Scientific Research Centre ''MachineStructure''



Amazon Kindle Direct Publishing

ISSN 2572-4347

Journal of Advanced Research in Natural Science

Issue 19

Journal of Advanced Research in Natural Science. -

Seattle, USA: SRC MS, AmazonKDP. – 2024. – Issue 19. – 43 p.

ISSN 2572-4347

Themes of journal:

- 1. Mathematics, mechanics, computer science: Mathematical modeling, numerical methods and software packages; Theoretical mechanics, dynamics of machines; Mechanics of deformable solids; Mechanics of liquid and gas; Biomechanics, bioengineering and biotechnology; Artificial intelligence and machine learning.
- 2. Materials science, physics, chemistry: Theoretical and experimental physics; Space physics, astronomy; Condensed matter physics; Materials Science; Physical Chemistry; Biophysics.
- 3. Earth sciences: Atmosphere and climate; Ecology; Soil science; Biological resources; Agronomy, Forestry and water management; Agroengineering and food technologies; Geophysics; Geodesy; Geology, prospecting and exploration of mineral deposits; Geomechanics and rock destruction.

T 1.	•	$\alpha_1 \cdot c$
Hditor	110	(hint:
Editor	$\iota\iota\iota\iota$	Chiel.

Ivan A. Zhukov	 Saint-Petersburg mining university of Empress
	Catherine II. Department of mechanical
	engineering

Editorial Board:

Artush A. Ghukasyan	_	Institute	of Me	chanic	es of Na	itional A	Academy of	
		α ·	CD	1 1 1	C 4			

Science of Republic of Armenia

Sergey P. Isaev – Pacific national university. Department of

technology of forest management and landscape

construction

Petr M. Mazurkin – Volga State University of Technology, Department

of Environmental Management

Vladislav G. Malinin – Orel state agrarian university. Department of

Technosphere safety

Lyudmila A. Ryabicheva – Vladimir Dahl Lugansk State University.

Department of Materials Sciences

Anarkul E. Sadieva – Kyrgyz State Technical University. Department of

Machines and devices of food production

Valery V. Alisin – Mechanical Engineering Research Institute of the

Russian Academy of Sciences. Laboratory of physical methods of hardening friction surfaces

Yulia V. Zakharova – Bauman Moscow state technical university,

Department of computational mathematics and

mathematical physics

Copyright © 2024 Authors, SRC MS All rights reserved.

CONTENTS

Mathematics, mechanics, computer science	
Filimonov A.B., Nguyen T.K. Method for solving the multiple traveling salesman problem with several depots	4
Materials science, physics, chemistry	
Okunev V.S. Another physical interpretation of the fine structure constant: the connection between gravitational and electromagnetic interactions	11
Biryukov V.P. Improving the tribotechnical properties of a multicomponent charge with carbide additives during laser surfacing	15
Roshchin M.N. Application of Carbon fiber material in sliding bearings at high temperature	21
Biryukov V.P., Goryunov Ya.A., Yakubovsky A.A. Determination of the abrasive wear resistance of polymer materials with fixed abrasive grain	24
Roshchin M.N. Analysis of the melting front movement of the coating on titanium alloy VT6	28
Earth sciences	
Khrustalev M.M. Elastic properties of the space-time continuum and a new model of the evolution of the universe	31

Scientific periodical issue

ISSN 2572-4347

Journal of Advanced Research in Natural Science

Issue 19

Founder: Elena V. Zhukova.

Editorial: Scientific Research Centre «MachineStructure».

Editor in chief: Ivan A. Zhukov.

Printed by AmazonKDP, Seattle WA.

Publication Date: 05.04.2024.

Title ID: 24-06.

Trim Size: 7" x 10" (17.78 x 25.4 cm).

Electronic version is available on the website: http://srcms.ru/jarins.html

Seattle, USA: Scientific Research Centre «MachineStructure», Amazon Kindle Direct Publishing 2024