
Eco-sustainable architecture and comfortable living environment.....	116
<i>S B Yazyeva, I A Mayatskaya</i>	
Bamboo in modern construction and architecture	123
<i>A P Lapina, N I Zakieva</i>	
Synthesis of virtual reality technologies and design.....	129
<i>E V Vishnevskaya, N B Strekalova</i>	
Transformation of the regional settlement system and the factors affecting the spatial development in the Ivanovo region.....	135
<i>D V Chebotarev</i>	
Cultural landscape in the sociospatial development strategy of a small town in Bashkortostan	141
<i>K V Ishmukhametova, S H Baymuratova</i>	
Housing construction design taking into account dust content index of climate in the Russian Federation.....	151
<i>N I Zakieva, A P Lapina, A P Aleksandrov, A S Kulikov, V A Zheleznyakov</i>	
Features of art and design schools on the example of the southern Federal and Riga technical universities.....	157
<i>A Y Mokina, A Yu Mokina, Ulme Andra</i>	
Features of the Kuban life environment historical formation	166
<i>O S Subbotin</i>	
Updating the architectural heritage of the Krasnodar Territory, in the context of its preservation and restoration.....	172
<i>O S Subbotin</i>	
Three-layer composite panel with discrete layer and bionic principles.....	178
<i>I A Mayatskaya, B M Yazhev, V D Eremin</i>	
Fractality and urban environment.....	184
<i>I A Mayatskaya, B M Yazhev, S B Yazyeva</i>	
The concept of creating an ethnographic miniature park “Armenia: historical capitals and masterpieces of architecture” in Armavir, Russian Federation.....	189
<i>A Yu Safaryan, O S Subbotin, A Yu Safaryan, R G Sargsyan</i>	
New type of hybrid housing structure for the city of Yerevan	195
<i>A Yu Safaryan, Yu A Safaryan</i>	

Analysis of the welded pipe joints state and the methods for increasing the bearing capacity of gas transmission systems' pipelines.....	201
<i>N V Pirumyan, M G Stakyan, H A Khazaryan</i>	
The individual components' influence on aging of bitumen mineral materials.....	209
<i>M G Salikhov, E V Veyukov, V M Vainshtein, L I Malianova</i>	
Structural features of a cement matrix modified with additives of sedimentary origin.....	214
<i>I V Korchunov, E A Dmitrieva, E N Potapova</i>	
Strength and deformation of bending normal sections made of concrete frame structure.....	222
<i>D R Mailyan, G V Nesvetaev, Yu I Koryanova, E V Lesniak</i>	
Modeling the dependence of the foam concrete structural quality coefficient on the speed and duration of mixing the foam concrete mixture	228
<i>A N Pavlov, L R Mailyan, S A Stel'makh, E M Shcherban', A K Sysoev</i>	
Investigation of the technological factors' influence on the formation of the repair compositions' properties.....	237
<i>I A Serebryanaya, E A Shlyakhova, I O Egorochkina, A V Serdyukova, R G Sarkisyan</i>	
Analytical optimization of the dispersion-reinforced fine-grained concrete composition.....	244
<i>A D Zhukov, I V Bessonov, A D Bekele, E A E A Zinoveva</i>	
Lightweight concrete based on crushed foam glass aggregate	250
<i>I V Bessonov, B I Bulgakov, A D Zhukov, V A Gradov, N A Ivanova, M-B Kh Kodzoev</i>	
Technologies for creating directional orientation of fiber reinforcement in concrete	257
<i>L R Mailyan, P A Shilov, A A Shilov</i>	
Destruction of polymers under the action of laser radiation.....	264
<i>B I Kunizhev, Z S Torshkhoeva, R N Zhelikhazhev, A V Starov</i>	
On the problems of controllability and uncontrollability for some mechanical systems described by the equations of vibrations of plates and beams with integral memory.....	269
<i>A V Romanova, I V Romanov</i>	
Calculation of a beam with external reinforcement. Contact layer model.....	278
<i>N Yu Tsybin, V I Andreev, R A Turusov</i>	
Free oscillations of a beam with installation (1st part).....	285
<i>Kh P Kulterbaev, V A Vodakhova, L A Baragunova, M M Shogenova, A Kh Tsypinova</i>	
Forced oscillations of beams with installation (Part II).....	292
<i>Kh P Kulterbaev, V A Vodakhova, L A Baragunova, M M Shogenova, A Kh Tsypinova</i>	
Application of the software package in the improvement of floors made of hollow core slabs.....	298
<i>S V Ovchinnikova, E M Schneider, G V Kulinova</i>	
Methodological foundations for the system analysis principles application for modeling the phenomena of heat transfer in the technological cleaning process of tanks for oil products.....	304
<i>S V Fedosov, A G Azovtsev, S A Syrbu</i>	
Scheme of the planning organization of the land plot" section development based on information modeling.....	311
<i>M M Zheleznov, A O Rybakova</i>	

The aggregation method of inhibiting factors in construction	317
<i>A O Alekseev, V S Gladkikh, U V Aftahova, A G Aftahov, O V Takhumova</i>	
Modern architectural - planning, organizational, technological, constructive solutions at green roofing	327
<i>L A Seferyan, V E Chubarov, K V Chubarova</i>	
Development of technological measures to ensure the safety of production facilities in petrochemical industry	334
<i>V L Adamyan, G A Sergeeva, L A Seferyan, N Y Gorlova</i>	
Optimal ways to develop ecological and energy-efficient construction	340
<i>S V Ovchinnikova, A Yu Kalinichenko, A A Lyamina, E M Schneider</i>	
Application of photogrammetric methods in architecture, construction and land management.....	345
<i>E N Tsoraeva, R K Gadzhiev, S E Kuchiev, A A Pekh, S A Mezhyan</i>	
General methodological foundations of measurement accuracy control	351
<i>A R Gubeladze, E N Yagovkina, I O Gubeladze</i>	
Investigation of the process organization of identifying an invalid test during construction expertise	356
<i>V Mischenko, Yu Sergeev, A Sergeeva, Yu Myasishev, R Myasishev</i>	
Engineering in modern construction.....	362
<i>E Yu Romanenko, N V Vodolazskaya</i>	
A non-standard mark's center recognition correctness by a 3D laser scanner	369
<i>D A Gura, G G Shevchenko, N A Dyakova, S K Pshidatok</i>	
Geodesic provision for cadastral works: development prospects	375
<i>D A Gura, A P Nedyakina</i>	
Organizational and technological approaches to the construction and technical expertise of cultural heritage sites	384
<i>I Yu Zilberova, I V Novoselova, AL-Fatla Tareq Neamah Mohsen</i>	
Opportunities for the drinking water resources' export-oriented commercialization as a potential element of the economic framework in mountainous areas.....	389
<i>R O Kalov, D D Kiloev, R S Elmurzaev</i>	
To the problem of determination the aerodynamic resistance coefficient value to the swirled dust and gas flow in the air ducts of engineering and environmental systems.....	396
<i>D P Borovkov, K O Chicherov</i>	
Procedure for digitalization of measures to create a gas distribution network	402
<i>D A Yedukov, V A Yedukov</i>	
Road incidents detecting.....	409
<i>A R Feizullaev</i>	
Automated transport and storage systems for road transport companies.....	414
<i>E V Marchenko, Ju V Marchenko, S I Popov, S G Kuren, I V Marchenko</i>	
Integral assessment of anti-corrosion materials' quality	423
<i>V V Deryushev, M M Zaitseva, I V Kundryutskova, O S Ovchinnikov</i>	

Improving the reliability of the truck frame, taking into account maintenance frequency	430
<i>V V Deryushev, M M Zaitseva, D N Kundryutskov, O S Ovchinnikov</i>	
Checking the adequacy of the technical and economic model for ensuring a target life of an individual production machine	437
<i>V E Kasyanov, E E Kosenko, V V Kosenko, D B Demchenko, R V Khvan</i>	
Theoretical substantiation of ensuring the machine parts' reliability for the assigned target life.....	445
<i>S V Teplyakova, A A Kotesova, A A Kotesov</i>	
The Internet of Things in Transport Technology Improvement and Project Learning	452
<i>N N Nikolayev</i>	
Some aspects of the bridges' functional qualities restoration.....	460
<i>A V Makarov, S A Kalinovsky, T V Ereshchenko, M A Pavlova</i>	
Modeling the stability of horizontal generations worked in parallel to the front of a uniform slope	466
<i>O A Bogomolova, A V Zhidelev, P V Ivanova</i>	
Evolution of loading paths in a heterogeneous soil mass during the foundation pits' construction	475
<i>Z G Ter-Martirosyan, A Z Ter-Martirosyan, Yu V Vanina</i>	
Improving the methodology of organizing the parking process in large cities of the world	483
<i>Aleksandr Sekisov, Leonid Ivanov, Alexander Begiashvili</i>	
Interregional water transport cluster as a tool for economic convergence and integration.....	488
<i>E N Rudskaya, I A Eremenko, I V Popova</i>	
Programs implementation prospects for the large city territories development in Russia: institutional aspect.....	498
<i>I A Bachurinskaya, N V Vasileva, S N Maksimov, M N Yudenko</i>	
Development of an algorithm for increasing the construction organization efficiency in the context of using production outsourcing	506
<i>E N Klochko, E A Britikova</i>	
Increasing the economic efficiency of design and construction solutions due to the automated identification of construction works and structural elements of information models.....	512
<i>I A Tyurin, A V Ginzburg</i>	
Comparative analysis of thermophysical characteristics for screen insulation and building heat-insulating materials.....	520
<i>V I Lepilov, D G Usadskiy, A V Kovylin</i>	
On the question of increasing the purification efficiency of flue gases from the boiler unit of HEPS Volzhsky automobile plant.....	525
<i>O A Balandina, S M Puring, D N Vatuzov, E B Filatova</i>	
Automated monitoring systems for defects and damages of building structures and materials	533
<i>S I Evtushenko, V A Lepikhova, M A Kuchumov, E G Scibin, T A Krachmalniy</i>	
An approach for automatization of geotechnical monitoring in cryolithozone	540
<i>A Alekseev, L Shilova, E Mefedov</i>	
Assessment of the concentration and properties of dust in emissions into atmospheric air from the sources of the workshop for the aerated concrete structures production	546
<i>T O Kondratenko, A P Lapina</i>	

Geotechnical and architectural studies of the territory in the water protection zone of the Temernik River at the pre-design analysis stage.....	551
<i>L A Zolotareva, S E Komarova, D I Shesternina, N M Khansivarova</i>	
Nitrogen oxide emissions reducing in cement production.....	564
<i>T V Guseva, E N Potapova, I O Tichonova, K A Shchelchkov</i>	
The carcinogenic risk index of the Vladikavkaz city territory in GIS technologies is an indicator of natural and technological safety level.....	571
<i>O G Burdzieva, A S Kanukov</i>	
Geological information database integration into a geographic information modeling system.....	578
<i>A S Kanukov, P G Ivanov</i>	
Features of the earthquakes' manifestation intensity formation in mountainous areas	584
<i>V B Zaalishvili</i>	
Vibrations of nonlinear, absorbing soil medium according to the seismic microzoning instrumental method.....	590
<i>V B Zaalishvili</i>	
The vibrations of a nonlinear, absorbing soil ground calculation by the method of the seismic microzoning multiple-reflected waves	595
<i>V B Zaalishvili</i>	
Rating assessment of an urbanized area for insurance purposes	601
<i>V B Zaalishvili</i>	
Accounting for nonlinear soil properties in the computational method of seismic microzoning	607
<i>V B Zaalishvili</i>	
Research of abrasive properties separate dust to ensure the reliability of dusting systems in the production of building materials.....	613
<i>B Ch Meskhi, A I Evtushenko, N M Sergina, V N Azarov</i>	
Innovative solutions to improve the purification method of chromium-containing waste water	621
<i>D O Ignatkina, V P Batmanov, M Y Belogorodskaya, G L Gizzatova</i>	
Optimisation of environmental protection measures in the electrodeposition industry.....	626
<i>D V Shchitov, Yu Yu Yuriev, A V Nesterchuk, A V Moskvicheva</i>	
Improvement of environmental and economic indicators of the electrolytic chromium plating process.....	634
<i>E V Moskvicheva, A G Timofeev, P A Sidyakin, L N Chernoshchekov</i>	
Mud stream formation conditions and mud stream hazardous areas of the Chechen Republic.....	640
<i>G A Sergeeva, V L Adamyan, E V Marinchenko, L A Seferyan</i>	
Statistical estimation of the effect of precipitation redistribution using the historical regression method.....	651
<i>S O Gekkieva, A H Sherkhov</i>	
Researches of ice-forming efficiency of products of sublimation of pyrotechnic compositions consisting of silver iodide agi particles and zinc oxide nanotubes	655
<i>B M Khuchunaev, Kh-M Kh Baysiev, S O Gekkieva, A Kh Budaev</i>	

Study of the dispersed composition of dust particles on the leaves of apricot trees (<i>Prúnus armeniáca</i>) in the residential area	662
<i>I Glinyánova, V Azarov</i>	
The effectiveness of the dust particles of the flask in the apparatus of counter-swirling flows	676
<i>A A Sakharova, A Yu Sorokin, D V Azarov, V V Lupinogin</i>	
The breakthrough of large particles in small devices of counter-swirling flows with top strikers	683
<i>V V Lupinogin, D V Azarov, A A Sakharova, D R Dobrinski</i>	
The forecast accumulation in vegetative and generative organs of black currants and plum with ⁹⁰ Sr its location on the surface of the soil.....	689
<i>A Gorodnichaya, I Glinyánova</i>	
Management of organizational and technological design in construction based on information modeling (BIM-technologies)	695
<i>Yu V Gushchina, Yu N Nikolaev, A A Chernikov</i>	
Clustering and its key features' formation in construction	700
<i>A V Ischenko, D V Shishkunova, N P Guryanov</i>	
Numerical and analytical calculation of longitudinal bending of prismatic elastic rods under the action of axial compressive load taking into account the authorized weight.....	706
<i>Azimli Aziz Shakhin Oglu, A Yu Nesterov, S B Yazyev, A S Chepurnenko, L G Babahova</i>	
Building life cycle information modeling at the operation stage.....	719
<i>S G Sheina, L V Girya, A S Livitchuk</i>	
Historical transformations of early medieval basilica churches of the North-Eastern Black Sea region in the light of the new data method based on lime mortars	732
<i>V V Pishchulina, V D Kotlyar</i>	

Author Index