SOCIETY FOR ROBOTICS OF BOSNIA AND HERZEGOVINA
4th International Conference
„NEW TECHNOLOGIES NT-2018“
ISSN 2303-7512

NT-2018

NEW TECHNOLOGIES DEVELOPMENT AND APPLICATION
NOVE TEHNOLOGIJE RAZVOJ I PRIMJENA

BOOK OF ABSTRACTS
KNJIGA SAŽETAKA

Editors: Isak Karabegović, Zijad Haznadar, Sead Pašić

Sarajevo
Bosnia and Herzegovina
28th-30th June 2018
NT-IV,Br-IV

Sarajevo
Bosna i Hercegovina
28.-30. Juna 2018
NT-IV, Br-IV

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www.icnt.robotika.ba

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ISSN: 2303-7512
Printed/Štamparija:
Fojnica d.o.o.
Printing/Tiraž: 150 primjeraka

Sarajevo
28th-30th June 2018

Sarajevo
28-30. juna 2018

Sponsors/Pokrovitelji

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NEW TECHNOLOGIES - DEVELOPMENT AND APPLICATION „NT-2018"

Word of the organizers

We are aware of a different problems that the contamporary economy suffer. Research capacities are limited and infrastructure is poorly developed. Companies fall in using the contemporary knowledge and specialization, rarely promote innovation and commercialization, poorly manage research facilities and technology transfer. All this ultimately leads to their inadequate capacities to meet market demands, as well as lagging in a regional development and a low competitiveness. The organizers are going to prepare the series of free seminars, conferences and round tables for the economy, small and medium enterprises, with the goal to introduce new capacities and the possibilities of the technology development. Thus the organizers want to encourage technology transfer, development projects and innovative work, as well as develop awareness of the importance of intellectual property protection. In a product development, from concept to its production, a key element in achieving market success, is time. With ever stringent market requirements, the trends in increasing product individualization (personalization) become more obvious, and there are fewer products of mass consumption. Alternative solutions in production are increasingly being used to meet such conditions in the development and production. The organizers' intention is to introduce new methods and technologies to our market, as well as to inform the engineers, designers, contractors and investors about the possibilities and advantages of new methods and technologies, as well as products in their technical and financial form. The aim is to bring closer new 21st century technologies, that are in use in developed countries, to professional public in above mentioned conferences, seminars and round tables. With their development trends and achievements, new technologies can contribute to the development of both small and medium-sized enterprises and large companies, and thus to develop the local community in which they operate. The goals of conferences, seminars and round tables is that manufacturing companies as well as research and development institutions become more familiar with the latest technical and technological achievements in the field of new technologies used in the 21st century.

Sarajevo, 12th May 2018 *THE ORGANIZERS*

NOVE TEHNOLOGIJE - RAZVOJ I PRIMJENA „NT-2018"

Uvodna riječ organizatora

Uočili smo veliki problem današnjeg gospodarstva. Istraživački su kapaciteti ograničeni, infrastruktura slabo razvijena, kompanije zaostaju za suvremenim znanjem i specijalizacijama, rijetko promoviraju inovacije i komercijalizacije, slabo se upravlja istraživačkim kapacitetima i transferom tehnologija, što u konačnici dovodi do neadekvatnih kapaciteta kompanija za odgovor na zahtjeve tržišta, zaostajanja u regionalnom razvoju i niskoj konkurentnosti. Organizatori pripremaju seriju besplatnih seminara, konferencija i okruglih stolova za privredu, mala i srednja poduzeća, na kojima ih žele upoznati s novim kapacitetima i mogućnostima koje nude. Time također žele potaknuti transfer tehnologije, razvojne projekte, inovativni rad i razviti svijest o važnosti zaštite intelektualnog vlasništva. Pri razvoju proizvoda, od ideje do njegove proizvodnje, ključni element u postizanju uspjeha na tržištu je vrijeme. Uz sve oštrije zahtjeve tržišta, očitiji su i trendovi u porastu individualizacije (personalizacije) proizvoda, a sve je manje proizvoda masovne potrošnje. Kako bi se udovoljilo takvim uvjetima pri razvoju i proizvodnji, sve se više primjenjuju alternativna rješenja u proizvodnji. Namjera je organizatora približiti nove metode i tehnologije našem tržištu i upoznati inženjere, projektante, izvođače, te investitore o mogućnostima i prednostima novih metoda i tehnologija, kao i proizvoda u njihovom tehničkom i financijskom obliku. Stručnoj javnosti ovakvim konferencijama, seminarima i okruglim stolovima želimo približiti nove tehnologije 21. stoljeća koje su u upotrebi u razvijenim zemljama u svijetu. Nove tehnologije svojim trendovima razvoja i dostignućima mogu doprinijeti razvoju kako malih i srednjih poduzeća, tako i velikih kompanija, te na taj način razviti lokalnu zajednicu u kojoj djeluju. Ciljevi konferencija, seminara i okruglih stolova će biti takvi da proizvodnim tvrtkama i razvojno-istraživačkim institucijama približe najnovija tehničko-tehnološka dostignuća na području novih tehnologija koje se koriste u 21. stoljeću.

Sarajevo, 12. maj,2018.god. *ORGANIZATORI*

PREFACE

Modern industrial production is exposed to many influences and problems that prevent the strengthening of market competitiveness. Let us mention a few of them: materials and raw materials are constantly becoming more expensive, and some even disappear, so a suitable replacement should be found; mass production disappears, and large series manufacturing decreases, while small-scale and medium serial production increases to some extent; new production philosophy demands and prefers highly educated personnel able to successfully implement new technologies; technologies, as well as knowledge, quickly become obsolete, which requires lifelong learning, i. e. constant update of already acquired knowledge; environmental requirements are stronger and higher, which increases companies' costs and funds to invest in equipment (there is a demand for pollution and waste materials reduction, greater work safety, recycling, etc.); market is full of various goods and products of questionable quality from medium developed countries and often with dumping prices; there are ever increasing demands for wage increases, which forces the owners to dislocate their production facilities or move to countries with cheaper labor force; increased education of personnel affects their mobility and increase of fluctuation, as well as greater opportunities in the choice of better jobs, so that they make more use of their intellectual and emotional capabilities, thereby changing the mental structure of employees; customers are increasingly looking for a good design, durability and good price, with a wide range of support and service, not just a product; customers' knowledge is increasing, thus causing the increase in requirements that a product must be flawless in every respect, rather «ideal» (well designed, reliable, stylish, economical, etc.).To successfully solve the abovementioned requirements, there are new technological, production, organizational and other methods and models that ensure the improvement and modernization of production in the preparation phase (modern methods of product design, methods for modeling, simulation and optimization of products and production program, evolutionary methods – methods of artificial intelligence, software and computer hardware), as well as in the realization phase of production (flexibility, innovation, productivity, automation, product quality).

The main objectives of the conference are:

- *Transfer of new and high technologies that serves to improving research and development work and implementation in production, in order to achieve technological and economic growth of domestic production in domestic companies.*
- *Transfer of practical knowledge and results of their own research,r to strengthen competitiveness of domestic companies*
- *Promotion of technological and economic feasibility of applying new technologies in companies' industrial production*
- *Organizing and conducting training in knowledge update and innovation lifelong learning*
- *Performing training courses in new technologies, production and business systems, integrated product development, implementation and maintenance of quality systems, production logistics, acquisition of competitive ability in the market, the application of modern methods in production management, the development of modern and successful production, etc.*
- *Education about justification for introducing new products and production program.*

Sarajevo, 12th May 2018 *THE ORGANIZERS*

PREDGOVOR

Suvremena industrijska proizvodnja je izložena mnogim utjecajima i problemima koji ometaju jačanje konkurentnosti na tržištu. Evo samo nekih od njih: materijali i sirovine neprestano poskupljuju, a neki i nestaju, pa im valja naći odgovarajuću zamjenu; masovna proizvodnja nestaje, a velikoserijska se smanjuje, dok raste maloserijska i donekle srednjeserijska proizvodnja; nova proizvodna filozofija uvjetuje, preferira visoko educirane kadrove sposobne da uspješno implementiraju nove tehnologije; tehnologije kao i znanja brzo zastarijevaju, što zahtijeva cjeloživotno učenje, odnosno stalno osvježavanje već stečenih znanja; sve su oštriji i veći ekološki zahtjevi, što poduzećima povećava troškove i sredstva za investiranje u opremu (traži se smanjenje zagađivanja i otpadnih materijala, veća sigurnost u procesu rada, reciklaža otpada i sl.); tržište je sve punije raznovrsnim proizvodima ali i proizvodima upitne kvalitete iz srednje razvijenih zemalja i često s damping cijenama; sve su veći zahtjevi za porastom plaća, što vlasnike prisiljava da svoje proizvodne pogone dislociraju, odnosno presele u zemlje sa jeftinijom radnom snagom; porast obrazovanosti kadrova sve više utječe na njihovu mobilnost i porast fluktuacije, te veće mogućnosti u izboru boljih radnih mjesta, kako bi više koristili svoje intelektualne i emocionalne mogućnosti, čime se mijenja mentalna struktura zaposlenih; kupci sve više traže dobar dizajn, trajnost i povoljnu cijenu proizvoda, uz široki asortiman i servisne usluge, a ne samo proizvod; znanje kupaca sve je veće, zbog čega nastaju i sve veći zahtjevi da proizvod mora biti bez greške u svakom pogledu, bolje rečeno «idealan» (dobro dizajniran, pouzdan, moderan, ekonomičan itd.). Za uspješno rješavanje navedenih zahtjeva postoje nove tehnološke, proizvodne, organizacijske i druge metode i modeli koji osiguravaju unapređenje i modernizaciju proizvodnje u fazi pripreme (moderne metode oblikovanja proizvoda, metode modeliranja, simulacije i optimizacije proizvoda i programa proizvodnje, evolucijske metode-metode umjetne inteligencije, softverske i računalne tehnike), kao i u fazi realizacije proizvodnje (fleksibilnost, inovativnost, proizvodnost, automatizacija, kvaliteta proizvoda).

***Osnovni ciljevi održavanja konferencije su slijedeći**:*

- *Transfer novih i visokih tehnologija u pravcu razvoja naučnoistraživačkog rada i implementacije u proizvodnji, s ciljem ostvarenja tehnološkog i ekonomskog rasta domaće proizvodnje u domaćim kompanijama.*
- *Transfer praktičnih znanja i rezultata vlastitih istraživanja, s ciljem jačanja konkurentske sposobnosti domaćih kompanija.*
- *Promocija tehnološke i ekonomske opravdanosti primjene novih tehnologija u industrijskoj proizvodnji u kompanijama.*
- *Organiziranje i izvođenje edukacije iz programa osvježavanja i inoviranja znanja i cjeloživotnog učenja.*
- *Izvođenje edukacijskih predavanja iz novih tehnologija, proizvodnih i poslovnih sistema, integriranog razvoja proizvoda, uvođenja i održanja sistema kvalitete, logistike proizvodnje, stjecanja konkurentske sposobnosti na tržištu, primjene modernih metoda u upravljanju proizvodnjom, razvoju moderne i uspješne proizvodnje, itd.*
- *Edukacija o opravdanosti uvođenja novih proizvoda i programa proizvodnje.*

Sarajevo, 12. maj,2018.god. *ORGANIZATORI*

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„NEW TECHNOLOGIES"
„NOVE TEHNOLOGIJE"
NT-2018

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Sarajevo
28th-30th June 2018

Sarajevo,
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4th International Conference
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PLENARY SESSION

Prof. Mirsad Hadžikadić, PhD
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Chorlotte,NC 28223

"POSSIBILITIES AND CHALLENGES OF INFORMATION AND COMMUNICATION TECHNOLOGIES WITH A FOCUS ON BOSNIA AND HERZEGOVINA"

Biography:

Mirsad Hadjikadić has more than 30 years of work experience in the field of information technology, including academic and industrial responsibilities. Dr. Hadzikadić joined the University of North Carolina in Charlotte, USA, in 1987, after completing his Ph.D. in computer science at Southern Methodist University in the United States where he stayed as a Fulbright scholar. His research includes areas of analytics, cognitive science, medical informatics and complex adaptive systems. Mirsad has published over fifty scientific papers in international and American journals, conferences and symposiums. Dr. Hadžikadić has published three books, has organized many international conferences and is the editor-in-chief of a scientific journal in the field of Politics and Complex Systems. Dr. Hadžikadić led teams or was part of research teams who designed models and simulations of economic, health, biological, financial, political and social problems. Dr. Hadžikadić was director of Medical Informatics and Orthopedic Informatics at the Carolinas Healthcare System organization from 1991 to 1997 and a manager at Deloitte and Touche Consulting in 1998. Dr. Hadžikadić became dean of the Faculty of Computer Engineering in 1998 and founding Dean of Information Technology College in 2000 at the University of North Carolina in Charlotte. Mirsad became the founder director of the Institute of Complex Systems in 2008, and is currently serving as the Executive Director of analytical programs in the field of Analytics at all colleges at the University of North Carolina in Charlotte. Also, Dr. Hadžikadić was the founder president of the Advisory Council for Bosnia and Herzegovina in Washington and the founding president of the Bosnian-Herzegovinian-American Academy of Sciences and Arts.

Prof. Mehmet Zeyrek, PhD
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"NEW TECHNOLOGIES AND INNOVATION AT CERN"

Biography:

Mehmet Zeyrek is a professor of Physics at the Physics Department, Middle East Technical University (METU), Ankara. He has served as a Chairman at the Physics Department and currently he is a Vice President of METU. He is a graduate of METU with B.Sc. in Physics. He has completed his Ph.D. in experimental high energy physics as a NATO scholar based on a research work done at CERN in Switzerland. He has worked as a post doctoral researcher at CERN. He has also worked as a visiting scientists at the Nagoya University, Japan and a visiting professor at the Texas Tech University, USA. He is currently involved in large experimental collaborations at CERN, LHCand at KEK, Belle II in Japan. His research interests are in high energy particle physics with emphasis on experimental and phenonomenological aspects of unified theories at the energy frontiers. He is also interested in the developments of particle detectors, their implementations in medicine. He is an author and co-aouthor of more than 700 research articles and his h-index count is 69.

Prof. Ahmed Kovačević, PhD
Centre for Compressor Technology,
City University London,
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United Kingdom

„MODELLING OF MULTIPHASE TWIN SCREW MACHINES"

Biography:

Professor Ahmed Kovacevic holds Howden Chair in Engineering Design and Compressor Technology at City University in London. His first degrees are from Bosnia and Herzegovina while his PhD is from City University in the United Kingdom. Following employments at the University of Sarajevo and his home town Tuzla in Bosnia and Herzegovina, he joined City University London in 1998. He was appointed Senior Lecturer in 2004 and promoted to professor at City University in 2008.Professor Kovacevic focuses his research to numerical modelling, analysis and design of positive displacement screw machines; he is extensively collaborating with industry and currently holds prestigious Howden Chair at City University. The main educational interest of Professor Kovacevic is developing design excellence of engineering undergraduate and postgraduate students and linking these with industrial research.Professor Kovacevic authored or co-authored 4 books, 35 Journal Papers, 100 Conference Papers, more than 50 Industrial Reports, he holds rights to several patents in the area of positive displacement machines, and has received many awards for best papers published in various journals and conferences including IMechE, ASME and World Geothermal Congress. He is Chairman of the International Conference on Compressors and their Systems at City University, board member of the Fluid Machinery Group in IMechE and he serves on organising committees of several conferences such as Fluid Machinery Congress, Engineering and Product Design Educational conference etc.He is editor of the Journal of Process Mechanical Engineering and a reviewer for many conferences and journals worldwide.

Prof. Sadko Mandžuka, PhD
Intelligent Transport System Department
Faculty of Traffic and Transport Sciences, University of Zagreb
Zagreb, CROATIA

„ COOPERATIVE SYSTEMS IN TRAFFIC TECHNOLOGY AND TRANSPORT "

Biography:

Prof. Sadko Mandžuka is a professor at the Faculty of Traffic and Transport Sciences, University of Zagreb. Prof. He received BSc Eng. (1980), MSc. (1992), and PhD. (2003) degrees in automatic control from the Faculty of Electrical Engineering, University of Zagreb. Prof. Mandžuka is currently Head of Intelligent Transport System Department. He has wide experience in the area of Intelligent Transport System, Traffic modeling, Floating vessels control, hydro-technical systems control etc. He had the opportunity to work both in academic and industrial environments including "Brodarski Institute Ltd", consulting in the Innovation Area for SME's, etc. He was a project leader and collaborating member of several EU and national Research & Development projects. Prof. Mandžuka is president of ITS Croatia, associate member of Croatian Academy of Engineering, member of Scientific Council for Traffic - Croatian Academy of Sciences and Arts, Founding member of Croatian Robotic Association, member of IFAC Technical Committee on Transportation and Vehicle Systems, member of IEEE Intelligent Transportation Systems Society etc. He is Engineering Applications Section Editor of the international scientific journal "An International Journal of Control and Optimization: Theories & Applications (IJOCTA)". Also, he is a member of the editorial board of international scientific journal International Journal of Intelligent Transportation Systems Research (Springer) and the national journal "Ceste i mostovi (Roads and Bridges)". Finally, he has served in the program committees and as reviewer at several international congress and conferences. He is author of more than 100 internationally reviewed publications.

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POSSIBILITIES AND CHALLENGES OF INFORMATION AND COMMUNICATIONTECHNOLOGIES WITH AFOCUS ON BOSNIA AND HERZEGOVINA

MOGUĆNOSTI I IZAZOVI INFORMACIONO KOMUNIKACIONIH TEHNOLOGIJA SA OSVRTOM NA BOSNU I HERCEGOVINU

Mirsad Hadžikadić

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Mirsad Hadžikadić

ABSTRACT:
New technologies are flooding the market at an ever-increasing pace. IoT, big data, deep learning, artificial intelligence, robotics, smart mobile devices, drones, social media, mobile medical sensors and devices, cyber security, and blockchain are just some of the technological tools, applications, and trends that have entered the mainstream conversation even in the general population. However, this is mostly true for developed nations. However, developing nations are not far behind. Thanks to the Internet and the global information flow these technologies find followers and practitioners in every corner of the world. Bosnia and Herzegovina is no different. Due to its many universities, the popularity of computer and communications technologies, and the availability of jobs young people learn quickly the latest trends in the world of advanced technologies. This paper will present an analysis of the best opportunities for the use of new technologies in a developing nation like Bosnia and Herzegovina.

Keywords:*New technologies,IoT, big data, deep learning, artificial intelligence, robotics,smart mobile devices.*

SAŽETAK:
Nove tehnologije preplavljuju tržište sa sve većim tempom. IoT, velike količine podataka, duboko učenje, vještačka inteligencija, robotika, pametni mobilni uređaji, dronovi, društveni mediji, mobilni medicinski senzori i uređaji, cyber sigurnost i blokchain su samo neki od tehnoloških alata, aplikacija i trendova koji su ušli u mainstream razgovor čak i u opštoj populaciji. Međutim, ovo je uglavnom tačno za razvijene nacije. Međutim, zemlje u razvoju nisu mnogo zaostale. Zahvaljujući internetu i globalnom protoku informacija, ove tehnologije pronalaze pristalice i praktičare u svakom uglu svijeta. Bosna i Hercegovina se tu ne razlikuje. Zbog mnogih univerziteta, popularnosti računarskih i komunikacionih tehnologija i dostupnosti radnih mjesta mladi ljudi brzo uče najnovije trendove u svijetu naprednih tehnologija. Ovaj rad predstaviće analizu najboljih prilika za korišćenje novih tehnologija u razvijanju nacije poput Bosne i Hercegovine.

Ključne riječi: *Nove tehnologije, IoT, veliki podaci, duboko učenje, vještačka inteligencija, robotika, pametni mobilni uređaji.*

NEW TECHNOLOGIES AND INNOVATIONS AT CERN

NOVE TEHNOLOGIJE I INOVACIJE U CERN-u

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Mehmet Zeyrek

ABSTRACT:
CERN (the European Organization for Nuclear Research) is one of the world's largest and leading laboratories for particle physics. CERN covers the researches in all aspects of particle physics and its spin-offs, reaching at the most extreme scientific and technological point. The technologies used at CERN are all new and fertile technologies. CERN expertise focuses on three main areas: accelerators, detectors and computing. Relating to these areas, cryogenics, superconductivity, vacuum, magnets, microelectronicsand data processing are known as CERN's primary competences. This paper reviews the interfaces fundamental science and key technology developments that give rise to innovations in various fields at CERN.

Keywords: *CERN, particle physics, innovations*

SAŽETAK:
CERN (Evropska organizacija za nuklearna istraživanja) je jedna od najvećih svjetskih i vodećih laboratorija za fiziku čestica. CERN pokriva istraživanja u svim aspektima fizike čestica i njegovih spin-offa, dostižući do najekstremnije naučne i tehnološke tačke. Tehnologije koje se koriste u CERN-u su sve nove i plodne tehnologije. CERN ekspertize se fokusiraju na tri glavna područja: akceleratori, detektori i računarstvo. Vezano za ove oblasti, kriogenetika, superprevodnost, vakuum, magneti, mikroelektronika i obrada podataka poznati su kao primarne kompetencije CERN-a. U ovom članku se daje pregled sučelja temeljne nauke i razvoj ključnih tehnologija koji dovode do inovacija u različitim oblastima u CERN-u.

Ključne riječi*: CERN, fizika čestica, inovacije.*

MODELLING OF MULTIPHASE TWIN SCREW MACHINES

MODELIRANJE MULTIFAZNIH VIJČANIH MAŠINA

Ahmed Kovacevic
City, University of London, EC1V 0HB, United Kingdom

Ahmed Kovacevic

ABSTRACT:
Twin screw compressors used in refrigeration, gas and air compression represent approximately 80% of the millions of industrial positive displacement compressors produced globally each year. More than 95% of these are oil injected. Screw machines canaslo be used as expanders, multiphase pumps and motors. Multiphase screw machines are traditionally analysed and designed by use of chamber thermodynamic models. However for further improvement of efficiency and reliability it is necessary to use more advanced modelling techniques such as 3D Computational Fluid Dynamics (CFD). In order to obtain fast and accurate solution using CFD, it is important that a numerical grid for a screw machine is of the highest quality and is generated quickly and reliably. Methods developed at City, University of London use algebraic transfinite interpolation for generation of the basic grid and a numerical solution of elliptic partial differential equations (PDE) of the Poisson's form to produce smooth final computational mesh.
This paper gives a review of the current state of art, future challenges and development trends in the application of CFD in modelling of multiphase twin screw machines.
Keywords:*screw compressor, multiphase flow, Computational Fluid Dynamics, grid generation.*

SAŽETAK:
Vijčani kompresori se koriste u rashladnoj tehnici, za kompresiju procesnih gasova i zraka, te čine oko 80% svjetske godišnje proizvodnje industrjskih kompresora. Od toga, preko 95% su uljno podmazivani vijačni kompresori. Osim kompresora, vijčane volumetrijske mašine se često koriste i kao ekspanderi, pumpe i hidraulični motori.Za analizu i konstrukciju vijčanih mašina najčesće se koriste tradicionalni termodinamski modeli.Međutim, za unapređenje performansi i pouzdanosti u radu, neophodno je u analizu uvesti modernije metode, naprimjer, 3D numeričku mehaniku fluida (CFD).Osnovni preduslov za brz i tačan proračun volumetrijskih mašina korištenjem CFD je kvalitetna numerička mreža koja treba da se može generisati brzo i efikasno. Metode za generaciju numeričke mreže za CFD u vijčanim mašinama razvijene na City, University u Londonu su bazirane na analitičkoj transfinitnoj interpolaciji za generaciju osnovne numeričke mreže te numeričkom rješenju parcijalniih differencijalnih jednačina u Poissonovom obliku kako bi se postigao zahtijevani kvalitet finalne mreže. U ovom radu je dat pregled metoda za generaciju numeričke mreže u vijčanim kompresorima koje se danas koriste u praksi i prikazani su trendovi razvoja metoda za CFD analizu kao i smjernice za dalji razvoj.
Ključne riječi:*vijčani kompresor, multifazni tok, numerička mehanika fluida, generacija mreže.*

COOPERATIVE SYSTEMS IN TRAFFIC TECHNOLOGY AND TRANSPORT

KOOPERATIVNO UPRAVLJANJE U TEHNOLOGIJI PROMETA I TRANSPORTU

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Sadko Mandžuka

ABSTRACT:
Traffic and transport engineering of the 21st century requires new approaches to make transport safer, moreefficient and reliable. The requirements for urban traffic are especially high with demands in integrationof different transport modes and significant reduction of noise and air pollution.Technological approach known as intelligent transport systems (ITS) is based on the use of modern information-communication technologies and artificial intelligencealgorithms.A particularly important area are cooperative systems that provide wirelessly communicationbetween vehicles, infrastructure (roads and related equipment) and other users (pedestrians, VRU, etc.). Technology of cooperative system allows two-way communication: V2V - vehicle to vehicle, V2I – vehicle to infrastructure, V2U- vehicle to other users (eg. Vulnerable Road User - VRU), I2U - infrastructure to other users, etc. The application of modern ICT technologies in this area aims to creating integrated solutions in the field of road safety, energy-efficient transport, more environmentally friendly solutions, etc.
Keywords:*intelligent transport systems, cooperative systems, information-communication technologies.*

SAŽETAK:
Promet i transportno inženjerstvo 21. stoljeća zahtijevaju nove pristupe kako bi transport bio sigurniji, učinkovitiji i pouzdaniji. Posebno su visoki zahtjevi za gradski promet s obzirom na potrebe integracije različitih načina prijevoza i značajno smanjenje buke i onečišćenja zraka. Tehnološki pristup poznat kao inteligentni transportni sustavi (ITS) temelji se na korištenju suvremenih informacijsko-komunikacijskih tehnologija i algoritama zasnovanih na umjetnoj inteligenciji. Posebno važno područje su kooperativni sustavi koji omogućavaju bežičnu komunikaciju između vozila, infrastrukture (ceste i pripadajuće opreme) i drugih korisnika (pješaka, VRU, itd.). Tehnologija kooperativnog sustava omogućuje dvosmjernu komunikaciju: V2V - vozilo - vozilo, V2I - vozilo - infrastruktura, V2U – vozilo - ostali korisnici (npr. ranjivi korisnici), I2U infrastruktura - ostali korisnici itd. Primjenom suvremenih ICT tehnologija u ovom području nastoje se stvoriti integrirana rješenja u području sigurnosti cestovnog prometa, energetski učinkovitog prijevoza, ekološki prihvatljivijih rješenja itd.
Ključne riječi:*inteligentni transportni sustavi, kooperativni sustavi, informacijsko-komunikacijske tehnologije.*

NUMERICAL ANALYSIS OF MATERIAL FATIGUE IMPACT ON BICYCLE FRAME SAFETY IN ACCORDANCE WITH EN 14764

NUMERIČKA ANALIZA UTICAJA ZAMORA MATERIJALA NA SIGURNOST RAMA BICIKLA U SKLADU SA EN 14764

Nermina Zaimović-Uzunović[1], Ernad Bešlagić[2], Almir Porča[3]
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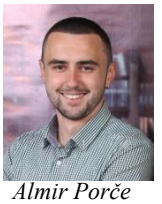

Nermina Zaimović -Uzunović *Ernad Bešlagić* *Almir Porče*

ABSTRACT:
Bicycles represent the most widespread means of transport today. The basis for a large bike usage is its relatively simple construction. There are many different types and shapes of bicycles on the market. In order to protect buyers and users from low quality and unstable bicycles, standards have been developed that prescribe minimum safety requirements and test methods before placing the bicycle on the market. The European standard for urban and recreational bicycles has the designation EN 14764 and prescribes, inter alia, the procedure for testing the impact of material fatigue on the safety of the bicycle frame. The study of how the impact of material fatigue affects the appearance of bicycle crack is carried out using numerical simulations. Simulations were performed on a concrete sample of BASMAN's bicycle manufacturer GS-TMT Travnik. The research carried out has shown that numerical simulations can help to determine the direction in which the designer creates a solution meeting the requirements of the standards at the very beginning of the bicycle design. The results of the numerical simulations have shown what needs to be done to make the analysed bicycle frame fulfilled the test requirements prescribed by EN14764. Analysis also showed the concentration of stresses in certain zones on the examined bicycle frame, which coincide with the point at which a cracking occurred at one used bicycle.

Keywords: *bicycle frame, fatigue, EN 14764, numerical simulation.*

SAŽETAK:
Bicikli predstavljaju najrasprostranjenija prevozna sredstva današnjice. Osnova velike upotrebe bicikla jeste njegova relativno jednostavna konstrukcija. Na tržištu se nalazi veliki broj različitih tipova i oblika bicikala. Da bi se kupci i korisnici zaštitili od nekvalitetnih i nesigurnih bicikala razvijeni su standardi koji propisuju minimalne sigurnosne zahtjeve i metode ispitivanja prije stavljanje bicikla na tržište. Evropski standard koji se odnosi na gradske i rekreativne bicikle ima oznaku EN 14764 i propisuje, između ostalog, proceduru za ispitivanje uticaja zamora materijala na sigurnost rama bicikla. Istraživanje kako uticaj zamora materijala utiče na pojavu pukotine rama bicikla izvedeno je korištenjem numeričkih simulacija. Simulacije se rađene na konkretnom uzorku rama bicikla BASMAN proizvođača GS-TMT Travnik.

Ključne riječi*: ram bicikla, zamor, EN 14764, numerička simulacija.*

THE INFLUENCEOF THE TOOL GEOMETRY ON THE QUALITY OF THE WELD IN FSW PROCESS

UTICAJ GEOMETRIJE ALATA NA KVALITET ZAVARA KOD PROCESA FSW

Aleksandra Koprivica[1], Nikola Šibalić[2], Milan Vukčević[3], Mirjana Jokanović[4]

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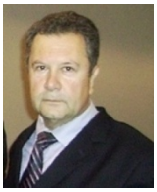


Aleksandra Koprivica Nikola Šibalić Milan Vukčević Mirjana Jokanović

ABSTRACT:

There are several friction welding procedures that have, to a greater or lesser extent, a commercial application, among which can be distinguished FSW - Friction Stir Welding. Firstly, using the FSW procedure, straight-line compounds were obtained, and soon afterwards also curvilinear, including circular. In addition to the great interest in the FSW process, many aspects of this process have not been sufficiently explored. This applies, inter alia, to the geometry of the tool. In this paper, the application of FSW welding to aluminium alloys is investigated, by varying different types of tool pin used during welding. Also, microstructure testing was performed, which was used for comparison and gradation of the quality of welds, welded with tools of different geometric shapes.

Keywords: *FSW method, microstructure, pin of tool.*

SAŽETAK:

Postoji više postupaka zavarivanja trenjem koji, u manjoj ili većoj mjeri, imaju komercijalnu primjenu od kojih se izdvaja FSW - Friction Stir Welding. Najprije su, korišćenjem postupka FSW, ostvareni pravolinijski spojevi, pa ubrzo nakon toga i krivolinijski, uključujući i kružne. Pored velikog interesovanja za FSW postupak, mnogi aspekti ovog procesa nisu u dovoljnoj mjeri istraženi. To se između ostalog odnosi i na geometriju alata. U ovom radu istražuje se primjena FSW zavarivanja na legure aluminijuma, varirajući razne oblike trna alata, koji se koristi tokom zavarivanja.Takođe, izvršeno je ispitivanje mikrostrukture, čime je napravljeno poređenje i gradacija kvaliteta zavara, zavarenih alatima različitih geometrijskih oblika.

Ključne riječi: *FSW postupak, mikrostruktura, trn alata.*

DIMENSION MEASUREMENT OF INJECTION MOULDED TOYBRICKS

MJERENJE DIMENZIJA IGRAČAKA ZA SKLAPANJE IZRAĐENIH BRIZGANJEM PLASTIKE

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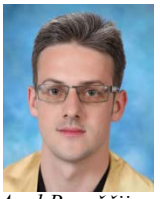

Samir Lemeš Anel Boruščija

ABSTRACT:
Polymer toybricks are available in different shapes and sizes, and their price varies significantly. The aim of this paper is to test whether high price of some brands of toybricks corresponds to their quality, in terms of dimension accuracy. For this purpose, two kinds of toybricks were tested: one made by the renowned LEGO® company, the other model made by anonymous Chinesemanufacturer. In addition to visual differences, such as colour stability and finishing quality, the difference is in quality and accuracy of shapes and dimensions that can affect the characteristics of the bricks, such as: quality and stable connection with other bricks in the assembly, lifetime etc. The main characteristic tested here is the dimension tolerance of specific dimensions of toybricks.

Keywords:*quality, tolerance, coordinate measuring machine, LEGO® toybricks.*

SAŽETAK:
Plastične igračke za sklapanje su dostupne u raznim oblicima i veličinama, s velikim razlikama u cijenama. Cilj ovog rada je da se ispita da li visoka cijena nekih brendova igračaka za sklapanje odgovara njihovom kvalitetu, u smislu preciznosti dimenzija. U tu svrhu, ispitane su dvije vrste igračaka za sklapanje: jedna renomirane kompanije LEGO®, a drugi model koji je proizveo anonimni kineski proizvođač. Pored vizualnih razlika, kao što su postojanost boje ili kvalitet obrađene površine, razlika je i u kvalitetu i preciznosti oblika i dimenzija koje mogu utjecati na karakteristike igračaka, kao što su: kvalitet i čvrsto povezivanje s drugim igračkama u sklopu, trajnost i sl. Glavna karakteristika koja je ovdje ispitana je tolerancija karakterističnih dimenzija igračaka za sklapanje.

Ključne riječi*: kvalitet, tolerancija, koordinatna mjerna mašina, LEGO® igračke za sklapanje.*

WIRE AND ARC ADDITIVE MANUFACTURING (WAAM) – A NEW ADVANCE IN MANUFACTURING

ADITIVNA PROIZVODNJA POMOĆU ELEKTRIČNOG LUKA I ŽICE - NOVA TEHNOLOGIJA PROIZVODNJE

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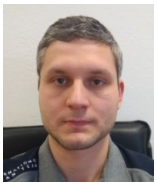


Nikola Knezović Angela Topić

ABSTRACT:
AdditiveManufacturing (AM) is atechnique where structures are produced by ading and depositingmaterial inalayer upon layer manner.. WAAM (Wire and Arc Additive Manufacturing) is a technology which has been investigated in last 30 years, although thefirst patent dates from almost 100 years ago. It became interesting for scientists and manufacturers due to its ability to produce fully dense metal parts and large near-net-shape products. WAAM is mostly used in modern industries, like aerospace industry. It uses existing welding equipment, electric arc as energy source and welding wire as feedstock. Because of this, it is cheaper than other AM technologies, which usually need specific equipment and materials. The process consists of few steps (designing CAD model, slicing into layers, tool-path generating, choosing welding parameters, material deposition and post-processing). The aim of this paper is to explain WAAM in detail, give areview about researches so far in this area and to give suggestions for new advances.

Keywords:*WAAM, welding, additive manufacturing.*

SAŽETAK:
Aditivna proizvodnja je tehnologija u kojoj se komadi proizvode na način da se materijal dodaje tako što se slojevi nanose jedan po jedan. WAAM (aditivna proizvodnja uz pomoć žice i električnog luka) je tehnologija koja se istražuje zadnjih 30 godina, iako prvi patent potječe otprije skoro 100 godina. Postala je zanimljiva istraživačima i proizvođačima zbog mogućnosti da se njome proizvedu komadi od punog metala i veliki proizvodi kojima je strojna obrada potrebna samo u završnoj fazi. WAAM se najčešće koristi u modernim industrijama, poput avionske. Koristi postojeću opremu za zavarivanje, električni luk kao izvor topline i žicu za zavarivanje kao dodatni materijal. Zahvaljujući tome, jeftiniji je od drugih tehnologija aditivne proizvodnje koji trebaju posebnu opremu i materijale. Postupak se sastoji od nekoliko koraka (dizajniranje CAD modela, rezanje na slojeve, generiranje putanje alata, odabir parametara zavarivanja, taloženje materijala i dodatna strojna obrada). Cilj ovoga rada je detaljno opisati WAAM tehnologiju, dati pregled dosadašnjih područja istraživanja i prijedloge za daljnja istraživanja i inovacije.

Ključne riječi*: WAAM, zavarivanje, aditivna proizvodnja.*

ANALYSIS OF THE TYPE AND CHEMICAL CONTENT OF THE INCLUSION ON SEM OF THE STAINLESS STEEL WITH AND WITHOUT THE ADDITION OF Zr AND Te

ANALIZA TIPA I HEMIJSKOG SASTAVA UKLJUČAKA NA SEM-u NEHRĐAJUČEG ČELIKA SA I BEZ DODATKA Zr I Te

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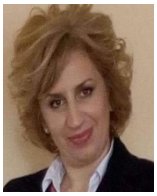

Derviš Mujagić Aida Imamović Mirsada Oruč Sulejman Muhamedagić

ABSTRACT:

Control of the formation of non-metallic inclusions and their characterization is presenting the foundation for improving of the qualities of steel products, as well as designing of the new types of steel.In order to produce steel with improved machinability, such as austenitic stainless steel X8CrNiS18-9 modification of the chemical composition of non-metallic inclusions is made. In this paper the SEM studies of the presence and type of inclusions in austenitic stainless steel with the addition of sulphur of the label X8CrNiS18-9 without addition and addition of alloying elements Zr and Te, were carried out individually in order to investigate its influence on the shape and chemical composition of the inclusions.

Keywords: *stainless steel, alloying, non-metallic inclusions, testing on SEM.*

SAŽETAK:

Kontrola formiranja nemetalnih uključaka i njihova karakterizacija predstavlja osnov u poboljšavanju osobina čeličnih proizvoda, kao i dizajniranju novih vrsta čelika.U cilju proizvodnje čelika sa boljom mašinskom obradivosti, kao što je austenitni nehrđajući čelik X8CrNiS18-9 urađena je modifikacija hemijskog sastava nemetalnih uključaka. U ovom radu provedena su SEM istraživanja prisustva i tipa uključaka u austenitnom nehrđajućem čeliku sa dodatkom sumpora oznake X8CrNiS18-9 bez dodatka i s dodatkom legirajućih elemenata Zr i Te, pojedinačno, a u cilju istraživanja njihovog uticaja na oblik i hemijski sastav uključaka.

Ključne riječi*: nehrđajući čelik, legiranje, nemetalni uključci, ispitivanje na SEM-u.*

STRENGTH AND DEFORMATION CALCULATION OF FLAT O-SPRINGS

PRORAČUN ČVRSTOĆE I DEFORMACIJA RAVNIH O-OPRUGA

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ABSTRACT:

A range of flat O-springs has been developed. 3Dcomputer modeling has been performed with strength and deformation calculation using the software products Autodesk Inventor Professional andSolidWorks. A computer-planned experiment has been made and regression equations have been obtained for determination of the maximum stresses and deformations of the O-springs. The results are shown graphically

Keywords: *flat springs, computer modeling, maximum stresses, deformations.*

SAŽETAK:

Razvijen je niz ravnih O-opruga. Proračun čvrstoće i deformacija je izvedeno na 3D komjuterskom modelu koristeći softverske pakete Autodesk Inventor Professional i SolidWorks. Urađeno je planiranje eksperimenta i dobijene su regresione jednačine za određivanje maksimalnog napona i deformacija O-opruga. Rezultati su prikazani grafički.

Ključne riječi*: ravne opruge, kompjutersko modeliranje, maksimalni naponi, deformacije.*

PROTOTYPE APPARATUS FOR CALIBRATION CONTACT SENSORS FOR MEASURING THE TEMPERATURE OF A SOLID SURFACE

PROTOTIPNI APARATI ZA KALIBRACIJU KONTAKTNIH SENZORA ZA MJERENJE TEMPERATURE ČVRSTE POVRŠINE

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Edina Terzić Raif Seferović Narcisa Bajramović

ABSTRACT:
The paper is about calibration of contact sensors for measuring temperature of solids surface. The paper describes process of idea development, design and make of prototype apparatus for calibration of contact sensors in temperature range from +50 ℃ to +600 ° C is described. The apparatus consists of two separate and integrated systems for heating. The test results are given in the form gained by measurement determined characterization of the relevant parameters of the apparatus, according to the protocol for the validation of the method. The significant improvements and innovative approach are confirmed and extending of the temperature range up to 600 ° C is provided. The se innovations are related to the way of heating the reference body to a set temperature calibration point. The innovations are also seen in a way to ensure long-term stability of the temperature of the reference surface with standard deviations less than 0,01°C to 0,05°C, based on values read-out during 180 minutes in the entire calibration range.The key parts of the apparatus, the way of apparatus functioning and the results of testing apparatus in the entire calibration range are also presented in this paper. The specified individual and summary contributions of measurement uncertainty of the apparatus for all calibration points are specified in the end.

Keywords: *calibration of contact temperature sensors; surface temperature; prototype apparatus; extrapolation; measurement uncertainty of apparatus.*

SAŽETAK:
Rad je o kalibraciji kontaktnih senzora za merenje temperature površine čvrste materije. Rad opisuje proces razvoja ideje, opisuje se projektovanje i izrada prototipnih aparata za kalibraciju kontaktnih senzora u temperaturnom opsegu od + 50 ° C do +600 ° C. Aparat se sastoji od dva odvojena i integrisana sistema za grejanje. Rezultati ispitivanja se daju u obliku dobijenim merenjem određene karakteristike relevantnih parametara aparata, prema protokolu za validaciju metode. Potvrđena su značajna poboljšanja i inovativni pristup i obezbeđen je proširenje opsega temperature do 600 ° C. Inovacije se odnose na način zagrijavanja referentnog tijela na određenu tačku kalibracije temperature. Inovacije se takođe vide na način da se obezbedi dugoročna stabilnost temperature referentne površine sa standardnim odstupanjima manje od 0,01 ° C do 0,05 ° C, na osnovu vrednosti za čitanje tokom 180 minuta u celini područje kalibracije. U ovom radu su predstavljeni i ključni dijelovi uređaja, način funkcionisanja aparata i rezultati aparata za testiranje u čitavom kalibracijskom opsegu. Navedeni pojedinačni i sažeti doprinosi mjerne nesigurnosti aparata za sve točke kalibracije su navedeni na kraju.

Ključne riječi: *kalibracija senzora kontaktne temperature; površinska temperatura; prototipni aparati; ekstrapolacija; mjerna nesigurnost aparata..*

AUTOMATIC CONTROL OF TUBE HYDROFORMING PROCESS IN EXPERIMENTAL CONDITIONS

AUTOMATOMATSKO UPRAVLJANJE PROCESOM HIDROOBLIKOVANJA CIJEVI U EKSPERIMENTALNIM USLOVIMA

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Edina Karabegović Edin Šemić Safet Isić

ABSTRACT:
Automatic control of tube hydroforming process enables control of the process by application of appropriate sensors for measuring fluid pressure, axial force of the press and axial displacement. In addition, it also provides control of the operation system of electric motor, hydraulic system for achieving fluid working pressure (pump, multiplier, proportional valve…), hydraulic drive for opening/closing hydroforming tools and axial punches. The paper presents an example of introducing automatic control of the tube hydroforming process in experimental conditions

Keywords: *automatic control, sensors, hydroforming, fluid pressure, multiplier.*

SAŽETAK:
Automatsko upravljanje procesom hidrooblikovanja cijevi omogućava kontrolu procesa primjenom odgovarajućih senzora za mjerenje pritiska fluida, aksijalne sile tiskača i aksijalnog pomaka, pri čemu je osigurano i upravljanje sistemom rada elektromotora, hidrauličnog sistema za ostvarivanje radnog pritiska fluida (pumpa, multiplikator, proporcionalni ventil,...), hidrauličnog pogona za otvaranje/zatvaranje alata za hidrooblikovanje i kretanje aksijalnih tiskača.U radu je naveden primjer uvođenja automatskog upravljanja procesom hidrooblikovanja cijevi u eksperimentalnim uslovima.

Ključne riječi*: automatsko upravljanje, senzori, hidrooblikovanje, pritisak fluida, multiplikator.*

ANALYSIS AND DETERMINATION OF FRICTION IN HYDROFORMING PROCESS OF CROSS TUBE

ANALIZA I ODREĐIVANJE TRENJA U PROCESU HIDROOBLIKOVANJA RAČVE

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ABSTRACT:
In hydroforming process of cross tube significant influence has a friction between tool and workpiece related to a tool load, stability of forming process and success of obtaining final piece. Although friction in hydroforming process is a lower intensity it affects the increase of process parameters and contact stresses, which results in greater tool load and decreasing its use span.
In this paper analysis of friction in hydroforming process of cross tube and determination of friction coefficient using experimental results and simulation with software simufact.forming is given.

Key words: *hydroforming, friction, experiment, analysis, simulation.*

SAŽETAK:
U procesu hidrooblikovanja cijevi znatan utjecaj ima trenje između alata i obradka koje se odnosi na opterećenje alata, na stabilnost procesa oblikovanja i uspješnost dobijanja gotovog komada. Iako je trenje kod procesa hidrooblikovanja manjeg intenziteta ono znatno utječe na povećanje parametara procesa i kontaktnih napona, a što dovodi do većeg opterećenja alata i smanjenja njegovog vijeka trajanja.
U radu je prikazana analiza trenja u procesu hidrooblikovanja krstaste račve i određivanje koeficijenta trenja korištenjem eksperimentalnih rezultata i simulacije softvera simufact.forming.

Ključneriječi: *hidrooblikovanje, trenje, eksperiment, analiza, simulacija*

INFLUENCE OF INJECTION MOLDING PROCESS PARAMETERS ON PART QUALITY

UTICAJ PARAMETARA PROCESA BRIZGANJA NA KVALITET KOMADA

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ABSTRACT:
A case study to determine the influence of injection molding process parameters on part quality isperformed. Part quality is evaluated based on deflection rate, volumetric shrinkage, and sink mark depth results. Considered process parameters are mold temperature, melt temperature, injection time, pack time, pack pressure and cooling time. A thin walled butterfly valve flap and a thick walled butterfly valve shaft are analyzed separately. Polypropylene is used as molding material. A design of experiment based on the Taguchi method is generated for both parts and a computer simulation to solve the case matrixes is executed. Relative process parameter influence on each individual quality criteria is determined by analysis of variance. Importance of process temperatures as well as parameter impact dependence on characteristic part shape is reveled.

Keywords: *injection molding, quality prediction, parameter study, design of experiment, Taguchi method, ANOVA.*

SAŽETAK:
Urađena je studija slučaja da se utvrdi uticaj parametara procesa brizganja na kvalitet komada. Kvalitet komada se procenjuje na osnovu rezultata nivoa deformacije, volumetrijskog skupljanja i dubinskog markera. Smatrani parametri procesa su temperatura kalupa, temperatura topljenja, vrijeme ubrizgavanja, vrijeme oblikovanja, pritisak oblikovanja i vrijeme hlađenja. Zasebno se analiziraju tankostjena klapna ventila i debolostjeno vratilo ventila. Kao materijal za oblokovanje koristi se Polipropilen. Dizajn eksperimenta zasnovan na metodi Taguchi je generisan za oba djela i izvršena je kompjuterska simulacija za rešavanje matrica slučaja. Relativni uticaj parametara procesa na svaki pojedinačni kriterijum kvaliteta određuje se analizom varijanse. Važnost temperatura procesa, kao i zavisnost od parametarskog uticaja na karakteristični oblik djelova je nađena.

Ključne riječi: *brizganje, predviđanje kvaliteta, studija parametara, dizajn eksperimenta, Taguchi metoda, ANOVA.*

SCIENCE OF METALS THROUGH LENS OF MICROSCOPE

NAUKA O METALIMA KROZ OBJEKTIV MIKROSKOPA

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Belma Fakić Adisa Burić Edib Horoz

ABSTRACT:
Man atempts to know and see what is not visible with the naked eye goes back to the far past. By the combination of concave and convex lenses, in the 16th century, Dutchman Janssen made the first ever-increasing instrument. Robert Hooke was first used to illuminate objects using artificial light and gave a first description of plant cells still afar 1665. Henry Clifton Sorby, in the 1960s, was the first to apply a microscope in metal testing. Today, microscopes are used daily for the testing purity of metals and alloys, the presence of nonmetallic inclusions, the microstructural phase present in the alloys as a result of various forms of heat treatment. This paper gives an overview of the possibilities of light microscopes in the testing of metal materials.

Keywords: *light microscope, metalic materials, steel, microstrukture.*

SAŽETAK:
Nastojanje čovjeka da spozna i ono što nije vidljivo golim okom seže u daleku prošlost. Kombinacijom konkavnih i konveksnih leća još u 16.stoljeću je nizozemac Janssen napravio prvi povećavajući instrument. Robert Hooke se prvi za osvjetljavanje predmeta koristio umjetnom svjetlošću i dao prvi opis biljnih stanica još daleke 1665.godine. Henry Clifton Sorby, šezdesetih godina 19.stoljeća je prvi primijenio mikroskop u ispitivanju metala. Danas se mikroskopi koriste svakodnevno za istraživanja čistoće metala i legura, prisustvo nemetalnih uključaka, mikrostrukturne faze prisutne u legurama kao posljedica raznih vidova termičke obrade. U ovom radu je dat pregled mogućnosti svjetlosnih mikroskopa u ispitivanju metalnih materijala.

Ključne riječi: *svjetlosni mikroskop, metalni materijali, čelik, mikrostruktura*

INCREASE OF PERFORMANCE OF GRINDING BY PLATE CIRCLES

POVEĆANJE PERFORMANSI BRUŠENJA DISKOVIMA

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Tankonogyi Vladimir Yakimov Alexey Bovnegra Liubov

ABSTRACT:
A method is proposed for increasing the grinding efficiency of gear wheels by two disk wheels. The possibility of increasing grinding capacity on machines working in two circles by the method of bending without reducing the accuracy of processing has been revealed. The conditions for increasing the processing capacity are determined when placing the disc wheels in one and two adjacent cavities of the treated wheel.

Keywords: *disc wheels, cross travel, angle of adjustment, machining accuracy.*

SAŽETAK:
Predložena je metoda za povećanje efikasnosti brušenja zupčanika pomoću dva disk. Prikazana je mogućnost povećanja kapaciteta brušenja na mašinama koje rade u dva kruga metodom savijanja bez smanjenja tačnosti obrade. Uslovi za povećanje kapaciteta obrade utvrđuju se prilikom postavljanja diskova na jednoj i dve susjedne šupljine obrađivanog točka.

Ključne riječi*: diskovi, krstovi, ugao podešavanja, tačnost obrade.*

ANALIZA TORZIONIH VIBRACIJA MOTORA SPOJENOG PROPELEROM PREKO PARA ZUPČANIKA

ANALYSIS OF TORSIONAL VIBRATION OF THE ENGINE CONNECTED WITH PROPELLER THROUGH PAIR OF GEARS

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Ermin Husak Erzad Haskić

ABSTRACT:
The determination of natural frequencies and the mode shapes of vibration of discrete and continuous systems is one of the basic tasks that are solved in the vibrations of these systems. By knowing these values, it is possible to avoid unwanted occurrences in the system. In this paper the torsional vibrations of the shafts of a marine engine connected with a propeller through pair of gears are analysed. A well-known process of transforming gear system with a multiple shafts to a single shaft or torsion chain with definite number of degrees of freedom has been carried out. From this analysis natural frequencies and modeshapes of vibration have been obtained. Then, a numerical analysis of the torsional vibration of the shafts of the engine connected with propeller

Keywords: *torsion, vibration, natural frequencies, mode shapes.*

SAŽETAK:
Određivanje prirodnih kružnih frekvencija i oblika oscilovanja diskretnih i kontinuiranih sistema je jedan od osnovnih zadataka koje se rješavaju u vibracijama ovih sistema. Poznavanjem ovih vrijednosti moguće je izbjeći neželjene pojave u sistemu. U ovom radu vrši se analiza torzionih vibracija vratila brodskog motora spojenog propelerom preko para zupčanika. Proveden je poznati postupak transformacije reduktora sa više vratila sa diskovima na jedno vratilo tj. torzioni lanac sa više stepeni slobode kretanja iz kojeg su dobijene prirodne frekvencije i oblici oscilovanja. Potom je provedena numerička analiza torzionih vibracija vratila brodskog motora spojenog propelerom preko para zupčanika korištenjem softvera ANSYS.

Ključne riječi*: uvijanje, vibracije, prirodne frekvencije, oblici oscilovanja.*

FEM MODEL OF MISALIGNED ROTATIONAL SYSTEM WITH ROTATING LOOSENESS

MKE MODEL NESAOSNOG ROTACIONOG SISTEMA SA ZAZOROM U LEŽAJU

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ABSTRACT:
Importance of knowing characteristics of rotational systems vibrations is significant, since it is main cause of machine failure. Vibration analysis could facilitate determination of the machine fault. As a part of the research on machine faults and its reflection on the machine behavior, numerical modeling could give excellent starting information for future research. Finite element model of rotational system motor – flexible coupling – rotor is presented in this paper. As a fault analyzed in this paper, misalignment and rotating looseness are used and modelled as external loads. For this modelled rotational system is shown that it is suitable for analysis of rotational machinery vibrations.

Keywords: *FEM, vibrations, rotating machinery, misalignment, rotating looseness.*

SAŽETAK:
Poznavanja karakteristika vibracija rotacionih sistema je veoma bitna u tehnici, obzirom da su vibracije jedan od glavnih uzročnika otkaza mašina. Analiza vibracija može olakšati određivanje uzročnika otkaza mašine. Kao dio istraživanja uzročnika otkaza mašina, kao i njihovog uticaja na samo ponašanje mašine, numeričko modeliranje može dati dobre polazne podatke za buduća istraživanja. U ovom radu je prezentovan model rotacionog sistema motor – fleksibilna spojnica – rotor predstavljen metodom konačnih elemenata (MKE). Kao greške analizirane u ovom modelu korištene su nesaosnost i zazor u ležaju, koje su modelirane kao vanjska opterećenja. Za predstavljeni model je pokazano da je pogodan za analizu vibracija rotacionih mašina.

Ključne riječi: *metod konačnih elemenata, vibracije, rotacione mašine, nesaosnost, zazor u ležaju.*

APPLICATION OF EXPLOSIVES IN METAL FORMING PROCESS

PRIMJENA EKSPLOZIVA U OBRADI DEFORMIRANJEM

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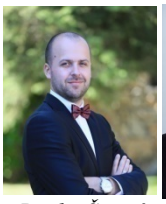
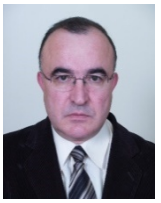

Darko Šunjić Stipo Buljan

ABSTRACT:
The use of explosives in deformation process is one of the most interesting and still insufficiently explored areas. This unconventional technology has an increasing use because of being much cheaper and not requiring expensive tools, machines. Explosive as a source of energy has a low price as well. This paper involves deep-drawing explosion technology as well as one of the tools which is used for this technology. High-alloy steels are used to make dies strength, concrete, plastics and others. Also types of media that can be used in processes of explosion are mentioned. Because the calculated mass of required explosives can differ up to 200%, three distinct expressions are suggested, as well as expression for calculating of detonation rate by Dautriche methode.

Keywords: *metal forming, explosive, unconventionaltechnology.*

SAŽETAK:
Upotreba eksploziva u obradi deformiranjem je jedno od najzanimljivijih i još uvijek nedovoljno istraženih područja. Ova nekonvencionalna tehnologija svakodnevno nalazi sve veću primjenu jer je za razliku od konvencionalnih tehnologija mnogo jeftinija i pri obradi nisu potrebni skupi alati i strojevi a eksploziv kao izvor energije ima nisku cijenu. U radu je navedena tehnologija dubokog izvlačenja pomoću eksplozije kao i jedan od alata koji se koristi za ovu tehnologiju.Za izradu kalupa primjenjuju se alatni čelici visoke čvrstoće, beton, plastika i drugi. Usto su navedene i vrste medija koje se mogu koristiti u procesima obrade eksplozijom. Budući da se u izračunima potrebne mase eksploziva mogu razlikovati i do 200%, u radu su navedena tri različita izraza, kao i izraz za računanje brzine detonacije po Dautriche metodi.

Ključne riječi*: obrada, eksplozija, nekonvencionalna tehnologija.*

AUTOMATION OF THE WELDING PROCESS BY USE OF INDUSTRIAL ROBOTS

AUTOMATIZACIJA PROCESA ZAVARIVANJA KORIŠTENJEM INDUSTRIJSKIM ROBOTIMA

Isak Karabegović[1], Riaz Mirza[2]
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Isak Karabegović *Riaz Mirza*

ABSTRACT:

The development of robotic technology, owing to the advancement of digital technology, is evolvingeach year, resulting in increased representation of industrial robots. We are currently in the fourth industrial revolution, referred to as "Industry 4.0" by the Germans. The implementation of the fourth technological revolution depends on a series of new and innovative technological achievements, most of which are applied in robotic technology. Automation of production processes, including automation of the welding process, must include industrial robots. ……Industrial robots are most widely used in two welding processes: arc welding and spot welding, so an analysis of their representation in these two welding processes for the period 2010-2016 was conducted. A comparative analysis of the annual production of vehicles in four countries was made: China, Japan, USA and Germany, as well as the presence of robots in these countries in the welding processes. The paper also includes the analysis and possibilities of future industrial robot representation in this area.

Keywords:*industry, process, robot, welding, arc welding, spot welding, application.*

SAŽETAK:

Razvoj robotske tehnologije zahvaljujući razvoju digitalne tehnologije napreduje iz godine u godinu, što ima za posljedicu povećanja zastupljenosti industrijskih robota. Danas se nalazimo u četvrtoj industrijskoj revoluciji koji njemci nazivaju „Industrija 4.0". Sama implementacija četvrta tehnološka revolucija zavisi od niza novih i inovativnih tehnološki dostignuća, a najviše koja su primjenjena u robotskoj tehnologiji.Svaka utomatizacija proizvodnih procesa, te tako i automatizacija procesa zavarivanja mora uključiti industrijske robote.....
Industrijski roboti se najviše primjenjuju za dva procesa zavarivanj. elektrolučno zavarivanje i zavarivanje plinom , tako da je napravljena analiza njihove zastupljenosti u ova dva postupka zavarivanja za period 2010-2016.godineNapravljena uporedna je analiza godišnje proizvodnje vozila u četiri zemlje: Kina, Japan, USA i Njemaka, kao i zastupljenosti robota u tim zemljama u procesima zavarivanja.Na kraju rada napravljena je analiza i mogućnosti buduće zastupljenosti industrijkih robota u ovoj oblasti.

Ključne riječi: *industrija, proces,robot, zavarivanje, arc welding, spot welding, aplikacija.*

APPLICATION OF ITERATIVE METHODS TO SOLVE INVERSE KINEMATICS PROBLEM OF ROBOT

PRIMJENA ITERATIVNE METODE NA RJEŠAVANJE INVERZNOG KINEMATSKOG PROBLEMA ROBOTA

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Avdo Voloder

ABSTRACT:

One of the most important segments of robotics is solving inverse kinematics of the robot. The paper presents the application of numerical methods iteration by individual coordinates, to solve the inverse problem of kinematics of the robot. This problem involves the determination of unknown internal coordinates of the robot, if they know the external coordinates. Using this method, the solution converges quickly, as can be seen from the illustrative examples in the paper.

Keywords:*inverse kinematics, iteration, convergence*

SAŽETAK:

Jedan od najvažnijih segmenata robotike je rješavanje inverzne kinematike robota. U radu je prikazana primjena numeričke metode iteracije po pojedinim koordinatama, na rješavanje inverznog problema kinematike robota. Taj problem podrazumjeva određivanje nepoznatih unutarnjih koordinata robota, ukoliko se znaju vanjske koordinate. Koristeći ovu metodu, rješenje brzo konvergira, što se može vidjeti iz ilustrativnog primjera u radu.

Ključne riječi*: inverzna kinematika, iteracija, konvergencija*

PARAMETERFITTING FOR SOFT DIELECTRIC ELASTOMER ACTUATOR

PODEŠAVANJE PARAMETARA ZA AKTUATOR SA MEKIM DIELEKTRIČNIM ELASTOMEROM

Timi Karner[1], Janez Gotlih[2], Boštjan Razboršek[3], Karl Gotlih[4]
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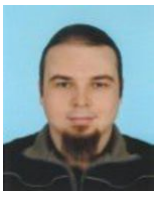


Timi Kerner Janez Gotlih Boštjan Razboršek Karl Gotlih

ABSTRACT:
Big progress has been made recently in humanoid robotics with the development of human like robots. Humanoid robots are becoming more and more similar to humans, but what they still lack are proper mechanical actuators which are still based on rotary motors or pneumatic cylinders. With the development of soft actuators one is getting closer to mimic the natural behavior of muscles. Dielectric elastomer actuators can be used as soft actuators. They can be described with fractional derivative Kelvin-Voigt model. With the help of fractional derivatives and least-square method one can use this combination in algorithm for parameter fitting. Fractional Kelvin-Voigt model can describewider working frequency range of dielectric elastomer actuator as can basic Kelvin-Voigt model do.

Keywords: *soft actuators, dielectric elastomers, viscoelasticity, Kelvin-Voigt, fractional derivative.s*

SAŽETAK:
Velik napredak je postignut u humanoidnoj robotici sa razvojem robota koji liče ljudima. Humanoidni roboti postaju sve više slični ljudima, ali ono što još uvek nedostaje su odgovarajući mehanički aktuatori koji su i dalje zasnovani na rotacionim motorima ili pneumatskim cilindrima. Sa razvojem mekanih aktuatora bliži se imitiranju prirodnog ponašanja mišića. Dielektrični elastomerni aktuatori mogu se koristiti kao mekani aktuatori. Mogu se opisati sa frakcionim derivativnim Kelvin-Voigt modelom. Uz pomoć frakcionih derivata i mateoda najmanjih kvadrata, ova kombinacija se može koristiti u algoritmu za podešavanje parametara. Frakcionalni Kelvin-Voigt model može opisati radni frekventni opseg dielektričnog elastomernog aktuatora, kao što može i osnovni Kelvin-Voigt model.

Ključne riječi: *mekani aktuatori, dielektrični elastomeri, viskoelastičnost, Kelvin-Voigt, frakcioni izvod.*

TIMBER CONSTRUCTION AND ROBOTS

DRVNE KONSTRUKCIJE I ROBOTI

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Salah-Eldien Omer

ABSTRACT:
The timber construction is using Robots from the phase of production to the assembling of the prefabricated houses. The usage of Robots is based on the need of the producer of prefabricated houses in the sense of software's programmed specially for certain production. The light timber construction are produced and assembled with programs, mainly organized from the side of the CNC centers and the Robots from the same machine producers. Unlike light frame constructions the heavy wait timber constructions needs different programs for production and additional Robots for assembling. Justification of usage of Roberts should be based on a long term strategic plans of production and assembling when they use digital designs.

Keywords: *Timber construction, software programming, special CNC centers and Roberts for prefabricated houses.*

SAŽETAK:
U drvenoj konstrukciji za proizvodnju drvenih kuća koriste se roboti u fazi proizvodnje i u montaži. Upotreba robota se bazirana na potrebi proizvođača montažnih kuće u smislu softverskih programa posebno za određene procese. Proizvodnja laganih drvnih konstrukcija u većini slučaja proizvodi se i montira koristeći programe CNC centra i roboti. Za razliku od njih, kod teških drvnih konstrukcija potrebno je koristiti drugačije programe za proizvodnju I za montažu. Upotreba robota mora biti opravdana s dugoročnim strateškim planovima proizvodnje I montaže posebno prilikom upotrebe digitalnog dizajna.

Ključne riječi*: Drvne konstrukcije, softverski programi, specijalni CNC centri i roboti za montažu kuća.*

CLOUD ROBOTICS

CLOUD ROBOTIKA

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Samir Vojić

ABSTRACT:
Cloud Robotics is a developing field of robotics, which currently includes various applications and network paradigmas. The robots are limited in terms of computing ability, memory and data storing. Cloud offers unlimited computing ability, memory, data storing and ecpecially a possibility for cooperation. In this paper, an overview of definitions, concepts and technologies related to cloud robotics is given. Cloud robotics may have an important role in the future asa a technology which is directed at man, capable of solving society's problems.

Keywords: *robot,cloud, cloud robotics .*

SAŽETAK:
Cloud robotika je polje robotike u nastajanju koje trenutno pokriva različite aplikacije i robotske mrežne paradigme. Roboti su ograničeni u pogledu računarske sposobnosti, memorije i spremanja podataka. Cloud pruža neograničenu računarsku sposobnost, memoriju, spremanje podataka i pogotovo mogućnost saradnje. U ovom radu dat je pregled definicija, koncepta i tehnologija povezanih sa Cloud robotikom. Cloud robotika može imati značajnu ulogu u budućnosti kao tehnologija koja je usmjerena na čovjeka sposobna za rješavanje potreba društva.

Ključne riječi*: robot, cloud, cloud robotika.*

CONCEPTUAL SOLUTION OF THE ROBOTIC ARM/PLOTTER

KONCEPTUALNO RJEŠENJE ROBOTSKE RUKE/PLOTERA

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Milena Đukanović Rade Grujičić Luka Radunović Vuk Bošković

ABSTRACT:
In everyday life - a person performs actions that require a lot of repetition, and therefore a lot of time. By creating a robot that would process and store data in real-time, repeating the given actions a certain number of times, it would eliminate the human presence in the process itself. In this regard, the aim of this paper is the development of a conceptual robot solution that would replace a human in performing some routine hand-executed functions, such as writing, drawing,and engraving.Realization of the resulting conceptual solution would have low cost of production and small dimensions,while easy portability would allow a greater accessibility and application, both in industrial plants and in personal use.

Keywords: *Robot arm, Plotter, Conceptual solution, Easy portability, Routine hand-executed functions.*

SAŽETAK:
U svakodnevnom životu, osoba obavlja radnje koje zahtjevaju puno ponavljanja istoga puno vremena.Kreiranjem robota koji bi procesirao i čuvao podatke u realnom vremenu, ponavljajući zadate akcije određeni broj puta, eliminisali bi ljudsko prisustvo u samom procesu. Cilj ovog rada je razvoj konceptualnog robotskog rješenja koji bi zamijenio čovjeka u obavljanju nekih rutinskih, ručno izvedenih radnji, kao što su pisanje, crtanje, graviranje. Realizacija dobijenog konceptualnog rješenja imala bi nisku cijenu proizvodnje, male dimenzije i laka prenosivost omogućile bi veću pristupačnost i primjenu, kako u industrijskim postrojenjima, tako i u ličnoj upotrebi.

Ključne riječi: *robotska ruka, ploter, konceptualno rešenje, laka prenosivost, rutinske ručno izvršene funkcije.*

ROBOT FOR CLEANING VENTILATION DUCTS

ROBOT ZA ČIŠĆENJE VENTILACIONIH CIJEVI

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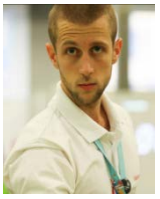
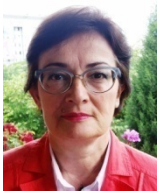
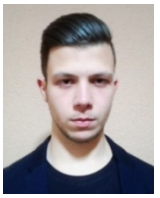
[1,2,3,4] University of Montenegro, 2000 Podgorica, Montenegro



Miloš Bubanja *Marina Mijanović -Markus* *Milena Đukanović* *Mihailo Vujović*

ABSTRACT:
Conceptual solution of robot for cleaning ventilation channel will be shown and elaborated upon in this work. Our research focuses on the non-destructive techniques to clean the dust, fungi, foreign particles and it also detects flaws, cracks, and corrosion inside the ducts. This research involves a semi-autonomous robot powered by rechargeable batteries, with four driven wheels for movement inside different cross-sectional ducts. It comprises of several sensors such as ultrasonic distance sensors for autonomous movement, quality of air sensor and HD camera to provide the great visuals for inspection of various parameters inside the ducts. Additional equipment like LED light and DC motor for brushes are also envisaged. The main objectives are to clean the ducts by a cleaning brushes attached to the robot, and ducts inspection by a HD camera, helping to provide the healthy conditioned air supply to the chambers. The robot equipped with HD camera for the live view of inside the ducts. The simple design of robot makes it more convenient and useful for varying cross section ducts and can helps to possible vendors build its bond at consumer ends.

Keywords: *robot, cleaning, inspecting,duct, ventilation system, air conditioning system*

SAŽETAK:
U ovom radu je prikazano i razrađeno konceptualno rešenje robota za čišćenje ventilacionihcijevi. Istraživanje je usmjereno na nedestruktivne tehnike za čišć enje prašine, gljivica, stranih čestica i na otkrivanje nedostataka, pukotina i korozije unutar cijevi. Razmatran je poluautonomni robot sa napajanjempreko punjivih baterija, i sa četiri pogonska točka za kretanje unutar različitih poprečnih preseka. Snabdjeven je sa nekoliko senzora, kao što su ultrazvučni senzori udaljenosti za autonomno kretanje, senzorkvalitetavazduha i HD kameraza jasan vizuelni prikaz različitih parametara unutar cijevi. Takođe je predviđena dodatna oprema kao što su LED lampica i DC motor za četke za čišćenje . Glavni zadaci robota su čišćenje cijevi pomoću četkica za čišćenje pričvršćenih za robot i kontrola kanala pomoću HD kamere , što potpomaže obezbjeđivanječistogvazduha u ventiliranim i klimatizovanim prostorijama. Jednostavan dizajn robota čini ga pogodnim i korisnim za cijevi različitog poprečnogpresjeka .Može pomoći potencijalnim proizvođačima da ostvare vezu sa krajnjim potrošačima.

Ključne riječi: *robot, šišćenje, inspekcija, cijev, ventilacioni sistem, sistem za klimatizaciju*

POWER AND CONTROL SYSTEM OF KNEE AND ANKLE POWERED ABOVE-KNEE PROSTHESIS

POGONSKI I UPRAVLJAČKI SUSTAV NATKOLJENIČNE PROTEZE POGONJENE U KOLJENU I GLEŽNJU

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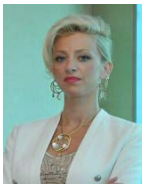

Miljan Rupar Zlata Jelačić Remzo Dedić Adisa Vučina

ABSTRACT:
After above-knee amputation, amputees usually go under intense rehabilitation process in order to overcome their disadvantage and successfully reintegrate in the society. Passive prostheses, which are mostly used by amputees, enable performing of various activities such as walking on levelled and inclined ground, and even running, riding a bicycle and as of lately swimming. However, performing high power demanding tasks, such as stair ascent, presents a problem because the lack of muscles makes it impossible to produce required forces. This means, that in order for the prosthesis to be able to perform high demanding power activities it must be powered, primarily in its main joints – knee and ankle. In this paper, we are presenting hydraulic power system and control system for knee and ankle powered prosthesis which we are developing in order to achieve required kinematics and dynamics of the prosthesis which would enable it to perform high power demanding activities in more natural manner, especially stair ascent.

Keywords: *powered above-knee prosthesis, hydraulic power system, control system.*

SAŽETAK:
Nakon natkoljenične amputacije, osobe u pravilu prolaze kroz intenzivni rehabilitacijski proces da bi mogle savladati novonastali nedostatak i uspješno se reintegrirati u društvo. Pasivne proteze, koje osobe s amputacijom uglavnom koriste, mogu obavljati različite aktivnosti poput hodanja po ravnom i nagnutom terenu, pa čak i trčanja, vožnje bicikla, a u posljednje vrijeme i plivanja. Međutim, izvršavanje radnji koje zahtijevaju visok utrošak snage, poput penjanja uz stepenice, predstavlja problem. Razlog tomu je što nedostatak mišića onemogućuje produciranje zahtijevanih sila za navedene aktivnosti.To znači, da bi proteza mogla obaviti zahtijevane aktivnosti, mora biti aktivno pogonjena, prvenstveno u svojim glavnim zglobovima – koljenu i gležnju. U ovom radu, predstavljen je hidraulični pogonski sustav te upravljački sustav za aktivno pogonjenu protezu u koljenu i gležnju, koja će omogućiti postizanje kinematskih i dinamičkih karakteristika neophodnih za obavljanje aktivnosti koje zahtijevaju visok utrošak snage. Ovime bi se postiglo prirodnije obavljanje tih aktivnosti, prvenstveno penjanja uz stepenice.

Ključne riječi*: pogonjena natkoljenična proteza, hidraulični pogonski sustav, upravljački sustav.*

VIBRATION ANALYSIS OF MOTORCYCLE HANDLES

ANALIZA VIBRACIJA RUČKI MOTOCIKLA

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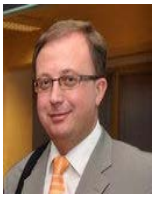
[1,2] University of Sarajevo, 71000 Sarajevo, Bosnia and Herzegovina

Zlata Jelačić Boran Pikula

ABSTRACT:
The exposure of men, or parts of their bodies, to vibration has been the subject of numerous studies for decades and has resulted in better understanding of many parameters governing the human response to vibrations. In particular, regarding the hand-arm system, vibration can cause changes in tendons, muscles, bones and joints and can affect the nervous system to eventually produce the so-called Hand-Arm Vibration Syndrome (HAVS). Quantification of the parameters affecting the subjective response of different individuals has led to define numerous standards as, for example, the EN ISO 5349-1 and EN ISO 5349-2 regarding the measurement and evaluation of human exposureto hand-transmitted vibrations. Moreover, the European Directive 2002/44/EC on the minimum health and safety requirements, regarding worker exposure to risks from physical agents (e.g. vibration), limit the exposure to vibrations. The aim of this study is to analyse the exposure level of motorcycle drivers to hand-arm vibration (HAV). For this research, vibration levels of a common 650 cm3 maxi scooter were experimentally measured and the maximum driving time that could be safely used was established.
Keywords:*motorcycle vibration, Slam Stick X, measurement.*

SAŽETAK:
Izlaganje ljudi ili dijelova njihovog tijela vibracijama je već desetljećima predmet brojnih studija i rezultiralo je u bolje razumijevanje mnogih parametara koji upravljaju ljudskim odgovorom na vibracije. Konkretno, s obzirom na sistem ruke, vibracije mogu uzrokovati promjene u tetivama, mišićima, kostima i zglobovima te mogu uticati na živčani sistem da bi na kraju stvorili tzv. sindrom vibracije ruke (HAVS). Kvantifikacija parametara koji utiču na subjektivni odgovor različitih pojedinaca dovela je do definiranja brojnih standarda, kao što su npr. EN ISO 5349-1 i EN ISO 5349-2 u vezi s mjerenjem i procjenom ljudske izloženosti ručno prenesenim vibracijama. Štaviše, Evropska direktiva 2002/44 / EZ o minimalnim zdravstvenim i sigurnosnim zahtjevima glede izloženosti radnika izloženim rizicima od fizičkih sredstava (npr. vibracija) ograničava izloženost vibracijama. Cilj ove studije je analizirati razinu izloženosti vozača motora na vibracije ruke (HAV). Za ovo istraživanje, razina vibracija standardnog 650 ccmaxi skutera eksperimentalno je izmjerena i utvrđeno je maksimalno vrijeme vožnje pri kojem ne dolazi do prekoračenja propisanih vrijednosti.
Ključne riječi*: vibracije motocikla, SlamStick X, mjerenje.*

ACOUSTIC DIAGNOSTICS OF LEVER MECHANISMS WITH SUBSEQUENT PROCESSING OF DATA ON NEURAL NETWORKS

AKUSTIČKA DIJAGNOSTIKA POLUŽNIH MEHANIZMA SA SUBSEKVENTNOM OBRADOM PODATAKA NA NEURONSKIM MREŽAMA

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Sergiy Kovalevskyy Olena Kovalevska Raul Turmanidze

ABSTRACT:
The technique of acoustic diagnostics for machine tools - robots is developed. A neural network reference model has been constructed that allows to diagnose the current characteristics of the state of objects under different conditions, namely, the configuration of the mechanism, the geometric parameters of the mechanism with the motor-spindle running, the dynamics of the movement of the nodes of the experimental stand mechanism with variable speed and load on the drive, and the temperature of the object. Experiments have been carried out to investigate the relationship between the parameters of the spectrum of an acoustic signal with a given discreteness, excited by a perturbing effect in the form of "white noise." The possibility of using the proposed approach to the management of complex technological machines, such as machines with mechanisms based on parallel kinematics, is shown to improve the accuracy of the positioning of the actuators, to ensure their dynamic tuning and to optimize the trajectories of the movements of the working organs of the equipment.

Keywords: *acoustic diagnostics, machine - robot, neural networks, reference model.*

SAŽETAK:
Razvijena je tehnika akustične dijagnostike za alatne mašine - robote. Izrađen je referentni model neuronske mreže koji omogućava dijagnoziranje trenutnih karakteristika stanja objekata pod različitim uslovima, redom, konfiguracija mehanizma, geometrijski parametri mehanizma sa pokretnim motornim vretenom, dinamika kretanja čvorova eksperimentalnog mehanizma postolja sa promenljivom brzinom i opterećenjem na pogonu i temperaturu objekta. Izvedeni su eksperimenti kako bi se ispitala veza između parametara spektra akustičnog signala sa datom diskretnošću, uzbuđena uznemirujućim efektom u obliku "bijele buke". Mogućnost korištenja predloženog pristupa za upravljanje složenim tehnološkim mašinama, kao što su mašine sa mehanizmima zasnovanim na paralelnoj kinematici, je pokazana da poboljšava tačnost pozicioniranja aktuatora, kako bi se osiguralo njihovo dinamičko podešavanje i optimizirati trajektorije kretanja radnih organa opreme.

Ključne riječi: *akustična dijagnostika, mašina - robot, neuronske mreže, referentni model.*

APPLICATION OF MULTIVARIATE STATISTIC TO CLASSIFY BLUEBERRY FRUITS

PRIMJENA MULTIVARIJATNE STATISTIKE U KLASIFIKACIJI PLODOVA BOROVNICE

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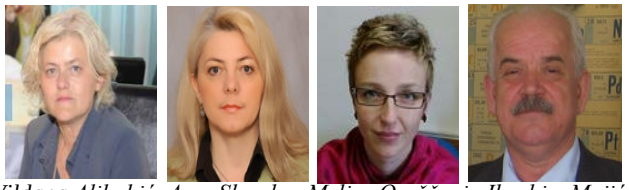

Vildana Alibabić Azra Skender Melisa Oraščanin Ibrahim Mujić

ABSTRACT:
Blueberry (Vaccinium myrtillus) is kind of the berry fruit which has recently been grown in the area of Bosnia and Herzegovina. A few farmers decided to plant this fruit, but there is no scientific data on the properties of the fruit so far, hence the need for this research. The research examines the morphological, chemical and sensory characteristics of the three cultivars of blueberry (Goldtraube, Bluecrop and Blueray), grown in the Una - Sana Canton, as well as a share of total phenols (TP), anthocyanins (TA) and ascorbic acid (TC). Therefore, the multivariate statistics were used for highlighting the similarities or differences in specific parameters.The Blueray cultivarhas the best morphological properties, as well as the highest dry matter share (13.72%), total acid (2.33%), sugar (11.76%) and ash (0.27%). TP content (29.75 - 59.34 mgGAE/100g) was lower than in blueberries grown in the region, while TA (213.91 - 684.84 mg/100g) and TC (7.52 - 9.16 mg/100g) were a bit higher. Significant differences ($p \leq 0.05$) among cultivars were observed for all measured parameters. By using the PCA Bluecrop cultivar was characterized with the share of water and Blueray with the share of ash, dry mater, sugar and total acid.

Keywords: *antioxidants, blueberry, fruit characteristics, multivariate statistic.*

SAŽETAK:
Borovnica (Vaccinium myrtillus) je voćna vrsta iz grupe jagodičastog voća koja se odnedavno počela uzgajati na području Bosne i Hercegovine. Nekoliko farmera odlučilo se uzgajati ovo voće, međutim nedostaju naučni podaci o karakteristikama plodova iz čega je proizišla potreba za ovo istraživanje. U radu su istražena morfološka, hemijska i senzorska svojstva tri sorte borovnice (Goldtraube, Blucrop and Blurej) koje se proizvode na Unsko – Sanskom Kantonu, kao i udio ukupnih fenola (TP), antocijana (TA) i askorbinske kiseline (TC). Za utvrđivanje sličnosti i razlika u specifičnim parametrimaprimjenjena je multivariatna statistika.Sorta Blurejimala je najbolja morfološka svojstva, kao i najviši udio suhe tvari (13.72%), ukupnih kiselina (2,33%), šećera (11,76%) i pepela (0,27%). TP udio (29,75–59,34 mgGAE/100g) bio je niži od udjela u borovnicama iz regije, dok je udio TA (213,91 – 684,84 mg/100g) i TC (7,52 – 9,16 mg/100g) bio nešto viši. Statistički značajne razlike ($p \leq 0,05$) između sorti utvrđene su za sve mjerene parametre. Primjenom PCA sorta Blucropokarakterizirana je udjelom vode, a Blurejudjelom pepela, suhe tvari, šećera i ukupnih kiselina.

Ključne riječi: *antioksidanti, borovnica, karakteristike ploda, multivariatna statistika.*

THE EFFECT OF CONCENTRATION OF METHANOL AS A SOLVENT ON THE ANTIOXIDATIVE ACTIVITY OF SAGE EXTRACT

UTICAJ KONCENTRACIJE METANOLAKAO OTAPALA NA ANTIOKSIDATIVNO DEJSTVO EKSTRAKTA ŽALFIJE

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ABSTRACT:
The production of high quality plant extracts is the basis for the production of herbal preparations and the isolation of bioactive ingredients. Recently, there is a tendency of replacing synthetic antioxidants, due to their toxic and potentially cancerous effects, with natural antioxidants. For this reason, it is necessary to intensify research of antioxidative and biological effects of plant extracts, as well as the influence of the process conditions of extraction on the mentioned effects and the yield of extraction. In this paper, the antioxidative activity of sage extract was tested, depending on the concentration of methanol as a solvent in the process of maceration with occasional mixing. Total phenolic and flavonoid content in obtained sage extracts was determined spectrophotometrically. The radical scavenging capacity was determined by the DPPH method, where the extract concentration required for the neutralization of 50% of the initial concentration of the DPPH radical was also determined.

Keywords: *methanol*, antioxidativity, *sage, extract.*

SAŽETAK:
Dobijanje visokokvalitetnih biljnih ekstrakataje osnova za proizvodnju biljnih preparatai izolaciju bioaktivnih sastojaka. U posljednje vrijeme postoji tendencija zamjene sintetskih antioksidanata, zbog njihovog toksičnog i potencijalno kancerogenog dejstva, prirodnim antioksidantima. Iz tog razloga, neophodno je intenzivirati istraživanja antioksidativnog i biološkog dejstva biljnih ekstrakata, kao i uticaj procesnih uvjeta ekstrakcije na pomenuta dejstva i prinos ekstrakcije. U ovom radu je provedeno ispitivanje antioksidativnog dejstva ekstrakta žalfije(Salvia officinalis L.), u zavisnosti od koncentracije metanola kao otapala u postupku maceracije sa povremenim miješanjem. Sadržaj ukupnih fenola i flavonoida u dobijenim ekstraktima žalfije određen je spektrofotometrijski. Kapacitet hvatanja slobodnih radikala određen je DPPH metodom, pri čemu je određena i koncentracija ekstrakta potrebna za neutralizaciju 50% početne koncentracije DPPH radikala.

Ključne riječi: *metanol, antioksidativnost, žalfija, ekstrakt.*

MODELING THE EXSTRACTION PROCESS OF SAGE (SALVIA OFFICINALIS L.)WITH SUPERCRITICAL CO_2 AT DIFFERENT TEMPERATURES

MODELOVANJE PROCESA EKSTRAKCIJE ŽALFIJE (SALVIA OFFICINALIS L.) PRI RAZLIČITIM TEMPERATURAMA SA SUPERKRITIČNIM CO_2

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Sabina Begić Vladan Mićić Darko Manjenčić

ABSTRACT:
In this paper aninvestigationwasdone onthe extraction of sage (Salvia officinalis L.) using supercritical carbon dioxide at different extraction temperatures (313, 323 and 333K). For the qualitative and quantitative analysis of the obtained extracts methods GC-FID and GC-MS were applied. Qualitative and quantitative composition of the obtained CO_2 extracts and essential oils isolated from CO_2 extracts at different temperatures of extraction was also determined. The extraction system was modeled by using the modified equation Reverchon - Sesti Osseo, whereby the effect of temperature on the yield of the extract was studied. Based on the results of modeling the overall yield of the extract depending on the temperature, it is concluded that a given model approximates the experimental results very well in all cases.

Keywords: *supercritical extraction, temperature, sage, modeling.*

SAŽETAK:
U okviru rada vršena je ekstrakcija žalfije (Salvia officinalis L.) korišćenjem superkritičnog ugljendioksida pri različitim temperaturama (313, 323 i 333K). Dobijeni CO_2ekstrakti su analizirani pomoću GC-FID i GC-MS metoda. Kvalitativni i kvantitativni sastav dobijenih ekstrakata za date temperature ekstrakcije, kao i etarskih ulja izolovanih iz ekstrakata je određen. Modelovan je ukupni prinos ekstrakta žalfije u zavisnosti od vremena pri datim temperaturama ekstrakcije primenom modifikovane jednačine Reverchon - Sesti Ossea. Na osnovu dobijenih rezultata zaključeno je da primenjeni model veoma dobro aproksimira eksperimentalne rezultate za sve tri temperature.

Ključne riječi*: superkritična ekstrakcija, temperatura, žalfija, modelovanje.*

THE EFFECT OF TECHNOLOGICAL PROCESS ON PHYSICO -CHEMICAL AND NUTRITIONAL PROPERTIES OF SOUR CHERRIES PRODUCTS

UTICAJ TEHNOLOŠKOG POSTUPKA NA FIZIKALNO-HEMIJSKA I NUTRITIVNA SVOJSTVA PROIZVODA OD VIŠNJE

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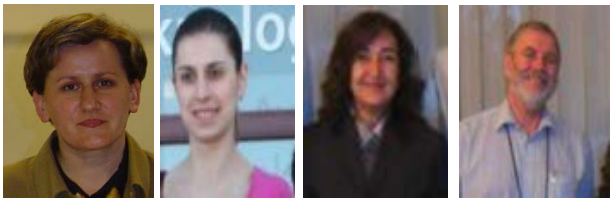

Ramzija Cvrk Azra Begović Snježana Marić Nils V.Juul

ABSTRACT:
The aim of this research was to determine the effect of selected processing methods on physico-chemical and nutritional properties of sour cherries (Prunuscerasus L.) products. Inlaboratory conditions, isapplied lyophilization (freeze drying) of sour cherries,and and vacuum concentration to obtain concentrate of sour cherry. For obtainedproductswere analyzed of vitamin C (L-ascorbic acid), crude fiber, sugar content, totalfruit acids,and color intensityusing byCIELABsystem, with coordinates(L,a,b*). Experimental resultsinlyophilized sour cherryshoweda significantly higher (p<0,05) content of vitaminC(35,76±0,05 mg/100 g), crude fiber (4,80±0,04%), totalfruit acids (7,23±0,05%), and significantly higher levels ofredcolorspectrum a* (32,09 ±1,00). This indicates that sour cherries processed by lyophilisation largely retain nutritionally valuable substances, in comparison with sour cherry concentrate obtained by the vacuum concentration.*

Keywords: *lyophilization, vacuum concentration, added nutritional value.*

SAŽETAK:
Cilj ovog istraživanja bio je utvrditi uticaj odabranih tehnoloških postupaka prerade na fizikalno-hemijska i nutritivna svojstva proizvoda od višnje (Prunuscerasus L.).U laboratorijskim uslovima, primijenjen je postupak liofilizacije i vakum koncentriranja za dobijanje liofilizirane višnje i koncentriranog soka višnje. Za dobijene proizvode su analizirani vitamin C (L-askorbinska kiselina), sirova vlakna, sadržaj šećera, ukupne voćne kiseline i intenzitet boje prema CIELAB sistemu korištenjem koordinata (L,a,b*). Eksperimentalni rezultati za liofiliziranu višnju pokazali su značajno viši (p<0,05) sadržaj vitaminaC(35,76±0,05 mg/100 g),sirovih vlakana (4,80±0,04%), ukupnih voćnih kiselina (7,23±0,05%), i značajno viši nivo crvene boje spektraa* (32,09±1,00), što ukazuje na značajno više nutritivne vrijednosti liofilizirane višnje u odnosu na koncentrat višnje dobijen vakum koncentriranjem.*

Ključne riječi: *liofilizacija, vakum koncentracija, dodana nutritivna vrijednost.*

OCCURRENCE OF APPLE POWDERY MILDEW, Podosphaera leucotricha (Ellis.&Everh.) E.S.Salmon IN NORTH-WESTERN REGION OF BOSNIA AND HERZEGOVINA

POJAVA PEPELNICE JABUKE, Podosphaera leucotricha (Ellis.&Everh.) E.S.Salmon U SJEVERO-ZAPADNOM DJELU BOSNE I HERCEGOVINE

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Zemira Delalić

ABSTRACT:
Apple powdery mildew (Podosphaera leucotricha (Ellis.&Everh.) E.S.Salmon) along with apple scab pathogen (Venturia inaequalis (Cooke)Winter) represents economically the most important apple pathogen. Apple powdery mildew was monitored during 2016 and 2017 in north-western area of Bosnia and Herzegovina at 10 orchards of the following varieties: Idared, Braeburn, Gala, Fuji, Elstar, Granny Smith, Cripps Pink, Jonathan, Golden Delicious and Red Delicious. A scale from 0-5 was used for determination of infection intensity on leaves of the examined varieties. The results were analysed using Townsend Heuberger method providing the infection index..... Important protection measures include removal of white infected branches and its disposal. For new orchards farmers should use resistant varieties. The basic protection measure for P. leucotricha is use of fungicides, which may prevent secondary infection of apple fruit, leaves and flowers.

Keywords: *apple, apple powdery mildew (Podosphaera leucotricha), infection intensity.*

SAŽETAK:
Pepelnica jabuke (Podosphaera leucotricha (Ellis.&Everh.) E.S.Salmon) uz čađava pjegavost lista i krastavost plodova (Venturia inaequalis (Cooke)Winter),pripada ekonomski najznačajnijim bolestima jabuke. U 2016. i 2017. godini praćena je pojava pepelnice jabuke u sjevero-zapadnom dijelu Bosne i Hercegovine na 10 zasada sa sortama: Idaerd, Braeburn, Gala, Fudži, Elstar, Grany Smith, Crispy Pink, Jonatan, Golden Delicious, i Crveni Delišes. Za ocjenu intenziteta infekcije na listovima sorata korištena je skala 0-5. Rezultati su obrađeni po metodi Townsend Heubergera, a iz istih je dobiven indeks oboljenja.....Od mjera zaštite važno je uklanjanje bijelih oboljelih mladara pri rezidbi i njihovo uništavanje. Kod podizanja novih zasada proizvođači trebaju odabrati otporne sorte. Osnovna mjera zaštite od P.leucotricha je primjena fungicida. Sekundarne infekcije ploda, listova i cvjetnih pupova jabuke se mogu uspješno spriječiti primjenom fungicida.

Ključne riječi*: jabuka, pepelnica jabuke (Podosphaera leucotricha), sjevero-zapadni dio Bosne i Hercegovine, intenzitet infekcije.*

APPLICATION OF NEW TECHNOLOGIES IN MEAT PROCESSING INDUSTRY IN THE FUNCTION OF IMPROVEMENT OF TOTAL QUALITY OF PRODUCTS AND CONSUMER PROTECTION

PRIMJENA NOVIH TEHNOLOGIJA U MESOPRERAĐIVAČKOJ INDUSTRIJI U FUNKCIJI POBOLJŠANJA UKUPNOG KVALITETA PROIZVODA I ZAŠTITE POTROŠAČA

Amir Ganić[1], Munevera Begić[2], Enver Karahmet[3]
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ABSTRACT:
Just as it does in the world, the meat processing industry in Bosnia and Herzegovina also represents one of the main branches of the food-processing sector. In the last twenty years, there have been great developments and applications of technological solutions, which accompany this branch of industry. Today, it is unimaginable that any production plant which deals with meat processing does so without the help of tens of highly-sophisticated machines (meat crusher, automatic mixers and fillers, micro and macrocutters, pickl-injectors, tumblers-massagers, smoking chambers, vacuum packing machines, etc.). Besides the fact that these machines, in their basic intent, have in a significant deal replaced the human factor, their application has other implications as well……..In addition, the modification of the technological process of production was performed in the segment of salting/brining. Namely, in this part of the production process the use of tumbler-massagers was implemented, for the purposes of the experiment. The aim of the applicationof these two contemporary machines was to establish the justification of their use from a technological standpoint. Besides that, their influence on the end quality of the product was the most important element of the justification of their use.

Keywords:*meat processing industry, new technologies, technology of dry-cured meat products, product quality.*

SAŽETAK:
Mesoprerađivačka industrija kako u svijetu tako i u Bosni i Hercegovini, predstavlja jednu od vodećih grana cjelokupnog prehrambenog sektora. U posljednjih dvadesetak godina došlo je do snažnog razvoja i primjene tehnoloških rješenja koja prate ovu industrijsku granu. Tako je danas nezamisliv bilo koji pogon koji se bavi obradom i preradom mesa bez desetina visokosofisticiranih mašina (drobilice mesa, automatske mješalice i punilice, mikro i makrokuteri, pickl-injektori, tambleri-masažeri, termodimne komore, vakum-pakerice,...i sl.). Pored toga što su svi ovi uređaji, u svojoj osnovnoj namjeri, u značajnoj mjeri zamijenili ljudski faktor, njihova primjena ima i druge implikacije..... Također, modifikacija tehnološkog procesa proizvodnje izvršena je i u segmentu prosoljavanja/prosalamurenja. Naime, u tom dijelu proizvodnog procesa, za potrebe eksperimenta, uvedena je upotreba tamblera-masažera. Cilj primjene ovih dvaju savremenih uređaja je bio utvrditi, sa tehnološkog aspekta, opravdanost njihove primjene. Pored toga, kao najvažniji element opravdanosti njihovog korištenja, bio je uticaj na krajnji kvalitet proizvoda.

Ključne riječi*: mesoprerađivačka industrija, nove tehnologije, tehnologija suhomesnatih proizvoda, kvalitet proizvoda.*

THE IMPACT OF WATER ON PVC FLOOR COVERINGS

UTJECAJ VODE NA PVC PODNE OBLOGE

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Mario Krzyk *DarkoDrev*

ABSTRACT:
PVC floor coverings are more or less resistant to water. Plasticised PVC typically has relatively loosely bound molecules of plasticizers and secondary plasticizers (DOP, BBP, etc.). In gelled PVC layers the durability is mostly the result of physical binding of plasiticizer molecules in between PVC chains.PVC plastisolingredients are by design not particularly solidly bound to the structure, which makes them susceptible to leaching or migration of water molecules into the structure of PVC floor coverings. The plasticiser molecules and other PVC paste compounding ingredients leach into the water (pigments, fillings, stabilisers, foaming agents, inhibitors, etc.). The resistance to water is significantly improved with an upper polyurethane (PU) layer. In the PVC paste production, the PVC types using the emulsion process are highly suitable. The PVC types so produced contain a significant proportion of emulsifier residue. Emulsifiers have a strong water-binding ability, which is reflected in the opacity of the PVC layer. Micro-suspension-type PVCs much more stable concerning the impact of moisture, however, the PVC paste that they produce is usually less stable.

Keywords: *PVC floor coverings, plasticizers, gelation, migration.*

SAŽETAK:
PVC podne obloge su manje ili više otporne na vodu. Omekšani PVC obično ima relativno slabo fizički vezane molekuleomekšivaća i sekundarnih omekšivaća (DOP, BBP, itd.). Kod PVC želiranih slojeva, je opstojnost u glavnom posljedica fizičkog povezivanja molekula omekšivaća među molekule PVC lanca. Zato sastojci PVC pasta nisu posebno čvrsto vezani u strukturu, te zbog toga može doći do izluživanja pojedinih sastojaka ili do prodiranja molekula vode u strukturu PVC podne obloge.Molekule omekšivaća, kao i druge komponente PVC pasta (pigmenti, punila, stabilizatori, pjenila, inhibitori, itd.), se mogu izluživati u vodu. Otpornost na vodu se znatno poveća s pomoću PU gornjeg sloja. Za izradu PVC pasta su vrlo primjereni PVC tipovi koji su bili izrađeni po emulzijskom postupku. Takvi tipovi PVC sadrže znatan dio ostataka emulgatora. Emulgatori znatno vežu vodu, što se izražava kao zamućenje PVC sloja. Mikrosuspenzijski tipovi PVC su daleko stabilniji pred utjecajem vlage, premda obično ne tvore tako stabilne PVC paste.

Ključne riječi*: PVCpodne obloge, omekšivaći, želiranje, migracije.*

EXPOSURE TO PM10 AEROSOL PARTICLES AND OTHER AERIAL POLLUTANTS IN THE CAPITAL CITY OF MONTENEGRO

IZLOZENOST PM_{10} AEROSOL CESTICAMA I DRUGIM VAZDUSNIM ZAGADJIVACIMA U GLAVNOM GRADU CRNE GORE

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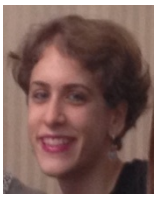


Jovana Jovanović Svetlana Stevović

ABSTRACT:

Aerial contaminations are of booming interest in the 21st century as they attenuate and disable favorable living conditions for each human being. This manuscript represents trajectories on the occurrence of PM10, particulate matters which are defined as atmospheric aerosol particles and emission densities of other toxic gases such as carbon monoxide, and nitrogen-dioxide. Trajectory on the occurrence of PM10 aerosol particles for one characteristic, in-situ spot of capital city of Montenegro, (Podgorica) from January 1st to July 20th (2017) was detected.....This manuscript serves as insight into the degree of local air pollution and limitative, stringent policies of air purification within one city. It reveals the genuine causes of such aerial contamination and discovers statistically the occurence frequencies of these particles in certain district.In that way, this is a guide through a certain microclimate and the readers can anticipate how much is a microclimate of a spot influential on a global scale.

Keywords: *PM10 aerosol particles, airborne pollutants, trajectories, air quality, MEPA*

SAŽETAK:

Vazdusna zagadjenja su u zizi interesa u 21. vijeku s obzirom da degradiraju i onemogucavaju povoljne zivotne uslove za ljudsku populaciju. Ovaj clanak predstavlja analizu koncentracijaPM10 cestica koje su definisane kao atmosferske cestice (aerosoli). On takodje daje uvid i u koncentracije drugih atmosferskih, otrovnih gasova kao sto su ugljen-monoksid, i azot-dioksid. Prikazana je analiza koncentracijePM10 aerosol čestica u jednom naselju, glavnog grada Crne Gore,u Podgorici, u vremenskom razdoblju od 1.januara do 20.jula (2017)..... .....Ovaj clanak pruza uvid u stepen intenziteta lokalnog, vazdusnog zagadjenja i u restriktivne politike radi ogranicenja lokalnog zagadjenja. Otkriva i prave uzroke takvog vazdusnog zagadjenja i statisticki ucestalosti pojave takvih cestica u ovom naselju.Na taj nacin, ovaj clanak je putokaz (vodic) kroz izvjesnu mikroklimu i citaoci mogu predvidjeti u kojoj mjeri mikroklima, (klima jednog mjesta) utice na globalnu klimu.

Ključne riječi*: PM10 aerosol cestice, vazdusni zagadjivaci, trajektorije, kvalitet vazduha, MEPA (crnogorska agencija za zastitu zivotne sredine).*

NEW TECNOLOGICAL PROCEDURES FOR PRODUCTION THIONCARBAMATES (SELECTIVE FLOTATION REAGENTS)

NOVI TEHNOLOŠKI POSTUPCI PROIZVODNJE TIONKARBAMATA (SELEKTIVNI FLOTOREAGENSI)

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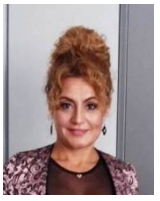

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ABSTRACT:
In this paper presented innovative technological procedures for the production of carbamates (selective flotation reagents) and demonstrated advantages over the classical, known process of production. New technological procedures for the synthesis of thiocarbamate are shown: from alkylxanthogens and amines in the presence of nano-palladium multiwall carbon nanotube catalysts, oxidation of the xanthogenic acid amine salt, catalytic reaction from isobutanol and amine. Comparative advantages over the classical method of production of ammonolysis of sodium salts of alkylsanthoic acetic acid with the corresponding alkyl and arylamines are presented, and the obtained results are compared in terms of yield and quality of the obtained products. New technological procedures for the production of carbamates have a number of comparative advantages over the known: mild reaction conditions, higher conversion rate, ecologically justified without the separation of the product.

Keywords: *tion carbamates, xanthogenate, xanthogen-acetic acid, nano-palladium.*

SAŽETAK:
U ovom radu predstavljeni su inovirani tehnološki postupci proizvodnje tionkarbamata (selektivni flotacioni reagensi) i prikazane prednosti nad klasičnim, poznatim postupkom proizvodnje. Prikazani su novi tehnološki postupci sinteze tionkarbamata: iz alkilksantogenata i amina u prisustvu nano-palladium multiwall carbon nanotube katalizatora, oksidacijom aminske soli ksantogene kiseline, katalitičkom reakcijom iz izobutanola i amina. Prikazane su komparativne prednosti nad klasičnim postupkom proizvodnje amonolizom natrijumove soli alkilksantogen sirćetne kiseline odgovarajućim alkyl i arilaminima, a dobijeni rezultati upoređeni u smislu prinosa i kvaliteta dobijenih proizvoda. Novi tehnološki postupci proizvodnje tionkarbamata imaju niz komparativnih prednosti nad poznatim: blagi reakcioni uslovi, veći stepen konverzije, ekološki opravdani bez izdvajanja nuz-proizvoda.

Ključne riječi*: tionkarbamati, ksantogenat, ksantogen-sirćetna kiselina, nano-paladijum.*

DETERMENATIONOF HEAVY METALS IN HAIR DYES BY THE ATOMIC APSORPTION SPECTROPHOTOMETRY

DETEKCIJA TEŠKIH METALA U BOJAMA ZA KOSU POMOĆU ATOMSKE APSORPCIONE SPEKTROFOTOMETRIJE

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ABSTRACT:
Heavy metals are present in our environment, and it is therefore difficult to avoid their presence and impact on the human organism. Some heavy metals are essential to the human body, but if not in high concentrations. It is known that heavy metals can be found in many cosmetic products, and one of these is hair colours, where they can enter the body through the skin and root of the hair. In this way, if they are in high concentrations in the body, they can cause various health problems. It is therefore more important to determine the content of heavy metals (Cd, Pb, Co, Zn and Fe) in hair dyes by using different types made by different manufacturers..... .....Hair dyes producing the darker shades of hair have a higher content of heavy metals than those used to produce brighter shades. Also, low concentrations of toxic heavy metals Pb and Cd were detected in all samples, however these heavy metals were strictly forbidden to be used as material (EU Directive No 1223/2009) for the production of cosmetic products, including hair dyes. Thus, all these analysed cosmetic products should not be used because of a potential negative health effect.
Keywords: *Hair dyes, heavy metals, AAS.*

SAŽETAK:
Teški metali su prisutni u našem okruženju, te je stoga teško izbjeći njihovo prisustvo i utjecaj na ljudski organizam. Neki teški metali su esencijalni za ljudski organizam, ali ako nisu u povišenim konentracijama. Poznato je da se teški metali mogu naći u mnogim kozmetičkim proizvodima, a jedan od takvih su i boje za kosu, gdje putem kože i korijena kose mogu ući u organizam. Na taj način ako su u povišenim koncentracijama u tijelu mogu izazvati razne zdravstvene probleme. S toga cilj rada je odrediti sadržaj teških metala (Cd, Pb, Co, Zn i Fe) u bojama za kosu koristeći različite vrste boja od različitih proizvođača..... .....Boje za kosu koje služe za nastajanje tamnijih nijansi vlasi, imaju veći sadržaj teških metala, od onih koje se koriste za dobivanje svjetlijih nijansi. Također, u svim uzorcima su detektirane niske koncntracije toksičnih teških metala Pb i Cd, međutim ovi teški metali su strogo zbranjeni da se koriste kao materijal (direktivom EU No 1223/2009), za proizvodnju kozmetičkih proizvoda, gdje spadaju i boje za kosu. S toga, sve ove analizirane kozmetičke proizvode ne bi trebalo upotrebljavati zbog potencijalnog negativnog učinka na zdravlje.
Ključne riječi: *Boje za kosu, teški metali, AAS.*

MICROBIOLOGICAL ANALYSIS OF SURFACE WATERS IN THE AREA OF NATIONAL PARK „UNA"

MIKROBIOLOŠKA ANALIZA POVRŠINSKIH VODA NA PODRUČJU „NACIONALNOG PARKA UNA"

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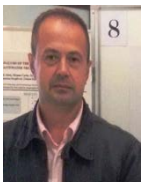
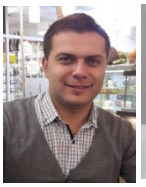


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ABSTRACT:
Natural water quality becomes one of the limiting factors for use and maintenance of the environment balance.Uncontrolled pollution of surface and groundwater reduces the quantity of quality water resources. Indicators of surface water faecal pollution are pathogenic microorganisms that are actively developing in water, and reaches the rivers by anthropogenic impacts through sewage systems.The primary aim of this research is to determine the microbiological analysis of surface waters in the area of National Park „Una".
Water samples were collected from two places: locality I (Martin Brod) and locality II (Kulen Vakuf).The selected microbiological parameters analysed: the number of colonies of aerobic organotrophs, the total number of coliform bacteria and the total number of faecal streptococcus. These parameters were used to present realistic image of microbiological water quality and to determine polution hotspots at National Park „Una".

Keywords:*water quality, surface water, microbiological parameters, National Park „Una".*

SAŽETAK:
Kvalitet prirodnih voda postaje jedan od ograničavajućih faktora njihove upotrebe i održavanja prirodne ravnoteže životne sredine. Nekontroliranim zagađenjem površinskih i podzemnih voda smanjuje se količina kvalitetnih vodnih resursa. Indikatori fekalnog zagađenja površinskih voda su patogeni mikroorganizmi koji se aktivno razvijaju u vodi, a u rijeke dospijevaju putem antropogenih utjecaja preko kanalizacionih sistema.Glavni cilj ovog istraživanja je utvrđivanje mikrobiološke analize površinskih voda na području Nacionalnog parka „Una". Uzorci vode su sakupljeni sa dva lokaliteta: lokalitet I (Martin Brod) i lokalitet II (Kulen Vakuf). Analizirani su odabrani mikrobiološki parametri: broj kolonija aerobnih organotrofa, ukupan broj koliformnih bakterija, ukupan broj fekalnih streptokoka. Na osnovu ovih parametara predstavljeni su rezultati stvarne slike mikrobiološke kvalitete vode te su određena žarišta zagađenja na području Nacionalnog parka „Una".

Ključne riječi*: kvalitet voda, površinske vode, mikrobiološki parametri, „Nacionalni park Una."*

THE CONTENT OF HEAVY METALS IN „PET" BOTTLES OF DRINKING WATER AND ITS ELECTRICAL CONDUCTIVITY

SADRŽAJ TEŠKIH METALA U „PET" AMBALAŽI VODE ZA PIĆE I NJENA ELEKTROPROVODLJIVOST

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ABSTRACT:
Heavy metals are natural ingredients of the Earth's crust. Due to their persistence, high toxicity and the tendency to accumulate in the ecosystem, heavy metals pose a threatto human health. The aim of the paper is to examine the content of heavy metals in the PET packaging of water, the pH value as well as the electrical conductivity of commercially produced bottled water. The analysis used bottled water purchased in Una-Sana Canton markets from twelve different manufacturers. PET packaging samples were digested in the microwave oven Anton Paar Multiwave PRO, and analysed on the PerkinElmer Atomic Absorption Spectrum AnalyserAAnalyst 800 with Zeeman correction. Cadmium (Cd), lead (Pb), cobalt (Co), zinc (Zn), and iron (Fe) were analysed by flame technique. The measured concentrations of heavy metals in PET packaging were low, and these values do not deviate from the European Parliament and Council Directive 94/62/EC on packaging and packaging waste. The electrical conductivity for all samples was in accordance with the Ordinance on table water in B&H. The analysed PET packaging does not present a danger to human health because the measured concentrations of heavy metals comply with Directive 94/62 / EC.

Keywords: *heavy metals, toxicty, PET.*

SAŽETAK:
Teški metali su prirodni sastojci zemljine kore. Zbog svoje postojanosti, visoke otrovnosti i sklonosti da se akumuliraju u ekosistemu, teški su metali predstavljaju opast za zdravlje ljudi. Cilj rada je da se ispita sadržaj teških metala u PET ambalaži vode zapiće, te pH-vrijednost kao i elektroprovdljivost komercijalno proizvedena flaširana voda. Za analizu su korištene flaširane vode koje su kupljene u marketima Unsko-sanskog kantona od dvanaest različitih proizvođača. Uzorci PET ambalaže su digestirani u mikrovalnoj pećnici Anton Paar Multiwave PRO,i analizirani na PerkinElmer Atomskom absorcionom spektrometru AAnalyst 800 sa Zeeman-ovom korekcijom. Kadmij (Cd), olovo (Pb), kobalt (Co), cink (Zn) i željezo (Fe) su analizirani plamenom tehnikom. Izmjerene koncentracije teških metala u PET ambalaži su bile niske, te ove vrijednosti ne odstupaju od Direktiva Europskog Parlamenta i Vijeća 94/62/EZo ambalaži i ambalažnom otpadu. Elektroprovodljivost za sve uzorke je bila u skladu sa Pravilnikom o stolnim vodama u BiH. Analizirana PET ambalaža ne predstavlja opasnost po ljusko zdravlje, jer su izmjerene koncentracije teških metala u skladu sa Direktivom 94/62/EZ.

Ključne riječi: *teški metali, toksičnost, PET.*

RESEARCH OF ANTIMICROBAL RESISTANCE OF CLINICAL IMPORTANT MULTI-RESISTENT GRAM NEGATIVE BACTERIAL ISOLATES IN THE UNA-SANA CANTON AREA

ISTRAŽIVANJE ANTIMIKROBNE REZISTENCIJE KLINIČKI ZNAČAJNIH MULTIREZISTENTNIH GRAM NEGATIVNIH BAKTERIJSKIH IZOLATA NA PODRUČJU UNSKO-SANSKOG KANTONA

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ABSTRACT:
The term "microbial resistance" means the immunity/resistance of bacteria to antimicrobial drugs. The level of their resistance depends on the antimicrobial drug, the bacterium itself and the mechanism of resistance. Microbial resistance may be a specific feature of a single bacterial isolate, but also of certain bacterial species and genera. When one bacteria is resistant to three or more antibiotics (i.e., an antibiotic group), there is multiple resistance.The enormous occurrence of resistance to both pathogenic and non-pathogenic bacteria occurred due to uncontrolled use of antibiotics. The occurrence of resistance of non-pathogenic bacteria disturbs the balance of existing microbial ecosystems.....Of the total of 9 species of isolated and identified Gram-negative multiresistant bacteria, the most abundant isolates were: Klebsiella pneumoniae ESBL (with 16 isolates, or 23,18%), Escherichia coli ESBL, Acinetobacter spp. *and Pseudomonas aeruginosa (with 11 isolates, or 15,94%), Enterobacter* spp. *ESBL (with 8, or 11,59% isolates), Proteus mirabilis (with 5 isolates, or 7,24%), then Serratia* spp. *(with 3 isolates, or 4,34%), and Citrobacter* spp. *ESBL and Klebsiella oxytoca (with 2 isolates, or 2,89%).*

Keywords: *microbial resistance, multi-resistance, bacterial isolates, Gram-negative bacteria.*

SAŽETAK:
Pojam "mikrobna rezistencija" označava neosjetljivost / otpornost bakterija na antimikrobne lijekove. Nivo njihove otpornosti ovisan je o antimikrobnom lijeku, samoj bakteriji i mehanizmu rezistencije. Mikrobna rezistencija može biti specifična osobina jednoga bakterijskog izolata, ali i određenih bakterijskih vrsta i rodova. Kada je jedna bakterija rezistentna na tri i više antibiotika (tj. na grupu antibiotika), govori se o multiploj rezistenciji.Do enormne pojave rezistencije kako patogenih tako i nepatogenih bakterija došlo je uslijed nekontrolisane upotrebe antibiotika. Pojava rezistencije nepatogenih bakterija narušava ravnotežu postojećih mikrobijalnih ekosistema.....Od ukupno 9 vrsta izoliranih i identificiranih Gram-negativnih multirezistentnih bakterija najzastupljeniji izolati bili su: Klebsiella pneumoniae ESBL (sa 16 izolata ili 23,18%), Escherichia coli ESBL, Acinetobacter spp. *i Pseudomonas aeruginosa (sa 11 izolata ili 15,94%), zatim Enterobacter* spp. *ESBL (sa 8 ili 11,59% izolata), pa Proteus mirabilis (sa 5 izolata ili 7,24%), Serratia* spp. *(sa 3 izolata ili 4,34%) te Citrobacter* spp. *ESBL i Klebsiella oxytoca (sa 2 izolata ili 2,89%).*

Ključne riječi: *Mikrobna rezistencija, multirezistencija, bakterijski izolati, Gram-negativne bakterije.*

WIRELESS SENSOR NETWORK BASED ALARM DETECTION AND MONITORING OF CYBER-PHYSICAL SYSTEM WITH MOBILE ROBOT INSPECTION

DETEKCIJA ALARMA I MONITORING CYBER-FIZIČKOG SISTEMA BAZIRAN NA BEŽIČNOJ SENZORSKOJ MREŽI I INSPEKCIJI POMOĆU MOBILNOG ROBOTA

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ABSTRACT:
The cyber-physical systems has been an evergrowing terminology in today's evolving Industry 4.0, combining improved information tehnology and automation solutions, data and physical elements and the ability to connect devices to one another using wireless sensor networks. In this paper we present alarm detection and monitoring system using the wireless sensor network (WSN) with the mobile robot inspection. An abnormal event could happen in any uncertain time, so we need more sensor nodes in industrial environment to set alarm precisely if abnormal event happen. Our framework includes the autonomous robot (agent) as an integral part of wireless sensor network and the mobile robot travels to the positions, where the alarm was detected to investigate. The aim of our work was to develop alarm detection system that could help in different factory to install reliable alarm detection systems with localizing and monitoring capability within a relatively lower cost. As such, it could be replicated anywhere including complex event processing.

Keywords: *alarm detection, cyber-physical systems, Industry 4.0, mobile robot inspection, monitoring, wireless sensor networks.*

SAŽETAK:
Cyber-fizički sistemi su novi trend industrijske revolucije (Industry 4.0), koji kombinuju unapređena rješenja informacionih tehnologija i automatike, podatake, fizičke uređaje i povezuju ih korištenjem bežičnih senzorskih mreža. U ovom radu je prikazana detekcija alarma i monitoring okruženja korištenjem bežičnih senzorskih mreža, uz inspekciju sa mobilnim robotom. Abnormalni događaji se mogu desiti u bilo koje vrijeme, tako da je bitno imati što veći broj senzorskih čvorova u industrijskom okruženju u cilju preciznog postavljanja alarma u slučaju detekcije alarmnih stanja. Naše rješenje uključuje i mobilnog robota (agenta) kao sastavni dio senzorske bežične mreže, koji dodatno istražuje područja gdje se dešava alarm. Cilj ovog rada je razvijanje sistema za detekciju alarma, koji može pomoći da se instaliraju pouzdani sistemi za lokalizaciju i monitoring u različitim fabrikama, uključujući zone kompleksnih procesnih dešavanja, uz relativno niske troškove realizacije.

Ključne riječi*: detekcija alarma, cyber-fizički sistemi, Industry 4.0, mobilni roboti u inspekciji, monitoring, bežične senzorske mreže.*

REVIEW OF SIMULATION BASED COMPARISON OF VANET PROTOCOLS

EVALUIRANJE I ANALIZA PERFORMANSI VANET PROTOKOLA NA BAZI POREDJENJA REZULTATA SIMULACIJE

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ABSTRACT:
Vehicle-to-Vehicle communications comprising of VANET is one of the best way to transfer information between vehicles. VANET protocols are the rules that perform the role of governing body for all this communications process. There are many parameters and factors that are taken into account while evaluating the performance of any protocols including VANET protocols as well. Protocol that performs best could be used for V2V communication in VANET. Another part of the VANET system is so-called Vehicle-to-Infrastructure communication that handles the communication of the vehicle with road side units or RSUs. RSUs play a vital role in communication between vehicles that are far away. There are certain factors again that effect the V2I communication. Vehicular Adhoc Network can be considered as the backbone of Intelligent Transportation System (ITS).

Keywords: *VANET, Intelligent Transportation System, Simulation topology, NCTUNs*

SAŽETAK:
Komunikacija od vozila do vozila koja se odvija u specijalnoj tehnologiji mreze VANET predstavlja jedan od najefikasnijih nacina korisnicke komunikacije zasnovane na bazi tzv. inteligentnih transportnih sistema koji se vec godinama nalaze u zizi interesovanja i istrazivanja razlicitih profila naucnika.VANET protokoli kao sastavni i neodvojiv dio pomenutih mreza predstavljaju skup specifcnihpravila koja obavljaju ulogu upravljačkog tijela za sve komunikacijske procese u sistemu razmjene informacija i podataka izmedju vozila i njihovih upravljackih instanci. Postoji citav niz parametara i faktora koji se uzimaju u obzir prilikom procjene ucinka i efikasnosti bilo kojeg protokola uključujući i VANET protokole.Protokol koji najbolje funkcionira koristiti se za tzv. V2V komunikaciju izmedju samih vozila u VANET-u. Drugi dio VANET sistema je takozvana komunikacija izmedju vozila i infrastrukture koja upravlja razmjenom podataka izmedju vozila i baznih stanica RSU koje se nalaze na putevima. RSU igraju ključnu ulogu u komunikaciji između vozila koja su nalazena razlicitim prostorno vremenskim distancama u odnosu na upravljacku infrastrukturu.

Ključne riječi: *VANET,inteligentni transportni sistem,simulacijski program,NCTUNs*

RAMP METERING ON URBAN MOTORWAYS

UPRAVLJANJE PRILJEVNIM TOKOVIMA NA URBANIMA AUTOCESTAMA

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ABSTRACT:
Reduced Level of Service on urban motorways, which actually represents evolved urban bypasses, is the product of two overlapping problems. First of them is related to the heavy congestions, and the second one is related to the unavailable constructional build-up of their capacities since they are surrounded by the urban and traffic infrastructure. In order to cope with those problems, it is necessary to introduce urban motorway control methods such as for example ramp metering (RM). The main goal of RM is to increase the throughput of urban motorways by restricting access of on-ramp traffic to mainstream traffic by using special traffic lights. In this paper, an overview of currently most used RM algorithms (ALINEA, SWARM, and HELPER) and their fundamental deficiency in partial problem solving for different traffic scenarios is given. A new RM algorithm based on the Adaptive Neuro-Fuzzy System neural networkcalled INTEGRA is also described.

Keywords: *urban motorways, ramp metering, traffic control, machine learning*

SAŽETAK:
Smanjena razina uslužnosti na urbanim autocestama, koje zapravo predstavljaju evoluirane urbane obilaznice, produkt su dva problema. Prva od njih povezan je s intenzivnim zagušenjima na spomenutim prometnicama, dok je drugi povezan s nemogućnošću nadogradnje njihovih kapaciteta, budući su okružne urbanom i prometnom infrastrukturom. Kako bi se ublažili spomenuti problemi potrebno je implementirati metode upravljanja prometom kao što je primjerice upravljanje priljevnim tokovima, (engl. rampmetering - RM). Glavni cilj RM-a je povećanje propusnosti urbanih autocesta ograničavanjem pristupa prometnog toka sa prilaza autoceste u glavni tokkorištenjem posebnih semafora. U ovom radu dat je pregled trenutno najkorištenijih konvencionalnih RM algoritama (ALINEA, SWARM i HELPER) te je opisan njihov temeljni nedostatak u djelomičnom rješavanju problema vezanih za različite prometne scenarije. Također, prikazan je jedan novi RM algoritam (INTEGRA) zasnovan na ANFIS metodologiji.

Ključne riječi: *upravljanje prljevnim tokovima, urbane autoceste, adaptivno upravljanje prometom, strojno učenje*

TERMINOLOGY EXTRACTION TO BUILD AN ONTOLOGY OF INTELLIGENT TRANSPORT SYSTEMS

IZGRADNJA RJEČNIKA ONTOLOGIJE INTELIGENTNIH TRANSPORTNIH SUSTAVA

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ABSTRACT:
Ontologies inthe field of information sciences represent the basic building blocks in formal semanticinfrastructure construction, which are needed for the development of various semantics-aware applications. At the beginning of any ontology development, it is important to create a dictionary of concepts which will make-up the ontology. The methodological basis for the construction of an Intelligent transport systems ontology and iterative procedures for its expansion is described in this paper. Furthermore, knowledge base analysis methods of terminology extraction for building ontologies within the domain of intelligent transport systems is presented.

Keywords: *intelligent transport system, ontology, dictionary.*

SAŽETAK:
Ontologije u području informacijskih znanosti predstavljaju osnovne blokove u izgradnji infrastrukture potrebne za razvoj i rad semantičkih aplikacija. Na početku zasnivanja ontologije, u jednoj od prvih etapa, važno je izgraditi rječnik pojmova koji ulaze u ontologiju. U ovom radu opisana je metodološka podloga izgradnje rječnika ontologije inteligentnih transportnih sustava te iterativni postupci za njegovo proširivanje. Također, opisuju se načini ekstrahiranja rječnika ontologije metodom analize baza prometnih znanja i standardizacijskih okvira unutar domene inteligentnih transportnih sustava.

Ključne riječi*: inteligentni transportni sustavi, ontologija, rječnik,*

COOPERATIVE VEHICLE ACTUATED TRAFFIC CONTROL IN URBAN AREAS

KOOPERATIVNO PROMETNO OVISNO UPRAVLJANJE PROMETOM U GRADOVIMA

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Miroslav Vujić Sadko Mandžuka Luka Dedić

ABSTRACT:
Rapid increasing in the number of vehicles in urban areas directly affects traffic quality because of the physical limitations of road infrastructure. Frequent congestions in the cities cause the increase of delays, stop-and-go actions and especially travel times. Up-to-datemethods of traffic control are focused on advanced intelligent transport systems solutions in order to increase the quality of urban traffic network. This is directly affects improvement of traffic parameters quality such as travel time, delay, etc. Also, defined parameters affect the quality of environmental factors in urban traffic network (emission of pollution from motor vehicles, fuel consumption, noise level, etc.). Higher level of traffic control is enabled by direct real-time communication between vehicles (personal vehicles, public transport vehicles, etc.). This method outperforms traditional fixed cycle management of signalized intersections, which use predetermined signal plans. Benefits of using cooperative actuated control where model with implemented control algorithms is compared with existing traffic model with fixed time signal plans are described. The main goal is to harmonize traffic flow with optimal vehicle speed and to reduce the number of stop-and-go actions which directly affects emission of pollution and fuel consumption.
Keywords: *intelligent transport systems, energy efficiency, level of service, urban traffic control*

SAŽETAK:
Brz porast broja vozila u gradskoj prometnoj mreži direktno utječe na kvalitetu prometnog sustava zbog fizičkih ograničenja prometne infrastrukture. Česta zagušenja u gradovima utječu na povećanje kašnjenja, broja "kreni-stani" akcija, te posebno vremenima putovanja. Najnovije metode upravljanja prometom fokusirane su na naprednim rješenjima inteligentnih transportnih sustava (ITS) s ciljem povećanja kvalitete gradske prometne mreže. Ta ITS rješenja direktno utječu na poboljšanje prometnih parametara kao što su vrijeme putovanja, čekanja na semaforiziranim raskrižjima, itd. Također, definirani parametri utječu i na kvalitetu ekoloških čimbenika (emisija štetnih plinova, potrošnja goriva, razina buke, itd.). Cilj rada je pokazati značaj kooperativnog prometno ovisnog upravljanja prometom uz definiciju parametara koji upućuju na sveukupnu izvedbu prometne mreže, s proširenjem na kooperativni pristup gdje se uspostavlja veza između vozila i infrastrukture. Viša razina kontrole prometa omogućena je izravnom komunikacijom u stvarnom vremenu između vozila (osobna vozila, vozila javnog prijevoza, itd.). Ova metoda nadmašuje tradicionalno upravljanje fiksnim ciklusom signaliziranih križanja, koja koriste unaprijed određene signalne planove. Prednosti korištenja kooperativnog prometno ovisnog upravljanja prometom gdje se algoritmima prometno ovisnog upravljanja uspoređuju s postojećim prometnim modelom s fiksnim signalnim planovima su opisane u ovom radu. Glavni cilj je ostvariti harmonizaciju prometnog toka i smanjiti broj "kreni-stani" akcija koji izravno utječu na emisiju štetnih plinova i potrošnju goriva
Ključne riječi*: inteligentni transportni sustavi, energetska učinkovitost, razina uslužnosti, upravljanje prometom u gradovima*

APPLICATION OF MINI COMPUTERS AND RFID TECHNOLOGY IN AUTOMATION

PRIMJENA MINI RAČUNARA I RFID TEHNOLOGIJE U AUTOMATIZACIJI

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Malik Čabaravdić Sanela Čančar Anel Husaković

ABSTRACT:
The advancement of technology is increasing the need for its application in everyday life. RF technologieis one of the interesting area and is widley used in Europe but also in Bosnia and Herzegowina. Point of this paper is to investigate usage, abilites and limitations of this contactless technology by simple access control of parking lot via RFIDtechnology and Arduino mini computer.

Keywords:*RF, RFID, single-board computers,mini-computers, arduino, parking lot.*

SAŽETAK:
Napredovanje tehnologije povećava potrebu za njegovom primjenom u svakodnevnom životu. RF technologieis je jedno od interesantnih područja i koristi se u Evropi, ali i u Bosni i Hercegovini. Tema ovog rada je istražiti upotrebu, abilite i ograničenja ove beskontaktne tehnologije jednostavnom kontrolom pristupa parkingu putem RFID technology i Arduino mini računara.

Ključne riječi*: RF, RFID, mini računari, arduino, parking prostor.*

APPLICATION OF UNMANNED AERIAL VEHICLES IN LOGISTIC PROCESSES

PRIMJENA BESPILOTNIH LETJELICA U LOGISTIČKIM PROCESIMA

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Jasmina Pašagić -Škrinjar *Pero Škoput* *Martina Furdić*

ABSTRACT:
In order to respond to the challenges of modern society, the organization of logistic processes requires synergistic optimization effects of physical processes and application of innovative technologies. The emphasis is based on continuous optimization of the processes with the aim of faster, more quality and more cost-effective services to the end user. In this paper possibility and potential of UAV (Unmanned aerial vehicle) application in logistics processes will be explained. Processes as stock inventory in warehouses and others can be improved with application of UAV.

Keywords:*Unmanned Aerial Vehicle; Logistic Processes; Warehouse Operation.*

SAŽETAK:

Kako bi se odgovorilo izazovima suvremenog društva, organizacija logističkih procesa zahtjeva sinergijske učinke optimizacije fizičkih procesa i primjene inovativnih tehnologija. Pri tome naglasak se stavlja na kontinuiranu optimizaciju procesa u svrhu brže, kvalitetnije i ekonomičnije usluge krajnjem korisniku. U radu će se istražiti mogućnost primjene bespilotnih letjelica u skladišnim procesima. Procesi kao što su inventura skladišta i slično mogu se unaprijediti primjenom bespilotnih letjelica.

Ključne riječi*: bespilotne letjelice, logistički procesi, skladišno poslovanje*

CYBER SECURITY CAPACITY BUILDING PLANNING WITHIN ORGANISATIONS

PLANIRANJE I IZGRADNJA SAJBER BEZBJEDNOSTNIH KAPACITETA UNUTAR ORGANIZACIJE

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ABSTRACT:
Organisations are facing challenges of protecting their data in cyberspace since damages of cyberattacks might potentially run into billions, besides killing investor confidence and denting brand image. Recent data shows that one of key threats for organisations are insider attacks caused by person who has/had authorized access to an organization's information system, and thus having the knowledge about the system and being a potential point of intrusion, and jeopardizing the availability, integrity and confidentiality of the organization's information systems. That is a reason why we analyse key factors influencing planning of capacity building activities for employees, and thus making optimal planning of raising awareness, training and education activities.

Keywords: *cyber security, user behaviour, capacity building, training, awareness*

SAŽETAK:
Organizacije se svakodnevno suočavaju sa izazovima zaštite svojih podataka u sajberprostoru. Imajući u vidu da sajber napadimoguprozrokovati problem u redovnom poslovanju organizacije, nauditi ugledu njihovog brendai ozbiljno poremetiti zainteresovanost potencijalnih investitora, za pojedine organizacije šteta nastala usljed sajber napada u finansijskom smislu može iznositi i nekoliko milijardi dolara.Veliki broj istraživanja pokazuju dasu unutrašnji napadi tj napadi koje je izazvala osoba koja ima ovlašćeni pristup informacionom sistemu organizacije i/ili koja ima znanje o sistemu koje joj omogućava da ugrozi dostupnost, integritet i tajnost podataka i servisa poslovnog informacionog sistema, jedna od ključnih sajber prijetnji za organizacije. Osnovni cilj rada je analiza ključnih faktora koji utiču na planiranje aktivnosti na izgradnji kapaciteta za zaposlene, a samim tim i optimalno planiranje podizanja svijesti, obuke i obrazovnih aktivnosti u oblasti sajber bezbjednosti.

Ključne riječi*: sajber bezbednost, ponašanje korisnika, izgradnja kapaciteta, obuka, svijest*

NEW METHOD OF SEQUENCES SPIRAL HYBRID USING MACHINE LEARNING SYSTEMS AND ITS APPLICATION TO ENGINEERING

NOVI METOD SEKVENCIJSKOG SPIRALNOG HIBRIDNOG KORIŠTENJA SISTEMA MAŠINSKOG UČENJA I NJEGOVE PRIMJENE NA INŽENJERING

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ABSTRACT:
In an era of increased emphasis on sustainability and quality assurance, knowledge about metals and other materials used in products, manufacturing processes, and construction is invaluable. Metallurgy is the study of the physical and chemical behaviour of metallicelements. CNC operators typically test many materials with different CNC machine parameters to optimize the topological properties of materials. In this article we present a solution to this problems. We analyse SEM pictures of the microstructure of robot laser hardened specimens using graph theory and fractal geometry. Intelligent systems methods enable predictions for mechanical engineering based on a hybrid of genetic programming and multiple regression, with applications to metallurgy and mechanical engineering. Hybrid evolutionary computation is a generic, flexible, robust, and versatile method for solving complex global optimisation problems that can also be used in practical applications. Hybrid intelligent systems enhance laser hardening by decreasing the process time and increasing the topographical properties of materials.

Keywords: *intelligent system, hybrid machine learning, laser, hardening, visibility graphs, fractal dimension, metallurgy.*

SAŽETAK:
U eri povećanog naglaska na održivost i osiguranje kvaliteta, znanje o metalima i drugim materijalima koji se koriste u proizvodima, proizvodnim procesima i građenju je neprocjenjivo. Metalurgija je proučavanje fizičkog i hemijskog ponašanja metalnih elemenata. CNC operateri obično testiraju mnoge materijale sa različitim CNC mašinskim parametrima kako bi optimizirali topološke osobine materijala. U ovom članku predstavljamo rešenje za ove probleme. Mi analiziramo SEM slike mikrostrukture robotskih laserskih očvrsnih uzoraka korišćenjem teorije grafova i fraktalne geometrije. Metode inteligentnih sistema omogućavaju prognoze za mašinstvo zasnovane na hibridu genetičkog programiranja i višestrukoj regresiji, sa aplikacijama za metalurgiju i mašinstvo. Hibridna evoluciona računanja predstavljaju generički, fleksibilni, robusni i svestrani metod za rešavanje složenih globalnih problema optimizacije koji se takođe mogu koristiti u praktičnim aplikacijama. Hibridni inteligentni sistemi poboljšavaju lasersko učvršćivanje time što smanjuju vreme procesa i povećavaju topografske osobine materijala.

Ključne riječi*: inteligentni sistem, hibridno mašinsko učenje, laser, otvrdnjavanje, grafi vidljivosti, fraktalna dimenzija, metalurgija.*

APPLYING WEIGHTED PARTICLE SWARMOPTIMIZATION TO IMBALANCED DATA INSOFTWAREDEFECT PREDICTION

PRIMENJIVANJE PONDERISANE OPTIMIZACIJE ROJEM ČESTICA NA NEURAVNOTEŽENIM PODACIMA U PREDVIĐANJU SOFTVERSKIH DEFEKATA

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Lucija Brezočnik Vili Podgorelec

ABSTRACT:
Imbalanced data typically refers to class distribution skews and underrepresented data, which affect the performance of learning algorithms. Such data are well-known in real-life situations, such as behavior analysis, cancer malignancy grading, industrial systems' monitoring and software defect prediction. In this paper, we present a W-PSO method, which comprises weighting of instances in a dataset and the Particle Swarm Optimization algorithm. The presented method was combined with classification methods C4.5 and Naive Bayes, respectively, and tested experimentally on ten freely accessible software defect prediction datasets. Based on the results achieved, the presented W-PSO method creates better classification models than classification methods C4.5 and Naive Bayes in the majority of the cases.

Keywords: *machine learning, swarm intelligence, particle swarm optimization, software defect prediction.*

SAŽETAK:
Neuravnoteženi podaci obično se odnose na asimetričnu raspodjelu klasa i nedovoljno zastupljene podatke, koji utiču na performance algoritama učenja. Takvi podaci su dobropoznati u stvarnim situacijama, kao što su analiza ponašanja, rangiranjem alignihtumora, praćenje industrijskih sistema i predviđanje softverskih defekata. U ovom radu predstavljamo metodu W-PSO, koja uključuje ponderisanje instanci u skupu podataka i algoritam za optimizaciju roja čestica. Prikazana metoda je kombinovana sa metodama klasifikacije C4.5 i Naive Bayes I eksperimentalno testirana na deset slobodno dostupnih skupova podataka predviđanja softverskih defekata. Na osnovu postignutih rezultata predstavljen ametoda W-PSO u većini slučajeva stvara bolje klasifikacione modele od metoda klasifikacije C4.5 i Naive Bayes.

Ključne riječi*: mašinsko učenje, inteligencija roja, optimizacija roja čestica, predviđanje softverskih defekata.*

CYBERNETIZATION OF INDUSTRIAL PRODUCT-SERVICE SYSTEMS IN NETWORK ENVIRONMENT

KIBERNETIZACIJA INDUSTRIJSKIH PROIZVODNO-SERVISNIH SISTEMA U MREŽNOM OKRUŽENJU

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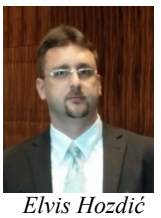


Elvis Hozdić Zoran Jurković

ABSTRACT:
The beginning of the new millennium, from the point of view of industrial production, is characterized by the rapid development of information and communication technologies and the Internet on one side, as well as globalization, uncertainty and ever-increasing demands of the contemporary market on the other. The basic question that arises from this relationship is: How to balance these two diametrically opposite "half", which are interconnected at the same time? The answer can be sought undoubtedly in the innovations of products, production technologies and production management methods on the underlying principles advocated by the new Industrial Revolution named in Industry 4.0.The proposed paper is part of the concept of cybernetization of advanced production systems developed in the framework of research work in the field of structuring reference models of cyber-physical production systems. The focus is on showing the cybernetic participants of modern industrial manufacturing and service systems and their connection to the Internet of Service Network.

Keywords: *Autonomous work system, cybernetics, cyber-physical systems, product-service system.*

SAŽETAK:
Početak novog milenija, iz vidika industrijske proizvodnje, obilježen je brzim razvojem informacijsko-komunikacijskih tehnologija i Interneta na jednoj strani, kao i globalizacijom, nesigurnošću i sve većim zahtjevima savremenog tržišta na drugoj strani. Osnovno pitanje koje proizlazi iz ovakvog odnosa je: Kako uravnotežiti ova dva suprotno dijametralna „pola", a koja se istovremeno međusobno prožimaju? Odgovor je moguće tražiti nedvojbeno u inovacijama proizvoda, proizvodnih tehnologija i metoda upravljanja proizvodnjom na temeljnim principima koje zagovara nova industrijska revolucija imenovana Industrijom 4.0.Predloženi rad predstavlja dio koncepta kibernetizacije naprednih proizvodnih sistema koji je razvijen u okviru istraživačkog rada na polju strukturiranja referentnih modela kibernetsko-fizičkih proizvodnih sistema. Fokus je dat na prikaz kibernetskih sudionika savremenih industrijskih proizvodno-servisnih sistema i njihovo povezivanje u mrežu Interneta servisa.

Ključne riječi: *autonomni radni sistem, kibernetika, kibernetsko-fizički sistemi, proizvodno-servisni sistem*

TECHNOLOGY-ENHANCED SYSTEMS IN IDIOPATHIC SCOLIOSIS3D DIAGNOSIS AND SCREENING

TEHNOLOGIJOM UNAPREĐENI SISTEMI ZA 3D DIJAGNOSTIKU I SKRINING IDIOPATSKIH SKOLIOZA

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ABSTRACT:
This paper presents some of the recently developed solutions for non-invasive scoliosis assessment and diagnosis. Scoliosis is a complex 3D deformity that affects younger population especially in early adolescence, usually without a known reason. The mainstandard in traditional scoliosis evaluation is single or biplanar radiography in frontal and sagittal plane of the patient and so-called Cobb angle measured on the dominant deformity curve. Nowadays, it is recommended, by many professional societies, to avoid intensive and oftenX-ray (ionizing) rehearsals and monitoring due to cumulative harmful effect on patients. In that course many research and development institutes and companies offer wide variety solutions for non-invasive diagnosis. Many of these are based on an optical 3D digitizer and software necessary to extract or estimate the degree of deformity and to generate its visualization. We also gave a contribution to this topic with innovative optical method - 3D Scoliosis simulator.

Keywords: *scoliosis, optical diagnosis, non-invasive solutions, radiation-free techniques.*

SAŽETAK:
U ovom radu predstavljena su neka od poslednjih rešenja u neinvazivnoj proceni i dijagnostici idiopatskih skolioza. Skolioza jekompleksan 3D deformitet kičemenog stuba koji najčešćepogađa mlađu populaciju posebno adolescente, često bez poznatih uzročnih faktora – idiopatski deformitet. Zlatni standard u tradicionalnoj evaluaciji i dijagnostici skolioza je planarana ili biplanarna radiografija pacijenta u frontalnoj i sagitalnoj ravni i tzv. Kobov ugao kojim se kvantifikuje veličina dominantnog segmenta krive deformiteta. U današnje vreme, mnogobrojna profesionala društva dala su preporuke za primenu i razvoj systema kojima će se izbeći ili smanjiti primena jonizujućih (radiografskih) ispitivanja čime bi se značajno redukovao kumulativan efekat izlaganja pacijenata štetnim metodama i sprečile maligne bolesti u kasnijoj životnoj dobi. S tim u vezi, mnogi naučno-istraživački instituti i kompanije razvile su brojna rešenjaza nejonizujuću i neinvazivnu 3D dijagnostiku. Najveći broj tih rešenja baziranje na optičkom 3D digitajzeru (skeneru) i pratećem softveru neophodnom za 3D rekonstrukciju ljudske površi, analizu i generisanje parametara deformiteta. Naš doprinos ovoj problematicije 3D simulator skolioza, inovativna optička metoda namenjena 3D dijagnostici i monitoring deformiteta čija se primena očekuje nakon završetka testiranja u kliničkoj praksi, kojasu u toku.

Ključne riječi*: skolioza, optičkadijagnostika, neinvazivnarešenja, nejonizujućetehnike*

THE ROLE OF HADOOP TECHNOLOGY IN THE IMPLEMENTATION OF BIG DATA CONCEPT

ULOGA HADOOP TEHNOLOGIJE U IMPLEMENTACIJI BIG DATA KONCEPT

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ABSTRACT:
Thanks to the incredible speed of the development of Information and Communication Technologies, a huge amount of information is generated in the world todaythatis increasing with every day. Since such a large amount of data could not be stored and processed (in real or reasonable time) using conventional methods of storing and processing data, a new paradigm of storage, processing and managing of large quantities, variety and data processing speed called the Big Data concept appeared. The aim of this paper is to try to explain the need and significance of the Big Data concept, the changes in data manifestationsfrom the Big Data concept and the role of Hadoop technology as a whole and its components individually in the practical realization of this concept. Since the practical realization of the Big Data concept would not be possible without the corresponding components of Hadoop technology,the paper will deal with the aspects of economics and productivity of storage, processing and data analysis.

Keywords:*Big data, Hadoop, HDFS, MapReduce, data processing productivity.*

SAŽETAK:
Zahvaljujući nevjerovatnoj brzini razvoja informaciono-komunikacionih tehnologija, danas se u svijetu generiše ogromna količina informacija, koja se svakog dana uvećava. Pošto je toliku količinu podataka nemoguće bilo skladištiti i obraditi (u realnom, odnosno razumnom vremenu) koristeći konvencionalne metode pohranjivanja i obrade podataka, pojavila se nova paradigma skladištenja, obrade i upravljanja velikom količinom, raznolikošću i brzinom obrade podataka pod nazivom Big Data koncept. Cilj ovog rada je pokušaj da se na što jednostavniji način objasni potreba i značaj Big Data koncepta, promjene u razmišljanjima o podacima koje je donio Big Data koncept, te uloga Hadoop tehnologije u cjelini kao i njenih komponenti pojedinačno u praktičnoj realizaciji tog koncepta. Pošto praktična realizacija Big Data koncepta ne bi bila moguća bez odgovarajućih komponenti Hadoop tehnologije, u radu će biti riječi o aspektima ekonomičnosti i produktivnosti skladištenja, obrade i analize podataka.

Ključne riječi: *Big data, Hadoop tehnologije, HDFS, MapReduce, produktivnost obrade podataka.*

ECONOMIC ASPECTS OF THE APPLICATION OF CLOUD COMPUTING

EKONOMSKI ASPEKTI APLIKACIJE CLOUD COMPUTING

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ABSTRACT:
The Paradigm, on which cloud computing was built, as a new model for using IT services, has been known since the beginning of computing, and was created as a result of analogy with the way public utility services are used and paid for: water, gas, electricity, telecommunication services, However, the practical realization of this idea was only possible after the emergence of the Internet and the rapid development of a range of other information and communication technologies. One of the root causes of both the development and the progress of cloud computing is significant time savings, lower risks and fewer barriers to the introduction of new applications, as well as significant cost savings in the implementation of IT projects. The aim of this paper is to briefly introduce some areas of cloud computing, then explain the key benefits and attractiveness of cloud computing in relation to other types of computing, and ultimately consider the economic aspects and issues that are related to it.

Keywords: *Economics of cloud computing, On-demand computing, IT resource scalability,comparative analysis of cost models, Application of cloud computing*

SAŽETAK:
Paradigma na kojoj je izgrađen cloud computing kao novi model korišćenja IT usluga, poznata je još iz vremena početaka računarstva, a nastala je kao rezultat analogije sa načinom korištenja i plaćanja javnih komunalnih usluga: vode, plina, električne energije, telekomunikacijskih usluga itd. Međutim, praktična realizacija te ideje bila je moguća tek nakon pojave interneta i brzog razvoja niza drugih informaciono-komunikacionih tehnologija. Jedan od suštinskih razloga nastanka i razvoja cloud računarstva jesu značajne vremenske uštede, manji rizici i manje prepreke za uvođenje novih aplikacija kao i značajne uštede na troškovima pri implementaciji IT projekata. Cilj ovog rada je da ukratko predstavi neka područja primjene cloud computinga, zatim da objasni ključne prednosti i privlačnost cloud computinga u odnosu na ostale vrste računarstva, te da na kraju razmotri ekonomske aspekte i pitanja, koja su u vezi s tim.

Ključne riječi*: Ekonomika cloud computinga, On-demand computing, skalabilnost IT resursa, komparativna analiza troškovnih modela, primjena cloud computinga*

SUPPORTPARAMETRIC VECTOR ANALYSIS OF AVAILABLE RESOURCES FOR MINIMISATION OF PROJECT DURATION–FOUR VARIETIES OF CONDITIONS

VEKTORSKA PARAMETARSKA ANALIZA RASPOLOŽIVIH RESURSA ZA MINIMIZACIJU TRAJANJA PROJEKTA – ČETIRI VARIJANTE USLOVA

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Omer Kurtanović Lejla Dacić

ABSTRACT:
This paper considers the dependence of the project duration on available resources through the problem of parametric analysis (PA). Vector PA has been presented from the aspect of variants of perturbation directions and intensities for several different categories of resources that belong to the 'work type' category. Four varieties of direction combination and selected change intensities are illustrated for m=3 resource categories P_i *with constant available amounts* $n_i = n_i(t)$ *andintensities* $n_i' = n_i(t)'$, $i \in I$, $t \in T$ *.A general formulation of the mathematical model, solution algorithm, and an illustrative example, are given too. The illustrative examples were solved using the MS Project software.*

Keywords: *project minimisation, available resources, parametric analysis, variants of conditions, software.*

SAŽETAK:
Ovaj rad razmatra zavisnost trajanja projekta od raspoloživih resursa, kao problem parametarske analize (PA). Prikazuje se vektorska PA za količine više različitih kategorije resursa koji su tipa rada, sa stanovišta varijanti za perturbacione smjerove i intenzitete.Ilustruju se četiri varijante kombinovanja smjerova i odabranih intenziteta promjena za m *=3 kategorija resursa* P_i *konstantnim raspoloživim količinama* $n_i = n_i(t)$ *i intenzitima* $n_i' = n_i(t)'$, $i \in I$, $t \in T$ *.Daje se formulacija opšteg matematičkog modela, algoritam iznalaženja rješenja i ilustrativni primjer.Ilustrativni primjer će se rješavani primjenom softvera MS Project*

Ključne riječi*: minimizacija projekta, raspoloživi resursi, parametarska analiza, varijanteuslova,softver.*

CONTRIBUTIONS TO IMPROVE THE SUSTAINABILITY IN SERVICES BASED ORGANIZATIONS

PRILOG ZA POBOLJŠANJE ODRŽIVOSTI U ORGANIZACIJAMA BAZIRANIM NA USLUGAMA

Titu Aurel Mihail[1], Pop Alina Bianca[2], Titu Stefan[3]

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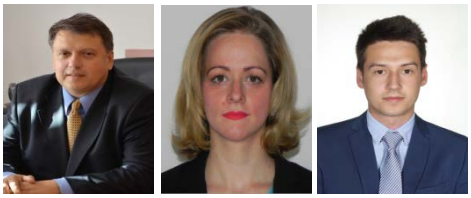

Titu Aurel Mihail Pop Alina Bianca Titu Stefan

ABSTRACT:
The sustainability of the services based organization consist on its ability to monitor the external environment about opportunities, changes, trends and risks, as well as the ability to learn, change and innovate. To reach the sustainability threshold, the organization must focus on both results and processes. A viable solution is to adopt a quality strategy that allows a perceptible perception of its products to its customers. This research purpose is to identify the extent of which organizations are sustainable and seek to meet the interests of all the involved stakeholders, as well as to help the organizations to identify areas where they can improve their performance.

Keywords: *quality, quality management, efficiency, sustainability, organization*

SAŽETAK:
Održivost organizacije zasnovane na uslugama sastoji se od njegove sposobnosti da nadgleda spoljno okruženje o mogućnostima, promJenama, trendovima i rizicima, kao i sposobnost učenja, promjene i inoviranja. Da bi se postigao prag održivosti, organizacija se mora usredsrediti na rezultate i procese. Važno rešenje je usvajanje strategije kvaliteta koja omogućava percepciju svojih proizvoda svojim klijentima. Ova svrha istraživanja je da identifikuje u kojoj mjeri su organizacije održive i da nastave da ispune interese svih uključenih aktera, kao i da pomognu organizacijama da identifikuju oblasti u kojima mogu poboljšati svoje učinke.

Ključne riječi*: kvalitet, upravljanje kvalitetom, efikasnost, održivost, organizacija.*

NEW TECHNOLOGIES IN EDUCATION AT "DŽEMAL BIJEDIĆ" UNIVERSITY IN MOSTAR

NOVE TEHNOLOGIJE U OBRAZOVANJE NA UNIVERZITETU "DŽEMAL BIJEDIĆ" U MOSTARU

AlimAbazović[1], Dragi Tiro[2], Fuad Ćatović[3]

[1,2,3] University of „Džemal Bijedić" Mostar, 88104 Mostar, Bosnia and Herzegovina



Alim Abazović Drago Tiro Fuad Ćatović

ABSTRACT:

Information and communication technologies (ICT) have become unavoidable in educational processes. They are used in higher education to a significant extent today in a complex Bosnian-Herzegovinian reality. This paper presents an overview of the development and experience in applying ICT in education with suggestions for further development and improvement at the DzemalBijedic University of Mostar.

Keywords:*ICT, higher education, e-learning, distance learning*

SAŽETAK:

Informacijsko komunikacijsketehnologije (IKT) su postale nezaobilazne u obrazovnim procesima. U značajnoj mjeri se danas koriste u obrazovanju u kompleksnoj bosanskohercegovačkoj realnosti. U ovom radu se daje pregled razvoja i iskustva u primjeni IKT u obrazovanju sa prijedlozima za dalji razvoj i unapređenja na Univerzitetu „Džemal Bijedić" u Mostaru

Ključne riječi*: IKT,visokoškolskoobrazovanje, elektronskoučenje, učenjenadaljinu.*

LABORATORY SUPPORT FOR THE SELECTION OF SUSTAINABLE COMBUSTION TECHNOLOGY IN THE LIGHT OF CONSTRUCTION OF NEW THERMOBLOCKSIN BOSNIA AND HERZEGOVINA - Example: Thermoblock 8 in Thermal Power Plant Kakanj

LABORATORIJSKA PODRŠKA IZBORU ODRŽIVE TEHNOLOGIJE SAGORIJEVANJA- primjer: blok 8 u TE Kakanj

Nihad Hodžić[1], Sadjit Metović[2], Anes Kazagić[3]
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Nihad Hodžić Sadit Metović Anes Kazagić

ABSTRACT:
In the Laboratory for coal and biomass combustion at the Mechanical Engineering Faculty - Universtity of Sarajevo, extensive research was carried out on the characte-ristics of combustion of mixtures of coals from Middle Bosnian basin. The aim of the research was to obtain reliable data for further analysis and optimization of the combustion system of these coal blends, and the answer to the question of whether it is possible to efficiently burn these coals in conditions of dry slag discharge from the furnace. Combustion of various coal blends from coal mines Kakanj, Breza and Zenica were investigated at various temperatures (950-1350°C) and under various techno-logical conditions in the combustion chamber. The following parameters were varied: fraction of individual coals in the mixture, combustion temperature, thermal load of the combustion chamber, air distribution including the combustion air staging system. During the study the composition of flue gas, in particular CO_2, CO, NO_x and SO_2 emissions, combustion efficiency, solid ash sample characteristics, reactivity of CaO and binding of coal-based sulfur to alkaline compounds of the coal ash were analyzed. Summary of the results of this research is given in this paper. It has been shown that high efficiency combustion can be established under certain conditions. It is also estimated that pulverized coal combustion with dry ash bottom furnace is acceptable and sustainable technology for treated coals/blends.

Keywords: *coal, combustion, emissions, boiler, furnace, solid ash, optimizatio.*

SAŽETAK:
Na Mašinskom fakultetu u Sarajevu su usklopu Laboratorije za sagorijevanje uglja i biomase obavljena opsežna bazna istraživanja karakteristika sagorijevanja mješavine ugljeva srednjobosanskog rudarskog bazena u sprašenom stanju. Cilj istraživanja je biodobiti pouzdane podatke za dalje analize i optimizaciju sistema sagorijevanja tih ugljeva, te odgovor na pitanje da li je moguće ove ugljeve efikasno sagorijevati u uslovima suhog odvođenja šljake iz ložišta. Istraživano je sagorijevanje različitih mješavina ugljeva iz rudnika mrkog uglja Kakanj, Breza i Zenica, pri različitim temperaturnim (950-1350 °C) i drugim tehnološkim uslovima u ložištu. Varirani su: učešće pojedinih ugljeva u mješavini, temperatura sagorijevanja, termičko opterećenje ložišta, distribucija zraka - uključivo i sistem za stepenovani privod zraka za sagorijevanje. Tokom istraživanja je analiziran sastav dimnih plinova, naročito emisije CO_2, CO, NO_xi SO_2, efikasnost sagorijevanja, karakteristike čvrstih uzoraka šljake i pepela, kao i reaktivnost CaO i vezivanje sumpora iz uglja za alkalne spojeve u pepelu uglja - izvod iz rezultata istraživanja je dat u ovom radu. Pokazano je da je u ovim uslovima moguće uspostaviti visokoefikasno sagorijevanje te je data ocjena da je za tretirane ugljeve/mješavine tehnologija sagorijevanja sprašenog uglja u letu sa suhim odvodom šljake iz ložišta prihvatljiva i održiva.

Ključne riječi: *ugalj, sagorijevanje, emisije, kotao, ložište, termoelektrana, optimizacija.*

INFLUENCE OF NEW TECHNOLOGIES ON HIGHER ENERGY EFFICIENCY OF HYDROSTATIC DEVICES AND SYSTEMS

UTICAJ NOVIH TEHNOLOGIJA NA VISOKU ENERGETSKU EFIKASNOST HIDROSTATSKIH UREĐAJA I SISTEMA

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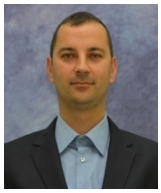

Milutin Zivković Predrag Dašić Zvonko Petrović

ABSTRACT:

Increasing requirements for automatization of production processes, flexibility and accuracy of achieving the given position, velocity, acceleration and force of actuators have a significant influence on application of hydrostatic systems. Thus, considerable financial means are invested into research and development of new designs and optimal control systems in order to solve all the problems of transmission and conversion of driving energy. Both the experience and data from literature show that current hydraulic components and development of electric control systems have significantly increased energy efficiency. Therefore, all world manufacturers of hydraulic devices and systems use advanced technologies and methods with the final aim to integrate them into mechanical system. Energy losses, made as a result of all forms of friction, are minimized. It is safe to say that modern growth is based on development of new materials and accompanying technologies as well as on control techniques, i.e. on mechatronic approach and design of such systems. Ecological requirements and legal regulations should not be neglected, either. Based on the above issues and available data the authors of the paper try to answer the following question: What is the position of once famous factory of hydraulic devices from Trstenik in comparison to other competitive factories worldwide?

Keywords: *development and research, efficiency, energy losses, new technologies.*

SAŽETAK:

Izraženi zahtevi za automatizacijom proizvodnih procesa, fleksibilnošću i tačnošću ostvarivanja zadatog položaja, brzine, ubrzanja i sile aktuatora značajno su uticali na primenu hidrostatičkih pogonskih sistema. Iz tog razloga se u istraživanje i razvoj novih konstruktivnih rešenja kao i u optimalne sisteme upravljanja ulažu značajna finansijska sredstva kako bi se rešili svi problemu prenosa i konverzije pogonske energije.Vlastito iskustvo kao i literaturni podaci pokazuju da su postojeće hidrauličke komponente i razvoj elektronskih upravljačkih sistema značajno povećali, pored ostalog, i njihovu energetsku efikasnost. Zato, svi svetski proizvođači hidrauličkih uređaja i sistema koriste napredne tehnologije i tehnika što za krajni cilj ima njihovu integraciju u mehanički sistem. Gubici energije, nastali kao posledica svih oblika trenja, svedeni su na minimum. Slobodno se može reći da je savremeni razvoj zasnovan na razvoju novih materijala i pratećih tehnologija kao i kontrolnih tehnika, tj. mehatroničnog pristupa i dizajnu ovakvih sistema. Ne treba zanemariti ni sve izraženije ekološke zahteve kao i zakonske propise. Iz tih razloga, autori ovog rada, će na osnovu svega navedenog korišćenjem dostupnih podataka pokušati da odgovore na pitanje gde je sada mesto, nekada poznate, fabrike hidrauličkih uređaja iz Trstenika, u odnosu na svetsku konkurenciju.

Ključne riječi*: razvoj i istraživanje, energetska efikasnost, gubici energije, nove tehnologije*

DESIGN OF PICO HYDROPOWER PLANTS FOR RURAL ELECTRIFICATION

PROJEKTOVANJE PIKO HIDROELEKTRANE ZA POTREBE ELEKTRIFIKACIJE RURALNIH PODRUČJA

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Krsto Batinić Dušan Golubović Stojan Simić Goran Orašanin

ABSTRACT:
Pico hydro power stations include all hydropower systems with output of up to 5 kW. These systems have proven themselves to provide a reliable source of electricity for rural areas. Apart from rural area electrification, pico hydro power stations are convenient for utilizing the hydropower potential of water supply systems. This paper shows the calculation procedure and the selection criteria for basic components of a pico hydropower station based on a Pelton turbine. The paper provides an example of calculation procedure as well as the possibility of using them in Bosnia and Herzegovina.

Keywords: *hydropower, pico hydropower plants, Pelton turbine, rural electrification.*

SAŽETAK:
Piko hidroelektranama pripadaju svi hidroenergetski sistemi snage do 5 kW. Ovi sistemi se pokazali kao stabilan izvor električne energije za elektrifikaciju ruralnih područja. Osim elektrifikacije ruralnih područja, piko hidroelektrane su pogodne za iskorištenje hidroenergetskog potencijala vodovodnih distributivnih sistema. U ovom radu je prikazan postupak proračuna i odabira osnovnih komponenata piko hidroelektrane bazirane na Peltonovoj turbini. Dat je primjer proračuna i mogućnosti korišćenja u Bosni i Hercegovini.

Ključne riječi: *hidroenergija, piko hidroelektrana, Peltonova turbina, ruralna elektrifikacija.*

DEVELOPMENT OF CONSTRUCTION OF MINI HYDRO POWER PLANT MODEL BASED ON PELTON TURBINE

RAZVOJ KONSTRUKCIJE MODELA MINI HIDROELEKTRANE NA BAZI PELTONOVE TURBINE

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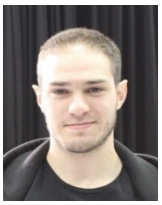
[1,2,3,4]University of Montenegro, 81000 Podgorica, Montenegro



Radoslav Tomović Tomović Aleksandar Mumović Marko Vujošević Vuk

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ABSTRACT:
In this paper is presented constructive development of a mini hydro power plant model, based on Pelton turbine.The 3D model of the Pelton turbine was constructed and drawn in working environment SOLIDWORKS. The construcion is implemented to the end, where the model of mini hydro power plant was obtained. The parts of a model where made of various materials. Supporting parts were made of steel, and on them is attached plexiglass, so the model look like an aquarium. The main part of the turbine, runner, is compiled using two disks made of aluminium alloy, and buckets which were printed on 3D printer, using PLA plastic. For the simulation of water head, water pump is used.

Keywords: *power plant, turbine, bucket, Pelton.*

SAŽETAK:
U ovom radu predstavljen je razvoj konstrukcije modela mini hidroelektrane na bazi Peltonove turbine. 3D model Peltnove turbine je konstruisan i nacrtan u radnom okruženju SOLIDWORKS. Konstrukcija je sprovedena do samog kraja, i dobijen je model mini hidroelektrane. Dijelovi modela turbine su napravljeni od raznih materijala. Dijelovi konstrukcije su napravljeni od čelika, i na njih je postavljen pleksiglas, tako da model izgleda kao akvarijum. Glavni dio turbine, kotur (tj. sama turbina), sastavljen je pomoću dva diska napravljena od legure aluminijuma, a lopatice su štampane na 3D štampaču, koristeći PLA plastiku. Kao simulacija pada vode upotrebljena je pumpa za vodu.

Ključne riječi*: hidroelektrana, turbina, lopatica, Pelton.*

GAS ESCAPE FROM COMBUSTION CHAMBER TO CRANKCASE, ANALYSIS OF A SET OF PARAMETERS AFFECTING THE BLOW BY

ISTICANJE GASOVA IZ PROSTORA ZA IZGARANJE U KARTER, ANALIZA SKUPA PARAMETARA KOJI UTIČU NA PRODIRANJE

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Cristiana Delprete Arian Bisha Erjon Selmani

ABSTRACT:
One of the several losses of a combustion chamber is the gas leakage toward the crankcase due to imperfect sealing of the rings. Commonly known as blow by,it affects efficiency and emissions. A bibliographic review concerning the phenomenon is mentioned and starting from that, the equations that rule the ring dynamics, inter-ring pressures and mass flows are described and solved for a diesel engine using ©RicardoRINGPAK Solver. Ring and groove dimension together with engine speed and load were the investigated parameters. However, blow by gasses shows to depend uponby many other factors.

Keywords: *Blow by, internal combustion engines, piston rings.*

SAŽETAK:
Jedan od nekoliko gubitaka komore za izgaranje je propuštanje gasova prema kućištu radilice zbog nesavršenog brtvljenja prstenova. Obično poznat kao prodiranje, utječe na učinkovitost i emisije. Dat je bibliografski pregled fenomena i počevši od toga, opisane su i riješene jednadžbe koje reguliraju dinamiku prstena, međusobni pritisak i masovne tokove za dizel motor pomoću © RicardoRINGPAK Solver. Dimenzija prstena i utora, zajedno s brzinom i opterećenjem motora, su istraživani parametri. Međutim, prodor plinovima pokazuje da ovisi o mnogim drugim čimbenicima.

Ključne riječi: *Prodor, motori s unutarnjim izgaranjem, klipni prstenovi.*

THE TURBULENCE INTENSITY OF THE WIND BORA

INTENZITET TURBULENCIJE BRZINE VJETRA BURE

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Blago Pehar Elvir Zlomušica Suad Zalihić

ABSTRACT:
The Bora is a cold and gusty wind which occurs along the eastern coast of the Adriatic Sea and its hinterland. It is most commonly from the north or north-east direction and often achieves stormy strength. Due to the direct connection of the Bora and the complex terrain, the speed of the wind Bora is rapidly changing while crossing obstacles and the turbulent flow occurs. For the classification of wind turbines the wind turbulence intensity with the wind speed are the basic parameters. The measurements of the Bora characteristics were made at Hrgud and Morine in the area of Eastern Herzegovina on an extremely complex terrain. The standardized measurement equipment was used which is mounted on a measuring mast at the height of 78 m. The measured values of the turbulence intensity of the Bora, have been analyzed and compared with the corresponding standards and recommendations.

Keywords: *turbulence intensity, complex terrain, wind Bora.*

SAŽETAK:
Bura je jak, hladan i mahovit vjetar poznat duž istočne obale Jadranskog mora i njegovog zaleđa. Najčešće je sjevernog ili sjeveroistočnog smjera i često postiže olujnu jačinu. Zbog neposredne veze bure i kompleksnog terena, brzina i smjer vjetra bure brzo se mijenjaju pri nailasku na prepreku i nastaje turbulentno strujanje. Intenzitet turbulencije vjetra uz parametre brzine vjetra su osnovni parametri pri klasifikaciji vjetroturbina. Mjerenja karakteristika vjetra bure je vršeno na lokaciji Hrgud i Morine u području Istočne Hercegovine na izrazito kompleksnom terenu. Korištena je standardizirana oprema za mjerenje montirana na mjerni stub visine 78 m. Vrijednost intenziteta turbulencije bure, dobivena mjerenjem, je analizirana i uspoređena sa odgovrajućim standardima i preporukama.

Ključne riječi*: intenzitet turbulencije, složeni teren, vjetar bura.*

THE FILTER-COMPENSATION DEVICE APPLICATIONS TO THE AC 25 KV 50 HZ AC OF SERBIAN RAILWAYS

PRIMENA KOMPENZACIONIH FILTERA U MONOFAZNOM ELEKTROVUČNOM SISTEMU 25 KV, 50 HZ ŽELEZNICE SRBIJE

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Branislav Gavrilović Zoran Bundalo

ABSTRACT:
New technologies in rail, including devices for infrastructure and transport, have meant improved safety, comfort, and speed of services. It has also brought new problems for the AC 25 kV 50 Hz traction power supply system with a specific filter-compensation device in traction substations of the Serbian Relways. These problems have resulted in some specific behavior issues during operation modes. For these reasons, research activities during last several years in engineering departments at the Railway College of Vocational Studies in Belgrade have been focused on studying the behavior of the traction system during selected operation states with traction vehicles with diode converters. The main findings of these problems are detailed in this paper.

Keywords: *AC railway, Filter-compensation device, Power quality.*

SAŽETAK:
Nove tehnologije na železnici, uključujući uređaje za infrastrukturu i transport, značajno poboljšavaju bezbednost, komfor i brzinu servisiranja usluga. Međutim one su takođe dovele i do novih problema kao što je to slučaj sa primenom kompenzacionih filtera u elektrovučnim podstanicama monofaznog elektrovučnog sistema 25 kV, 50 Hz Zeleznice Srbije. Problemi se odnose na neka specifična ponašanja tokom funkcionisanja sistema. Sa ovom logikom, na Visokoj železničkoj školi u Beogradu, poslednjih nekoliko godina, sprovedena su istraživanja vezana za ponašanje elektrovučnog sistema sa primenom kompenzacionih filtera tokom selektovanih režima rada elektrovučnih vozila sa diodnim ispravljačima. Najvažniji rezultati ovih istraživanja dati su u radu..

Ključne riječi: *AC vuča, kompenzacioni filter, kvalitet napajanja.*

COMB-BASED DECIMATOR FOR MULTIPLES-OF-FIVE DECIMATION FACTORS

ČESLJASTI FILTER ZA DECIMACIONE FAKTORE KOJI SU DJELJIVI SA TRI

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Gordana Jovanović Isak Karabegović -Doleček

ABSTRACT:
This paper presents novel comb-based decimator for multiples-of-five decimation factors. The proposed decimation structure has two stages. In the first stage is a comb filter decimated by one fifth of the overall decimation factor, while in the second stage is a comb decimated by five. Additionally, the simple multiplierless filter is inserted in the second stage.This filter improves alias rejection in all folding bands except in bands which are multiples of five, in comparison with the original comb filter. Like original comb filter, the proposed filter is multiplierless.

Keywords: *decimation, alias, comb filter, folding bands, multiplierless filters.*

SAŽETAK:
U ovome članku je predložen novi decimator na principu česljastog filtera za decimacione faktore koji su djeljivi sa pet.Predložena struktura ima dvije etape:Na prvoj etapi se nalazi česljasti filter decimiran sa jednom petinom od ukupnog decimacionog faktora, dok je na drugoj etapi česljasti filter koji je decimiran sa pet. Osim toga, na drugoj etapi je dodan jednostavan filter bez množača. Ovaj filter popravlja prigušenja u svim freqventnim opsezima oko nula česljastog filtera, osim u opsezima koji su faktor od pet, tj. u opsezima pet, deset, petnaest i tako dalje.Slično kao originalni česljasti filter, predloženi filter ne zahtjeva množače za svoju implementaciju.

Ključne riječi*: decimacion, alijasing, česljasti filter, frekventni opsezi česljastog filtera, filteri bez množača.*

A MULTIFUNCTIONAL PLATFORM FOR ELDERS' ASSISTING TO LIVE ALONE

MULTIFUNKCIONALNA PLATFORMA ZA POMOĆ STARIMA ZA SAMOSTALAN ŽIVOT

Blerina Zanaj[1], Fatjon Shaba[2], Majlinda Belegu[3], Ggerti Boshnjaku[4] Elma Zanaj[5]
[1,3]Agricultural University of Tirana,1029 Tirana, Albania
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Blerina Zenaj Fatjon ShabaMajlinda Belegu Gerti Boshnjaku

ABSTRACT:
Living well demands for many facilities in order to assist the people suffering from different disease, especially for those who are unattended by a nurse. The houses of elder people that prefer to live alone require the equipment with such facilities that we think will help them to carry on with their life on their own. According to the recent statistics the prevalence of dementia is increasing as a trend with a sharp curve. Where the observations has shown that belonging to this group are mostly the people of middle or greater age, so 25%-30% of people of age 85 years old or older suffer from this disease. In order to make more enjoyable their life we have thought to build a multifunctional platform that will assist them during the day. Another purpose of this platform will be the notification of their relatives mostly their children, so the platform will show them that they parents or relatives are in good health. So they can be notified if something unusual and bad happened to them and this will be achieved through a non invasive system. The platform LAB (Living Alone Better) that we are proposing is a multifunctional application. The main features of it is to remember ....

Keywords: *application, medicine, taking care, dementia.*

SAŽETAK:
Dobar životni standard oboljelih osoba zahtijeva mnoge uređaje koji im mogu pomoći a naročito se to odnosi na oboljele koji nisu pod stalnim nadzorom pomoćne osobe. Kuće, u kojima žive same starije osobe, potrebno je da budu opremljne uređajima sa takvim mogućnostima da omoguće starijim osobama da samostalno žive. Prema posljednjim statističkim istraživanjima pojava demencije se povećava zabrinjavajućim trendom. Promatranja su potvrdila da ovoj grupi većinom pripadaju osobe srednjih godina i stariji, tako da 25% -30% osoba od 85 godina starosti i više pate od ove bolesti. Kako bi ovim osobama omogućili udobniji život potrebno je da razmišljamo o izgradnji multifunkcionalne platforme koja će im pomagati preko dana. Druga mogućnost je da budu nadzirani od njihove rodbine, najčešće njihove djece, gdje bi im platforma omogućavala da prate i provjeravaju da li su im roditelji ili rodbina dobro. Platforma će im omogućiti da utvrede da se nešto neobično događa, što se može postići kroz neinvazivan sistem. Platforma LAB (Living Alone Better) koju predlažemo je multifunkcionalna aplikacija. Glavne karakteristike je da pamte .....

Ključne riječi*: aplikacija, medicina, briga, demencija.*

OPTIMIZATION OF WATER SUPPLY SYSTEM USING SOFTWARE EPANET 2.0

OPTIMIZACIJA VODOVODNOG SISTEMA UPOTREBOM SOFTVERSKOG PAKETA EPANET 2.0

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ABSTRACT:
Concepts of planning water supply networks in countries in transition were based at the beginning and during 20th Century, when most of the existing objects were built. In that period main aim of water supply system was to provide sufficientamount of water for the population and economy, so the water objects were planned based on the input available at that time. Upgrades of water supply systems were done in different scale, without systematic approach to an integral overview to a weakness in whole system. New concept of Water Utilities, which has appeared in countries in transition, changes approach where in old systems water utilities have to satisfy demand driven consumption towards the system where utilities start to managing with demand managed consumption. First task to use new concept is introduction of efficiency in management and maintenance of water supply system.In this paper there is presented the process of water supply system optimization by using software package Epanet 2.0 on real example of DMA Pavlovac which is part of water supply system under the authority of the UC „Vodovodikanalizacija" East Sarajevo.

Keywords:*district metered area, optimization, water supply system.*

SAŽETAK:
Koncepti tehničkih rješenja vodovoda u zemljama u tranziciji zasnovani su početkom i sredinom 20 vijeka, kada je i izgrađena većina postojećih objekata. U tom periodu vodovod je prvenstveno imao za cilj obezbjeđenje dovoljnih količina vode za tadašnje stanovništvo i privredu, pa su objekti sistema projektovani na osnovu ulaznih podataka iz tog perioda. Dogradnje vodovodnih sistema vršene su u različitim obimima, bez planskog pristupa integralnog sagledavanja nedostataka u sistemu.Nova koncepcija rada vodovoda, koji se počinje pojavljivati u zemljama u tranziciji, mijenja se od starog sistema, gdje vodovod mora da zadovoljava potrošnju, ka sistemu gdje vodovod počinje da upravlja potrošnjom vode. Prvi zadatak u primjeni nove koncepcije je uvođenje efikasnog upravljanja i održavanja sistema. U ovom radu je prezentovan postupak optimizacije vodovodnog sistema upotrebom softverskog paketa Epanet 2.0 na realnom primjeru vodovodne zone Pavlovac koja je dio vodovodnog sistema u nadležnosti preduzeća K.P. „Vodovod i kanalizacija" a.d. Istočno Sarajevo.

Ključne riječi: *ograničena mjerna oblast, optimizacija, vodovodni sistem.*

NANOTECHNOLOGY IN CIVIL ENGINEERING

NANOTEHNOLOGIJA U GRAĐEVINARSTVU

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ABSTRACT:
Nanotechnology is a way forward, not only in civil engineering, but in other industries as well. Much effort is being given to these research, and main focus is in improving existing materials, in terms of their properties. In this paper brief information of nanotechnology applied and investigated in civil engineering will be given. Most of the presented research include enhancement of concrete, as the most used material in civil engineering, thus silica fume, fly ash and red mud are presented, as well as carbon nanotubes, which are a great leap forward in this field.

Keywords: *carbon nanotubes, silica fume, fly ash, red mud.*

SAŽETAK:
Sažetak: Nanotehnologija predstavlja budućnost razvoja, ne samo građevinarstva, nego i drugih industrija. Mnoga istraživanja vrše se u ovom polju, i glavni fokus je na poboljšanju postojećih materijala s obzirom na njihove osobine. U ovom radu će se dati kratke informacije o istraživanju i primjeni nanotehnologije u građevinarstvu. Većina prikazanih istraživanja odnosi se na poboljšanje osobina betona, najkorištenijeg materijala u građevinarstvu, te su opisane mikrosilika, leteći pepeo i crveni mulj. Također, prikazane su i karbonske nano-cijevi, koje predstavljaju veliki iskorak u ovom polju.

Ključne riječi: *karbonske nano-cijevi, mikrosilika, leteći pepeo, crveni mulj.*

THE POSSIBILITIES OF THE CADASTRAL LAND USE ASSESSMENT BY THE METHODS OF REMOTE SENSING

MOGUĆNOSTI ODREĐIVANJA KATASTARSKE KULTURE ZEMLJIŠTA METODAMA DALJINSKIH ISTRAŽIVANJA

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ABSTRACT:
This study shows integration of remote sensing methods and conventional geodetic methods as well as processing and analysis of the results of cadastral land use assessment for the area of cadastral municipality Butmir in Sarajevo. For that purpose high-resolution multi-spectral WorldView-2 satellite images were used, with the object-oriented approach to image classification and image classification algorithm creation. The main objective is to compare the results obtained with the conventional methods of cadastral land evaluation and the results obtained by the methods of remote sensing. The possibilities of methodology development for the assessment of cadastral land use for each individual cadastral parcel have been assessed. Such a methodology would provide updated information on the real estate cadastre, reduce the costs and time of data collection and land use map creation procedure, with the aim to solve problems in economic development of the country, urbanization of the area, development of science and exploration of the land potentials.

Keywords: *Land cadastre, Cadastral land evaluation, Remote sensing, WorldView2, Image classification in Remote sensing, GIS.*

SAŽETAK:
U radu je opisana integracija daljinskih istraživanja i klasičnih geodetskih metoda, kao i obrada i analiza rezultata određivanja katastarske kulture zemljišta za područje K.o. Butmir, Sarajevo. Pri tome, korišteni su visoko rezolucijski multispektralni satelitski snimci satelita WorldView-2, uz objektno orijentisani pristup klasifikaciji i izradi klasifikacionog algoritma. Cilj ovog rada je uporediti rezultate dobivene metodama klasičnog katastarskog klasiranja i rezultate dobivene metodama daljinskih istraživanja. Ispitane su i mogućnosti izrade metodologije za određivanje katastarske kulture zemljišta za svaku pojedinu katastarsku parcelu. Takva metodologija bi osigurala ažurne podatke katastra zemljišta, smanjila troškove i vrijeme prikupljanja podataka i izrade karte korištenja zemljišta, a sve u svrhu rješavanja problema privrednog razvoja zemlje, urbanizacije prostora, razvoja nauke i istraživanja zemljišnih potencijala.

Ključne riječi*: katastar zemljišta, katastarsko klasiranje zemljišta, daljinska istraživanja, WorldView-2, klasifikacija satelitskih snimaka daljinskih istraživanja, GIS.*

ANALYSIS OF THE ENERGY POTENTIAL OF ORGANIC BIORADABLE PART OF MUNICIPAL WASTE

ANALIZA ENERGIJSKOG POTENCIJALA ORGANSKOG BIORAZGRADIVOG DIJELA KOMUNALNOG OTPADA

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Mahmut Jukić Ifet Šišić

ABSTRACT:
Sustainable waste management, and especially its biodegradable part at the European Union level, is becoming one of the priorities, not only because of the necessity of conserving soil and reducing waste, but also the possibility of using significant energy potentials of this type of waste. This is particularly true, bearing in mind that about 90 million tons of biowaste is produced annually in the EU, 40% of which is still disposed of in landfills.Considering the composition of biodegradable municipal waste (food waste, garden waste, agricultural waste, etc.), as well as a high percentage of moisture in it, the process of anaerobic digestion is the most appropriate way of converting biodegradable municipal waste into renewable energy. This process is carried out using biogas plants that use biodegradable municipal waste as a raw material for producing biogas as an energy product for energy production.Therefore, the use of biodegradable municipal waste for the purpose of biogas production has two important beneficial aspects: environmental protection through the avoidance of waste disposal on non-sanitary landfills, and the production of energy from renewable sources.

Keywords: *biodegradable waste, biogas, anaerobic digestion, digestate, compost, cogeneration*

SAŽETAK:
Održivo upravljanje otpadom, a pogotovo njegovim biorazgradivim dijelom na nivou Evropske unije postaje jedno od prioriteta, ne samo zbog nužnosti očuvanja tla i smanjivanja odlaganja, već i mogućnosti korištenja znatnih energetskih potencijala ove vrste otpada. To naročito dolazi do izražaja imajući na umu da se godišnje u EU proizvede oko 90 milijona tona biootpada od čega se 40% i dalje odlaže na odlagalištima.Obzirom na sastav biorazgradivog komunalnog otpada (ostaci hrane, vrtni otpad, otpad od poljoprivredne proizvodnje i dr,), kao i veliki procenat vlage u istom, postupak anaerobne digestije je najprikladniji način pretvorbe biorazgradivog komunalnog otpada u obnovljivu energiju. Ovaj proces se odvija pomoću bioplinskih postrojenja koji koristeći biorazgradivi komunalni otpad kao sirovinu proizvode bioplin kao energent za proizvodnju energije. Stoga, korištenje biorazgradivog komunalnog otpada u svrhu proizvodnje bioplina ima dva značajna benefitna aspekta i to: zaštita okoliša kroz izbjegavanje odlaganja otpada na nesanitarna odlagališta, te proizvodnja energije iz obnovljivih izvora.

Ključne riječi: *biorazgradivi otpad, boplin, anaerobna digestija, digestat, kompost, kogeneracija*

Autors Indeks – Indeks autora

SOCIETY FOR ROBOTICS OF BOSNIA AND HERZEGOVINA

The Society for Robotics has years of experience in education and training of personnel in Bosnia and Herzegovina. The Society for Robotics is working to increase the role of knowledge in Bosnia and Herzegovina, and thus to influence the positioning of Bosnia and Herzegovina as high as possible on an innovative scale in Europe and the world. The role of the Society for Robotics is to encourage the development of science and technology, as well as to increase their contribution to the development of society, with the widest possible application of new knowledge and new technologies. Thus, it aims to encourage the transformation of Bosnian-Herzegovinian society into a modern knowledge-based society. For these reasons, the objectives of the Society for Robotics are: scientific and technical research in the field of robotics and robotic systems; education and improvement of education in robotics, robotic systems and mechatronics; application of robots and robotic systems in the industry; establishment of laboratories for education and knowledge transfer; establishment of centers for robotics and robotic systems at universities, secondary and vocational schools; innovators in the wider field of robotic systems conducting various activities; organizing scientific and professional conferences in the country and abroad; having innovators in the field of robotics, robotic systems and mechatronics organize exhibitions; cooperation with similar societies abroad. Activities of the Society for Robotics are the following: gathering scientists, researchers, engineers, teachers and students who work in all areas of robotics; publishing and encouraging the publication of monographs, textbooks, journals and other publications in the field of robotics; helping teachers to introduce new ideas and modern methods in teaching robotics; organizing congresses, conferences, symposia, seminars, and other scientific meetings of scientists and engineers; cooperation with similar professional organizations in the country, international societies and associations; popularization and dissemination of knowledge, as well as training and assistance in the training of scientific novices and researchers.

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DRUŠTVO ZA ROBOTIKU U BOSNI I HERCEGOVINI

Društvo za robotiku ima višegodišnje iskustvo u edukaciji i obrazovanju kadrova u Bosni i Hercegovini. Društvo za robotiku radi na tome da poveća ulogu znanja u Bosni i Hercegovini, a samim tim da utiče na pozicioniranje Bosne I Hercegovine na što više mjesto na inovativnoj skali u Evropi i svijetu. Uloga Društva za robotiku je da postiče razvoj nauke i tehnologije , te poveća njihov doprinos razvoju društva, uz najveću moguću primjenu novih znanja i novih tehnologija, i da na taj način podstakne transformaciju bosanskohercegovačkog društva u moderno društvo temeljno na znanju. Zbog navedenih razloga ciljevi Društva za robotiku su slijedeći: naučno-stručna istraživanja u oblasti robotike i robotskih sistema, edukacija i unapređenje obrazovanja iz robotike, robotskih sistema i mehatronike, aplikacija robota i robotskih sistema u industriji, formiranje laboratorija za edukaciju i transfer znanja, formiranje centara za robotiku i robotskih sistema na univerzitetima, srednjim i stručnim školama, održavanje aktivnosti inovatora iz šire oblasti robotskih sistema, organiziranje naučno-stručnih skupova u zemlji i inostranstvu, organiziranje izložbi inovatora iz oblasti robotike, robotskih sistema i mehatronike, saradnja sa sličnim društvima u inozemstvu. Djelatnosti Društva za robotiku su slijedeće: okupljanje naučnika, istraživača, inženjera, nastavnika, studenata i učenika koji rade u svim područjima robotike, objavljivanje i poticanje objavljivanja monografija, udžbenika, časopisa i ostalih publikacija u području robotike, pomaganje nastavnicima u uvođenju novih ideja i modernih metoda u nastavi robotike, organiziranje kongresa, konferencija, simpozijuma i seminara te ostalih naučnih okupljanja naučnika i inženjera, surađivanje sa sličnim stručnim organizacijama u zemlji, surađivanje sa sličnim međunarodnim društvima i savezima društva, populariziranje i širenje znanja kao i izobrazba i pomoć u izobrazbi znanstvenih novaka i istraživača.

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IN MEMORIAM

Akademik
Vlatko Doleček
(1939 - 2016)

DOLEČEK Vlatko*, radio je u profesorskom zvanju od 1968. na Mašinskom fakultetu Univerziteta u Sarajevu. Držao je nastavu i na Elektrotehničkom (1993-1995) i Saobraćajnom fakultetu (1993-1995) u Sarajevu, Mašinskom fakultetu u Zenici (1976-1984), Mašinskom fakultetu u Banja Luci (1969 -1981), na VTVa u Rajlovcu (1972-1984), Tehničkom fakultetu u Bihaću (1996-2005), Mašinskom fakultetu u Tuzli (1997- 2001) i na Mašinskom fakultetu u Mostaru (1979-1983, 1999-2000), predavajući više kolegija iz Mehanike krutog i deformabilnog tijela na dodiplomskom i postdiplomskom studiju.Od osnivanja UNIS-instituta bio je angažiran kao znanstveni savjetnik, gdje je rukovodio projektom Produktika (1986-1993) na kojem je bilo angažirano preko 1000 znanstvenih radnika i inženjera sa 28 fakulteta i naučnih instituta. Bio je mentor većeg broja diplomskih, magistarskih i doktorskih radova. Učesnik je i organizator većeg broja znanstvenih skupova. Bio je Predsjednik društva za teorijsku i primijenjenu mehaniku BiH (1976- 1986), Dekan Mašinskog fakulteta Univeziteta u Sarajevu (1980-1982), Predsjednik Saveza aero- kosmonautičkih i raketnih društava ex jugoslavije (1982-1984), član Parlamenta BiH (1982-1986), član Skupštine ex Jugoslavije (1986-1990), predsjednik Pedagoškog savjeta R BiH (1989-1991) i dopredsjednik Jugoslovenskog Društva za teorijsku i primijenjenu mehaniku (1990-1992). osnivač je asocijacije nezavisnih intelektualaca „Krug 99" i njen predsjednik (1995-2002). Predsjednik je Društva za robotiku u BiH od 2003-2016 godine. Dobitnik je Šestoaprilske nagrade Grada Sarajeva (2001) i većeg broja priznanja Sarajevskog Univerziteta za uspjeh na postdiplomskom studiju i za svoj znanstvenopedagoški rad na Univerzitetu. Vlatko Doleček je od decembra 2008. dopisni član Akademije nauka i umjetnosti Bosne i Hercegovine, a od februara 2013. redovni član ANU BiH, gdje je sekretar odjeljenja tehničkih nauka. Član je Predsjedništva akademije nauka i umjetnosti Bosne i Hercegovine.*

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