

Advances in Composite Science and Technology (ACST 2019)

IOP Conference Series: Materials Science and Engineering
Volume 934

Moscow, Russia
20 - 21 November 2019

ISBN: 978-1-7138-4770-0
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	
Investigation of the effect of zinc borate on the physic mechanical properties of PVC plastic.....	1
<i>T A Borukaev, A Kh Shaov, A M Kharaev, A S Borodulin</i>	
Simulation of the kinetics of the curing process of polymer composite materials based on epoxy binders	7
<i>Yangyang Chen, Pyi Phyo Maung, G V Malysheva, A A Paduchin</i>	
Assessment of technological resources for the production of composite products based on mathematical methods	14
<i>A E Brom, M V Stoyanova, M V Yazev, S A Korolev</i>	
Composite materials based on propylene and modified Na +-montmorillonite N, N-diallylacrilamide	20
<i>M B Begieva, R Ch Bazheva, A M Kharaev, A S Borodulin</i>	
Analysis of the non-isothermal resin impregnation process of carbon fibre reinforced composite wing spar structure	27
<i>Pyi Phyo Maung, G V Malysheva, Tun Lin Htet, G V Drobyshev</i>	
Composites Based on Carbon Tapes with a Copper coating Based on Organic and Inorganic Matrices.....	35
<i>V A Nelyub</i>	
Selection of the best available technology based on the Analytic Hierarchy Process	41
<i>A Brom, M Stoyanova, I Sidelnikov</i>	
The influence of the use of composite materials on the rationing of material resources in mechanical engineering	47
<i>I Sidelnikov, A Brom, I Omelchenko</i>	
Aromatic polyethersulphones with improved performance characteristics.....	51
<i>R Ch Bazheva, A M Kharaev, A S Borodulin, A N Kalinnikov</i>	
Polyetherimides for creation of heat-resistant polymeric composite materials with high physical and mechanical properties	56
<i>A S Borodulin, A N Kalinnikov, A G Tereshkov, S S Muzyka</i>	
Numerical simulation of the stability of three-dimensional elastic composite structures based on the finite element method.....	63
<i>Yu I Dimitrienko, I O Bogdanov</i>	
Universal models of the constitutive relations for transversely isotropic compressible composites with finite strains	71
<i>Yu I Dimitrienko, E A Gubareva, S B Karimov, D Yu Kolzhanova</i>	
Computational conjugate modeling of aerodynamical flow and thermal stresses in ablative composite structures	77
<i>Yu I Dimitrienko, M N Koryzkov, Yu I Yurin, A A Zakharov, S V Sborschikov</i>	

Modeling the nonlinear permeability of porous composite structures with non-Newtonian fluids	83
<i>Yu I Dimitrienko, Li Shuguang</i>	
Modeling of stresses in inorganic composite plates under non uniform high temperature heating	90
<i>Yu I Dimitrienko, E S Egoleva, D O Yakovlev, S V Sborschikov</i>	
Modeling of the electromagnetic and elastic properties of composite materials	97
<i>Yu I Dimitrienko, K M Zubarev, Yu V Yurin, V I Yakovlev</i>	
Asymptotic stress analysis of multilayer composite thin cylindrical shells.....	103
<i>Yu I Dimitrienko, E A Gubareva, A E Pichugina</i>	
Asymptotic theory of multilayer plates with imperfect contact between layers.....	109
<i>Yu I Dimitrienko, E A Gubareva</i>	
Development of a High Strength Polymeric Composite Material Using 3D-Printing and Vacuum Impregnation Technology	117
<i>Yu A Lopatina, V E Slavkina</i>	
Selection and justification of polymer composite wing structural arrangement using parametrical modeling.....	123
<i>S V Baranovski, K V Mikhailovskiy</i>	
Selection and justification of polymer composite wing load-bearing elements design parameters with material anisotropy and airload	130
<i>S V Baranovski, K V Mikhailovskiy</i>	
Mechanics of orthotropic plates with honeycomb filler	136
<i>A V Berezin, M A Lyubchenko, I V Gadolina</i>	
Analysis of 3D-reinforced composite annular plate subjected to concentrated forces	142
<i>B S Sarbayev, D T Bregvadze</i>	
Determination of the permeability coefficient in the Darcy formula for liquid molding of thermal insulation products from quartz fibers.....	150
<i>M A Komkov, Yu V Badanina, P O Yanko</i>	
Thermal Regulation of Space Platform Panels by Using Electric Heaters	155
<i>M A Gorodetsky, K V Mikhaylovsky, S V Reznik</i>	
Carbon nanofillers in polypropylene: in situ synthesis and properties	160
<i>O M Palaznik, P M Nedorezova, V G Shevchenko</i>	
Matrix curing in the workpieces made of polymer composites using microwave radiation.....	167
<i>P V Prosuntsov, S V Reznik, A R Gareev, P V Polsky</i>	
Dynamic characteristics of modified bitumen systems	177
<i>L V Fedorova, Z O Tretyakova, M V Voronina</i>	
Parametric and topology optimization of load bearing elements of aircraft fuselage structure	183
<i>Tun Lin Htet, P V Prosuntsov</i>	
Development and implementation of a technology for introducing reinforcement into aluminum matrix composite	190
<i>Yijin Chen, Yu A Kurganova, S P Scherbakov</i>	

A study of physical and mechanical characteristics of polymer composite materials by ultrasonic technique	198
<i>D I Chulkov, A B Terekhin, A M Dumansky</i>	
Calculation and experiment approach to predicting the properties of C/SiC and SiC/SiC composites	205
<i>D V Sapronov, M A Mezentsev, D S Palchikov</i>	
Development of a method of hydroerosive saturation of liquids with microparticles of target materials using ultra-jet	212
<i>A L Galinovskiy, Kyaw Myo Htet, S A Erokhin, Jia Zhenyuan</i>	
Stability of Shape Memory Alloy rods under reverse phase transformation in case of initial tensile phase-structural strains	222
<i>S A Dumanskiy</i>	
Homogenization of nanocontaining suspensions using ultra-jet methods	229
<i>Kyaw Myo Htet, A L Galinovskiy</i>	
Innovative processes of production functional gradient layered compositions with enhanced tribological properties.....	237
<i>R S Mikheev</i>	
Simulation and Optimization of a CFRP and a GFRP floating pontoon	243
<i>M N Lotfy, E Fathallah, YA Khalifa, A K Dessouki</i>	
Research of change of mechanical properties of the ionic-alloyed samples in the corrosion environment.....	257
<i>R R Giniyatullin, N M Yakupov</i>	
Development of imid-containing appretes for carbon fibers and carbon fabrics.....	263
<i>I P Storozhuk, N G Pavlukovich, A S Egorov</i>	
Comparison of low cost lasers for graphene oxide thin films reduction.....	269
<i>I A Komarov, N S Struchkov, I A Polikarpova, V G Peretiyyagin, A D Buyanov, E A Danilova, E I Denisenko, E A Onoprienko</i>	
Estimation of the durability of polymer composites on a fabric basis, taking into account the influence of non-force factors.....	280
<i>R A Kayumov, A M Suleymanov, I Z Muhamedova</i>	
Estimation of the residual strength of supporting composite structural elements.....	286
<i>R A Kayumov, D E Strakhov, A M Sulejmanov, E B Tuysina</i>	
Structure, properties and heat treatment of aluminum alloy BAC1 synthesized by 3D printing.....	293
<i>R S Fachyrtdinov, P E Kuznetsova, I D Savichev</i>	
Design and analysis of the strength and durability of metal composite assemblies of aircraft structures	302
<i>A A Larionova, A A Dudchenko</i>	
Thinking development and aesthetic education of students in the process of teaching mathematics by example solutions for one problem.....	306
<i>A B Zhanys, A O Dautov, A U Aktayeva, A Zh Askarova</i>	
High-speed induction heating during tensile strength testing of a composite material based on an inorganic binder at temperatures up to 1500 ° C	321
<i>K V Klemazov, P Yu Yakushkin, M O Zabezhailov, P A Stepanov</i>	

Solution of experimental tasks in the study of physics.....	328
<i>S N Nurkasymova, U S Nurgaliyeva, A B Zhanys, A S Baigizova, A S Bayegizova</i>	
Developing a New Type of Jointing the Metal Plates of a Heat Exchanger.....	336
<i>D O Onishchenko, A Yu Krotchenko, Yu O Fokin, M V Tverskoy</i>	
Development of equipment for composite 3D printing of structural elements for aerospace applications.....	343
<i>A V Azarov, V A Kolesnikov, A R Khaziev</i>	
Microstructure and erosion resistance of Mo-Si-B, Mo-Zr-Si-B, and Mo-Hf-Si-B coatings.....	350
<i>Ph V Kiryukhantsev-Korneev, A D Sytchenko, N Ulan</i>	
Methods of teaching computer science in the system pedagogical knowledge.....	355
<i>F K Nadyrova, A B Zhanys, A M Mubarakov</i>	
Developing of the autoclave-free composite manufacturing technology	361
<i>A D Novikov, A O Lubyanskiy, P I Ignatov</i>	
Optimization Model for Dairy Farms of Northern Kazakhstan.....	367
<i>A H Sukoot, R Z Suleimenova, A B Zhanys</i>	
Possibilities of Obtaining Diffused Layers upon Saturation of Multilayer Materials with Nitrogen and Carbon	374
<i>K B Polikevich, A I Plokhikh, L P Fomina</i>	
Overview of 4G, 5G radio spectrum spectrum in the world and Kazakhstan.....	379
<i>A S Tolegenova, A B Zhanys, S N Nurkasymova, L A Soboleva</i>	
Research of thermal control system for nanosatellite with carbon fiber reinforced plastic body	392
<i>Wang Yu, Zarni Soe-Moe, O V Denisov, L V Denisova</i>	
Increase of the resistance to high-temperature effects of carbon composite materials.....	400
<i>K S Panina, E A Danilov, Yu A Kurganova</i>	
Ceramic Matrix Composite Materials for Structural Elements of Aviation and Rocket-Space Equipment	407
<i>P A Stepanov, I G Atroshchenko, O V Nikulina</i>	
Evaluation the complex of thermal properties for epoxy-based GFRP used in wing of tourist class reusable space vehicle	414
<i>E R Ashikhmina, N M Petrov, P V Prosuntsov</i>	
Influence of modes of washing-out of the polyvinyl acetate-based substrate on the properties of carbon fiber reinforced plastics obtained by TFP	421
<i>V A Nelyub, A S Borodulin, M A Orlov, I A Polikarpova, A N Kalinnikov, A I Soloviev, S I Dzhafarova</i>	
Analytical and experimental research of epoxy-based glass/carbon hybrid polymer composites	426
<i>E R Ashikhmina, T G Ageyeva, Yu S Fedorov, V Klimovich</i>	
Optimal design of advanced 3D printed composite parts of rocket and space structures.....	433
<i>A V Azarov, T A Latysheva, A R Khaziev</i>	
Modeling of volumetric deformation during compaction of Al-SiC composite materials based on mechanically activated batch.....	441
<i>S N Sergeenko</i>	

Optimization of the power structure of carbon-ceramic composite materials	447
<i>N Yu Taraskin, V L Grigorieva</i>	
Biharmonic Problems and their Application in Engineering and Medicine	453
<i>H A Matevossian, G Nordo, T Sako</i>	
Research of physical and mechanical properties of reinforced carbon fiber plastics based on tfp- preforms	463
<i>M A Orlov, I A Polikarpova, V I Solodilov</i>	
Thermoplastic poly ether sulfones for composite materials	471
<i>I P Storoshuk, V M Alekseev, N G Pavlukovich, A S Borodulin, A N Kalinnikov, A V Poleshaev</i>	
Evaluation construction made of polymer composite materials by molding using reusable flexible punches production profitability	475
<i>M V Stoyanova, A D Novikov, A S Borodulin</i>	
Environmental effectiveness assessment of the technology for molding products made of polymer composite materials using a reusable flexible punch.....	485
<i>A D Novikov, M V Stoyanova, A S Borodulin</i>	
Numerical simulation of the heat transfer process in the antiicing heating system for Arctic marine applications.....	491
<i>Yu I Dimitrienko, V Yu Chibisov, M N Koryakov</i>	

Author Index