

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 4 contains papers reported in the Transport and Machine Science 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-EEEA	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	European Studies and International Relations: 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 FRI-2.205-1-AS	Linguistics and Literature 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 Turky, 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. Vladimir 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 Tekin, 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, Serbia
- **Assoc. Prof. Alexandrache Carmen, PhD,**
Departament 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, Sarospatak, 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, Prof. at the Department of Social Work,
University of Zagreb, Croatia
- **Prof. Violeta Jotova, MD, DSc,**
Pediatric department in University Hospital „St. Marina“- Varna, Bulgaria
- **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 Technologie, 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-Sklodowska University of Lublin, Poland
- **Prof. Papken Ehiasar Hovsepian,**
Sheffield Hallam University, Sheffield, UK
- **Accos. Prof. Krassimir 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
- ♦ **THEMATIC FIELDS:**
 - **Agricultural Machinery and Technologies (AMT)**
 - **Agrarian Sciences and Veterinary Medicine (ASVM)**
 - **Maintenance and Reliability (MR)**
 - **Thermal, Hydro- and Pneumatic Equipment (THPE)**
 - **Ecology and Conservation (EC)**
 - **Industrial Design (ID)**
Assoc. Prof. Kaloyan Stoyanov, PhD
kes@uni-ruse.bg, 082/888 542
 - **Mechanical Engineering and Machine-building Technologies (MEMBT)**
Assoc. prof. Velina Bozduanova, PhD,
velina@uni-ruse.bg, 0887119914
 - **Electrical Engineering, Electronics and Automation (EEEA)**
Assoc. Prof. Kiril Sirakov, PhD,
csirakov@uni-ruse.bg, 082/888 364
 - **Computer Systems and Technologies (CST)**
Assoc. Prof. Milko Marinov, PhD,
mmarinov@ecs.uni-ruse.bg, 082/888 356
 - **Communication Systems and Networks (CSN)**
Pr. Assist. Elena Ivanova, PhD,
epivanova@uni-ruse.bg, 082/888 831
 - **Transport and Machine Science (TMS)**
Assoc. Prof. Simeon Iliev, PhD,
spi@uni-ruse.bg, 082/888 331
 - **Economics and Management (EM)**
Assoc. Prof. Pavel Vitliemov, PhD,
pvitliemov@uni-ruse.bg, 082/888 495
 - **Linguistic and Cultural Science, Intercultural and Political Communication (LCSIPC)**
Prof. Juliana Popova, PhD,
jppopova@uni-ruse.bg, 0887 899 654
Pr. Assist. Hristina Sokolova, PhD,
hsokolova@uni-ruse.bg
 - **Mathematics, Informatics and Physics (MIP)**
Pr. Assist. Magdalena Andreeva, PhD,
magie@ami.uni-ruse.bg, 082/888 470

- **Education - Research and Innovations (ERI)**

Assoc. Prof. Emilia Velikova, PhD,
evelikova@uni-ruse.bg, 0885 635 874

- **Pedagogy and Psychology (PP)**

Assoc. prof. Bagryana Ilieva, PhD,
bilieva@uni-ruse.bg 082 888 219

- **Linguistics, Literature and Art Science (LLAS)**

Pr. Assist. Velislava Doneva, PhD,
doneva_v@uni-ruse.bg, 0886 060 299

- **Health Prevention and Social Work (HPSW)**

- **Health Promotion (HP)**

Assoc. Prof. Stefka Mindova, PhD
smindova@uni-ruse.bg, 0882 895 149

- **Social Work (SW)**

Assoc. Prof. Sasho Nunev, DSc,
snunev@uni-ruse.bg, 0886 802466

- **Health Care (HC)**

Assoc. Prof. Despina Georgieva, PhD,
dpgeorgieva@uni-ruse.bg, 0889 789 100

- **Law (L)**

Assoc. Prof. Elitsa Kumanova, PhD,
ekumanova@uni-ruse.bg, 082/ 888 434

- **Quality of Higher Education (QHE)**

Assoc. Prof. Emil Trifonov, PhD, e-trifonov@abv.bg,
Daniela Todorova,
dtodorova@uni-ruse.bg, 082 888 378

- **Social Sciences and Humanities (SSH) (18.10., Silistra)**

Assoc. Prof. Todorka Georgieva, DfS,
tgeorgieva@uni-ruse.bg

- **Pedagogy, Psychology, Teaching Methodology (PPTM) (18.10., Silistra)**

Assoc. Prof. Galina Lecheva, PhD,
glecheva@uni-ruse.bg, +359 88 540 0647

- **Technical Sciences (TS) (18.10., Silistra)**

Pr. Assist. Prof. Milen Sapundzhiev, PhD,
msapundziev@uni-ruse.bg

- **Chemical Technologies (CT) (01-02.11., Razgrad)**

Assoc. Prof. Tsvetan Dimitrov, PhD,
conf_rz@abv.bg, 0887 631 645

- **Biotechnologies and Food Technologies (BFT) (01-02.11., Razgrad)**

Assoc. Prof. Nasty Ivanova, PhD,
nivanova@uni-ruse.bg, 0899 450 177

♦ REVIEWERS:

- Prof. Radostin Dolchinkov PhD,
- Prof. Hristo Stachev PhD,
- Prof. Emil Marinov PhD,
- Assoc. Prof. Svetla Stoilova, PhD
- Assoc. Prof. Durhan Saliev, PhD
- Assoc. Prof. Simeon Iliev, PhD

TRANSPORT AND MACHINE SCIENCE

Content

<ol style="list-style-type: none"> 1. FRI-2.203-1-TMS-01 Calculation Methodology of Economic Efficiency in Machines' Brake System Regulated Repair Work <i>Henrik Vardanyan</i> 2. FRI-2.203-1-TMS-02. Experimental Study on Hazardous Fire Factors in a Passenger Train Coupe <i>Svilena Arabadzhieva, Todor Toshev</i> 3. FRI-2.203-1-TMS-03 Study of Some Exploitation Properties of Converted Electric Vehicle, by Reason of the Change in Mass and the Location of the Mass Center <i>Evgeni Sokolov, Nikolay Pavlov</i> 4. FRI-2.203-1-TMS-04 Exploring Different Car Suspension Solutions for the Shell Eco-Marathon Competition <i>Rosen Hristov, Plamen Petrov</i> 5. FRI-2.203-1-TMS-05 Analysis of Methods for Measuring the Temperature of Moving Parts of the Crank Mechanism <i>Delyan Petkov</i> 6. FRI-2.203-1-TMS-06 Modelling of Working Process of Diesel Engine When Working With Addition of Gas Fuel <i>Velichka Georgieva, Krasimir Bogdanov</i> 7. FRI-2.203-1-TMS-07 Modelling of Working Process of Diesel Engine When Working With Addition of Gas Fuel <i>Daniel Kostadinov, Nikolai Andonov, Krasimir Bogdanov</i> 8. FRI-2.203-1-TMS-09 Analysis Braking Deceleration of Light Vehicles <i>Zdravko Ivanov, Radostin Dimitrov, Stoyan Stoyanov, Daniel Ivanov</i> 9. FRI-2.203-1-TMS-10 Experimental Study of Post-Injection for Soot Reduction at Medium Load of a Light-Duty Direct Injection Diesel Engine <i>Plamen Punov, Svetoslav Mihalkov</i> 10. FRI-2.203-1-TMS-11 Standards and Methods for Measuring Vehicle Noise <i>Kamelia Dimitrova</i> 11. FRI-2.203-1-TMS-12 A Review of the Possibility for Using of Alternative Fuels and Biofuels in Hybrid Vehicles <i>Krasimir Markov</i> 12. FRI-2.203-1-TMS-13 	<hr/> <p style="text-align: right;">12</p> <p style="text-align: right;">16</p> <p style="text-align: right;">22</p> <p style="text-align: right;">30</p> <p style="text-align: right;">34</p> <p style="text-align: right;">39</p> <p style="text-align: right;">44</p> <p style="text-align: right;">49</p> <p style="text-align: right;">53</p> <p style="text-align: right;">54</p> <p style="text-align: right;">61</p> <p style="text-align: right;">67</p>
---	---

Investigation of the Engine Operation on Gasoline-Isopropanol Fuel Blends	
<i>Kiril Hadjiev, Emilian Stankov, Nikolay Daskalov</i>	
13. FRI-2.203-1-TMS-14	71
Improving Measurement Accuracy Through the Randomization Method	
<i>Atanas Iliev, Petar Kazakov</i>	
14. FRI-2.203-1-TMS-15	77
Life Cycle Assessment for Compressed Air and Conventional Cars Concerning Energy Consumption and CO₂ Emissions	
<i>Ivan Evtimov, Rosen Ivanov, Georgi Kadikyanov, Gergana Staneva</i>	
15. FRI-2.203-1-TMS-16	85
The Butanol as Alternative Fuel for Diesel Engines	
<i>Emil Mitev</i>	
16. FRI-2.203-1-TMS-17	92
Investigating the Opportunities of Automated Test Machines Used for Research of Mechanical Systems	
<i>João Ribeiro, Hugo Alves, Gergana Mollova</i>	
17. FRI-2.203-1-TMS-18	97
Improving Students' Communication and Problem Solving Skills During Teamwork	
<i>Hugo Alves, João Ribeiro, Yordanka Dimitrova</i>	
18. FRI-2.203-2-TMS-01	103
Development of a Tethered Air Handler With a Soft Link	
<i>Yavor Yotov, Simeon Iliev</i>	
19. FRI-2.203-2-TMS-02	110
Assesment of Time Irregularities of Road Accidents in Bulgaria	
<i>Velizara Pentcheva, Asen Asenov, Stanimir Penev</i>	
20. FRI-2.203-2-TMS-03	111
Optimization of the Carriage of Transit Goods by Road Between Two Ports as Part of Multimodal Transport With a Requirement for Prompt Discharge of the Vessel	
<i>Boril Ivanov</i>	
21. FRI-2.203-2-TMS-04	117
Methodology for the Integration of Risk Management in Logistics Processes in Inland Ports	
<i>Kamen Ivanov</i>	
22. FRI-2.203-2-TMS-05	129
Methods to Reduce the Number of Incidents with Vulnerable Road Users	
<i>Toncho Balbuzanov</i>	
23. FRI-2.203-2-TMS-06	137
Assessment of the Maas System as a Tool for Shared Economy in Transport and the Application of Hydrogen Mobility	
<i>Velizara Pentcheva, Asen Asenov, Dimitar Grozev, Ivan Beloev, Tsvetelina Georgieva, Plamen Daskalov</i>	
24. FRI-2.203-2-TMS-07	145
Study of the Possibilities of Applying Hydrogen Mobility in Modern Cities	

	Asen Asenov, Velizara Pentcheva, Ivan Beloev, Dimitar Grozev, Plamen Daskalov Tsvetelina Georgieva	
25.	FRI-2.203-2-TMS-08 Determining the Power Required to Drive a Prototype With Hydrogen Fuel Cell <i>Dimitar Grozev, Ivan Beloev, Georgi Hristov</i>	153
26.	FRI-2.203-2-TMS-09 Creating a Urban Vehicle Prototype With a Hydrogen Fuel <i>Dimitar Grozev, Ivan Beloev, Georgi Hristov</i>	163
27.	FRI-2.203-2-TMS-10 A Study of the Influence of Input Parameters on Output Results for the Delta V Method <i>Daniel Lyubenov, Filip Kirilov</i>	171
28.	FRI-2.203-2-TMS-11 Examination of Basic Qualities of Candidates for Drivers Category «B» for the Safe Driving of a Vehicle <i>Nikolay Paunov</i>	178
29.	FRI-2.203-2-TMS-12 A Study of Advanced System for Training of Drivers Candidates <i>Polina Atanasova</i>	182
30.	FRI-2.203-2-TMS-14 A Study of the Braking Properties of Cars <i>Filip Kirilov</i>	190
31.	FRI-2.203-2-TMS-15 A Study of the Vulnerable Road Users Safety in Bulgarian Roads <i>Ivo Balevski</i>	198
32.	FRI-2.203-2-TMS-16 Research Cross-Docking Warehouse Organization as Part of the Integrated Delivery System in Conditions of 3PL Operator <i>Iskren Petrov, Ivan Petrov, Valeri Gamozov,</i>	204
33.	FRI-2.203-2-TMS-17 Analysis of the Some Buses Routes from Urban Passenger Transport in Big City <i>Pavel Stoyanov,</i>	209
34.	FRI-2.203-2-TMS-18 Modeling and Simulation Approaches for Hybrid Fuel Cell Power Systems <i>Velizara Pencheva, Tsvetelina Georgieva, Asen Asenov, Sechkin Remzi, Plamen Daskalov</i>	216