

14th International Forum on Strategic Technology (IFOST 2019)

IOP Conference Series: Materials Science and Engineering
Volume 1019

**Tomsk, Russia
14-17 October 2019**

Editors:

**Roman Ostvald
Daria Gvozdeva
Anastasia Ryabikina**

ISBN: 978-1-7138-4550-8
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	
Effect of iron nanopowder on flammability of epoxy composites.....	1
<i>O B Nazarenko, D S Lipchansky, I N Smirnova</i>	
Application of software testing methodology based on quality criteria and expert assessments to mobile applications.....	6
<i>E Y Galimova</i>	
Effect of local power systems integration on the distribution network functions.....	13
<i>F L Byk, L S Myshkina, Ya A Frolova</i>	
Powerflow calculations in powersystems considering traction load	22
<i>V V Shestakova, I M Kats, A V Darkhanova</i>	
Transverse profile forming for high energy electron beams using 3D-printed plastic samples.....	27
<i>A A Bulavskaya, Yu M Cherepennikov, A A Grigorieva, B M Gavrikov, A A Loginova, I A Miloichikova, N E Toropkov, S G Stuchebrov</i>	
The development of post-processing algorithm for the ultrasonic evaluation by the application of automated robotic testing systems.....	33
<i>D Dolmatov, V Zhvyrblya, D Sednev</i>	
The use of computer visualization in the analysis of breathing curves	41
<i>O Berestneva, I Lyzin, A Yumasheva, O Marukhina, A Trufanov</i>	
Investigation of edge detection methods using the example of wave field pattern image	50
<i>A A Yakimenko, A I Makfuzova</i>	
Functioning of back-to-back high voltage direct current link model in Tomsk electric power system.....	59
<i>A P Maltsev, V E Rudnik, Y Yu Malkova, R A Ufa</i>	
Assessment of wind power generation impact on the distance protection operation.....	66
<i>N Yu Ruban, A B Askarov, A V Kievets, V E Rudnik</i>	
The influence of load distribution along a line on power and place of connection of a photovoltaic system.....	73
<i>A V Bogdan, VA Bogdan, KA Garkavyi, D S Netrebko</i>	
Heating index for combined-cycle	81
<i>P A Shchinnikov, O V Borush, A S Voronkova, P V Belyavskaya</i>	
The analysis of power system steady-state aperiodic stability with electronic generation	89
<i>A Fishov, I Murashkina, A Marchenko, E Enksaikhan, E Ivkin</i>	
Nonequidistant antenna arrays synthesis based on genetic algorithm	100
<i>V I Oznobikhin, V B Romodin, L V Shebalkova</i>	
Preparation and properties of composite material based on hafnium diboride and aluminum	107
<i>S A Belyakovich, A V Mostovshchikov, A P Ilyin, F A Gubarev</i>	

The Location estimation of seismic wave propagation layer velocities	114
<i>E V Rabinovich, N Y Filipenko, G S Shefel</i>	
Principles of manufacturing of DC on-board harness for a spacecraft based on 3D technology.....	121
<i>S Efremov, N Karpov, A Leonov</i>	
Emission properties of YAG: Ce ceramics with barium fluoride flux	128
<i>S A Stepanov, D T Valiev, V A Vaganov, A M Shrayber, V D Paygin</i>	
Remote Reconfiguration for hardware-accelerated integrated Circuits.....	134
<i>M Nagler, G G Kotre, W Hardt</i>	
Parallel solution of 3D forward and inverse problems of airborne electromagnetic survey	142
<i>M G Persova, Y G Soloveichik, D V Vagin, D S Kiselev, O S Trubacheva, N S Kondratyeva</i>	
Analysis of the opportunities for improving energy efficiency in public buildings	150
<i>A Terziev, V Stoyak, V Ushakov, D Brazhanova, S Suleimanov</i>	
AREIOM: adaptive research multicopter platform	159
<i>R Harradi, B Battseren, A Heller, W Hardt</i>	
Study of the laws of oxidation of biodiesel	167
<i>S A Yudaev, E N Ivashkina, V N Sapunov, M C Voronov</i>	
Development of impulse method for transformer winding condition control technology.....	172
<i>A Mytnikov, A Lavrinovich, V Strugov, M Saqib</i>	
High-resolution phonocardiogram parameters	181
<i>I Yu Zemlyakov, D S Zdanov, Y V Kosteley, E V Golobokova, E Yu Dikman, A Sh Bureev</i>	
A system-inno-diversified approach to the development of technologies for the effective transformation of organizations of the agro-industrial complex into a digital economy	188
<i>M K Chernyakov, M M Chernyakova</i>	
Application of neural networks in problems of determining geometrical properties of objects placed in geophysical elastic media.....	199
<i>A E Morozov, A A Yakimenko, D A Karavaev</i>	
Mathematical model of power supply system for remotely operated underwater vehicle with dc power transmission line and load voltage feedback	207
<i>V Chekh, D Lyapunov, A Pravikova</i>	
The Joule–Thomson effect and the non-equilibrium thermodynamics of sliding nano-contact.....	212
<i>V S Deeva, S M Slobodyan</i>	
Influence of modified natural zeolite on the thermal stability of epoxy based composites	218
<i>Y S Murashkina, D V Martemyanov, O B Nazarenko</i>	
Recognition of english and russian-language texts based on frequency characteristics	224
<i>Y Kotov, O Sanina</i>	
Permanent magnet synchronous motor sensorless control based on rotor flux observer with low-pass filter adaptation.....	231
<i>D V Bevz, V M Zavyalov</i>	
Quantized lobe level theoretical estimates for phased array antennas applicability	240
<i>A A Slobodyanenko, V G Edvabnik, L V Shebakova</i>	

Application of standard ZET-algorithm for gaps filling in wide area measurement system data assets.....	246
<i>N L Batseva, J A Foos</i>	
Scientific-technical developments that ensure the growth of the resource potential of the regional oil and gas complex	255
<i>A S Novikova, O V Eremenko, S A Gancharov</i>	
Road pavement crack detection using deep learning with synthetic data.....	262
<i>I A Kanaeva, Ju A Ivanova</i>	
Particularities of spatial kinetics of hybrid thorium reactor installation containing the long neutron source based on magnetic trap.....	272
<i>I V Shamanin, S V Bedenko, I O Lutsik, S D Polozkov, A V Arzhannikov</i>	
Time indicators of effective optimization algorithms in group load control modelling	279
<i>A P Dimitriev, R I Bazhenov</i>	
The dependence between the ignition value of air suspension and the size of the reaction chamber.....	286
<i>A I Sechin, A A Sechin, Yu F Patrakov, I L Mezenceva, Yu A Amelkovich</i>	
Modification of ANFO detonation parameters by biowaste addition.....	292
<i>E Uranchimeg, M Narantsetseg, L Purev</i>	
The mechanoenzymatic method for enhancing the biological value of condensed cream soups	297
<i>E Bychkova, V Pogorova, D Gosman, K Dome</i>	
Optimal voltage regulator of power supply system for submersible processing equipment.....	304
<i>V G Bukreev, V M Rulevskiy, E B Shandarova, E A Bystrov</i>	
Measurement of electron beam transverse flux density distribution	311
<i>A A Bulavskaya, Yu M Cherepennikov, S V Chakhlov, A A Grigorieva, I A Miloichikova, A V Vukolov, S G Stuchebrov</i>	
Computing unite of a mobile computer vision system	316
<i>I V Zoev, N G Markov, T A Yagunov</i>	
Knowledge models in computer-aided manufacturing systems	323
<i>A A Zakharova, Y V Grebenyuk</i>	
Intelligent analysis of digital economy competencies in agriculture labor.....	330
<i>A A Aletdinova, M A Bakaev, V A Astapchuk</i>	
Crowd intelligence methods for identifying corruption-prone legislative acts.....	337
<i>D Rakhvalova, G Kurcheeva, M Rakhvalova, M Bakaev</i>	
Registration and processing system of digital speckle images	346
<i>E A Korotina, F A Gubarev, T V Gandzha, I D Liushnevskaya</i>	
New technology for assessing platelet aggregation activity	351
<i>I I Tyutrin, L Li, F A Gubarev, E L Zhukov, D S Slizevich, I D Liushnevskaya, I S Kalganov</i>	
Numerical 3D simulation of enhanced oil recovery methods for high-viscosity oil field	356
<i>M G Persova, Y G Soloveichik, A S Ovchinnikova, I I Patrushev, A V Nasybullin, E V Orekhov</i>	

Feasibility demonstration of back-to-back method for induction traction motors testing	366
<i>E V Beyerleyn, P V Tyuteva, B S Dorzjeva</i>	
Megawatt PV-diesel power stations in the Arctic	371
<i>V N Dmitrienko, B V Lukutin, M M Popov</i>	
The efficiency of combined electrothermal and electrochemical accumulation of electricity of a photovoltaic power plant	380
<i>B V Lukutin, D I Muravyev, A V Ryzhkova</i>	
Automated filtering and polygonal reconstruction of virtual skull model based on computed tomography.....	387
<i>M G Grif, A M Grif</i>	
Prospects for the development of functional expansion of individual low-cost prosthetic limbs for people with disabilities with intelligent sensors	393
<i>D Gryaznov, V Zhmud, V Avrmachuk, D Malakhov, J Nosek, L Dimitrov</i>	
Research on the effect of test parameters on signal contrast and accuracy of determining the size of a defect	397
<i>V Radchenko, D Palumbo, N Ryngach, K Bobin, N Kurlaev</i>	
The calculation of the campaign of reactor RITM-200	405
<i>D E Savitsky, A V Kuzmin</i>	
Method of multispectral image fusion using wavelet spectra.....	413
<i>I Borisova, V Legkiy</i>	
Perspective direction of shaped charges perfecting	418
<i>E M Grif, A V Guskov, K E Milevskij</i>	
Algorithm for markers detection on fringe images.....	426
<i>A I Ubert</i>	
Study of aluminium nanopowder combustion by method of laser-speckle correlation	434
<i>L Li, A V Mostovshchikov, A P Ilyin, F A Gubarev</i>	
The choice of feedstock for the biodiesel production with optimal physicochemical and low-temperature properties	440
<i>N E Belozertseva, I A Bogdanov, A T Balzhanova, M V Kirgina</i>	
Analysis of the FACTS devices impact on the transmission line protection operation.....	447
<i>N Yu Ruban, A S Gusev, Yu D Bay, I A Razzhivin</i>	
Engineering a cyclone pre-furnaces' calculating method for combustion fine water-coal suspensions	455
<i>E E Boyko, Yu V Ovchinnikov</i>	
Critical technologies in the cluster of virtual and augmented reality	463
<i>V Zhmud, A Liapidevskiy, V Avrmachuk, V Sayapin, J N Sedinkin, W Hardt</i>	
Visual shape and position sensing algorithm for a continuum robot	467
<i>R A Manakov, D Y Kolpashchikov, V V Danilov, N V Laptev, I P Skirnevskiy, O M Gerget</i>	
Information support of stakeholder cooperation: technology for formation of a digital footprint of companies.....	473
<i>O V Milekhina, I B Adova, V A Fomin</i>	

Investigation of the properties changes observed for plastic samples made by fused deposition modelling under radiation exposure	479
A A Bulavskaya, Yu M Cherepennikov, A A Grigorieva, I A Miloichikova, N E Toropkov, S G Stuchebrov	
Aircraft landing gear with electromagnetic damper	485
A R Zagidulin, E G Podruzhin	
Technology of partial discharge detection by means analysis of impulse interaction	491
A Mytnikov, V Strugov	
InAlN/GaN and AlGaN/GaN HEMT technologies comparison for microwave applications	497
L E Velikovskiy, P E Sim, O I Demchenko, N E Kurbanova, I A Filippov, A V Sakharov, W V Lundin, E E Zavarin, D A Zakheim, D S Arteev, M A Yagovkina, A F Tsatsulnikov	
The influence of the method of an arc discharge initiation on the product of plasma dynamic synthesis in the W-C system.....	505
A A Sivkov, D S Nikitin, I I Shanenkov, A Nassyrbayev, I A Rakhmatullin	
A computational fluid dynamic approach to validate the wind effect in air pollution of Ulaanbaatar city.....	511
B Bulgansaikhan, V Ulzitbayar, T S Munkherdene	
Novel DC arc plasma method for super dispersed metal carbides synthesis.....	516
A Ya Pak, G Ya Mamontov, Yu Z Vassilyeva	
The approach to construction and discretization of complex 3D models of geological media in software for airborne geophysical surveys maintenance	521
Y G Soloveichik, M G Persova, D S Kiselev, O S Trubacheva, N S Kondratyeva, A Griff	
Whole blood clotting time assessment by method of laser-speckle correlation	527
I D Liushnevskaya, L Li, F A Gubarev, A V Nosarev, V S Gusakova	
Prospects for the use of wireless reading of prosthetic control signals and methods for generating commands.....	532
D Malakhov, V Zhmud, V Avrmachuk, D Gryaznov, J Nosek, L Dimitrov	
Generalization of data on heat exchange within a gas mixture with a small value of Prandtl numbers in channels of different forms	536
S L Elistratov, E Yu Slesareva	
Analysis of barriers to the development of Industrial Internet of Things technology and ways to overcome them	544
V Zhmud, A Liapidevskiy, V Avrmachuk, V Sayapin, O Stukach, H Roth	
Model of on-line control for the smart object by communication technologies	548
Y A Maksimova, D Barchukov, S Slobodyan	
Study on interfacial tension of surfactant and its oil displacement performance	554
Risu Na, V I Erofeev	
Varying spatial orientation of photoelectric panels as method of managing graph of electric energy generation	560
Y Daus, I Yudaev, D Desyatnichenko	
Method for numerical optimization of the parameters of regulator from unstable condition	567
A A Voevoda, D O Romannikov	

Implementation of vibration signals receiving unit on Raspberry single-board computers	572
<i>V A Faerman, A V Tsavnin, S A Andreev</i>	
Wettability inversion of aluminum-magnesium alloy surfaces	578
<i>A Islamova, E Orlova</i>	
Automation of the monitoring system for surface contamination with α -active radionuclides	584
<i>V A Khan, V F Myshkin, D M Khorokhorin, D A Izhoykin, M S Kuznetsov, A N Panamaryova, L A Rakhimzhanova</i>	
High-level architecture for a digital oilfield: features of the transition to data-driven decision management.....	590
<i>A O Savelev</i>	
Study of enzymatic hydrolysis parameters for reducing anti-nutritional properties of flour.....	597
<i>N Ashirova, E Bychkova, D Gurova</i>	
Characteristic barriers to the implementation of the roadmap for augmented reality technology development program.....	603
<i>V Zhmud, A Liapidevskiy, V Avrmachuk</i>	
Application of the probabilistic technologies to power plant design.....	609
<i>L V Krivova, A V Shmoilov</i>	
Glass composite modified with silicon carbide and gallium arsenide, that absorbs electromagnetic radiation.....	614
<i>O V Kazmina, V I Semenova, K V Dorožkin</i>	
Research of the operation voltage limiter in pulsed mode.....	620
<i>I Krasniy, S Akimov</i>	
Dielectric particle-based strategy to design a new self-bending subwavelength structured light beams.....	627
<i>I V Minin, O V Minin</i>	
The possibility of obtaining materials by plasma dynamic synthesis in the Ti-O system	635
<i>A A Sivkov, Yu N Vympina, I A Rakhatullin, A S Ivashutenko, Yu L Shanenkova</i>	
Automated anomalies detection in the work of industrial robots	641
<i>A Goncharov, A Savelev, N Krinitsyn, S Mikhalevich</i>	
Studying the influence of supply pulse duration on the phase composition of iron oxides obtained by the plasma-dynamic method.....	647
<i>I I Shanenkov, A A Sivkov, A S Ivashutenko, M I Gukov, Y L Shanenkova</i>	
The high-level overview of social media content search engine	654
<i>A O Savelev, A Yu Karpova, D V Chaykovskiy, A D Vilnin, A Yu Kaida, S A Kuznetsov, L O Igumnov, N G Maksimova</i>	
On the self-testing (m,n)-code checker design	660
<i>N Butorina, Yu Burkatovskaya, E Pakhomova</i>	
An investigation of novel active phased array components.....	667
<i>S A Alekseytsev, A P Gorbachev, Y N Parshin</i>	

System for automated environmental monitoring using remote sensing data of the Earth from open data sources	676
<i>K A Maslov, O S Tokareva</i>	
Compatibility of the dimensions of polymer molecular aggregates to the pore throat of a reservoir	683
<i>Risu Na, V I Erofeev</i>	
Adaptive frequency islanding system for distributed generation energy districts	691
<i>R B Abeuov, E A Aryutina, Yu Z Vassilyeva</i>	
Concept of the comprehension level of situation awareness using an expert system	696
<i>J Nine, S Manoharan, W Hardt</i>	

Author Index