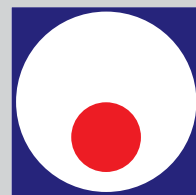




FACULTY OF MECHANICAL AND CIVIL ENGINEERING  
IN KRALJEVO  
UNIVERSITY OF KRAGUJEVAC



The Eighth Triennial  
International Conference

# HEAVY MACHINERY HM 2014

Proceedings

ZLATIBOR, SERBIA  
24 - 26 June 2014





**FACULTY OF MECHANICAL AND CIVIL ENGINEERING KRALJEVO  
UNIVERSITY OF KRAGUJEVAC  
KRALJEVO – SERBIA**

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**THE EIGHTH INTERNATIONAL TRIENNIAL CONFERENCE**

# **HEAVY MACHINERY HM 2014**

## **PROCEEDINGS**

**Zlatibor, June 25 – June 28 2014.**



**FACULTY OF MECHANICAL AND CIVIL ENGINEERING KRALJEVO  
UNIVERSITY OF KRAGUJEVAC  
KRALJEVO – SERBIA**

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# **HEAVY MACHINERY HM 2014**

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**Ministry of Education and Science, Republic of Serbia**

**Zlatibor, June 25 – June 28 2014**



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## **PREFACE**

The Faculty of Mechanical Engineering Kraljevo has been traditionally organizing the international scientific conference devoted to heavy machinery every three years. The VIII International Scientific Conference HM 2014 is considering modern methods and new technologies in the fields of transport design in machinery, control energy, production technologies, urban engineering and civil engineering through thematic sessions for the purpose of sustainable competitiveness of economic systems. Modern technologies are exposed to fast changes at the global world level so that their timely application both in large industrial systems and in medium and small enterprises is of considerable importance for the entire development and technological progress of economy as a whole.

The VIII International Scientific Conference Heavy Machinery HM 2014 is a place for exchange of experiences and results accomplished in domestic and foreign science and practice, with the goal to indicate directions of further development of our industry on its way toward integration in European and world economic trends. Exchange of experiences between our and foreign scientific workers should contribute to extension of international scientific-technical collaboration, initiation of new international scientific-research projects and broader international collaboration among universities.

The papers which will be presented at this Conference have been classified into seven thematic fields:

- A. EARTH-MOVING AND TRANSPORTATION MACHINERY
- B. PRODUCTION TECHNOLOGIES
- C. CIVIL ENGINEERING AND MATERIALS
- D. AUTOMATIC CONTROL, ROBOTICS AND FLUID TECHNIQUE
- E. MACHINE DESIGN AND MECHANICS
- F. RAILWAY ENGINEERING
- G. URBAN ENGINEERING, THERMAL TECHNIQUE AND ENVIRONMENT PROTECTION

Within this Conference, the First International Students Symposium will be held. The aim is to open a scientific discussion on this actual problem in industry among young students.

The sponsorship by the Ministry of Science of the Republic of Serbia is the proper way to promote science and technology in the area of mechanical engineering in Serbia.

On behalf of the organizer, I would like to express our thanks to all organizations and institutions that have supported this Conference. I would also like to extend our thanks to all authors and participants from abroad and from our country for their contribution to the Conference. And last but not the least, dear guests and participants in the Conference, I wish you a good time in Kraljevo – Vrnjačka Banja and see you again at the Eight Conference, in three years.

Kraljevo – Zlatibor, June 2014

Conference Chairman,

  
Prof. Dr. Milomir Gašić, mech eng.



## PLENARY SESSION

<b>MODELLING AND WORKING SIMULATION OF THE MECHANISM OF AXIAL PISTON HYDROSTATIC PUMPS USING DENAVIT-HARTENBERG METHOD</b> Adrian Bruja, Marian Dima	1-8
<b>DEFINITION RATIONAL GATE FRAME SIZE DISTRIBUTION UNIT DOUBLE PISTON CONCRETE PUMP WITH HYDRAULIC DRIVE</b> Inga A. Emeliyanova, A. A. Zadorozhny, D. V. Legeyda, N. A. Melencov	9-13
<b>MECHANICAL BEHAVIOUR AND FRICTION EVOLUTION ON BOLTED CONNECTIONS</b> Dario Croccolo	15-23
<b>DYNAMIC ANALYSIS OF MECHANICAL SYSTEMS</b> Evgeniy Kudryavtcev, A. A. Ruchkin	25-30

## SESSION A: EARTH-MOVING AND TRANSPORTATION MACHINERY

<b>GENERAL CLASSIFICATION OF SMALL-SIZED TECHNOLOGICAL SETS FOR PRODUCTION OF DRY BUILDING MIXTURES</b> Inga Emelyanova, Vladimir Blazhko	1-4
<b>POST-EJECTION FAILURE MODE OF POST DRIVING MACHINES</b> William Singhose, Dooroo Kim, Joshua Vaughan	5-11
<b>DETERMINING THE INVERSE KINEMATICS MODEL OF A BUCKET EXCAVATOR'S DIGGING EQUIPMENT</b> Marian Dima, Cătălin Frăncu, Radu Ghelmei	13-16
<b>ADAPTATION OF EARTH-MOVING MACHINES TO EXTERNAL LOADING CONDITIONS</b> Valery Shevchenko	17-21
<b>INCREASING THE EFFICIENCY OF THE OPERATION OF THE BATCH-TYPE EARTH-MOVING MACHINES AT THE EXPENSE OF USING THE PNEUMATIC STORAGE SYSTEM</b> Leonid Khmara, Anton Kholodov	23-28
<b>FRACTURE ANALYSIS OF THE HYDRAULIC TRUCK CRANE ATLAS 3006</b> Mile Savković, Milomir Gašić, Nebojša Zdravković, Goran Bošković, Goran Pavlović	29-35
<b>APPLICATION OF THE NUMERICAL METHODS FOR DYNAMIC ANALYSIS OF TRANSPORTSYSTEMS WITH ROPE</b> Jovan Vladić, Dragan Živanić, Igor Džinčić, Radomir Đokić, Anto Gajić	37-42
<b>THE DEVELOPMENT OF HYDROSTATIC DRIVE TRANSMISSIONS OF WHEEL LOADERS</b> Jovan Pavlović, Dragoslav Janošević, Vesna Jovanović, Saša Petrović	43-48
<b>ABOUT CHOOSING THE RIGHT COMPUTATIONAL MODEL FOR FEA STRESS ANALYSIS OF DRILLING RIGS AND WELL SERVICING STRUCTURES IN OIL INDUSTRY</b> Radoslav Simić, Nikola Brkljač	49-57

<b>ROAD-HOLDING ABILITY OF THE MOTOR GRADER IN THE PROCESS OF PERFORMING WORK OPERATIONS</b>	<b>59-67</b>
Valery Shevchenko, Olexandra Chaplygina, Zhanna Beztseennaya	
<b>5D MODELLING OF MECHANICAL SYSTEMS</b>	<b>69-71</b>
Evgeniy Kudryavtcev	
<b>NEW EFFECTIVE MACHINE FOR ROLLING HOLES DURING INSTALLING UNDERGROUND COMMUNICATIONS IN URBAN CONSTRUCTION</b>	<b>73-74</b>
Anatoly Dotsenko	
<b>KINEMATICS COMPUTATIONAL MODELLING OF SELF-ERECTING TOWER CRANES' ERECTION MECHANISM</b>	<b>75-84</b>
Cătălin Frăncu, Marian Dima	
<b>RESEARCH AND THE CREATION OF ENERGY-EFFICIENT VIBRATION MACHINES BASED ON THE STRESS-STRAIN STATE OF METAL AND TECHNOLOGICAL ENVIRONMENTS</b>	<b>85-89</b>
Ivan Ivanovich Nazarenko, Anatoliy Tofiliyovych Svidersky, Mykola Mykolayovych	
<b>TOP TIER TECHNOLOGY IN SUBWAY TUNNELLING USING A MECHATRONIC DRIVING SHIELD</b>	<b>91-97</b>
Ioan Bărdescu, Amelitta Legendi	
<b>FREE VIBRATIONS OF THE PLANAR GANTRY-LIKE STRUCTURES</b>	<b>99-104</b>
Vlada Gašić, Aleksandar Obradović, Nenad Zrnić	
<b>OPTIMIZATION OF THE BOX SECTION OF THE MAIN GIRDERS OF THE BRIDGE CRANE FOR THE CASE OF PLACING THE RAIL IN THE MIDDLE OF THE TOP FLANGE</b>	<b>105-112</b>
Goran Pavlovic, Milomir Gasic, Mile Savkovic, Radovan Bulatovic, Nebojsa Zdravkovic	
<b>OPTIMAL SYNTHESIS OF THE DRIVING MECHANISM OF BASKET ARTICULATED TRUCKS</b>	<b>113-118</b>
Dragoslav Janošević, Jovan Pavlović, Vesna Jovanović, Predrag Milić	
<b>NUMERICAL ANALYSIS OF ELEVATOR ROPES VIBRATION WITH TIME VARYING LENGTH</b>	<b>119-124</b>
Jovan Vladić, Radomir Đokić, Anto Gajić, Dragan Živanić	
<b>THE INFLUENCE OF STRUCTURE ANCHORING ON EIGENVALUES AND TRANSLATIONS</b>	<b>125-130</b>
Goran Radoičić, Miomir Jovanović, Ivan Savić	
<b>THEORETICAL ASPECTS OF ZIP LINE ANALYSIS</b>	<b>131-136</b>
Mircea Alamoreanu, Andrei Vasilescu	
<b>TIP-OVER STABILITY OF CRAWLER CRANES WITH MOVABLE COUNTERWEIGHT</b>	<b>137-143</b>
Huasen Liu, William Singhose, Wenming Cheng	
<b>KINEMATICS OF THE TRUCK MOUNTED HYDRAULIC CRANES</b>	<b>145-150</b>
Boris Jerman, Jurij Hladnik, Vlada Gašić, Miloš Đorđević	
<b>DETERMINING THE FORWARD KINEMATICS MODEL OF A BUCKET EXCAVATOR'S DIGGING EQUIPMENT</b>	<b>151-155</b>
Marian Dima, Cătălin Frăncu, Radu Ghelmei	
<b>CASE STUDY OF PRODUCT INNOVATION BASED ON SPECIAL CRANE TROLLEY</b>	<b>157-164</b>
Zoran Petrović, Uglješa Bugarić, Dušan Petrović	

<b>SIMPLIFIED LIFE CYCLE ASSESSMENT OF A CONVEYOR BELTING</b> Milos Djordjevic, Nenad Zrnic, Boris Jerman	<b>165-170</b>
<b>SELECTION OF THE BASIC PARAMETERS OF GENERAL PURPOSE TELESCOPIC BELT CONVEYOR</b> Rodoljub Vujanac, Nenad Miloradovic	<b>171-175</b>
<b>'DESIGN-IN' FAULTS - THE REASON FOR SERIOUS DRAWBACKS IN HIGH CAPACITY BUCKET WHEEL EXCAVATOR EXPLOITATION</b> Nebojsa Gnjatovic, Goran Milojevic, Ivan Milenovic, Aleksandar Stefanovic	<b>177-182</b>
<b>THE EQUATIONS OF MOTION OF THE CRANE WITH LOADING-UNLOADING TROLLEY ON THE SLEWING PLATFORM</b> Spasoje Trifkovic, Milomir Gasic, Nebojsa Radic, Miroslav Milutinovic	<b>183-186</b>
<b>THE KINEMATIC AND DYNAMIC ANALYSIS OF THE HYDRAULIC EXCAVATORS</b> Vesna Jovanović, Dragoslav Janošević, Jovan Pavlović	<b>187-192</b>

## **SESSION B: PRODUCTION TECHNOLOGIES**

<b>IDENTIFICATION OF SUPPORTING ELEMENTS DYNAMICS OF PRODUCTION MACHINES USING DYNAMICS OF RIGID BODIES SYSTEM</b> Radomir Slavković, Ivan Milićević, Nedeljko Dučić, Marko Popović, Zvonimir Jugović	<b>1-6</b>
<b>NEW CONCEPT OF MULTI-AGENT CAPP SYSTEM IN INTELIGENT MANUFACTURING SYSTEMS</b> Ljubomir Lukic, Mirko Djapic, Aleksandra Petrovic, Veda Kilibarda	<b>7-12</b>
<b>THE USE OF BIOLOGICALLY-INSPIRED ALGORITHMS FOR THE OPTIMIZATION OF MACHINING PARAMETERS</b> Goran Miodragović, Radovan Bulatović, Slobodan Ivanović, Marina Bošković	<b>13-18</b>
<b>MACHINING PARAMETERS INFLUENCE ON CUTTING FORCE USED FOR TOOL PATH OPTIMIZATION IN END MILLING</b> Aleksandra Petrović, Ljubomir Lukić, Marina Pljakić	<b>19-25</b>
<b>MARKETING ORIENTED ORGANIZATIONAL CULTURE AS PREREQUISITE FOR TQM IMPLEMENTATION: THE CASE STUDY OF SERBIAN MECHANICAL INDUSTRY</b> Ljiljana Pecić, Milan Kolarević	<b>27-35</b>
<b>RECOGNIZING MAG PROCESS PARAMETERS ON THE BASIS OF THE SOUND EMITTED</b> Marina Pljakić, Miomir Vukićević, Milan Kolarević, Mišo Bjelić	<b>37-42</b>
<b>APPLICATION OF SUBMATRICES FOR SOLVING PHASE PROCESSES BY THE LINEAR PROGRAMMING METHOD</b> Milan Kolarević, Vladan Grković, Zvonko Petrović, Miloje Rajović	<b>43-48</b>
<b>APPLICATION OF THE COPRAS METHOD FOR SELECTION OF COMPETITIVE NON-CONVENTIONAL MACHINING PROCESSES</b> Miloš Madić, Miroslav Radovanović, Danijel Marković, Goran Petrović	<b>49-54</b>
<b>EVALUATION OF QUALITY AND EFFICIENCY OF TECHNOLOGIES FOR MAKING AXI-SYMMETRICAL PROFILES – METHOD OF SUPERIORITY AND INFERIORITY</b> Dragana Temeljkovski, Dragan Temeljkovski	<b>55-61</b>

<b>ON THE EFFECT OF NORMAL LOAD AND SLIDING SPEED ON WEAR UNDER DRY SLIDING CONTACT ON THE BRASS (70-30, 60-40)</b> Dragan Milcic, Amir M. Rashid, Boban Anđelković, Mustafa A. Mustafa	<b>63-68</b>
<b>IMPLEMENTATION OF THE RCM METHODOLOGY ON THE EXAMPLE OF CITY WATERWORKS</b> Zoran Petrovic, Zlatan Car, Branko Radicevic, Leon Šikule, Vladan Grkovic	<b>69-78</b>
<b>MODELING AND NUMERICAL ANALYSIS OF WIRE TEMPERATURE IN GMA WELDING</b> Mišo Bjelić, Karel Kovanda, Ladislav Kolařík, Marie Kolaříková, Petr Vondrouš	<b>79-82</b>
<b>COMPLEXITY IN PRODUCTION SYSTEMS</b> Elvis Hozdić, Emine Hozdić	<b>83-87</b>

## **SESSION C: CIVIL ENGINEERING AND MATERIALS**

<b>DRAINAGE WELLS ON THE LANDSLIDE - SLOBODA BRIDGE IN NOVI SAD</b> Milinko Vasić, Mitar Đogo, Branko Jelisavac	<b>1-7</b>
<b>MICROSTRUCTURAL ANALYSIS OF CONSTRUCTIONAL MATERIALS</b> Milena Rangelov, Vlastimir Radonjanin, Mirjana Malešev, Jovana Kaličanin	<b>9-15</b>
<b>ESTIMATION OF MARSHALL STABILITY OF STEEL FIBER REINFORCED ASPHALT CONCRETE ADAPTIVE USING NEURO-FUZZY INFERENCE SYSTEM</b> Nihat Morova, Sercan Serin, Serdal Terzi, Mehmet Saltan, Mustafa Karaşahin	<b>17-20</b>
<b>GEOTECHNICAL CONDITIONS FOR FOUNDATION OF COMPRESSOR IN VELEBIT</b> Mitar Đogo, Milinko Vasić, Rada Stevanović	<b>21-24</b>
<b>KNOWLEDGE INNOVATION TRENDS ON A STANDARDIZATION PLATFORM - PARALLEL: CIVIL ENGINEERING AND RAILWAY ENGINEERING</b> Živadin Micić, Slobodan Petrović	<b>25-33</b>
<b>ALTERATION IN MECHANICAL PROPRIETIES OF PORCELAIN PASSING BY A BENDING PROCESS</b> Cristiano Fragassa, Ana Pavlovic, Pier Paolo Conti, Olivera Eric	<b>35-43</b>
<b>SYSTEM FOR MONITORING THE WELDING OPERATION</b> Olivera Eric Cekic, Radomir Jovičić, Branko Zrilić, Nebojša Pantelić	<b>45-49</b>
<b>INVESTIGATION OF STEEL PROPERTIES FOR SIDE FRAMES OF SCRAPER CONVEYOR PANS</b> Diana Glushkova, Ye. Voronova, Valentina Tarabanova, Larisa Rak	<b>51-54</b>
<b>DEPENDENCE OF MECHANICAL PROPERTIES OF THE BASE METAL AND WELDED JOINT OF THE HIGH STRENGTH STEEL S690QL ON ELEVATED TEMPERATURES</b> Dusan Arsic, Vukić Lazić, Andreja Ilić, Lozica Ivanović, Srbislav Aleksandrović, Milan Đorđević	<b>55-59</b>

## **SESSION D: AUTOMATIC CONTROL, ROBOTICS AND FLUID TECHNIQUE**

<b>MODELLING, SIMULATION AND CASCADE NAVIGATION CONTROL OF A PROTOTYPE CARGO VESSEL</b> Erol Uyar, Semih Arıkan, Mücahid Candan, Nail Akçura	<b>1-6</b>
---	------------

<b>DEFINITION OF POWER AND KINEMATIC PARAMETERS OF FULL-FLOW HYDROSTATIC TRANSMISSION</b> Vladimir Alexeevich Zhulai, Vladimir Ivanovich Yenin, Evgenii Vladimirovich	<b>7-10</b>
<b>THE LOCALIZATION OF THE ROBOTIC MOBILE PLATFORMS FOR CONSTRUCTIONS WITH TRACKER LASER AND SMARTTRACK SENSOR</b> Radu Ghelmeci, Marian Dima	<b>11-15</b>
<b>COMPARISON OF TWO APPROACHES TO IDENTIFICATION PROCESS OF CONDENSER IN THERMAL POWER PLANT</b> Novak Nedić, Saša Prodanović	<b>17-22</b>
<b>HARMONIC ANALYSIS OF A PNEUMATIC FIXED ORIFICE</b> Dragan Pršić, Ljubiša Dubonjić, Vladimir Stojanović	<b>23-28</b>
<b>MATHEMATICAL MODELING, IDENTIFICATION AND OPTIMIZATION OF PARAMETERS OF THE VALVE PLATE OF THE WATER HYDRAULIC PISTON-AXIAL PUMP/MOTOR</b> Radovan Petrovic, Nenad Todić, Miroslav Zivkovic, Zoran Glavčić	<b>29-34</b>
<b>COMPUTER CONTROL ON POSITIONING STEPPER DRIVE – LABORATORY STAND</b> Vasil Dimitrov, Ivan Milenov, Emiliya Dimitrova	<b>35-40</b>
<b>POSITION CONTROL OF A THREE DEGREE OF FREEDOM ROBOT</b> Gökmen Katipoğlu, Savaş Takan	<b>41-44</b>
<b>RECURSIVE ESTIMATION OF THE TAKAGI-SUGENO MODELS I: FUZZY CLUSTERING AND THE PREMISE MEMBERSHIP FUNCTIONS ESTIMATION</b> Vojislav Filipovic, Vladimir Djordjevic	<b>45-50</b>
<b>ENERGY PERFORMANCE CONSTANT POWER MOTION CONTROL OF ROBOTIZED MINING TRUCK</b> Denis Pogosov	<b>51-59</b>
<b>DESIGN THE DIGITAL INTERNAL MODEL CONTROL OF AN ELECTROMECHANICAL POSITIONING SYSTEM WITH CONTROLLED JERK</b> Mihaylo Stoychitch	<b>61-66</b>
<b>DESIGN OF PID CONTROLLERS FOR HIGH ORDER SYSTEMS</b> Ljubisa Dubonjic, Novak Nedic, Dragan Prsic	<b>67-72</b>
<b>ROBUST AKAIKE'S CRITERION FOR MODEL ORDER SELECTION</b> Vladimir Stojanovic, Vojislav Filipovic	<b>73-78</b>
<b>SIMULATION RESULTS OF PARAMETER ESTIMATION FOR A GIVEN ARX MODEL – SYSTEM IDENTIFICATION</b> Saša Prodanović, Vesna Brašić	<b>79-84</b>
<b>COMPARING THE RESULTS OF STOCHASTIC APPROXIMATION METHOD WITH AVERAGING RELATED TO CONVENIENT IDENTIFICATION METHODS</b> Vesna Brašić	<b>85-91</b>
<b>ROBUST RECURSIVE IDENTIFICATION OF MULTIVARIABLE PROCESSES</b> Vladimir Djordjevic, Vojislav Filipovic	<b>93-98</b>

## **SESSION E: MECHANICAL DESIGN AND MECHANICS**

<b>GEAR DRIVE UNIT WITH CONTINUAL VARIATION OF TRANSMISSION RATIO</b> Sanja Vasin, Milosav Ognjanovic, Marko Milos	<b>1-6</b>
<b>CAD MODEL OF DISC BRAKE FOR ELIMINATING NOISE PROBLEMS</b> Jasna Glišović, Jovanka Lukić, Dobrivoje Ćatić, Vanja Šušteršič	<b>7-16</b>
<b>INFLUENCE OF SUB-STRUCTURES' SHAPES ON VIBRATION BEHAVIOUR OF SANDWICH WALLS</b> Aleksandar Vranić, Snežana Ćirić Kostić, Bojan Tatić	<b>17-22</b>
<b>NUMERICAL-EXPERIMENTAL IDENTIFICATION OF A WORKING UNIT MODULE DYNAMIC CHARACTERISTICS</b> Aleksandar Košarac, Milan Zeljković, Cvijetin Mlađenović, Aleksandar Živković	<b>23-28</b>
<b>THE USE OF VIRTUAL MODELS IN THE DESIGN OF MECHANISMS</b> Ivan Miličević, Stojan Savković, Milosav Šekarić, Radomir Slavković, Nedeljko Dučić, Marko Popović	<b>29-34</b>
<b>CONTRIBUTION TO THE DETERMINATION OF THE LOAD ON SUSPENSION RING OF THE UNDERFRAME OF THE HYDRAULIC EXCAVATOR</b> Slaviša Šalinić, Marko Nikolić, Goran Bošković	<b>35-39</b>
<b>INFLUENCE OF PLASTICITY REDUCTION ON INTEGRITY AND SERVICE LIFE OF TURBINE RUNNER COVER OF THE HYDROELECTRIC GENERATING SET A4 AT HYDRO POWER PLANT „ĐERDAP“</b> Miodrag Arsic, Srdjan Bosnjak, Vencislav Grabulov, Brane Vistac, Zoran Savic	<b>41-45</b>
<b>COUPLING OF BENDING IN HORIZONTAL PLANE AND TWIST OF A TRUSS BEAM WITH TRIANGULAR CROSS-SECTION</b> Milan Dedic, Milica Todorovic	<b>47-52</b>
<b>FREIGHT WAGON MASS REDUCTION USING PARAMETRIC OPTIMIZATION</b> Marko Topalović, Vladimir Milovanović, Milan Blagojević, Aleksandar Dišić, Dragan Rakić, Miroslav Živković	<b>53-60</b>
<b>NATURAL FREQUENCIES OF A TAPERED CANTILEVER BEAM OF CONSTANT THICKNESS AND LINEARLY TAPERED WIDTH</b> Aleksandar Nikolić, Slaviša Šalinić	<b>61-69</b>
<b>AN ANALYSIS OF THE END DEFLECTIONS OF SPATIAL TRUSSES WITH RIGIDITY VARIABLE IN INTERVALS</b> Milica Todorovic, Milan Dedic	<b>71-76</b>
<b>SHAPING THE HOUSING OF TRANSMISSION GEAR WITH HIGH SPECIFIC POWER</b> Vojkan Nojner, Dragan Milčić	<b>77-82</b>

## **SESSION F: RAILWAY ENGINEERING**

<b>THE WAVE DISTORTION ANALYSIS OF THE VOLTAGE FOR CONTACT LINE SYSTEM AT SERBIAN RAILWAYS</b> Branislav Gavrilovic, Zoran Bundalo, Savo Gavrilovic	<b>1-7</b>
<b>DEVELOPMENT OF KEY PERFORMANCE INDICATORS FOR MAINTENANCE OF THE RAILWAY SIGNALLING SYSTEM</b> Margarita Georgieva, Nelly Stoytcheva	<b>9-12</b>
<b>EFFECTIVE STRATEGY FOR MAINTENANCE OF THE RAILWAY ASSETS</b> Nelly Stoytcheva, Margarita Georgieva	<b>13-19</b>
<b>APPLICATION OF GPSS QUEUING NETWORK MODEL TO EVALUATE THE PERFORMANCE OF THE TRANSPORTATION TECHNOLOGICAL SYSTEM</b> Kiril Karagyozev	<b>21-26</b>
<b>WEB BASED SYSTEM FOR THE INTEGRATION OF THE OVERHAUL PROCESS FOR RAILWAY BRAKING DEVICES</b> Zdravko Tešić, Branislav Stevanov, Danijela Gračanin	<b>27-32</b>
<b>IMITATION MODEL OF DISPATCHING SYSTEM FOR CONTROL ON PROCESSES IN METROPOLITAN-SOFIA</b> Emiliya Dimitrova, Vasil Dimitrov	<b>33-39</b>
<b>OPTIMIZATION OF FREIGHT WAGONS FLEET OF REPUBLIC OF BULGARIA</b> Valeri Nikolov, Boris Galev	<b>41-46</b>
<b>INFLUENCE OF THE DESIGN OF BRAKE DISCS ON THE THERMAL EFFICIENCY</b> Vasko Nikolov	<b>47-50</b>
<b>INFLUENCE OF TRACK SUBSIDENCE ON ROLLING STOCK DERAILMENT RISK</b> Dobrinka Atmadzhova, Tsvyatko Penchev	<b>51-58</b>
<b>A CRASH BUFFER FOR RAILWAY VEHICLES</b> Venelin Pavlov, Dobrinka Atmadzhova	<b>59-68</b>
<b>VALIDATION OF A RAILWAY VEHICLE MODEL BASED ON COMPARISON OF CUMULATIVE DISTRIBUTION FUNCTIONS</b> Nebojša Bogojević, Jelena Tomić, Slobodan Todosijević, Vojkan Lučanin	<b>69-76</b>
<b>FUNCTIONS OF WHEEL-RAIL CONTACT GEOMETRY</b> Milan Bižić, Dragan Petrović, Isidora Pančić	<b>77-84</b>
<b>NUMERICAL SIMULATION OF WAGONS IMPACT</b> Dragan Petrović, Milan Bižić, Dragan Pančić, Dragić Mirković	<b>85-92</b>
<b>METHOD OF CONTROL OF THE TRAIN MOVEMENT BASED ON NATURAL RECUPERATION OF ENERGY</b> V. A. Shevchenko, V. Kh. Pshikhopov, M. Yu. Medvedev, A.R. Gaiduk, A. A. Zarifyan, Yu. P. Voloschenko	<b>93-96</b>

## **SESSION G: URBAN ENGINEERING, THERMAL TECHNIQUE AND ENVIRONMENT PROTECTION**

<b>MONITORIZATION SYSTEM FOR THE ENVIROMENT IN THE PROXIMITY OF INDUSTRIAL POLLUTERS USING A SINGLE-BOARD COMPUTER RASPBERRY PI</b> Cristina Sescu-Gal, Mihail Savaniu	<b>1-6</b>
<b>EFFECT OF THE SUSPENSION ON WHOLE BODY VIBRATION: COMPARISON OF HIGH POWER AGRICULTURAL TRACTORS</b> Boban Cvetanović, Miljan Cvetković, Dragan Cvetković, Miloš Ristić	<b>7-11</b>
<b>INVESTIGATION AND REDUCTION OF NOISE GENERATED BY HEAVY TRAFFIC IN URBAN ENVIRONMENT</b> Vasile Bacria, Nicolae Herisanu	<b>13-18</b>
<b>RECONSTRUCTION OF WAREHOUSE SYSTEM IN PHARMACEUTICAL INDUSTRY</b> Dusan Petrovic, Ugljesa Bugaric, Zoran Petrovic	<b>19-24</b>
<b>PERSPECTIVE OR AIRLINE DEVELOPMENT, THE CASE OF “KONSTANTIN VELIKI” AIRPORT NIŠ</b> Vojislav Tomić, Goran Petrović, Danijel Marković, Miloš Madić	<b>25-30</b>
<b>APPLICATION OF CORRELATION TEST TO CRITERIA SELECTION FOR MULTI CRITERIA DECISION MAKING PROBLEMS IN DOMAIN OF LOGISTICS SYSTEMS</b> Goran Markovic, Zoran Bogicevic, Mile Savkovic, Zoran Marinkovic, Vojislav Tomic	<b>31-36</b>
<b>DEVELOPMENT OF MICRO COGENERATION PLANTS IN INDIVIDUAL HOUSES</b> Jelica Dimitrijević, Stefan Pantović	<b>37-44</b>
<b>DEVELOPING MODEL OF A PHOTOACOUSTIC MEASUREMENT SYSTEM</b> Slobodan Todosijević, Slobodanka Galović, Jelena Tomić, Zlatan Šoškić	<b>45-50</b>
<b>DEVELOPING METHODOLOGY FOR THE SELECTION OF PRIORITY LOCAL INFRASTRUCTURE PROJECTS TO BE IMPLEMENTED IN SPECIFIC PLANNED PERIOD</b> Jovan Nesovic, Mirko Djapic	<b>51-54</b>
<b>A SIMPLIFIED METHOD FOR DATA PROCESSING OF SIGNALS WITH HEAVY DATA TRANSMISSION LOSSES</b> Jelena Tomić, Zlatan Šoškić, Nebojša Bogojević, Slobodan Todosijević	<b>55-59</b>
<b>SIMPLIFIED MODELING OF ELECTRICAL CABINETS</b> Rade Karamarkovic, Vladan Karamarkovic, Miljan Marasevic, Andjela Lazarevic	<b>61-68</b>
<b>ENERGETIC AND EXERGETIC EVALUATION OF 4 SYSTEMS FOR A ROTARY KILN IMPROVEMENT</b> Miljan Marasevic, Vladan Karamarkovic, Rade Karamarkovic, Nenad Stojic	<b>69-75</b>



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