

INTERNATIONAL SCIENTIFIC JOURNAL

**MATHEMATICAL
MODELING**

YEAR II, ISSUE 1/2018
ISSN (PRINT) 2535-0986
ISSN (WEB) 2603-2929

Published by
SCIENTIFIC-TECHNICAL UNION of MECHANICAL ENGINEERING - INDUSTRY 4.0
Sofia, BULGARIA

INTERNATIONAL EDITORIAL BOARD

EDITOR I CHIEF

Prof. ANDREY FIRSOV Peter the Great St.Petersburg Polytechnic University	RU
---	----

Members:		
Abilmazhin Adamov, Prof.	L.N.Gumilyov Eurasian National University	KZ
Alexander Guts, Prof.	Omsk State University	RU
Alexei Zhabko, Prof.	Saint Petersburg State University	RU
Andrey Markov, Prof.	Baltic State Technical University	RU
Andrii Matviichuk, Prof.	Kyiv National Economics University	UA
Andrzej Nowakowski, Prof.	University of Lodz	PL
Anton Makarov, Dr.	Saint Petersburg State University	RU
Armands Gricans, Assoc. Prof.	Daugavpils University	LV
Artūras Dubickas, Prof.	Vilnius University	LT
Avinir Makarov, Prof.	Saint Petersburg State University of Industrial Technologies and Design	RU
Christo Boyadjiev, Prof.	Institute of Chemical Engineering, BAS	BG
Daniela Marinova, Dsoc. Prof.	Technical University of Sofia	BG
Dimitrios Poulakis, Prof.	Aristotle University of Thessaloniki	GR
Evgeniy Smirnov, Assoc. Prof.	Volgograd State Technical University	RU
Giovanni Borgioli, Assoc. Prof.	University of Florence	IT
Haskiz Coskun, Prof.	Karadeniz Technical University of Trabzon	TR
Idilia Bachkova, Prof.	University of Chemical Technology and Metallurgy	BG
Igor Anufriev, Assoc. Prof.	Peter the Great St.Petersburg Polytechnic University	RU
Irena Stojkowska, Prof.	Ss. Cyril and Methodius University in Skopje	MK
Ivana Štajner-Papuga, Prof.	University of Novi Sad	RS
Kanagat Aldazharov, Assoc. Prof.	Kazakh Economics University	KZ
Karl Kunisch, Prof.	University of Graz	AT
Mahomed Agamirza ogly Dunyamalyev, Prof.	Azerbaijan Technical University	AZ
Marius Giuclea, Prof.	The Bucharest University of Economics Studies	RO
Mihail Okrepilov, Prof.	D.I. Mendeleev Institute for Metrology (VNIIM)	RU
Milena Racheva, Assoc. Prof.	Technical University of Gabrovo	BG
Mohamed Kara, Dr.	Ferhat Abbas Sétif 1 University	DZ
Mohamed Taher El-mayah, Prof	MTI University	EG
Neli Dimitrova, Prof.	Institute of Mathematics and Informatics, BAS	BG
Nina Bijedic, Prof.	Dzermal Bijedic University of Mostar	BA
Oleg Obradović, Prof.	University of Montenegro	ME
Olga Pritomanova, Assoc. Prof.	Oles Honchar Dnipropetrovsk National University	UA
Özkan Öcalan, Prof.	Akdeniz University of Antalya	TR
Pașc Gävrută, Prof.	Politehnic University of Timisoara	RO
Pavel Satrapa, Assoc. Prof.	Technical University of Liberec	CZ
Pavel Tvrdík, Prof.	Czech Technical University in Prague	CZ
Pavlina Yordanova, Assoc. Prof.	Shumen University	BG
Petr Trusov, Prof.	Perm State Technical University	RU
Rannveig Björnsdóttir, Prof.	University of Akureyri	IS
Roumen Anguelov, Prof.	University of Pretoria	ZA
Sándor Szabó, Dr. Prof.	University of Pécs	HU
Sashko Martinovski, Assoc. Prof.	St. Kliment Ohridski University of Bitola	MK
Sergey Bosnyakov, Prof.	Moscow Institute of Physics and Technology	RU
Sergey Kshevetskii, Prof.	Immanuel Kant Baltic Federal University	RU
Snejana Hristova, Prof.	University of Plovdiv	BG
Svetlana Lebed, Assoc. Prof.	Brest State Technical University	BY
Tomasz Szarek, Prof.	University of Gdansk	PL
Valeriy Serov, Prof.	University of Oulu	FI
Vasily Maximov, Prof.	Saint Petersburg State University of Industrial Technologies and Design	RU
Ventsi Rumchev, Prof.	Curtin University, Perth	AU
Veronika Stoffová, Prof.	University of Trnava	SK
Veselka Pavlova, Prof.	University of National and World Economy	BG
Viorica Sudacevschi, Assoc. Prof.	Technical University of Moldova	MD
Vladimir Janković, Prof.	University of Belgrade	RS
Vladislav Holodnov, Prof.	Saint Petersburg State Institute of Technology	RU
Vyacheslav Demidov, Prof.	Saint Petersburg State University of Industrial Technologies and Design	RU
Yordan Yordanov, Assoc. Prof.	University of Sofia	BG
Yuriy Kuznetsov, Prof.	Nizhny Novgorod State University	RU
Zdenka Kolar - Begović, Prof.	University of Osijek	HR

INTERNATIONAL SCIENTIFIC JOURNAL

MATHEMATICAL MODELING

PUBLISHER:

SCIENTIFIC TECHNICAL UNION OF MECHANICAL ENGINEERING
“INDUSTRY 4.0”

108, Rakovski Str., 1000 Sofia, Bulgaria

tel. (+359 2) 987 72 90,

tel./fax (+359 2) 986 22 40,

office@stumejournals.com

www.stumejournals.com

ISSN (PRINT) 2535-0986

ISSN (WEB) 2603-2929

YEAR II, ISSUE 1 / 2018

EDITOR IN CHIEF:

Prof. D.Sc. ANDREY FIRSOV

Peter the Great St.Petersburg Polytechnic University, Russia

CONTENTS

MATHEMATICAL MODELLING OF TECHNOLOGICAL PROCESSES AND SYSTEMS

SOFTWARE DEVELOPMENT FOR NUMERICAL SIMULATION OF FORMATTING THE PERIODIC NANOSTRUCTURES AFTER LASER IRRADIATION B.Sc. Phys. Zaimis U., Prof. Dr. Sc. Comp. Jansone A.	3
IMPROVING THE PERFORMANCE OF AN INADEQUATELY TUNED PID CONTROLLER BY INTRODUCING A POLYNOMIAL MODEL BASED INCREMENT IN PID CONTROL VALUE Dushko Stavrov, Gorjan Nadzinski, Goran Stojanovski, Stojche Deskovski	8
MODELLING OF THE FORM OF ELECTRON BEAM WELDING JOINTS Dipl. Mag. Tsonevska Tsvetomira, PhD student, Assoc. Prof. Dr. Eng. Koleva Elena, Eng. Asparuhova Boriana, PhD student, Assos. Prof. Dr. Olshanskaya Tatiana, Prof. DSc. Vutova Katia	13
INFLUENCE OF RANDOM NUMBER GENERATORS IN AIR POLLUTION MODEL SAMPLING MSc. Eng. Vrglevski G., Prof. D-r. Eng. Mitreski K., Ass. Prof. D-r. Eng. Naumoski A., Prof. D-r. Eng. Zajkova S.G.	17
ROTATIONAL MOTION OF TOWER CRANE - DYNAMIC ANALYSIS AND REGULATION USING SCHEMATIC MODELING Prof.dr. Doçi Ilir, Prof.ass. Lajqi Shpetim	21
A INVERSE PROBLEM IN ULTRASONIC TESTING AND MECHANICAL PROPERTIES OF POLYCRYSTALLINE MATERIALS Assoc. Prof, PhD. Alexander Popov , MSc Eng. Georgy Dobrev	26
ROBUST BI-CRITERIA APPROACH TO OPTIMIZE THE COMPOSITION AND PROPERTIES OF MAGNESIUM ALLOY Yordan Kalev, Hai Hao, Nikolay Tontchev	28
SOLIDIFICATION ON SURFACE Ass. Prof. Eng. St. Bushev PhD., Ass. Prof. Eng. I. Georgiev PhD.	33

MATHEMATICAL MODELLING OF SOCIO-ECONOMIC PROCESSES AND SYSTEMS

ASSESSMENT OF THE APPLICATION OF BUSINESS PROCESS MODELLING APPROACH IN MARITIME OPERATIONS Sen. Assistant Prof. PhD Varbanova A.	37
MODELLING THE PROCESS OF FORMING THE INITIAL KINEMATIC PARAMETERS OF THE FRAGMENTATION FIELD Prof. Dr. Eng. Petkov S., M.Sc. Petkov P., Assist. Prof. Dr. Eng. Tumbarska A.	41
ADMINISTRATIVE PROCESS MODELING: BASIC STRUCTURES AND MODELING M.Sc. Trashlieva V., M.Sc. Radeva T. PhD.	44