

Volume 58 of PROCEEDINGS includes the papers presented at the scientific conference RU & SU'19, organized and conducted by University of Ruse "Angel Kanchev" and the Union of Scientists - Ruse. Series 2.1. contains papers reported in the Mechanical Engineering and Machine-Building Technologies section.

Book	Code	Faculty and Section
Agrarian and Industrial Faculty		
1.1	FRI-8.121-1-AMT&ASVM	Agricultural Machinery and Technologies and Agrarian Science and Veterinary Medicine
	FRI-1.202-1-MR	Maintenance and Reliability
	FRI-9.3-1-THPE	Thermal, Hydro- and Pneumatic Equipment
1.2	FRI-9.2-1-EC	Ecology and Conservation
	FRI-16.203-1-ID	Industrial Design
Faculty of Mechanical and Manufacturing Engineering		
2	FRI-1.417-1-MEMBT	Mechanical Engineering and Machine-Building Technologies
Faculty of Electrical Engineering Electronics and Automation		
3.1	FRI-10.326-1-EEEE	Electrical Engineering, Electronics and Automation
3.2	FRI-2G.302-1-CSN	Communication Systems & Networks
3.3	FRI-2G.303-1-CST	Computer Systems & Technologies
Faculty of Transport		
4	FRI-2.203-1-TMS FRI-2.203-2-TMS	Transport and Machine Science
Faculty of Business and Management		
5.1	FRI-2G.404-1-EM FRI-2G.407-1-EM	Economics and Management
5.2	FRI-2G.509-1-LCSIPC	Linguocultural, Intercultural and Political Communication
Faculty of Natural Sciences and Education		
6.1	FRI-1.405B-1-MIP	Mathematics, Informatics and Physics
6.2	FRI-2G.405-1-PP	Pedagogy and Psychology
6.3	FRI-2G.307-1-LL	Linguistics and Literature
	FRI-2.205-1-AS	Art Studies
6.4	FRI-2G.305-1-ERI	Education - Research and Innovations
Faculty of Law		
7	FRI-2B.313-1-L FRI-2B.312-1-L FRI-2.101-1-L	Law
Faculty of Public Health and Health Care		
8.1	FRI-K.201-1-HP	Health Promotion
8.2	FRI-2.113-1-SW	Social Work
8.3	FRI-2G.104-1-HC	Health care
Quality of Education Directorate		
9	FRI-K1-1-QHE	Quality of Higher Education

Razgrad Branch of the University of Ruse		
10.1	FRI-CR-1-CT(R)	Chemical Technologies
10.2	FRI-LCR-1-BFT(R)	Biotechnologies and Food Technologies
Silistra Branch of the University of Ruse		
11	FRI-216-2 SSH(S) FRI-227-2 PPTM(S) FRI-110-2-TS(S)	Social Sciences and Humanities Pedagogy, Psychology, Teaching Methodology Technical Sciences
12		

The papers have been reviewed.

ISSN 1311-3321 (print)

ISSN 2535-1028 (CD-ROM)

ISSN 2603-4123 (on-line) Copyright © authors

The issue was included in the international ISSN database, available at <https://portal.issn.org/>.

The online edition is registered in the portal ROAD scientific resources online open access



PROGRAMME COMMITTEE

- **Prof. Velizara Pencheva, PhD,**
University of Ruse, Bulgaria
- **Prof. Leon Rothkrantz**
Delft University of Technology, Netherlands
- **Assoc. Prof. Antonio Jose Mendes,**
University of Coimbra, Portugal
- **Prof. Ville Leppanen,**
University of Turku, Finland
- **Assoc. Prof. Marco Porta,**
University of Pavia, Italy
- **Prof. Douglas Harms,**
DePauw University, USA
- **Prof. Ismo Hakala, PhD,**
University of Jyväskylä, Finland
- **Prof. Dr. Artur Jutman,**
Tallinn University of Technology, Estonia
- **Prof. RNDr. Vladimír Tvarozek, PhD,**
Slovak University of Technology in Bratislava, Bratislava, Slovakia
- **Doc. Ing. Zuzana Palkova, PhD,**
Slovak University of Agriculture in Nitra, Nitra, Slovakia
- **Andrzej Tutaj, PhD,**
AGH University of Science and Technology, Krakow, Poland
- **Assoc. Prof. Behiç TEKİN, PhD,**
EGE University, Izmir, Turkey,
- **Prof. Valentin NEDEFF Dr. eng. Dr.h.c.,**
“Vasile Alecsandri” University of Bacău, Romania
- **Dr. Cătălin POPA,**
“Mircea cel Bătrân” Naval Academy, Constantza, Romania
- **Prof. dr Larisa Jovanović,**
Alfa University, Belgrade, Serbia
- **Prof. dr hab. Edmund LORENCOWICZ,**
University of Life Sciences in Lublin, Poland
- **Assoc. Prof. Ion MIERLUS - MAZILU, PhD,**
Technical University of Civil Engineering, Bucharest, Romania
- **Prof. Dojčil Vojvodić PhD,**
Faculty of Philosophy, University of Novi Sad, Serbi
- **Assoc. Prof. Alexandrache Carmen, PhD,**
Department of Teacher Training, “Dunarea de Jos”, Galati University, Romania
- **Prof. Alberto Cabada,**
University of Santiago de Compostela, Faculty of Mathematics, Santiago de Compostela, Spain
- **Assoc. Prof. Dr. Mehmet Şahin,**
Necmettin Erbakan University, Ahmet Keleşoğlu Faculty of Education, Konya, Turkey
- **Assoc. Prof. Erika Gyöngyösi Wiersum, PhD,**
Eszterházy Károly University, Comenius Campus in Sárospatak, Institute of Real Sciences, Sárospatak, Hungary
- **Anna Klimentova, PhD,**
Constantine the Philosopher University in Nitra, Slovakia
- **Prof. Igor Kevorkovich Danilov, DSc,**
Yuri Gagarin State Technical University of Saratov, Russia

- **Prof. Aleksander Valentinov Sladkowski, DSc,**
Silesian University of Technology, Poland
- **Prof. Pether Shulte, PhD,**
Institute for European Affairs (INEA), Dusseldorf, Germany
- **Prof. Aslitdin Nizamov, DSc., PhD,**
Bukhara Engineering-Technological Institute, Bukhara, Uzbekistan
- **Prof. Marina Sheresheva, PhD,**
Lomonosov Moscow State University, Russia
- **Prof. Erik Dahlquist, PhD,**
Mälardalen University, Sweden
- **Prof. Erik Lindhult, PhD,**
Mälardalen University, Sweden
- **Prof. Annika Kunnasvirta, PhD,**
Turku University of Applied Sciences, Finland
- **Prof. Walter Leal, Dr. (mult.) Dr.h.c. (mult.),**
Hamburg University of Applied Sciences, Germany
- **Prof. Dr. Gerhard Fiolka,**
University of Fribourg, Switzerland
- **Prof. Haluk Kabaalioglu, PhD,**
Yeditepe University, Turkey
- **Prof. Silva Alves, PhD,**
University of Lisbon, Portugal
- **Hanneke van Bruggen,**
Appeldoorn, The Netherlands
- **Nino Žganec,**
President of European Association of Schools of Social Work, Assoc. Prof. at the Department of Social Work,
University of Zagreb, Croatia
- **Prof. Violeta Jotova,**
Направление „Педиатрия“ в УМБАЛ „Св. Марина“ – Варна, България
- **Assoc. Prof. Tanya Timeva, MD, PhD,**
Obstetrics and Gynecology Hospital "Dr. Shterev", Sofia, Bulgaria
- **Prof. Kiril Stoychev, PhD,**
Institute of Metal Science, Equipment and Technologies "Acad. A. Balevski" with Hydroaerodynamics centre
– BAS, Bulgaria
- **Assoc. Prof. Mark Shamtsyan, PhD,**
Technical University, Saint Petersburg, Russia
- **Assoc. Prof. Oleksii Gubenia, PhD,**
National University of Food Technologies, Kiev, Ukraine
- **Assoc. Prof. Olexandr Zaichuk, DSc,**
Ukrainian State University of Chemical Technology, Dnepropetrovsk, Ukraine
- **Prof. Eugene Stefanski, DSc,**
Samara University, Russia
- **Doc. Dr. Tatiana Strokovskaya,**
International University of Nature "Dubna", Dubna, Russia
- **Prof. DSc. Petar Sotirow,**
Maria Curie-Skłodowska University of Lublin, Poland
- **Prof. Papken Ehasar Hovsepian,**
Sheffield Hallam University, Sheffield, UK
- **Assoc. Prof. Krassimir Dochev Dochev, PhD,**
University of Portsmouth School of Engineering, UK
- **Mariana Yordanova Docheva, PhD,**
University of Portsmouth School of Engineering, UK

- **Assoc. Prof. Ivan Antonov Lukanov, PhD,**
University of Botswana, Faculty of Engineering and Technology, Gaborone, Botswana
- **Assoc. Prof. Petko Vladev Petkov, PhD,**
Research Associate Cardiff University, UK
- **Prof. Stepan Terzian DSc,**
Bulgarian Academy of Science, Bulgaria
- **Prof. Dr. Gabriel Negreanu,**
University Politehnica of Bucharest, Romania

ORGANISING COMMITTEE

- ♦ **ORGANIZED BY: University of Ruse (UR) and Union of Scientists (US) - Ruse**
- ♦ **ORGANISING COMMITTEE:**
 - **Chairpersons:**
COR. MEM Prof. Hristo Beloev, DTSc – Rector of UR, Chairperson of US - Ruse
 - **Scientific Secretary:**
Prof. Diana Antonova PhD, Vice-Rector Research,
dantonova@uni-ruse.bg, 082/888 249
- ♦ **MEMBERS:**
Assoc. Prof. Kaloyan Stoyanov, PhD
Assoc. prof. Velina Bozduganova, PhD,
Assoc. Prof. Kiril Sirakov, PhD,
Assoc. Prof. Milko Marinov, PhD,
Pr. Assist. Elena Ivanova, PhD,
Assoc. Prof. Simeon Iliev, PhD,
Assoc. Prof. Pavel Vitliemov, PhD,
Assoc. Prof. Mimi Kornazheva, PhD,
Boryana Stancheva, PhD,
Prof. Vladimir Chukov, DESc,
Pr. Assist. Krasimir Koev, PhD,
Prof. Juliana Popova, PhD,
Pr. Assist. Hristina Sokolova, PhD,
Pr. Assist. Magdalena Andreeva, PhD,
Assoc. Prof. Emilia Velikova, PhD,
Assoc. prof. Bagryana Ilieva, PhD,
Pr. Assist. Reneta Zlateva, PhD,
Pr. Assist. Velislava Doneva, PhD,
Assoc. Prof. Stefka Mindova,
Assoc. prof. Sasho Nunev, PhD,
Assoc. Prof. Despina Georgieva, PhD,
Pr. Assist. Vanya Panteleeva, PhD,
Assoc. Prof. Emil Trifonov, PhD,
Assoc. Prof. Galina Lecheva;
Assist. Prof. Milen Sapundzhiev, PhD;
Assoc. Prof. Tsvetan Dimitrov, PgD,
Assoc. Prof. Nastya Ivanova, PhD,

◆ **REVIEWERS:**

Prof. Branko Sotirov, PhD

Prof. Ivelin Ivanov, PhD

Prof. Ivan Zamfirov, PhD

Assoc. Prof. Venko Vitliemov, PhD

Assoc. Prof. Petko Petkov, PhD

Assoc. Prof. Krasimir Ivanov, PhD

Assoc. Prof. Boris Sakakushev, PhD

Assoc. Prof. Maria Nikolova, PhD

Assist. Prof. Mariana Ilieva, PhD

Assist. Prof. Tsvetelin Georgiev, PhD

Assoc. Prof. Georgi Nenov, PhD

Mechanical Engineering and Machine-Building Technologies

Content

1. FRI-1.417-1-MEMBT-01	9
Synthesis of Mobile Walking Robots	
<i>Pavel Sinilkov</i>	
2. FRI-1.417-1-MEMBT-02	22
Studying the Possibilities of an Approach for Limiting Vibrations when Machining Thin-Walled Beams	
<i>Dimitar Dimitrov, Nikolay Nikolov</i>	
3. FRI-1.417-1-MEMBT-03	28
Research of the Possibilities of a Method for Touch Probe Coordinate Measurements	
<i>Dimitar Dimitrov, Valentin Mihov</i>	
4. FRI-1.417-1-MEMBT-04	35
About the Information Assurance of the Turning Process	
<i>Svetlana Koleva, Milko Enchev, Emil Belyov</i>	
5. FRI-1.417-1-MEMBT-05	41
Automated Mixing and Dosing of Lubricants with Controlled Cavitation	
<i>Tihomir Todorov, Deniz Chakar</i>	
6. FRI-1.417-1-MEMBT-06	46
Opportunities for Heat Treatment Processes Simulation	
<i>Iliyan Danev, Danail Gospodinov, Rosen Radev</i>	
7. FRI-1.417-1-MEMBT-07	53
Optimal Build Inclination in 3D Printing - Shell Eco-Marathon Rapid Prototyping Car Parts Case	
<i>Emil Yankov, Dimitar Kamarinchev, Roussi Minev</i>	
8. FRI-1.417-1-MEMBT-08	61
Technology Maturity Studies of Equipment for Welding in a Protective Gas Environment	
<i>Sasho Iliev, Nikolay Ferdinandov, Roussi Minev</i>	
9. FRI-1.417-1-MEMBT-09	67
Numerical Modeling and Calibration of Steel Plate Welding in Vacuum	
<i>Ivo Draganov, Nikolay Ferdinandov, Danail Gospodinov, Rosen Radev, Stiliyana Mileva, Yulian Angelov</i>	
10. FRI-1.417-1-MEMBT-10	76
Design and Construction of a Gyroscopic Propulsion Mechanism	
<i>Ivan Loukanov, Svetlin Stoyanov</i>	