

**INTERNATIONAL CONFERENCE
ON APPLIED SCIENCES
ICAS2020**



Hunedoara, May 20-22, 2020

PROGRAM
and
short abstracts of ICAS2020

EDITOR:
Tihomir Latinovic

ISSN 2784-2797

Event dedicated to
the **Centenary of the University Politehnica Timișoara**
and
the **Semi-Centenary of the Engineering Faculty of Hunedoara**

Event organized by:



University Politehnica Timișoara



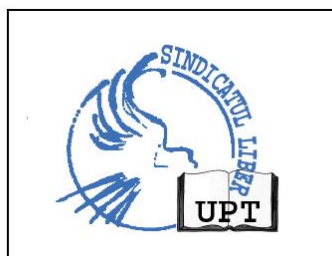
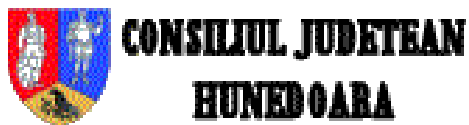
University of Banja Luka
Republic of Srpska

University of Banja Luka

in cooperation with

Ministry for Scientific and Technological Development, Higher
Education and Information Society of the Republika Srpska
Academy of Romanian Scientists
Academy of Sciences and Arts of the Republika Srpska
Academy of Technical Sciences of Romania - Timisoara Branch
General Association of Romanian Engineers - Hunedoara Branch
and
Association Universitaria Hunedoara

Event supported by:



Honorary Committee

Harau Carmen, Parliament of Romania - Senat

Srdan Rajčević, Ministry for Scientific and Technological Development, Higher Education and Information Society of the Republika Srpska

Popoviciu Octavian Mircea, Academy of Romanian Scientists

Dragoljub Mirjanic, Academy of Sciences and Arts of the Republika Srpska

Ilca Ioan, Academy of Technical Sciences of Romania

Predrag Damjanovic, Director of Republica Srpska Pedagogical Institute

Borko Durić, President of the Chamber of Commerce, Republika Srpska

Radojičić Igor, Mayor of Banja Luka

Bobouțanu Dan, Mayor of Hunedoara

Pawar Dayanada Rao, C.E.O. Arcelor Mittal S.A.

Xi Yang, S.C. Eurosport DHS S.A.

Organizing Committee

Co-Presidents

Dragan Florin, University Politehnica Timisoara
Posavljak Strain, University of Banja Luka

Vice-Presidents

Panoiu Caius, University Politehnica Timisoara
Knezevic Darko, University of Banja Luka

Coordinators of the Conference

Lemle Ludovic Dan, University Politehnica Timisoara
Latinovic Tihomir, University of Banja Luka

Coordinators of the Program

Kiss Imre, University Politehnica Timisoara
Lakic-Globocki Gordana, University of Banja Luka

Coordinators of the Video-Conferences

Muscalagiu Ionel, University Politehnica Timisoara
Knezevic Bojan, University of Banja Luka

Coordinators of the Plenary Speakers Session

Bordeasu Ilare, University Politehnica Timisoara
Golubovic Bugarski Valentina, University of Banja Luka

Organizers of Fundamental Sciences Session

Bistriian Diana, University Politehnica Timisoara
Vojvodic Biljana, University of Banja Luka

Organizers of Computers Engineering Session

Panoiu Manuela, University Politehnica Timisoara
Rogić Miroslav, University of Banja Luka

Organizers of Electrical Engineering Session

Deaconu Sorin, University Politehnica Timisoara
Blanusa Branko, University of Banja Luka

Organizers of Mechanical Engineering Session

Pinca-Bretotean Camelia, University Politehnica Timisoara
Todic Mladen, University of Banja Luka

Organizers of Materials Science Session

Ardelean Erika, University Politehnica Timisoara
Dobras Dragoslav, University of Banja Luka

Members

Abrudean Cristian, University Politehnica Timisoara
Alexa Vasile, University Politehnica Timisoara
Ardelean Marius, University Politehnica Timisoara
Benea Marius, University Politehnica Timisoara
Birtok-Baneasa Corneliu, University Politehnica Timisoara
Dinis Corina, University Politehnica Timisoara
Djeordjic Dijana, University of Banja Luka
Gherman Lucian, University Politehnica Timisoara
Kardas Danijela, University of Banja Luka
Maglov Sanja, University of Banja Luka
Popa Gabriel, University Politehnica Timisoara
Popa Mihaela, University Politehnica Timisoara
Prohaska Biljana, University of Banja Luka
Ratiu Sorin, University Politehnica Timisoara
Savkovic Ivana, University of Banja Luka
Skundrić Jovan, University of Banja Luka
Socalici Ana, University Politehnica Timisoara
Sredanovic Branislav, University of Banja Luka
Tirian Ovidiu, University Politehnica Timisoara
Tosic Gordana, University of Banja Luka

Secretariat

Berdie Adela, University Politehnica Timisoara
Bojinovic Mirko, University of Banja Luka
Josan Ana, University Politehnica Timisoara
Novakovic Bojana, University of Banja Luka
Petrovic Slavica, University of Banja Luka
Rob Raluca, University Politehnica Timisoara
Serban Sorina, University Politehnica Timisoara

Translator

Gaianu Oana, University Politehnica Timisoara

Computer typesetting

Lemle Katerina Lucia, University Politehnica Timisoara

Contact:

e-mail: conference@icas.science

Scientific Committee

President

Lemle Ludovic Dan, University Politehnica Timisoara
-Editor of the *Proceedings of ICAS2020*

Vice-Presidents

Kiss Imre, University Politehnica Timisoara
-Editor of *Acta Technica Corviniensis* and *Annals of Faculty Engineering Hunedoara*
Latinovic Tihomir, University of Banja Luka
-Editor of the *Program and short abstracts of ICAS*

Members

Babic Zivko, University of Banja Luka
Barz Cristian, Technical University of Cluj Napoca
Benea Laura, University Politehnica Timisoara
Borojević Stevo, University of Banja Luka
Cioata Vasile, University Politehnica Timisoara
Ćirić Kostić Snežana, University of Kragujevac
Cohodar Maida, University of Sarajevo
Cosma Marius, Technical University of Cluj Napoca
Cuntan Corina, University Politehnica Timisoara
Dezso Gergely, University of Nyíregyháza
Dobrnjac Mirko, University of Banja Luka
Fras Zemljic Lidija, University of Maribor
Gvero Petar, University of Banja Luka
Holubek Radovan, Slovak University of Technology in Bratislava
Heput Teodor, University Politehnica Timisoara
Iagar Angela, University Politehnica Timisoara
Ilić Gradimir, University of Niš
Kaouka Allaedine, Ecole Normale Superieure de Laghouat
Karabegovic Isak, University of Bihac
Kopei Volodymyr, Ivano-Frankivsk National Technical University of Oil and Gas
Kosec Borut, University of Ljubljana
Labudzki Remigiusz, University of Poznan
Lečić Milan, University of Beograd
Mandru Dan, Technical University of Cluj Napoca
Mijakovski Vladimir, University St. Kliment Ohridski-Bitola
Milašinović Aleksandar, University of Banja Luka
Milovanovic Zdravko, University of Banja Luka
Miroslavljevic Krunislav, College of Slavonski Brod
Nedelcu Dorian, University "Eftimie Murgu" Resita
Nemedi Imre, Polytechnical Engineering College of Subotica
Onysko Oleh, Ivano-Frankivsk National Technical University of Oil and Gas
Orwat Justyna, Silesian University of Technology
Osaci Mihaela, University Politehnica Timisoara

Panchuk Vitalii, Ivano-Frankivsk National Technical University of Oil and Gas
Petkovic Snezana, University of Banja Luka
Pop Sitar Petrica, Technical University of Cluj Napoca
Popa Bogdan, University Politehnica of Bucharest
Popov Gencho, University of Ruse
Putan Vasile, University Politehnica Timisoara
Rusu-Anghel Stela, University Politehnica Timisoara
Ružarovský Roman, Slovak University of Technology in Bratislava
Serafimovski Marko, University of Skopje
Stoica Diana, University Politehnica Timisoara
Stoychitch Mihaylo, University of Banja Luka
Szabo Atilla, University of Dunajvaros
Szabo Gyla, Obuda University
Sziebig Gabor, UiT Arctic University of Norway
Tanasić Zorana, University of Novi Sad
Tica Gordana, University of Banja Luka
Tomljenović Ljerka, Polytechnic of Rijeka
Topcic Alan, University of Tuzla
Trišović Nataša, University of Banja Luka
Vasiu Teodor, University Politehnica Timisoara
Velisek Karol, Slovak University of Technology in Bratislava
Zivkovic Predrag, University of Niš

DATE	HOUR	VIDEOCONFERENCES
May 20	10:00-11:50	VIDEO-CONFERENCE 1 - Session 1: FUNDAMENTAL SCIENCES
	14:00-16:00	VIDEO-CONFERENCE 2 - Session 2: COMPUTERS ENGINEERING
	17:00-19:00	VIDEO-CONFERENCE 3 - Session 4: MECHANICAL ENGINEERING
May 21	10:00-12:00	VIDEO-CONFERENCE 4 - Session 3: ELECTRICAL ENGINEERING
	14:00-16:00	VIDEO-CONFERENCE 5 - Session 4: MECHANICAL ENGINEERING
	17:00-19:00	VIDEO-CONFERENCE 6 - Session 5: MATERIALS ENGINEERING
May 22	10:00-12:00	VIDEO-CONFERENCE 7 - Session 4: MECHANICAL ENGINEERING
	14:00-16:00	VIDEO-CONFERENCE 8 - Session 1: FUNDAMENTAL SCIENCES
	17:00-19:00	VIDEO-CONFERENCE 9 - Session 3: ELECTRICAL ENGINEERING
May 23	10:00-11:50	VIDEO-CONFERENCE 10 - Session 5: MATERIALS ENGINEERING
END of the CONFERENCE		

May 20, 2020

VIDEO-CONFERENCE I

Session I. FUNDAMENTAL SCIENCES

Chairmen: Diana BISTRIAN and Biljana VOJVODIC

- 10:00-10:10 Speaker: Sa Niwitpong
Title: *Confidence intervals for coefficient of variation of log-normal distribution*
Authors: W Thangjai and Sa Niwitpong
- 10:10-10:20 Speaker: S Niwitpong
Title: *Confidence intervals for difference between coefficients of variation of two log-normal distributions*
Authors: W Thangjai and S Niwitpong
- 10:20-10:30 Speaker: K J Sumonthip
Title: *Product development of dried fruit compote yogurt*
Authors: K J Sumonthip
- 10:30-10:40 Speaker: D Hodžić
Title: *Application of comparative experiment in analysis of wood strength*
Authors: N Hurem, D Hodžić and A Hodžić
- 10:40-10:50 Speaker: D Hodžić
Title: *Social responsibility recognition and involvement of interested parties*
Authors: E Bajramović, D Hodžić and E Bajramović
- 10:50-11:00 Speaker: J Orwat
Title: *Occurrence consequences of mining terrain surface discontinuous linear deformations in a residential building*
Authors: J Orwat and K Gromysz
- 11:00-11:10 Speaker: J Orwat
Title: *Mining terrain curvatures approximation using the polynomial various orders and a subsidence trough profile fragmentation*
Authors: J Orwat
- 11:10-11:20 Speaker: N Stupar
Title: *A slightly different view of complexity*
Authors: D Malivuk Gak, Z Rajilic and N Stupar
- 11:20-11:30 Speaker: N Stupar
Title: *Asymmetry bandwidth of stock market index time series as a warning signal*
Authors: D Malivuk Gak, Z Rajilic and N Stupar
- 11:30-11:40 Speaker: A Tomporowski
Title: *Determination of the discretion interval of the temporal series of the technological process parameter measurement in ACS TP in the noises conditions*
Authors: S Tymchuk, I G Abramenko, K V Zahumenna, O Miroshnyk, T Shchur, A Tomporowski and W Kruszelnicka
- 11:40-11:50 Speaker: A Tomporowski
Title: *Free oscillations of the dissipative oscillator with double quadratic nonlinearity*
Authors: V Ol'shanskii, S Kharchenko, S Kovalyshyn, F Kharchenko, O Kovalyshyn, A Tomporowski and P Bałdowska-Witos

END of VIDEO-CONFERENCE I

May 22, 2020

VIDEO-CONFERENCE 8

Session I. FUNDAMENTAL SCIENCES

Chairmen: Diana BISTRIAN and Biljana VOJVODIC

- 14:00-14:10 Speaker: S Jitian
Title: *The comparative analysis of the poly (methyl methacrylate) films degradation subject to different destructive treatments*
Authors: A D Berdie, A A Berdie and S Jitian
- 14:10-14:20 Speaker: S Jitian
Title: *The dependence of the appearance of the reflection-absorption spectra of the polystyrene films applied on metal mirrors by the solvent used in the preparation of the superficial film*
Authors: S G Șerban, L M Strugariu and S Jitian
- 14:20-14:30 Speaker: L Arkhypova
Title: *Renewable energy resources in the system of sustainable development of Carpathian region of Ukraine*
Authors: L M Arkhypova, O M Mandryk, N M Moskalchuk, M M Prykhodko and K O Radlovska
- 14:30-14:40 Speaker: M V Korchemlyuk
Title: *Spatial-factorial analysis of background status of the Danube River basin state on the Northeastern Slops of the Ukrainian Carpathians*
Authors: R L Kravchynskyi, M V Korchemlyuk, V K Khilchevskyi, L M Arkhypova, J D Mykhailiuk and I R Mykhailiuk
- 14:40-14:50 Speaker: M Ivanovici
Title: *Biogas production on lab-scale: utilization of wastewater from Hunedoara treatment plant*
Authors: M Ivanovici, A E Cioabla, D Lelea, F Popescu, L I Dungan and L V Ordodi
- 14:50-15:00 Speaker: C V Anghel-Drugarin
Title: *An approach of simulations in high energy heavy ion collisions*
Authors: C V Anghel-Drugarin, V L Vyacheslav, M Ayaz Ahmad, M J Mbunwe, K M Syed and R A Mohammad
- 15:00-15:10 Speaker: M Dungan
Title: *Effects of environmental pollution due to land transport activity*
Authors: L I Dungan and M A Dungan
- 15:10-15:20 Speaker: V Novac
Title: *Sea ice impact on naval operations*
Authors: V Novac, E Rusu, F Onea and G Stăvărache
- 15:20-15:30 Speaker: F Popescu
Title: *Using SHERPA screening tool for design and assessment of local and regional air quality management*
Authors: F Popescu, B Vujic, A E Cioabla, U Marceta, L I Dungan, G Trif-Tordai and E A Laza
- 15:30-15:40 Speaker: R Balasa
Title: *Air fleet endowment using methods of decision under certainty*
Authors: R Balasa, M Costea, A G Andrei, A E I Apostol and A Semenscu
- 15:40-15:50 Speaker: R V Corlan
Title: *The importance of indoor air quality (IAQ) monitoring*
Authors: R V Corlan, I Ionel, R M Balogh, St Kilyeny and N S Lontis
- 15:50-16:00 Speaker: A I Halmaciu
Title: *Turning a waste producer into an energy producer*
Authors: A I Halmaciu, I Ionel M R Wachter and A E Cioabla

END of VIDEO-CONFERENCE 8

May 20, 2020

VIDEO-CONFERENCE 2

Session 2. COMPUTERS ENGINEERING
Chairmen: Manuela PANOIU and Miroslav ROGIC

14:00-14:10	<p>Speaker: D Nedelcu Title: <i>PyChart – A Python module for analysis and visual view of 2D/3D Charts</i> Authors: D Nedelcu and T Latinovic</p>
14:10-14:20	<p>Speaker: E M Ciortea Title: <i>Aspects regarding maintenance of the manufacturing system in Industry 4.0</i> Authors: E M Ciortea</p>
14:20-14:30	<p>Speaker: A G Andrei Title: <i>Building a blockchain for aviation maintenance records</i> Authors: A G Andrei, M Costea, R Bălașa and A Semencescu</p>
14:30-14:40	<p>Speaker: T S Latinovic Title: <i>Improving the safety of railway from basic Start-Stop to the intelligent system</i> Authors: T S Latinovic, M M Todic, D Nedelcu and C P Barz</p>
14:40-14:50	<p>Speaker: T S Latinovic Title: <i>Education 4.0 in the era of digital revolution and Industry 4.0</i> Authors: T S Latinovic, D Nedelcu, D Frunzaverde and Lj Sikman</p>
14:50-15:00	<p>Speaker: R Labudzki Title: <i>Efficiency study of aeroelastic energy harvester via analytical approach</i> Authors: F Sarbinowski, R Labudzki and R Talar</p>
15:00-15:10	<p>Speaker: R Labudzki Title: <i>Chaotic evolutionary algorithms for dynamic instability enhancement</i> Authors: F Sarbinowski, R Labudzki and R Talar</p>
15:10-15:20	<p>Speaker: M Janiček Title: <i>Analysis of voice control of a collaborative robot</i> Authors: M Janiček, R Ružarovský, R Holubek and K Velíšek</p>
15:20-15:30	<p>Speaker: R Ruzarovsky Title: <i>Analysis of the Industry 4.0 key elements and technologies implementation in the Festo Didactic educational systems MPS 203 I4.0</i> Authors: R Ružarovský, R Holubek, M Janiček, K Velíšek and G O Tirian</p>
15:30-15:40	<p>Speaker: A A Berdie Title: <i>Some aspects on how to implement a web application in different SAP UI technologies</i> Authors: A D Berdie, A A Berdie and K L Lemle</p>
15:40-15-50	<p>Speaker: P P Pop Title: <i>Research on the simulation of quantum processes using computer programming</i> Authors: P P Pop, A Pop-Vădean, T Latinovic and C Barz</p>
15:50-16:00	<p>Speaker: A Pop-Vadean Title: <i>Smart home devices, source of RF waves. Ways to harvest energy</i> Authors: A Pop-Vădean, D Mândru, P P Pop, T Latinovic and C Barz</p>

END of VIDEO-CONFERENCE 2

May 21, 2020

VIDEO-CONFERENCE 4

Session 3. ELECTRICAL ENGINEERING
Chairmen: Sorin DEACONU and Blanusa BRANKO

10:00-10:10	<p>Speaker: M Topor Title: <i>Dual Stator Winding Induction Generator (DSWIG) used for hybrid micro grid power systems</i> Authors: M Topor, S I Deaconu, F Bu, G N Popa, L N Tutelea and N Muntean</p>
10:10-10:20	<p>Speaker: E Spunei Title: <i>The power factor and the upper harmonics</i> Authors: E Spunei, I Piroi, B Protea and F Piroi</p>
10:20-10:30	<p>Speaker: L M Crisan Title: <i>Optimize the maintenance activity with computer application</i> Authors: L M Crisan, A E Crisan, D Brebenariu and I Borza</p>
10:30-10:40	<p>Speaker: M Lolea Title: <i>Assessing the parameters of energy performance at the electric plants based on Renewable Energy Sources</i> Authors: M Lolea, C V Anghel Drugarin and E Szabo</p>
10:40-10:50	<p>Speaker: M Lolea Title: <i>The Support of neuro-fuzzy technique for assess the connection of Renewable Energy Sources into electricity grids</i> Authors: M Lolea, C V Anghel Drugarin and E Szabo</p>
10:50-11:00	<p>Speaker: E Szabo Title: <i>A Fuzzy Logic method for appreciation the availability level of electricity by solar-photovoltaic conversion</i> Authors: E Szabo, M Lolea and C V Anghel Drugarin</p>
11:00-11:10	<p>Speaker: E Szabo Title: <i>Actual status and perspectives about the hydro-energy conversion in electricity for the case of Bihor County, Romania</i> Authors: E Szabo, M Lolea and C V Anghel Drugarin</p>
11:10-11:20	<p>Speaker: A Najari Title: <i>Integrated intelligent Control System Design to improve vehicle rotational stability using active differential</i> Authors: O Hajfathali, H Ahani and A Najari</p>
11:20-11:30	<p>Speaker: A Najari Title: <i>Tree-based routing protocol in wireless sensor networks using optimization algorithm batch particles with a mobile sink</i> Authors: F Shabani and A Najari</p>
11:30-11:40	<p>Speaker: C P Chioncel Title: <i>IRR in renewable technologies based on the Romanian green certificate promotion system for clean energy</i> Authors: C P Chioncel, N Gillich and G O Tirian</p>
11:40-11:50	<p>Speaker: C P Chioncel Title: <i>Energy efficiency of wind power plants in various wind condition</i> Authors: C P Chioncel, E Spunei and G O Tirian</p>
11:50-12:00	<p>Speaker: L Ghiormez Title: <i>Tuning proportional-derivative controller for a three-phase electric arc furnace</i> Authors: L Ghiormez, M Panoiu, C Panoiu and I Muscalagiu</p>

END of VIDEO-CONFERENCE 4

May 22, 2020

VIDEO-CONFERENCE 9

Session 3. ELECTRICAL ENGINEERING

Chairmen: Sorin DEACONU and Blanusa BRANKO

17:00-17:10	Speaker: M A Blaj Title: <i>Romania in this energy transition, or the emancipation of small independent power producers and the gain from autarky/energy independence</i> Authors: M A Blaj
17:10-17:20	Speaker: A Iagar Title: <i>Comparative study between the melting process of an aluminum batch and a steel batch in a high frequency induction furnace</i> Authors: A Iagăr, G N Popa and C M Diniş
17:20-17:30	Speaker: D Brebenariu Title: <i>Measuring luminance with a digital photometric camera in a short and straight tunnel in the Municipality of Resita, Caras-Severin County, Romania</i> Authors: D Brebenariu, C D Gălăţanu, S Brebenariu and I Borza
17:30-17:40	Speaker: D Brebenariu Title: <i>Lighting optimization in a short and straight tunnel, from Resita municipality, Caras-Severin county, Romania, by designing with specialized software</i> Authors: D Brebenariu, C D Gălăţanu, S Brebenariu and I Borza
17:40-17:50	Speaker: C V Anghel-Drugarin Title: <i>Characterization of three phase solid state VAR compensation scheme in three phase pulse width modulation voltage source inverter</i> Authors: J M Mbunwe, E E Ezema, A A Ngwu, C V Anghel-Drugarin, R A Mohammad and M Ayaz Ahmad
17:50-18:00	Speaker: G N Popa Title: <i>Ozone and anions generator for disinfection of enclosed spaces</i> Authors: G N Popa, L Popa and C M Diniş
18:00-18:10	Speaker: G N Popa Title: <i>Temperature-frequency converter made with astable multivibrator and thermistor</i> Authors: I Popa, G N Popa, C M Diniş and A Iagăr
18:10-18:20	Speaker: G N Popa Title: <i>Power factor measuring device using microcontroller for single-phase consumers</i> Authors: C M Diniş, G N Popa and A Iagăr
18:20-18:30	Speaker: P Bałdowska-Witos Title: <i>Structural features of the fuzzy parallel controller for smart grid applications</i> Authors: S Bovchaliuk, O Miroshnyk, S Tymchuk, T Shchur, O Kovalyshyn, P Bałdowska-Witos and W Kruszelnicka
18:30-18:40	Speaker: P Bałdowska-Witos Title: <i>Assessment of the impact of beverage blow molding machine parameters on the efficiency of bottle formation</i> Authors: P Bałdowska-Witos
18:40-18:50	Speaker: S S Mezinescu Title: <i>Experimental stand and researches on pantograph-catenary contact force control using Chaos Theory</i> Authors: S Rusu-Anghel, S S Mezinescu and I C Lihaciu
18:50-19:00	Speaker: I Baciu Title: <i>The analysis of the deforming regime in the electric traction railway</i> Authors: I Baciu and C D Cuntan

END of VIDEO-CONFERENCE 9

May 20, 2020

VIDEO-CONFERENCE 3

Session 4. MECHANICAL ENGINEERING

Chairmen: Camelia PINCA BRETOTEAN and Mladen TODIC

- 17:00-17:10 Speaker: C Pinca-Bretotean
Title: *Investigation of functional characteristics of non-asbestos friction material under different braking conditions*
Authors: C Pinca-Bretotean, A Josan and A K Sharma
- 17:10-17:20 Speaker: C Preda
Title: *Physico-mechanical and tribological characteristics of composite materials used for brake pads*
Authors: C Pinca-Bretotean, A L Crăciun, C Preda and A K Sharma
- 17:20-17:30 Speaker: O Nedelcu
Title: *Modes for measuring aerodynamic resistances in the wind tunnel in the laboratory*
Authors: O Nedelcu, I C Salisteanu, O Magdun and V Dogaru
- 17:30-17:40 Speaker: V Golubović-Bugarški
Title: *The requirements for the design and construction of a gas cylinders aimed for transportation of a of compressed and liquefied gases*
Authors: V Golubović-Bugarški, M Todić, S Petković and G Globočki-Lakić
- 17:40-17:50 Speaker: K Gromysz
Title: *Bar model of temporary wooden support used for removing deflections of buildings*
Authors: K Gromysz
- 17:50-18:00 Speaker: A Yousefiankalareh
Title: *Passive tracking of a target based on supervisory adaptive EKF and CKF*
Authors: M Mohammadi, S A Aboutalebi, S R Surakanti and A Yousefiankalareh
- 18:00-18:10 Speaker: A Yousefiankalareh
Title: *Design adaptive tracking controller for the networked systems with stochastic delay and data packet dropout in communication channels*
Authors: S R Surakanti, A Yousefiankalareh and M A Manouchehri
- 18:10-18:20 Speaker: A D Voicu
Title: *Numerical simulation of different s.h.m. piezoelectric sensors for helicopter rotor blades*
Authors: A D Voicu, A Hadăr and D Vlăsceanu
- 18:20-18:30 Speaker: P Condruz
Title: *Modular load-bearing structures for the study of interactions between the soil and working parts of agricultural machines*
Authors: P Cardei, N Constantin, R Sfîru, V Muraru and P Condruz
- 18:30-18:40 Speaker: S Muraru
Title: *Structural analysis of a modulated load-bearing structure designed to investigate the interaction between soil and the working parts of agricultural machines*
Authors: P Cardei, N Constantin, R Sfîru, V Muraru and S Muraru
- 18:40-18:50 Speaker: H Ahani
Title: *Hybrid controller design for bending channel of an auto-pilot guided projectile*
Authors: B Zeinali and H Ahani
- 18:50-19:00 Speaker: H Ahani
Title: *Design a gain scheduled fuzzy controller for distributed parabolic solar collectors*
Authors: A Adami, H Ahani and S Mouaviani

END of VIDEO-CONFERENCE 3

May 21, 2020

VIDEO-CONFERENCE 5

Session 4. MECHANICAL ENGINEERING

Chairmen: Camelia PINCA BRETOTEAN and Mladen TODIC

- 14:00-14:10 Speaker: P K Shahri
Title: *Design an estimator with robust unknown input for undefined interval type-2 fuzzy systems with immeasurable decision variables*
Authors: H Hasani and P K Shahri
- 14:10-14:20 Speaker: D Jevtic
Title: *Numerical simulation of gas flow field in a muzzle brake*
Authors: D Jevtić, D Micković, P Elek, M Marković and L Jaramaz
- 14:20-14:30 Speaker: V Alexa
Title: *Optimization of industrial compressed air installations by energy audit*
Authors: V Alexa, S A Rațiu, I Kiss and V G Cioată
- 14:30-14:40 Speaker: M Popa
Title: *Possibilities of 3D reconstruction of the vehicle collision scene in the photogrammetric environment Agisoft Metashape 1.6.2*
Authors: A Dascăl and M Popa
- 14:40-14:50 Speaker: M Popa
Title: *The 3D reconstruction of a road accident using the specialized program PC Crash 12.1*
Authors: A Dascăl and M Popa
- 14:50-15:00 Speaker: I Zs Miklos
Title: *Elastic couplings design with bolts using iPart and iAssembly concepts*
Authors: I Zs Miklos, C C Miklos and C I Alic
- 15:00-15:10 Speaker: Y Kusyi
Title: *Development of the fundamental diagram of the formation and transformation of the parts properties during their manufacturing*
Authors: Y Kusyi, V Stupnytskyy, A Kuk and V Topilnytskyy
- 15:10-15:20 Speaker: Y Kusyi
Title: *Development of a functional model of the technological inheritability mechanics of parts properties*
Authors: Y Kusyi, V Stupnytskyy, A Kuk and V Topilnytskyy
- 15:20-15:30 Speaker: Z I Korka
Title: *A novel device capable to generate propulsion using rotating masses*
Authors: A Geroacs, Z I Korka, G R Gillich, D Nedelcu and I Biro
- 15:30-15:40 Speaker: Z I Korka
Title: *Evaluation of gear pitting severity by using various condition indicators*
Authors: C R Sfetcu, Z I Korka and A V Bloju
- 15:40-15:50 Speaker: R Kasner
Title: *Scheduling of preventive maintenance of an power equipment of the agricultural enterprises*
Authors: I Trunova, O Miroshnyk, O Savchenko, O Moroz, V Pazyi, T Shchur, R Kasner and P Bałdowska-Witos
- 15:50-16:00 Speaker: R Kasner
Title: *The separation assessment of the small-seed mixtures of agricultural crops*
Authors: S Kovalyshyn, V Ptashnyk, O Shvets, I Fedir, B Nester, R Kasner and P Urbańska

END of VIDEO-CONFERENCE 5

May 22, 2020

VIDEO-CONFERENCE 7

Session 4. MECHANICAL ENGINEERING

Chairmen: Camelia PINCA BRETOTEAN and Mladen TODIC

10:00-10:10	Speaker: S Ratiu Title: <i>Impact of contaminants on engine oil: a review</i> Authors: S Rațiu, A Josan, V Alexa, V G Cioată and I Kiss
10:10-10:20	Speaker: J Szymborski Title: <i>Development of a novel model for emptying of a self-pressurising nitrous oxide tank</i> Authors: D Kardaś and J Szymborski
10:20-10:30	Speaker: G R Gillich Title: <i>A method to determine the severity of transverse cracks in beams</i> Authors: M Pop, G R Gillich, C Tufisi and C Chioncel
10:30-10:40	Speaker: G R Gillich Title: <i>A method to detect cracks in the beams with imperfect boundary conditions</i> Authors: D Lupu, G R Gillich, D Nedelcu and N Gillich
10:40-10:50	Speaker: E Bajramovic Title: <i>Conformity assessment of metal framing elements</i> Authors: E Bajramovic, E Bajramovic and F Islamovic
10:50-11:00	Speaker: A Sobczak Title: <i>Analysis and assessment of the 2.3MW wind turbine impact on the environment</i> Authors: A Sobczak and P Urbanska
11:00-11:10	Speaker: P Urbanska Title: <i>Analysis of the impact of solar farm on the environment</i> Authors: P Urbanska and A Sobczak
11:10-11:20	Speaker: W Kruszelnicka Title: <i>Design features of comminution disc and their relation with CO2 emission in disc life cycle</i> Authors: W Kruszelnicka
11:20-11:30	Speaker: W Kruszelnicka Title: <i>Investigation of the separation of combed heap of winter wheat</i> Authors: O Lezhenkin, S Halko, O Miroshnyk, O Vershkov, I Lezhenkin, O Suprun, T Shchur, W Kruszelnicka and R Kasner
11:30-11:40	Speaker: O Onysko Title: <i>Investigation of the influence of the cutter-tool rake angle on the accuracy of the executed helices in the tapered thread machining</i> Authors: O Onysko, V Panchuk, V Kopei, Y Havryliv and I Schuliar
11:40-11:50	Speaker: Y F He Title: <i>A method of detecting the feature of cylindrical pin based on machine vision</i> Authors: Y F He and G O Tirian
11:50-12:00	Speaker: V G Cioata Title: <i>Study on the influence of fabric characteristics on mechanical properties of textile composite materials</i> Authors: V G Cioată, I Kiss, V Alexa, S Rațiu and A Dascăl

END of VIDEO-CONFERENCE 7

May 21, 2020

VIDEO-CONFERENCE 6

Session 5. MATERIALS SCIENCE

Chairmen: Erika ARDELEAN and Dragoslav DOBRAS

17:00-17:10	Speaker: H Allaf Title: <i>Electrochemical study of borided Ti-6Al-4V titanium alloy</i> Authors: A Kaouka, H Allaf and M A Khamed
17:10-17:20	Speaker: M A Khamed Title: <i>Improvement of the tribological properties of titanium alloy Ti-6Al-4V surfaces</i> Authors: M A Khamed, A Kaouka and H Allaf
17:20-17:30	Speaker: C L Salcianu Title: <i>The behavior of structures CuSn12-C bronze obtained by heat treatments at erosion of the cavitation</i> Authors: D V Bazavan, I Lazar, I Bordeasu, I Mitelea, L D Pirvulescu, C L Salcianu and M Popoviciu
17:30-17:40	Speaker: C Ghera Title: <i>The behavior of structures CuZn39Pb3 brass obtained by heat treatments at erosion of the cavitation</i> Authors: I Lazar, I Bordeasu, L D Pirvulescu, M Hluscu, I Mitelea and C Ghera
17:40-17:50	Speaker: A K Sharma Title: <i>Impact of silicon carbide reinforcement on characteristics of aluminum metal matrix composites</i> Authors: A K Sharma, R Bhandari, A Aherwar and C Pinca-Bretotean
17:50-18:00	Speaker: A K Sharma Title: <i>A systematic overview on fabrication aspects and methods of aluminum metal matrix composites</i> Authors: A K Sharma, R Bhandari, A Aherwar and C Pinca-Bretotean
18:00-18:10	Speaker: A Josan Title: <i>Management of the activity of quality assurance of cast iron castings in foundries</i> Authors: A Josan, E Ardelean, M Ardelean, V Putan and D Josan
18:10-18:20	Speaker: A A Sorescu Title: <i>Degradation of azo – dyes using green synthesized silver nanoparticles</i> Authors: A A Sorescu, A Nuta, I R Suica-Bunghez, R M Ion and V Raditoiu
18:20-18:30	Speaker: A A Sorescu Title: <i>Rumex acetosa – mediated one pot green synthesis of noble metallic nanoparticles</i> Authors: A A Sorescu, A Nuta and I R Suica-Bunghez
18:30-18:40	Speaker: I Kiss Title: <i>Half-hard cast-Iron rolls: statistically research of the manufacturing technology for increase their quality and safety in exploitation</i> Authors: I Kiss, V Alexa, V Cioată and S Rațiu
18:40-18:50	Speaker: S Aluvihara Title: <i>Elementary chemical analysis of different clay types</i> Authors: S Aluvihara, C S Kalpage and K L Lemle
18:50-19:00	Speaker: S Aluvihara Title: <i>Fundamental physico-chemical and mechanical analysis of different clay types</i> Authors: S Aluvihara, C S Kalpage and L D Lemle

END of VIDEO-CONFERENCE 6

May 23, 2020

VIDEO-CONFERENCE 10

Session 5. MATERIALS SCIENCE

Chairmen: Erika ARDELEAN and Dragoslav DOBRAS

10:00-10:10	<p>Speaker: V E Caloian</p> <p>Title: <i>Experimental research with the help of thermal - derivatographic analysis on coal powder that can be blowed in the blast furnace</i></p> <p>Authors: V E Caloian, E M Vlad, C Pandelescu, E F Plopeanu, V Oancea, V Rucai, N Constantin and M Hritac</p>
10:10-10:20	<p>Speaker: M E Vlad</p> <p>Title: <i>Experimental research on the effect of additives on the sintering process of alumina-based refractory materials</i></p> <p>Authors: E M Vlad, V E Caloian, C Pandelescu, E F Plopeanu, V Oancea, V Rucai, N Constantin and M Hritac</p>
10:20-10:30	<p>Speaker: R Bucevschi</p> <p>Title: <i>Experimental analysis of the influence of clogging on the filtration process for internal combustion engines</i></p> <p>Authors: R Bucevschi, V Socalici, A Budiul Berghian and C Birtok Băneasă</p>
10:30-10:40	<p>Speaker: F Bucur</p> <p>Title: <i>Manufacturing process management for cast iron brake blocks</i></p> <p>Authors: F Bucur, A Josan, O Gaianu and A Socalici</p>
10:40-10:50	<p>Speaker: M Radu</p> <p>Title: <i>Research on the influence of casting powders on the increase of the quality of cast continuous semi-finished products</i></p> <p>Authors: M Radu, T Heput, E Ardelean and A Dascal</p>
10:50-11:00	<p>Speaker: O Lupu</p> <p>Title: <i>Processing of ferrous iron and steel waste in the context of the circular economy</i></p> <p>Authors: O Lupu, A Socalici, E Popa and O Gaianu</p>
11:00-11:10	<p>Speaker: L Zgripcea</p> <p>Title: <i>Technology of thin metal sheet cutting with fiber laser</i></p> <p>Authors: L Zgripcea, V Putan, M Ardelean and C Birtok Baneasa</p>
11:10-11:20	<p>Speaker: D C Labes</p> <p>Title: <i>Managerial analysis of technological production processes in the metallic materials industry</i></p> <p>Authors: D C Labes, A Ioana, N Constantin, D F Marcu and P S Trandafir</p>
11:20-11:30	<p>Speaker: P S Trandafir</p> <p>Title: <i>Comparative managerial analysis of production enterprises in the metallic materials industry</i></p> <p>Authors: P S Trandafir, A Ioana, N Constantin, D F Marcu and D C Labes</p>
11:30-11:40	<p>Speaker: M Ardelean</p> <p>Title: <i>The importance of recovering precious metals from waste electrical and electronic equipment</i></p> <p>Authors: M Ardelean, E Ardelean, G Mihut and O Gaianu</p>
11:40-11:50	<p>Speaker: E Ardelean</p> <p>Title: <i>Reduction of pollution by controlled disposal of hazardous pharmaceuticals</i></p> <p>Authors: E Ardelean, V Ordodi, M Ardelean, A Socalici and K L Lemle</p>

END of VIDEO-CONFERENCE 10

IFS – FUNDAMENTAL SCIENCES

Title: *Confidence intervals for coefficient of variation of log-normal distribution*

Authors: W Thangjai and Sa Niwitpong

Abstract: In statistics, the log-normal distribution is important distribution because it is closely related to normal distribution. The coefficient of variation is defined as the standard deviation divided by the mean. It was used as a measure of precision within and between laboratories. The coefficient of variation of log-normal distribution is of interest. Therefore, the confidence intervals for the coefficient of variation of log-normal distribution are constructed in this paper. The confidence intervals are obtained by two large sample, chi-squared, and approximate fiducial approaches. The two large sample approaches are based on the concepts of Thangjai et al. (2016) and Nam and Kwon (2017). Monte Carlo simulation was used to assess the performance of these approaches in terms of coverage probability and average length. The chi-squared and approximate fiducial approaches provided the coverage probabilities close to the nominal confidence level of 0.95. Moreover, the confidence intervals using the chi-squared and approximate fiducial approaches had the shortest average length. Therefore, the chi-squared and approximate fiducial approaches were better than the two large sample approaches in terms of the coverage probability and average length.

Title: *Confidence intervals for difference between coefficients of variation of two log-normal distributions*

Authors: W Thangjai and S Niwitpong

Abstract: The coefficient of variation is an important and a widely used measure of data dispersion. It is free from the unit of measurement. The coefficient of variation can be useful to compare the variability between two groups of observations. Log-normal distribution is widely used to describe the data from positively skewed distribution. This distribution is in relation with a normal distribution. That is the logarithm of the log-normal random variable has the normal distribution. Therefore, the coefficient of variation of log-normal distribution is used as a model in various real-life applications such as biological, medical, and economic data. The problem of comparison of the two group coefficients of variation is interests in two experimental data arising from two populations. The confidence intervals for the difference between the coefficients of variation of two lognormal distributions are proposed using the method of variance estimates recovery (MOVER), modified MOVER, and approximate fiducial approaches. Monte Carlo simulation was used to evaluate the performance of the three confidence intervals. The results of the simulation indicate that the MOVER confidence interval was conservative confidence interval, but the performance of the MOVER approach was better than the performances of the modified MOVER and approximate fiducial approaches when the sample sizes are small and the values of (σ_1, σ_2) are large.

Title: *Product development of dried fruit compote yogurt*

Authors: K J Sumonthip

Abstract: The product development of dried fruit compote yogurts were studied. Pasteurized milk, skim milk powder, and pasteurized skim milk were used to produce yogurt in this work. These milk were incubated with *Lactobacillus bulgaricus* and *Streptococcus thermophilus* at 42°C for 16 hours to obtain the highest lactic acid bacteria counts of 9.8×10^7 CFU/ml at the pH of 4.2. Then,

carboxy methyl cellulose (CMC), gelatin and sodium alginate were added. Results showed that the best yogurt was obtained with 0.4 % CMC. Its viscosity was 2758 cP, color value of white color and L^* , a^* , b^* of 92.7, -1.7 and 16.4, respectively. Its fluid flow and water activity were 31.23 and 0.987, respectively. Five dried fruit compote, which were strawberry, winter melon, cherry tomatoes, pineapple core, and pomelo peel, were added as flavor and increase nutrition. Sensory evaluation with 9-point Hedonic Scale indicated that the color and physical appearance were not different, Texture, flavor, taste, and overall statistical analysis showed that differences were significant at $p \leq 0.05$. The confidence interval was equals to 0.032, 0.006, 0.000 and 0.001, respectively. The highest acceptance value was obtained from strawberry flavor product.

Title: *Application of comparative experiment in analysis of wood strength*

Authors: N Hurem, D Hodžić and A Hodžić

Abstract: The paper describes a method of comparative experiment, which is a simple method of design and analysis of experiment in which the effects of two different treatments are compared. The aim of this experimental method is to compare the differences of the dependent variable after obtaining the results of the experiment and to conclude whether one of the treatments is more effective than the other or that both treatments are equally effective.

To explain this method, we will take the example of determining the maximum force when bending fifteen slab samples of two different types of wood, solid and fibreboard. Maximum force data were obtained in the laboratory of the Technical Faculty Bihac on the universal testing machine.

The data were processed by the method of comparative experiment in the classical way and by the software package R intended for statistical and experimental data processing.

Title: *Social responsibility recognition and involvement of interested parties*

Authors: E Bajramović, D Hodžić and E Bajramović

Abstract: This paper will outline social responsibility in organisations. The concept of corporate social responsibility is becoming more and more prevalent both in business practice and in scientific and professional analyses. Being responsible for an organisation means that its actions are driven by a knowledge of responsibility not only to shareholders, owners, but also to all related parties. The concept of corporate social responsibility is based on the growing belief that modern organisations have more and more responsibility for their role in society. Corporate social responsibility has evolved from the idea that organisations that successfully operate on a voluntary basis give back to the wider community a share of the profits made. It was accepted worldwide that corporate social responsibility was compatible with the competitiveness of organisations. The research shown that organisations that are socially responsible were making more profit. Thus, the ISO 26000 standard is a recognized international standard that organisations should implement in their processes.

Title: *Occurrence consequences of mining terrain surface discontinuous linear deformations in a residential building*

Authors: J Orwat and K Gromysz

Abstract: Article presents results of own research conducted on an influence of discontinuous linear deformations of mining terrain surface on a residential building deviation. Ground steps and building deviations were observed in the Upper Silesian Coal Basin, in a southern part of Poland

and caused by exploitation of a high longwall located at a small depth, in the 405/1 hard coal seam. Geodesic surveys were carried out from February to September 2019 on the ground and mural points stabilized along two perpendicular directions. There have been determined values of terrain inclinations and building deviations from the geodesic measurements results. There have been also measured deviations of floors and walls inside the building. It has been done a leveling of windows lintels to show general deviation of a building structural system. Linear deformations have been observed in front of, under and behind the building and along a road located near the building. It has been measured a road longitudinal profile in order to occurrence places location of discontinuous deformations. Damages on an external facade and inside the building have been inventoried. A single-family building was made in a traditional technology and had a partial basement. Building local vision confirmed that the main damages have been occurred in a non-basement part of the building and on the walls and floors in places in which discontinuous deformations have been appeared.

Title: *Mining terrain curvatures approximation using the polynomial various orders and a subsidence trough profile fragmentation*

Authors: J Orwat

Abstract: In article a method of average course obtaining of measured mining terrain curvatures has been presented. Terrain curvatures values are very important for building objects located on mining areas and which have a considerable length or/and a great cubature. Curvatures observed graph has an irregular course and that's why there is a need of their average course determination in order to obtain the most probable value. Measured curvatures approximation by use of the polynomial various orders has been done. Additionally, a whole profile of subsidence trough into the parts has been divided. Subsidence trough fragmentation allowed for a better fit of the curvatures average values to the observed values. A right polynomial order and a trough segments proper number taking into account value of variability coefficient of curvatures random dispersion have been chosen. Geodesic surveys, based on which a graph of measured curvatures has been obtained, in the Upper Silesian Coal Basin have been made. There was conducted a mining exploitation of hard coal deposits by use of the longwall system with a roof rocks cave-in.

Title: *A slightly different view of complexity*

Authors: D Malivuk Gak, Z Rajilic and N Stupar

Abstract: This paper presents a different approach to understanding the concept of complexity and its relation to various phenomena in the field of physics. A unique definition of complexity does not yet exist. Complexity C_{mp} was calculated in three systems simulated in computational experiments: 1) a body in free fall while falling towards body of much greater mass; 2) two bodies with different temperatures; 3) crystals in crystallization chamber. Complexity increases when the temperatures of two bodies are equalized, when one body falls to another and the crystal grows from the solution.

Title: *Asymmetry bandwidth of stock market index time series as a warning signal*

Authors: D Malivuk Gak, Z Rajilic and N Stupar

Abstract: The time series of the S&P 500 index from 2003 to 2018 and the stochastic time series are considered. The asymmetry is called the change in the complexity C_{mp} of the time series when time direction is changing, and the values of the asymmetry of the substrings are in the interval of a certain width. The asymmetry bandwidth of the S&P 500 series is minimal for 2005, and stochastic strings can have such a small width. The 2007-2008 crisis seems to have been preceded by a rush of

heightened stochasticity (a fall in predictability) that has led to a decline in investor optimism. By calculating asymmetry bandwidth, a warning signal could be obtained for a possible stock market crash.

Title: *Determination of the discretion interval of the temporal series of the technological process parameter measurement in ACS TP in the noises conditions*

Authors: S Tymchuk, I G Abramenko, K V Zahumenna, O Miroshnyk, T Shchur, A Tomporowski and W Kruszelnicka

Abstract: We have solved the problem of substantiating the choice of the sampling interval of the temporal series of the technological process parameter measurements for automation systems, if there are errors, which takes into account the frequency characteristics of this series. The subject of the research is models, methods and algorithms for receiving and processing the measurement information for automation purposes. Purpose of the work is improvement of the method for determining the sampling interval of the temporal series of parameter measurements for automation systems. We used the mathematical apparatus of the Discrete Fourier Transform to describe the frequency characteristics of signals in the measurement channels of automation systems, as well as the Kotelnikov sampling theorem. We have implemented methods and algorithms of information transformation in the measuring channel and digital filtering in the analog-to-digital converter, as well as we have performed computer simulation of the suggested method of decision making, based on the comparison of harmonic amplitudes of the maximum frequency of the spectrum in various components of the measuring signal. The computational experiments have confirmed the possibility of using the Discrete Fourier Transform to ensure the required accuracy of obtaining the measurement information for any real parameter of the technological process and the justified formulation of the requirements for the controller used by comparing the harmonic amplitudes of the maximum frequency of the spectrum in the filtered noise and the smoothed signal.

Title: *Free oscillations of the dissipative oscillator with double quadratic nonlinearity*

Authors: V Ol'shanskii, S Kharchenko, S Kovalyshyn, F Kharchenko, O Kovalyshyn, A Tomporowski and P Bałdowska-Witos

Abstract: The energy balance method shows approximate formulas for calculating the amplitudes of free damping oscillations of an oscillator with a quadratic nonlinear elastic characteristic under the action of a resistance force that is proportional to the square of the velocity of motion. Two variants of the method are implemented. The first makes an approximate differential equation of the envelope of the oscillation graph and constructs its analytical solution. As a result, iterative relationships were obtained for the amplitude calculations using the Lambert function. For the hard power characteristics, the argument of this special function is positive and for the soft one it is negative. Asymptotic approximations of the Lambert function are proposed, which simplify the practical implementation of analytical solutions, and indicate the possibility of using known tables of this special function. When presenting the second variant of the energy balance method, the recurrence relation between the amplitudes of the oscillations associated with the analytic solution of the cubic equation is deduced. Unlike the first variant, it does not require iterations. Satisfactory consistency of the results obtained in various ways confirmed the suitability of the approximate formulas for engineering calculations. The advantage of the presented method is that it does not involve the construction and use of an exact solution of the double nonlinear differential equation of motion of the oscillator. In addition, the inverse problem of determining the quadratic resistance of the medium by the results of the measurement of the swings on the free oscilloscope is analytically solved.

Title: *The comparative analysis of the poly (methyl methacrylate) films degradation subject to different destructive treatments*

Authors: A D Berdie, A A Berdie and S Jitian

Abstract: A comparative study of the degradation of PMMA films deposited on metal mirrors as a result of heat treatment or irradiation with various UV or g radiation is presented.

The main degradation processes of PMMA during degradation are the random homolytic breakdown of carbon-carbon bonds in the polymer main chain and the photolysis of the lateral methyl groups and lateral esters to form free radicals.

All observations on the reflection-absorption spectra explain the mechanism of PMMA film degradation, subjected to various types of destructive degradation: thermal heating, UV irradiation or g irradiation.

Title: *The dependence of the appearance of the reflection-absorption spectra of the polystyrene films applied on metal mirrors by the solvent used in the preparation of the superficial film*

Authors: S G Șerban, L M Strugariu and S Jitian

Abstract: The paper presents the influence of the remaining solvent in the films of polymers deposited from solutions on metallic mirrors on the aspect of the reflection-absorption spectrum.

The appearance of the spectrum can be affected so that false conclusions can be drawn about the positions and appearance of the absorption bands. These influences must be taken into account when interpreting IR-RA spectra of polymer films.

The reflection-absorption spectra of PS films from benzene, toluene and trichloromethane solutions were analyzed.

The polymer films must be subjected to a light heat treatment or a slight vacuum to remove the remaining solvent.

Title: *Renewable energy resources in the system of sustainable development of Carpathian region of Ukraine*

Authors: L M Arkhypova, O M Mandryk, N M Moskalchuk, M M Prykhodko and K O Radlovska

Abstract: The scientific novelty presented in this paper is to substantiate the extension of the resource potential of renewable energy sources in the Carpathian region with the creation of a set of maps in the geographic information system "Map Info". For each type of renewable energy (solar, wind, small hydropower) a number of technical issues and advantages, technological ecologically safe priorities are defined. The detailed regional calculation of wind, solar, hydropower potential for the Carpathian region of Ukraine has been performed. The spatial limitations and possibilities of introducing renewable energy sources in the sustainable development of the region are scientifically substantiated. Renewable energy scenarios are proposed

Title: *Spatial-factorial analysis of background status of the Danube River basin state on the Northeastern Slops of the Ukrainian Carpathians*

Authors: R L Kravchynskyi, M V Korchemlyuk, V K Khilchevskyi, L M Arkhypova, J D Mykhailiuk and I R Mykhailiuk

Abstract: The study solved the problem of analyzing the background spatial-factorial patterns of

distribution of quantitative and qualitative indicators of groundwater sources and surface waters within the upper part of the Prut River that belongs to the Danube River basin. The studies have been conducted within the Carpathian National Nature Park, located on the northeastern slopes of the Ukrainian Carpathians. The basic regularities and peculiarities of the distribution of water sources in the researched territory have been studied by means of factor analysis of the set of estimation parameters and the relationships between them. Patterns of changes in the concentrations of the natural components of the qualitative composition of the hydro-ecosystem were found, depending on the height of the terrain. Similar data were obtained in the analysis of the relationship between the average geometric components of the chemical composition of natural waters and the length of the river. Trend lines and equations were obtained, which can be used to determine the background normative values of natural water components along the length of the stream and the height of the basin for individual seasons and phases of water. In this paper, for the first time, the functional natural pattern of hydroecosystems of the upper part of the Danube basin within the northeastern slopes of the Ukrainian Carpathians is shown to increase its qualitative potential with increasing absolute altitude above sea level for nature conservation territory

Title: *Biogas production on lab-scale: utilization of wastewater from Hunedoara treatment plant*

Authors: M Ivanovici, A E Cioabla, D Lelea, F Popescu, L I Dungan and L V Ordodi

Abstract: In the present work, the potential of wastewater procured from a local treatment plant situated in Hunedoara in order to produce biogas was assessed in anaerobic co-digestion process. Finding appropriate combination of feedstocks involved in the process represents a key factor in obtaining high biogas amounts and also high quality of biogas. Therefore, a case study was carried out in a lab-scale installation for biogas production using a suspension consisting of wastewater, animal (cow and chicken) slurry from a commercial biogas plant and degraded corn. The wastewater and animal slurry were selected as the main feedstock, providing for the microbial community required in the anaerobic digestion, in a volume ratio of 3:1 animal slurry to wastewater. Moreover, the feedstocks were subjected to several characterization methods: determination of total content of carbon, hydrogen and nitrogen and the content of volatile matter using European Standards in order to determine additional information which may be correlated with the results. The process was performed in thermophilic conditions and controlled mixing of the suspension for a period of 24 days. The performances were appreciated by monitoring the amount of produced biogas and the following gaseous components: CH₄, CO₂ and H₂S.

Title: *An approach of simulations in high energy heavy ion collisions*

Authors: C V Anghel-Drugarin, V L Vyacheslav, M Ayaz Ahmad, M J Mbunwe, K M Syed and R A Mohammad

Abstract: A modest attempt has been made for the high-tech simulations to understand the reaction mechanism of relativistic heavy ion collisions. The structure of produced events in the heavy ion collisions at ultrahigh energies is very complex and not predictable from first principles. The simulations so called event generators (like as; Monte Carlo generator) allow the problem to be subdivided into more manageable pieces, some of which can be described from first principles, while others need to be based on appropriate models with parameters tuned to experimental data. We provide an overview, discuss how matrix elements are used, introduce the machinery for initial- and final-state parton showers, explain how matrix elements and parton showers can be combined for optimal accuracy, introduce the concept of multiple parton-parton interactions, comment briefly on the hadronization issue, and provide an outlook for the future.

Title: *Effects of environmental pollution due to land transport activity*

Authors: L I Dungan and M A Dungan

Abstract: In the literature it is specified that any transport activity has a major impact on the environment, and in accordance with the Environmental Protection Law 137/1995 this impact must be assessed in terms of its negative influence. Studies conducted near the transport infrastructure have shown that approximately 65% of the pollutants emitted by vehicles and over 50% of the pollutants emitted by the rolling stock are dispersed in the vicinity of the transport infrastructure contaminating the environment. The paper presents the main polluting factors, their effect on the environment as well as the results of research conducted in the interaction area of those two transport systems (road and rail) in the southern part of Timisoara.

Title: *Sea ice impact on naval operations*

Authors: V Novac, E Rusu, F Onea and G Stăvărache

Abstract: This paper highlights the icing regime and its impact on the primary naval operations conducted in the Black Sea basin. The article analyzes the phenomenon of seawater freezing through the perspective of merchant shipping operations and also underlines the impact on undersea or surface warfare. The article figures out the impact on the ship hull, weapons systems, personnel, as well as the tactics aspects of operations or de-icing strategies when ice accrues on ship hull and equipment. The article points out associated meteorological phenomena and brings in attention the importance of meteorological and oceanographic observations in situ or by satellites as a condition for the success of the operation. In the end, the article concludes regarding shortfalls faced during icing periods and give some directions meant to curb the adversary effects of unfavorable icing environment.

Title: *Using SHERPA screening tool for design and assessment of local and regional air quality management*

Authors: F Popescu, B Vujic, A E Cioabla, U Marceta, L I Dungan, G Trif-Tordai and E A Laza

Abstract: As atmospheric pollution continue to be a significant issue on global level, but with a particular importance at European Union level, the air pollution reduction policies will continue to be enforced in the next decades. At EU level, especially on most developed countries, NO₂ and Particulate Matter (fine and coarse fractions) remain an acute problem. To help decision factors to have a better view on entire EU region the SHERPA (Screening for High Emission Reduction Potentials on Air quality) was developed, a tool that was proven helpful in addressing source allocation, governance and the assessment of scenario impacts.

Title: *Air fleet endowment using methods of decision under certainty*

Authors: R Balasa, M Costea, A G Andrei, A E I Apostol and A Semenscu

Abstract: This study presents how to develop the information used during the decision-making process regarding the endowment of the Romanian air fleet with fighter aircraft, where after the analysis, we have as a result the appropriate model for the requirements and criteria for modernization and reorganization of the fleet. This analysis is performed by mathematical methods under certainty by the moments method or the Deutch Martin method. The first step of the method is to normalize the consequence matrix by linear transformations. It is taken into account that the 4 chosen criteria are of maximum. The moments method optimally generates clear results regarding the purchase of fighter aircraft that help the development of the fleet.

Title: *The importance of indoor air quality (IAQ) monitoring*

Authors: R V Corlan, I Ionel, R M Balogh, St Kilyeny and N S Lontis

Abstract: Air pollution is already a global public health crisis, as it kills seven million people each year, according to the World Health Organization. Presently, a correlation between health and air pollution levels recorded in the past exists. The paper presents series of instruments concerning IAC (Indoor Air Quality) measurements and focuses on indoor air quality measurements taken in different closed spaces, as example. Based on the concentration values detected, the conclusion of the paper indicates that, depending on the technological process or activity in enclosed spaces, it is mandatory to check the IAQ. This action must be taken as prevention, in order to reduce potential health risks upon humans, acting in their homes, or schools and offices or industrial halls, in general in closed spaces, even when artificially ventilated.

Title: *Turning a waste producer into an energy producer*

Authors: A I Halmaciu, I Ionel M R Wachter and A E Cioabla

Abstract: The paper focuses on the possibility to turn waste generated by farms into biogas, which can be used for electricity and heat generation, covering own use or even more. Three case studies, all based on experiments, are presented, the first two revealing data concerning the potential energy development from the waste, as energy carrier, the third, run on a very modern lab facility, demonstrating the high potential of the manure as renewable bio-energy source. All are based on anaerobic biogas production.

2CE – COMPUTERS ENGINEERING

Title: *PyChart – A Python module for analysis and visual view of 2D/3D Charts*

Authors: D Nedelcu and T Latinovic

Abstract: The paper describes the PyChart module (aimed at analysis and visual view of 2D/3D Charts), which was created with the help of free and Open Source resources, using Python as a programming language and wx.Python as a graphical user interface toolkit. The chart data is imported from a Excel/ CSV file with a template structure and is drawn in the PyChart module as XY or XYZ curves similar with Excel scatter with smooth lines and markers style. The main functions of the charts are activated using the toolbar. The module is provided with zooming instruments (fit, pan, zoom in, zoom out), cubic spline curves interpolation, chart intersection with constant X, Y or Z values, visual follow of the 2D chart points to view coordinates, export of data in Windows Clipboard, Excel or Microsoft Word format and saving the chart as a image file.

Title: *Aspects regarding maintenance of the manufacturing system in Industry 4.0*

Authors: E M Ciortea

Abstract: This paper highlights the role of Industry 4.0 for the maintenance of manufacturing systems. Due to the implementation of advanced technologies and ways of learning technological equipment, hard systems can adapt relatively easily to fluctuations in the manufacturing process over time. For the realization of the system subject to analysis we used the specialized petri nets simulation packages, and the final implementation is done on a specialized database. The model is intended to be a source of support for the activities of companies wishing to adopt new technologies in the manufacturing system and to identify as few errors as possible due to ensuring the necessary maintenance and control, imposed by the chosen technological process. The advantages are those of prototyping and analyzing the entire system after the implementation of tracking and being able to control the entire system, which leads to the prevention and subsequent elimination of queues or possible accidents.

Title: *Building a blockchain for aviation maintenance records*

Authors: A G Andrei, M Costea, R Bălașa and A Semenescu

Abstract: The objective of this paper was to create a proof of concept for a blockchain application in aviation world, with an emphasis on improving the aircraft maintenance traceability. It is well known that aviation industry manages incredible complex systems, where failure is not an option. This industry needs blockchain technology not only for safety improvements but also for a new business model where airline companies can deliver more trust and more transparency to their customers.

Nowadays, the passengers which are the end customers, cannot evaluate an airline company from the point of view of fleet maintenance. Bad or uncompleted maintenance it is a premise for an undesired accident. Moreover, aircraft investigators and auditors are experiencing difficulties in understanding how an aircraft was operated. Thinking of forecasting defects, models of predictive maintenance cannot be developed if accurate data are not available. All these can be changed with the implementation of the proposed blockchain application.

Beside the theoretical explanations, the scope of this work was also to put in practice the main blockchain features and develop on a small scale, a real decentralized blockchain application using Python programming language. The script was design to run on a localhost machine and store maintenance records and relevant parameters for the process of tracking an airplane's lifespan in a

chain of interconnected blocks.

Therefore, the traditional approach in the data management is no longer an option for aviation industry.

Title: *Improving the safety of railway from basic Start-Stop to the intelligent system*

Authors: T S Latinovic, M M Todic, D Nedelcu and C P Barz

Abstract: Increasing railway safety is the basis of new high-speed railways. To do this, we need automatic locomotive protection in increasing the safety of railway traffic. The basic system used in this is the so-called start / stop automatic protection system type RAS 8385, which consists of a part located on a locomotive and a part located on rails. One part is mounted on a locomotive and the other on rails. By contacting the track section and the rolling mode, the locomotive can be stopped if, after contact with the track section, the locomotive has passed faster than it should or had to stop, so the system will automatically lock and shut it down. This system is used to avoid driver errors and reduce its impact on railway safety.

The previous start-stop system does not provide complete protection at open crossings, which we have from the moment of the locomotive's exit to its departure at the destination. In the world, and especially in the western Balkans, there are many unmarked crossings or crossings without secure protection against an incoming locomotive other than a warning or light signaling. Then collisions happen with catastrophic consequences. With the help of new intelligent technologies and the above system, it is possible to minimize problems.

Title: *Education 4.0 in the era of digital revolution and Industry 4.0*

Authors: T S Latinovic, D Nedelcu, D Frunzaverde and Lj Sikman

Abstract: Industry 4.0 will completely change the education that we know. The introduction of artificial intelligence, robots, BIG Data as well as the Internet of Things will impact new jobs in Industry 4.0. This revolution will affect both the new jobs and the role of universities and colleges in the world to preparing students, but also lifelong learning to sustain jobs with the quick development of new technologies. Teachers now have to use the latest artificial intelligence technologies, and someone has to enable them. Learning is personalized and is done in small groups or almost individually. Artificial intelligence, digital experiential learning must be used and final exams must be replaced. Teachers need to teach students, not the entire group of students from a particular year. They use technology and information tools to reach and get the best out of the individual. New higher education is innovation-oriented for both professors and students and we can call it University 4.0. It would be an intelligent university that is innovative. This requires a constant change and improvement of educational content and the use of new information technologies, as well as a shift in focus to the individual student rather than the group of students.

Title: *Efficiency study of aeroelastic energy harvester via analytical approach*

Authors: F Sarbinowski, R Labudzki and R Talar

Abstract: In the paper we examined the impact of structure parameters of aeroelastic energy harvester on the power it generates. Study of system was preceded by deriving dimensionless analytical equations describing the power generated by the device. For this purpose, the Galerkin method was used while adopting a simplifying assumption about the sinusoidal motion of the device. The accuracy of this assumption was tested each time by comparing the obtained solution with a numerical one. By analysing the obtained solutions, the impact of individual model parameters on the generated power was examined. By further calculations, the optimal values of

the structure parameters were determined as a function of the flow velocity to which the device is subjected.

Title: *Chaotic evolutionary algorithms for dynamic instability enhancement*

Authors: F Sarbinowski, R Labudzki and R Talar

Abstract: The algorithm principle will be presented based on a geometry optimization of aeroelastic energy harvester. Efficiency of this class of devices highly depends on oscillation amplitude caused by dynamic instability of the system, which is related to its geometry. Optimization was performed using a genetic algorithm (GA) that processes data from CFD calculations. This algorithm generated a random population of twenty-arm geometrical figures. Each geometry was subjected to a numerical experiment during which its movement in a fluid-filled channel were simulated and resultant force acting on body was calculated. The calculations were repeated for angular orientation of the object varying from 0 to 180 degrees, at 5 degrees step, in order to obtain a complete characteristic of aerodynamical forces acting on body related to its angular orientation. For each of the obtained functions, satisfaction of Den Hartog's criterion is examined, which is the basis for geometry evaluation. In order to accelerate the calculations, classical GA has been modified by substituting random crossover process by operation determined by chaotic process — in this case, a logistic map. The numerical calculations was carried by Method of Fundamental Solutions.

Title: *Analysis of voice control of a collaborative robot*

Authors: M Janíček, R Ružarovský, R Holubek and K Velíšek

Abstract: Using the voice control to interact with things around us can always be one of the most interesting things. Voice control is becoming more and more used in everyday life, whether it is a smart home, voice control of a mobile phone or voice control of comfort equipment in a car. Whether, voice control gets into the production industry line is the right question. Reliability is still insufficient. The paper is focused on analysis of voice control of a collaborative robot. Analysis is focused on various voice commands, their repeatability and reliability in robot-human cooperation. The research determines the most problematic voice commands and ideal voice commands for voice control of a collaborative robot.

Title: *Analysis of the Industry 4.0 key elements and technologies implementation in the Festo Didactic educational systems MPS 203 I4.0*

Authors: R Ružarovský, R Holubek, M Janíček, K Velíšek and G O Tirian

Abstract: The main part of the contribution is the issue of Industry 4.0 and its architecture with respect to automated assembly devices and systems. The basic key elements are connected with the issue of Industry 4.0, which belong to the basic 9 technologies of Industry 4.0. The Industry 4.0 reference architecture is mentioned in connection with the implementation of these technologies and basic elements. The Industry 4.0 reference architecture is mentioned in connection with the implementation of these technologies and key elements. The reference architecture is based on the publication "Guideline Industrie 4.0", prepared by a group around the German and European Association of Mechanical Engineering Companies and Machine Designers and Manufacturing Plants VDMA. The aim of the contribution is to analyze the possibilities of implementing the reference architecture and explain on an example model how it is possible to use the key elements and technologies of I4.0. The MPS® system 203 I4.0 assembly system from Festo Didactic, GmbH, Germany is used as a model for the Industry 4.0 reference architecture. This model is designed

according to the "VDMA Toolbox" manual and this manual together with the operation of the integrated basic elements of Industry 4.0 is analyzed, implemented and evaluated. The technologies and key elements of Industry 4.0 are also implemented in the assembled product of the pneumatic cylinder, which is a part of the assembly system MPS® system 203 I4.0.

Title: *Some aspects on how to implement a web application in different SAP UI technologies*

Authors: A D Berdie, A A Berdie and K L Lemle

Abstract: Currently, in the development and implementation of an web application, the software developers are turning to those technologies that satisfy the client's requirements, that can be easily extended and have optimal results in terms of execution time. This scientific paper addresses issues related to the development and implementation of the same web application using three different web technologies, existing on the SAP NetWeaver platform. In this context, aspects related to the SAP NetWeaver technological platform and the SAP AS application server ABAP, the facilities offered by these for developing and implementing web applications, as well as the features specific to Web Dynpro ABAP, Floorplan Manager and WebClient UI technologies are highlighted.

Title: *Research on the simulation of quantum processes using computer programming*

Authors: P P Pop, A Pop-Vădean, T Latinovic and C Barz

Abstract: Through this approach we aim to investigate the possibility of modeling some principles of the quantum world using classical computer programming. Quantum computers are in the early stages of their development. They require huge construction costs, expensive materials and demanding complicated operation. Access to quantum technology is currently very limited. The complexity of the problems that can be solved by a quantum computer is low. For these reasons, the quantum computer is inaccessible to most researchers. Through our research we want to offer solutions using the classic computer. The development of this field are very promising.

Title: *Smart home devices, source of RF waves. Ways to harvest energy*

Authors: A Pop-Vădean, D Mândru, P P Pop, T Latinovic and C Barz

Abstract: Grid-connected devices, including the Internet of Things, are growing rapidly and offer enormous opportunities for improved energy management. At the same time, there is a responsibility to ensure that these devices use a minimum amount of energy to stay connected. One solution could be to harvest RF energy which is a self-sustaining operation that can provide unlimited power supply potential. , which can be used to power low power devices remotely. An important use is in the automation of smart homes and buildings, because copper cables (for sensors and actuators) can be eliminated, as well as installation and maintenance costs.

In addition, the finite life of electric batteries encourages researchers to find new solutions in the field of RF energy harvesting, in order to reduce even more efficiently the gap from 10 μ Watt to 1 Watt, because IoT devices work predominantly in this power range. And why not explore how to transfer energy between two points without the need for a physical connection to an energy source that would, as the great Tesla said, be "all-surpassing importance to man"

In this article we will investigate how to harvest energy from RF waves in a smart home and how we can protect ourselves from the adverse effects of RF waves.

3EE – ELECTRICAL ENGINEERING

Title: *Dual Stator Winding Induction Generator (DSWIG) used for hybrid micro grid power systems*

Authors: M Topor, S I Deaconu, F Bu, G N Popa, L N Tutelea and N Muntean

Abstract: A key element of the proposed micro grid is a dual stator winding induction generator DSWIG. The DSWIG is basically an induction generator equipped with two independent stator windings. What is interesting on this type of generator is the fact that the machine is multiport generator capable to provide energy on two separate windings. Its stator windings are separated from one set into two sets: one is called as the control winding (CW), which provides the variable excitation reactive power for the generator; the other is referred to as the power winding (PW), which outputs the active power to the loads. For the integration in the micro grid we have considered the micro gas turbine powered DSWIG. The reason we have used this solution is that the micro gas turbines is that we need a fast reliable primary energy source capable to provide are very small size gas turbines with sizes as small as 1 kW but it can be scaled up to 500 kW which meets our requirement. A few seconds after the main (and possibly secondary) power network are lost, the gas micro turbine is switched on and the DSWIG generates power, with help of a battery of capacitors that permanently magnetizes the machine magnetic core, placed in the stator auxiliary winding. To optimize the operation, it is proposed to use a combination of several power sources the photovoltaic source, which can be developed over time and which contributes to reducing network consumption and energy costs. It is also proposed to use as power sources or storage elements, electric vehicles (EVs) or hybrid plug-in vehicles, parked in the critical consumer area, to be connected to the grid and to be able to operate after the vehicle to grid (V2G) or grid to vehicle (G2V) technology. For micro grid simulation we can assume that the system is operating under normal operating conditions by neglecting fast dynamics of the micro turbine. The main functions of the micro turbine are: speed control block for part load conditions, temperature control function for upper output power limit, and acceleration control to prevent over speeding. The hybrid micro grid integrating solar, V2G, G2V and micro gas turbine with DSWIG scheme, proposed in this paper, uses an inverter with apparent power lower than the corresponding generator power. The expected ratio between the inverter power and the generator power is 50% in the case of DSWIG. The output voltages can be regulated by the control of fundamental current loop. The output voltages and control variable are described using the instantaneous power theory. For the generator control we use field oriented of the control-winding flux.

Title: *The power factor and the upper harmonics*

Authors: E Spunei, I Piroi, B Protea and F Piroi

Abstract: Upper harmonics that occur in electrical installations due to the use of semiconductor components increases the angle of phase difference between the voltage and the current of a phase. Following this, the power factor decreases, which necessitate, then, installations to compensate for it – to reduce or cancel the upper harmonics. In this work we present a case study on how upper harmonics influence the power factor. This work has been supported by Project CNFIS-FDI-2018-0282.

Title: *Optimize the maintenance activity with computer application*

Authors: L M Crisan, A E Crisan, D Brebenariu and I Borza

Abstract: The paper contains a few knowledges about the maintenance activity to establish an optimal maintenance strategy with computer application. Maintenance activity is theoretically analyzed by finding a logical scheme for implementing a maintenance strategy and a brief description of the advantages of implementation a computerized maintenance management software. MM@EI is an original application and was designed to facilitate the maintenance activity of electrical installations. In this paper is made a short description of the application and the operating algorithm of application.

Title: *Assessing the parameters of energy performance at the electric plants based on Renewable Energy Sources*

Authors: M Lolea, C V Anghel Drugarin and E Szabo

Abstract: The paper analyzes the parameters of energy performance of some categories of power plants based on renewable energy sources, in the context of the influence of the quality of the electric energy produced and the technical or economic impact of the consumers. Case studies are presented on the renewable energy sources existing in the Power System of Bihor County, Romania. Both experimental and statistical data analyzes are presented. Based on the results obtained, the authors propose some specific solutions to increase the energy performance of the power plants so that the negative impact on the functioning of the electricity grids and the power supply to the consumers is minimal.

Title: *The Support of neuro-fuzzy technique for assess the connection of Renewable Energy Sources into electricity grids*

Authors: M Lolea, C V Anghel Drugarin and E Szabo

Abstract: The paper proposes a way of approaching the optimal extension of the regional power systems through models that combine neural networks with fuzzy logic. Although they can be applied to any category of energy sources connected to electrical grids, the authors approach the integration of power plants with renewable energy sources in the Electricity System of Bihor County, as a case study. Through the established solutions, one can intuitively coordinate the uninterrupted operation of local power grids through links and rules between the input and output sizes of the neuro-fuzzy system.

Title: *A Fuzzy Logic method for appreciation the availability level of electricity by solar-photovoltaic conversion*

Authors: E Szabo, M Lolea and C V Anghel Drugarin

Abstract: The paper presents a way to evaluate the availability of electricity produced in photovoltaic power plants, using fuzzy logic. The authors set different levels of electricity availability based on the variation of the input parameters in the proposed fuzzy system. The connection between inputs and outputs is based on inference rules. Among the input parameters were considered solar radiation, efficiency of photovoltaic panels, assurance of energy accumulation, position of solar panels and the degree of shading or the level of reservation, ensured by the electrical lines of connection to the local electricity grids.

Title: *Actual status and perspectives about the hydro-energy conversion in electricity for the case of Bihor County, Romania*

Authors: E Szabo, M Lolea and C V Anghel Drugarin

Abstract: This article presents an evolution of the low hydropower plants realized in Bihor County in which the micro-hydroelectric stations with their technical or functional characteristics are identified. The authors developed a digital map with the territorial distribution of micro-hydroelectric plants in Bihor County, where the locations of the power plants can be identified, the connection ways with Bihor Power System, exploitation data, the distance between the hydropower objectives, the access roads and the installed powers. Finally, the future development prospects of micro-hydro power plants are analyzed in the context of the existence of financial support schemes for projects in the field of green energy, with the aim of increasing energy efficiency and reducing pollution.

Title: *Integrated intelligent Control System Design to improve vehicle rotational stability using active differential*

Authors: O Hajfathali, H Ahani and A Najari

Abstract: This paper examines the improvement of the car's dynamic performance using a two-layer intelligent control system to control its direct torque. For this purpose, an active differential system is installed, which is located on the rear axle of the car. The top layer of this controller is produced using the optimal controller method, the values of the torque transmitted in the rear differential, and the torque produced. This system announces the necessary information by the front-wheel brake to track the desired values of the car to the subsystems. In the second layer, according to these two values, the transfer torque in the active differential and the brake torque are applied to the front wheels of the car. The simulated results of the 9-DOF model of the car show that the designed controller has the ability to maintain the car's stability in all driving and road conditions.

Title: *Tree-based routing protocol in wireless sensor networks using optimization algorithm batch particles with a mobile sink*

Authors: F Shabani and A Najari

Abstract: Wireless sensor networks include a large number of sensor nodes that are distributed over a given range. To improve energy efficiency and delay, which are two important criteria in wireless sensor networks, tree-based routing protocols are common. In this paper, we present a minimally invasive veneer tree using the particle optimization algorithm for routing wireless sensor networks with a moving sink. This algorithm is population-based, and population members try to find a tree that has less energy and latency by sharing routing information. The proposed algorithm was compared in terms of energy consumption, distance, and the number of steps with previous algorithms. The simulation results showed that the improvement of the proposed protocol compared to the MWST method is on average in energy, distance, and step 30, 40, and 36 percent, respectively.

Title: *IRR in renewable technologies based on the Romanian green certificate promotion system for clean energy*

Authors: C P Chioncel, N Gillich and G O Tirian

Abstract: The paper offers an overview of the Romanian renewable energy sources promotion scheme through green certificates. Basically, this promotion system consisted of granting green certificates to the energy producers from renewable sources, which are then sold through competitive mechanisms to the energy suppliers / producers, with the obligation to purchase green certificates. They are required to purchase a certain number of green certificates, depending on the amount of electricity supplied to final consumers.

For 2019, the authors present an overcompensation analysis of the renewable energy production activity for the producers benefiting from the support scheme, depending on the renewable technologies (wind, micro-hydro, biomass cogeneration, solar PV), focused on the internal rate of return (IRR).

Title: *Energy efficiency of wind power plants in various wind condition*

Authors: C P Chioncel, E Spunei and G O Tirian

Abstract: The present paper determines the optimum energy operation area of an electric wind power system, under time varying wind speed conditions. The determinations of the optimal area, from the energy point of view, is done based on experimental values from the Romanian black sea coast, Dobrogea area. The optimum operation area is defined by the optimal mechanical velocity, ω_{OPTIM} . For this, the dependence between the wind speed, v , and ω_{OPTIM} are computed based on the current wind speed and the current mechanical velocity ω . Due to the high inertia of the wind turbine (WT), the generators speed is not able to follow the changes of the wind speed. Knowing the optimum value ω_{OPTIM} , the solution is to determine the load at the permanent magnet synchronous generator (PMSG) in order that the mechanical speed should timely reach his optimum.

Title: *Tuning proportional-derivative controller for a three-phase electric arc furnace*

Authors: L Ghiormez, M Panoiu, C Panoiu and I Muscalagiu

Abstract: In this paper is presented a control system that is based on the proportional-derivative controller for modeling and simulation of the electric arc furnace focusing on the controller's loop. The proposed controller is used to modify the position of the electrodes of the electric arc furnace in order to minimize the effect of the disturbances that can appear in the process during its functioning. With the proposed controller can be obtain the maximum power that can be used during functioning of the electric arc furnace. Also, the proposed control system can be used to obtain a specific active power for the electric arc that appears in the functioning of the electric arc furnace. In this paper are presented the steps used to tune the proportional and derivative gains of the controller. Used mathematical model of the electric arc is based on the voltage-current characteristic of the electric arc that simulates the functioning of the electric arc from the electric arc furnace. The model is integrated in the control system implementation. The simulations are implemented using Simulink toolbox from Matlab software. Taking into consideration obtained results during simulation are selected the best values for the gains of the proportional-derivative controller in order to obtain performance optimization of the electric arc furnace. For the selected gains of the proportional-derivative controller is presented the response of the system that is tested in a closed loop.

Title: *Romania in this energy transition, or the emancipation of small independent power producers and the gain from autarky/energy independence*

Authors: M A Blaj

Abstract: These past several years Romania made great progress with respect to power production from renewable sources. Being offered access to the daily electricity market was the main incentive for many power producers. In parallel with the increase of power generation capacity, the distribution and quality of the electricity offered to consumers deteriorated. Most small and medium size consumers, households and industrial alike, must face now all sorts of power quality issues from use of a relatively old infrastructure. One perfectly fit solution for improving the quality of the power used by consumers is the deployment and further development of micro grids, all while increasing capacity for power production locally. For certain, this development will be aligned to the power needs of the local consumers. This paper will present a practical case, a solution adapted for households, with its advantages and disadvantages, while making use of available materials and technologies.

Title: *Comparative study between the melting process of an aluminum batch and a steel batch in a high frequency induction furnace*

Authors: A Iagăr, G N Popa and C M Diniş

Abstract: In this work we analyzed a laboratory induction furnace fed by a high-frequency static converter, with rated power of 20 kW and output frequency of 5...12 kHz. The measurements were carried out in the case of an aluminum batch (2.5 kg), and a steel batch (7 kg), using the power quality analyzer CA8334B. We studied the influence of the type, temperature and amount of processed material, on the electrical parameters of induction furnace during the melting process.

The experiments were started from the cold state of crucible, being necessary a preheating stage of this, in both situations. It was found that the melting time of aluminum batch represents 40% from the melting time of steel batch, due to the much lower melting temperature. Largest electromagnetic disturbances (harmonics, unbalances, reactive power consumption) are recorded during the preheating period of crucible and the first stage of heating, when the furnace worked at low power, for the both batches. The experiments showed that large amount of current harmonics (of order $k = i \cdot 6 \pm 1$, $i = 1, 2, 3, \dots$) are generated due to the 6-pulse rectifier, from the static converter.

In the case of steel melting, the power factor is slightly higher (but much lower than neutral value) and the currents unbalance is smaller comparative to aluminum melting.

Also, in the case of steel melting, the electrical efficiency is better than in the case of aluminum melting, which is non-magnetic and has lower electrical resistivity. This is mainly due to the better magnetic coupling between the inductor and the batch.

Title: *Measuring luminance with a digital photometric camera in a short and straight tunnel in the Municipality of Resita, Caras-Severin County, Romania*

Authors: D Brebenariu, C D Gălăţanu, S Brebenariu and I Borza

Abstract: This research paper refers to the measurement of luminance in a short straight tunnel using a digital camera calibration photometric that functions as luminance meter, as well as LMK mobile air device. The measurement of luminance had been conducted in the evening of January 2020, in accordance of the standard SR EN 13201-4: 2016 - Road lighting - Part 4: Methods of measuring lighting performance respectively. To consider the guide for the lighting of road tunnels and underpasses CIE 88: 2004, from the analysis of the obtained results it is observed that the luminance is not adequate, i.e. they have values lower than the recommended minimum. In order to

obtain a suitable lighting in accordance with the standard and the guide, it is necessary to redesign the lighting in the tunnel using LED luminaires with luminous and energetic efficiency superior to the HPS luminaires which currently illuminates the tunnel.

Title: *Lighting optimization in a short and straight tunnel, from Resita municipality, Caras-Severin county, Romania, by designing with specialized software*

Authors: D Brebenariu, C D Gălăţanu, S Brebenariu and I Borza

Abstract: This research paper refers in optimizing the lighting on a straight and short tunnel with a length of about 100 m and located in the Municipality of Resita in Romania, where lighting is currently provided by lighting fixtures equipped with HPS lamps. As the results of the luminance measurements, they do not meet the recommendations of the norms and standards in force, we re-designed the tunnel lighting system using the licensed and specialized software SifisaLux-Tunel, because the feature of tunnel lighting according to the standard is not available in DIALux evo nor in DIALux 4.13 at present. Through design, I used luminaires with LED modules with superior light and energy efficiency to those equipped HPS lamps. Through the obtained results, I consider that I have managed to optimize by designing the lighting in the tunnel, in order to ensure a safety of the corresponding road traffic.

Title: *Characterization of three phase solid state VAR compensation scheme in three phase pulse width modulation voltage source inverter*

Authors: J M Mbunwe, E E Ezema, A A Ngwu, C V Anghel-Drugarin, R A Mohammad and M Ayaz Ahmad

Abstract: The principle of a three phase solid state Var compensation (SSVC) system that uses a three-phase pulse width-modulated (PWM) Voltage-Source Inverter (VSI) is presented and analyzed. The proposed SSVC system can compensate for leading and lagging displacement power factor and the PWM is used as a means of reducing the size of reactive components. The significant aspect of the presented Var compensator is the adjustment of the angle difference between the static fundamental circuit output voltage and the utility supply voltage in order to optimize the alternating current (a.c.) power factor to a non-linear load. The SSVC system is analyzed under self-controlled DC bus voltage operating conditions. Other areas of investigation include the design of SSVC reactive components. The dynamic analysis is carried out in a d-q reference frame to verify the performance of the Var compensator in terms of speed of response and stability. Analysis and stability plots generated confirm a high performance static Var compensator. Finely, the findings of present research work were found within good agreement with some other workers.

Title: *Ozone and anions generator for disinfection of enclosed spaces*

Authors: G N Popa, L Popa and C M Diniş

Abstract: After the pandemic of SARS-CoV-2, people's lives will be different. It seems that in the next period of, due to the spread of SARS-CoV-2 virus worldwide, all objects or surfaces that people come in contact with must be disinfected frequently. At the same time, the atmosphere in closed spaces must be disinfected because the transmission of the virus through the air is made easier. It seems that an effective method of disinfection (viruses, bacteria, etc.) is the use of ozone generators. Ozone in the air over a certain concentration and a certain period of time affects the human respiratory system.

It is known the role of negative ions on human health, especially given that the vast majority will

spend time indoors. Staying in homes for long periods of time has negative effects on the body and especially on mental health.

The paper presents and analyze ozone and the anions generators. It is presented a generator that can produce both ozone (measured with an electrochemical sensor) at a certain concentration for limited periods of time, as well as anions in high concentrations and over long periods of time that have a beneficial effect on health. Air quality is measured (with an electrochemical sensor), and in conditions of low quality, the generator can provide higher concentrations of ozone or anions by changing the durations. The ozone and anions generator is controlled with microcontroller development board and LCD shield. The program used in the microcontroller is presented.

Title: *Temperature-frequency converter made with astable multivibrator and thermistor*

Authors: I Popa, G N Popa, C M Diniş and A Iagăr

Abstract: The temperature can be measured electrically by several methods: with thermoresistive transducers, with thermocouple transducers, with thermistors, with the pn junctions of semiconductor devices, etc. Thermistors are electrical resistors made of metal oxides with semiconductor properties, which are small in size, have very small time constants and can measure temperatures locally, without disturbing the temperature range in the measured area.

In order to conveniently transmit the temperature information (without errors) at a distance, the paper uses an astable multivibrator circuit RC type, in which the resistor is replaced with a thermistor with negative characteristic, whose resistance changes depending on the temperature in a range allowed by this type of oscillator. After several experiments, it was established that for a certain value of a capacitor, using a thermistor with a negative characteristic, the frequency of the oscillator (rectangular signal) changes quasi-linearly (in the range of tens of kHz). The measured temperature (tens of °C) corresponds to the environment in which the thermistor is mounted. It was possible to determine the value of the astable multivibrator circuit capacity for which the temperature and frequency ranges in which the converter is considered to operate quasi-linearly were established.

The signal obtained from the output of the astable multivibrator circuit is transmitted remotely to a digital port of a microcontroller development board with an LCD shield that displays the measured temperature. Also, it is present the software implemented in microcontroller.

Title: *Power factor measuring device using microcontroller for single-phase consumers*

Authors: C M Diniş, G N Popa and A Iagăr

Abstract: The paper presents a device with microcontroller for measuring the power factor used for single-phase low voltage electrical consumers. Voltage and current are measured, and the paper presents two constructive variants of pulse formation circuits (TTL compatible) used to measure the phase shift between current and voltage.

In the first constructive variant, without galvanic separation, the voltage measurement is performed with a voltage divider connected in parallel with the consumer, and the current measurement is made by a shunt resistor connected in series with the consumer. In the second construction variant, with galvanic separation, the voltage is measured by a step-down voltage transformer, and the current is measured with a current transformer that has a load resistance. The signals coming from the voltage and current measuring equipment are limited by a group of diodes, then amplified-separated, and the resulting signals are connected to the input of a XOR logic gate. The signal from the XOR gate output has constant amplitude pulses and time durations proportional to the phase shift value between current and voltage.

After this XOR gate, a Schmitt trigger inverter was connected to reduce disturbances. The signal after the inverter is applied to the digital input of a microcontroller development board that, also,

has an LCD shield. The program used to calculate the power factor according to the pulse duration is presented.

Experiments are performed with RL and RC consumers to measure the power factor and the obtained measurements are compared with those measured with a precision device.

Title: *Structural features of the fuzzy parallel controller for smart grid applications*

Authors: S Bovchaliuk, O Miroshnyk, S Tymchuk, T Shchur, O Kovalyshyn, P Bałdowska-Witos and W Kruszelnicka

Abstract: The article discusses some of the problems of implementing Smart Grid technology in electric networks of Ukraine. It is proposed to use parallel controllers in a power management system. To do this, it is proposed to make changes to the structure of the parallel controller. The general strategy for building parallel controllers with fuzzy logic is given.

Title: *Assessment of the impact of beverage blow molding machine parameters on the efficiency of bottle formation*

Authors: P Bałdowska-Witos

Abstract: Operating characteristics of machines most often express three basic features: device performance, high product quality and material losses. In relation to food machinery, the fourth feature should be the efficiency of the process. The study characterizes the test method for assessing the material efficiency of selected phases of the production cycle of shaping beverage bottles made of polyethylene terephthalate. A technological process decomposed into six technological operations: collection, heating, stretching, pressure shaping preforms, and for degassing and cooling shaped bottles. The considerations were carried out for six sizes of preforms: 0.5l, 0.85l, 1.0l, 2.0l, 2.25l, 2.5l. The production process was monitored with particular regard to the parameters of temperature, pressure and time of technological operations. Hence, the criteria for obtaining indicators for: high quality products, unit energy consumption and mass efficiency have become the criteria for the operational assessment of food machinery, as well as for the interaction in the environment-machine system.

Title: *Experimental stand and researches on pantograph-catenary contact force control using Chaos Theory*

Authors: S Rusu-Anghel, S S Mezinescu and I C Lihaciu

Abstract: Due to the oscillating behavior of the pantograph and the catenary during the movement of the locomotive, the contact force changes to wide limits, resulting in electric arc with consequences: premature wear of the contact wire, electromagnetic disturbances, energy loss. Suitable control of the contact force at speeds exceeding 160 km / h may diminish these effects. Due to the particularities of the pantograph-catenary system and many random external factors, existing control methods do not always give the best results. The authors research has shown that the contact force signal contains a chaotic component that can be offset by chaos theory methods. Their own studies have demonstrated theoretically and by simulation that this approach can largely eliminate the separating the pantograph from the catenary and will lessen excessive forces. Experimental research, conducted by the authors and presented in this article, has been done in laboratory conditions on a specially built test stand and confirms that this new approach to active pantograph control produces superior results to existing methods.

Title: *The analysis of the deforming regime in the electric traction railway*

Authors: I Baciú and C D Cuntan

Abstract: The paper presents the results of measurements of electric power quality analyzer CA8334 on an electric locomotive equipped with continuous power engines. Determinations were made of the arrangements of current and voltage related to a motor of a locomotive 5 MVA. The data measured by the analyzer were transferred to a computer system using the Qualistar program and further processed in Excel that allows graphical representation of the characteristic quantities of power quality.

4ME – MECHANICAL ENGINEERING

Title: *Investigation of functional characteristics of non-asbestos friction material under different braking conditions*

Authors: C Pinca-Bretotean, A Josan and A K Sharma

Abstract: The friction material for the brake pads must have a low wear rate, outstanding thermal stability to maintain the braking characteristics of the vehicle and constant coefficient of friction under different operating conditions which includes applied loads, temperature, dry or wet braking environment and speed. Therefore, each newly developed friction material's fabrication must be subjected to a series of experimental tests to evaluate the friction and wear properties. In this paper we will study the frictional and wear behavior of a friction material for ecological brake pads of road vehicles. In the formulation of the friction material were used shells as a filler, a small amount of metal, silicon carbide, graphite, resin and hexamethyltetramine. The main objective of the paper refers to the study of the influence of the working regime on the tribological characteristics of the friction material. In this sense, were studied the evolution of the coefficient of friction and the thermal field at the contact surface between the friction couplings, influence of load on friction coefficient at different speeds and influence of load on wear rate at constant speed. The knowledge of the functional characteristics of the new friction material produced in the laboratory provides the possibility of pertinent assessments regarding the durability in operation of the brake pads, as well as on the quantity of wear products released into the atmosphere.

Title: *Physico-mechanical and tribological characteristics of composite materials used for brake pads*

Authors: C Pinca-Bretotean, A L Crăciun, C Preda and A K Sharma

Abstract: Brake pads are a crucial component of the braking system in an automotive vehicle. It is a primary factor in ensuring the normal driving of motor vehicles and the safety of passengers. Therefore, the research and study of the brake pads are extremely important. The materials which used in the manufacturing of brake pads should be environmentally friendly as harmful substances releases during operations by asbestos containing brake pads, which pollute the environment and thus harmful for human so becomes a primary reason of acceleration for research and development of new materials for brake pads. Composite materials have required excellent properties, so it is gaining an important position in this field. In this research, composite materials with coconut fiber are produced in the laboratory which can be used to produce brake pads for braking systems of the medium-performance small car. This research aims primarily towards producing the composite material which consists of the best proportion of organic fiber to have superior physico-mechanical and tribological characteristics. To achieve these goals, the following steps have been taken, the laboratory manufacturing of organic composite materials. Technological analysis of the samples, improving the qualitative characteristics of friction materials, determination of the physico-mechanical and tribological characteristics of the materials according to the standards in force. This paper provides a detailed investigation on the characteristics of composite materials made with coconut fiber for brake pads.

Title: *Modes for measuring aerodynamic resistances in the wind tunnel in the laboratory*

Authors: O Nedelcu, I C Salisteanu, O Magdun and V Dogaru

Abstract: The paper is focused on the architecture and design of a wind tunnel for measurement of aerodynamical resistances. The quantities which influence the flow of fluids and the applied laws in this case are described on short. Taking into account the main criteria for wind tunnels classification (architecture, test chamber type, test chamber fluid speed) type of the tunnel will be chosen followed by the design and construction. Test chamber measurements are carried on by an anemometer. The physical results are compared with the modelling results obtained for ideal conditions with the aid of SolidWorks software.

Title: *The requirements for the design and construction of a gas cylinders aimed for transportation of a of compressed and liquefied gases*

Authors: V Golubović-Bugarški, M Todić, S Petković and G Globočki-Lakić

Abstract: In this paper a typical requirements for the design and construction, workmanship and tests of a gas cylinders of water capacity between 150 l and 3000 l are described. This type of gas cylinder presents a refillable seamless steel tube aimed for transportation of compressed and liquefied gases exposed to extreme world-wide ambient temperatures. These tubes can be used alone or in batteries to equip trailers or multiple element gas containers (ISO modules or skids). When it comes about design requirements, the main focus is on the cylindrical shell thickness, which is calculated using the Lamé-von Mises formula. For some applications such as tubes assembled in batteries to equip trailers or skids (ISO modules) or MEGCs for the transportation and distribution of gases, it is important to calculate stresses associated with mounting the tube (bending stresses, torsional stresses, dynamic loadings etc.). Special attention must be paid to design of tube ends, which should be approximately hemispherical. To permit internal visual inspection of the tube, an adequate opening must be provided at the neck ends. The tubes are manufactured from seamless steel tubing, typically hot rolled, extended/extruded or forged. The ends of tube is hot formed using either forging or spinning methods. After manufacturing process, each tube must be inspected in terms of surface imperfections. Next, each tube must be ultrasonically examined for internal and external defects and laminar imperfections and to determine wall thickness. Batch tests for checking the quality of tubes includes mechanical testing, such as tensile and impact testing. Beside the batch tests, following heat treatment, all tubes must be subjected to the following tests: a hydraulic proof pressure test or a volumetric expansion test, a hardness test, a visual inspection, a visual check of the stamp markings, a dimensional inspection and an ultrasonic non-destructive testing (NDT). At the end of this paper, the most commonly found manufacturing imperfections are pointed out.

Title: *Bar model of temporary wooden support used for removing deflections of buildings*

Authors: K Gromysz

Abstract: Deflection of buildings is removed by uneven lifting of the above-ground part of the object. During the removal of building deflections temporary supports, consisting of a stack of repeatable elements, are used. Hydraulic jacks which force the vertical displacement of the building are used, as well. The article presents a bar model of a temporary support consisting of stack of repeatable elements. The model, described by the second order differential equation, let to compute the value of its displacements in the horizontal direction. It has been shown that these displacements are influenced by the unintended eccentricity and the geometrical imperfections. In addition, the impact of the load transmitted from the deformed neighboring supports is significant. The presented method allows to determine the load carrying capacity of temporary supports due to

unintentional displacement of the object in the horizontal direction. Therefore the method allows for safe design of the removal of building's deflections.

Title: *Passive tracking of a target based on supervisory adaptive EKF and CKF*

Authors: M Mohammadi, S A Aboutalebi, S R Surakanti and A Yousefiankalareh

Abstract: This study proposed a neural network structure for passive tracking of a target by an observer. Since the passive tracking measurement equation is nonlinear, the extended Kalman filter (EKF) and cubature Kalman filter (CKF) methods were implemented. Due to the nonlinear nature of the passive tracking measurement equation, the conventional extended and cubature Kalman filters are not good candidates where bearing-only target tracking is a standard and traditional passive tracking method. The effectiveness of Kalman filters dramatically depended on measurement noise covariance (R). Since R is challenging to be determined and changed with environmental variations, an on-line adaptive filter is proposed. The adaptive structure is founded on the double-layer perceptron neural network (DLPNN). The weights of the DLPNN are updated by the steepest descent method to tune covariance matrix R . In the numerical simulations; it is assumed that tracking of a target was carried out in an underwater environment by sonar measurement. In this paper, in addition to the proposed method, the neural network extended Kalman filter (NNEKF), neural network cubature Kalman filter (NNCKF), Sage Husa adaptive cubature Kalman filter (SHCKF) are used to track the target. The simulation results show the effectiveness of the proposed method.

Title: *Design adaptive tracking controller for the networked systems with stochastic delay and data packet dropout in communication channels*

Authors: S R Surakanti, A Yousefiankalareh and M A Manouchehri

Abstract: In this article, inspired by system identification methods, minimal variance adaptive control approach, delayed and predictive digital Smith prediction (with adaptive structure), a new strategy for controlling network time-delay systems has been presented. Two types of time delays in this paper are packet drop and stochastic delay in communication channels, which causes delays greater than the sampling period in the system. These time delays in two communication channels are considered concurrently. Packet drops in both communication channels through the use of two groups of the Bernoulli process is modeled. Because delays may affect the performance of the closed-loop system and may even reduce the system's regional stability, Smith's digital prediction is used to compensate for network control system delays (including network variable delay delays and process delays). In the numerical simulation, the pressure source unit of a boiler is networked, and the proposed control method in this paper is applied to it.

Title: *Numerical simulation of different s.h.m. piezoelectric sensors for helicopter rotor blades*

Authors: A D Voicu, A Hadăr and D Vlăsceanu

Abstract: Structural health monitoring techniques and the sensing elements incorporated in them have been intensely researched over the last decades, their development being of high importance for the aerospace industry due to the multiple advantages they generate, one of them being the potential of replacing scheduled maintenance with condition-based maintenance. A composite alternative of the tail rotor blade of an IAR330 helicopter is modeled with different thin sensors embedded in the laminar composite skin of the blade, with the purpose of studying the effects generated by the sensor's placement on the mechanical behavior of the blade, from a

numerical point of view.

Title: *Modular load-bearing structures for the study of interactions between the soil and working parts of agricultural machines*

Authors: P Cardei, N Constantin, R Sfiru, V Muraru and P Condruz

Abstract: The authors outline in this article the principles underlying the conception and design of modular load-bearing structures for the study of the interaction between soil and the agricultural machinery working bodies (MLBS) for the inter-study study of 3D CAD design. It presents the main scientific problems faced by agricultural machines for soil works, main reasons for the conception and realization of this machine or category of machines. It also presents the scientific but also economic reasons for the modulation or modular design of this machine, an operation that has led to several possible working variants, which require power sources for traction of different values. It also presents the multifunctionality acquired through the possibility of using work parts and their supports of different types and mountable on the structure in different formations.

Title: *Structural analysis of a modulated load-bearing structure designed to investigate the interaction between soil and the working parts of agricultural machines*

Authors: P Cardei, N Constantin, R Sfiru, V Muraru and S Muraru

Abstract: The article presents how to approach the structural analysis of a *modulated load-bearing structure* (MLBS) for researching the interaction between the soil and the working parts of agricultural machines. The special approach, in relation to the usual structures, is due to the fact that the supporting structure is a modulated, multifunctional one and, consequently, all the usual modular types of operation must be tested. The structure is analyzed in the hypothesis of the loads that maintain the demands of the materials used in the characteristic range of the linear elasticity, because the structure is expected to work in such conditions. The analyzed modulated structure is obtained by modular design for use in research, in several working variants. The authors also present the difficulties related to the transformations of CAD / CAM models into CAD / CAE models and opinions on the necessity of mixed analysis teams in addressing such problems.

Title: *Hybrid controller design for bending channel of an auto-pilot guided projectile*

Authors: B Zeinali and H Ahani

Abstract: In this paper, a robust hybrid controller is designed using the H_∞ control method and the gain tabulation method for self-tapping bending channel self-propelled tactical rotation projectiles based on a linear model. To do this, a linear model of the guided project bending channel is initially provided, despite the variable parameters. The changes in these parameters are due to the speed of the guided projectile, altitude, angle of attack, and so on. Here's how to design a self-sustaining hybrid pilot. To compare the pilot's performance, two other self-destructors have been developed based on the interest rate and PID scheduling methods. The results of the simulation show more efficiency of the proposed resistant hybrid method than the self-destructing table of PID and PID.

Title: *Design a gain scheduled fuzzy controller for distributed parabolic solar collectors*

Authors: A Adami, H Ahani and S Mouaviani

Abstract: The subject of this paper is the gain scheduled fuzzy control for the field of distributed parabolic solar collectors. System modeling has been done in different operation points. These different operation points are caused by various conditions caused by the nonlinear and time-varying behavior of the system. Based on the different operating points that are considered due to the presence of various disturbances and inputs, the switching mechanism between controllers is performed by a time-controlled control structure, which will reduce the effects of disturbances on the system response. The PID controller is then designed based on the Anti-Windup circuit and a feedforward controller that runs parallel to it. The use of a feedforward controller can also improve the system response time and its overshoot value, as well as reduce the effect of disturbances on the system.

Title: *Design an estimator with robust unknown input for undefined interval type-2 fuzzy systems with immeasurable decision variables*

Authors: H Hasani and P K Shahri

Abstract: In this paper, an innovative approach is proposed for designing an estimator with robust unknown input for undefined interval type-2 T-S fuzzy systems with immeasurable decision variables. In system modeling by the T-S fuzzy model, decision variables may be a function of system modes, which in many cases are immeasurable due to the structure of the system. Therefore, in this paper, the decision variables of the system are considered immeasurable. This assumption has led to a new trend in robot design. Also, in order to create a residual signal that has the highest sensitivity to a fault and the lowest sensitivity to unknown input, the H_{∞}/H_2 optimization criterion is considered. The existence of this criterion in design has led to two theorems in estimator design with new conditions based on linear matrix inequalities.

Title: *Numerical simulation of gas flow field in a muzzle brake*

Authors: D Jevtić, D Micković, P Elek, M Marković and L Jaramaz

Abstract: The muzzle brake is an important part of the artillery system because of its efficiency depends reliable work of the recoil system. To estimate the efficiency of the muzzle brake, it is important to determine the time-dependent pressure and velocity field inside the muzzle brake, which depends on the geometry of the brake, pressure and velocity of the gases at the gun muzzle, energy loses in the flow field along the muzzle brake etc. Also, the analysis of the flow field parameters of the gunpowder combustion products in the muzzle brake provides stress and temperature field in the brake, which affects the design parameters, material type and surface protection of the muzzle brake. The numerical simulation was performed using CFD software ANSYS Fluent to analyze phenomena inside the muzzle brake during the emptying of the gun barrel. Numerical simulation was performed in 2D geometry which was created based on the mass flow in 3D geometry. Experimental results were obtained measuring static pressure of the gunpowder combustion products at three places along the axis of the brake. A comprehensive comparison between numerical and experimental results shows good agreement. Based on this analysis, it was determined how geometry parameters of the muzzle brake and flow parameters on the gun muzzle affects its efficiency. This allows finding the optimal design parameters of the muzzle brake, taking into account the possibility of production. The analysis of the flow field parameters in the muzzle brake is not important only because of the determination of its efficiency, but it allows further analysis of the blast pressure around the gun and its effect on the gun crew members.

Title: *Optimization of industrial compressed air installations by energy audit*

Authors: V Alexa, S A Rațiu, I Kiss and V G Cioată

Abstract: Compressed air, after electricity, natural gas and water, is a widely used energy source in industrial processes. When an efficiency of the compressed air system is desired, it must be taken into account that each system is unique and the solutions provided are specifically adapted for each compressed air installation. In order to reduce (eliminate) the losses from the compressed air installation and to be able to optimize the energy consumption, the way of production, distribution and use of the compressed air must be studied and analyzed. Energy audit for industrial compressed air is often ignored, although it is one of the biggest opportunities to reduce energy consumption in the industry.

Title: *Possibilities of 3D reconstruction of the vehicle collision scene in the photogrammetric environment Agisoft Metashape 1.6.2*

Authors: A Dascăl and M Popa

Abstract: A car accident is the multifactorial result of circumstances and conditions that must be simultaneously present to create that specific event. For the purpose of reconstruction and accident analysis, each accident data must be collected, analyzed and processed to obtain information on the determinants. The collected data from road accident investigations are often informative and contain many variables for each case analyzed. In this context, the photos that highlight the collision scene, the damage found in space and time and the sketch of the accident scenario are among the most important. The elements that must be known in order to reconstruct the dynamics of a road accident are: the place of the accident, in GPS coordinates, the traces identified on the spot by the investigation bodies and the final stopped positions of the vehicles. Agisoft Metashape software is an advanced 3D modeling solution for a road accident scenario. The re-creation of the accident scene, in 3D coordinates through high quality professional content, allows the use of the result obtained by the photogrammetric method in the faithful reconstruction of the accident dynamics, which can be made and presented suggestively in 3D view. Using the 3D reconstruction of the accident scene, information can be obtained in 3 dimensions, which can make the difference in the conclusions of the technical expertise of a road accident.

Title: *The 3D reconstruction of a road accident using the specialized program PC Crash 12.1*

Authors: A Dascăl and M Popa

Abstract: The increase of the number of vehicles and the development of road infrastructure have led to an increase in traffic and an increase in the number of traffic accidents. The process of analysis and reconstruction of road accidents is characterized by a great complexity and by the existence of numerous parametric, functional and operational uncertainties. This complexity is due to difficulties, including mathematical description, in rendering the kinematics and dynamics of the vehicle as real as possible. A closer look at reality is possible if data from the vehicle's on-board computer memory or special EDR (Event Data Recorder) equipment is used. In general, uncertainties belong to the three main factors: the vehicle, the road and the driver. In this context, computer modeling is the cheapest option and allows the analysis of as many working hypotheses as possible before being put into practice, while containing a particularly high bio fidelity that allows repeatability of simulations.

The reconstruction of accidents is useful in determining what happened before and during an accident, especially when there are no witnesses or there are contradictory reports.

A modern tool used in the realization of forensic and extrajudicial technical expertise is the program specialized in simulating road traffic accidents PC-Crash, which covers a multitude of

different situations, as it benefits from the advantages of the latest achievements in the fields of hardware and software.

The paper presents one of the possibilities of the PC Crash program for computerized reconstruction of the dynamics of a road accident, by correlating the physical possibilities of the accident, based on the laws of mechanical engineering.

Title: *Elastic couplings design with bolts using iPart and iAssembly concepts*

Authors: I Zs Miklos, C C Miklos and C I Alic

Abstract: This paper presents the possibilities for designing an elastic coupling with bolts, using the concepts iPart and iAssembly. Concepts iPart and iAssembly are in the category of tools to increase the productivity of computer-aided design in Autodesk Inventor. When designing the elastic coupling with bolts, these tools are very useful and productive, because the components of the coupling and the assembly have the same geometric shape with different types of dimensions. Basically, iPart and iAssembly tools allow creation of libraries for components (flanges, bolts, etc.) and elastic coupling, geometrically modeled once, which extract their dimensions from pre-created value tables, depending on coupling size determined based on the transmitted torque. In this respect, it is necessary that the components and the assembly to be modeled parametrically, i.e. all the dimensional constraints applied to be defined by a clear parameter

Title: *Development of the fundamental diagram of the formation and transformation of the parts properties during their manufacturing*

Authors: Y Kusyi, V Stupnytskyy, A Kuk and V Topilnytskyy

Abstract: In object-oriented technologies of mechanical engineering [production](#), step-by-step execution of interconnected substages of technological process planning of a part is used. The systematic approach for investigations and qualitatively modelling of the real physical processes, taking into account the operational characteristics of parts and machines at the all levels of researches is ignored. As a rule, object-oriented technological processes don't track the change of the parts properties during their manufacturing from the position of technological inheritability for all stages and substages of the Life Cycle of a Part. Therefore, the development of scientific and applied principles of technological inheritability of quality parameters to provide the operational characteristics of parts in the functionally oriented technologies planning is a priority task for modern mechanical engineering. The structure of function-oriented technologies is closely related with the stages and substages of the Life Cycle of a Part. From the position of the continuum damage mechanics, the Life Cycle of a Part is considered as a single process of exhaustion of the material plasticity reserve under the influence defined load programs according to the technological inheritance of the part properties. The fundamental diagram of the formation and transformation of the properties of the parts from the position of the mechanics of technological inheritability is developed. This scheme, in contrast to previous studies in this research field, takes into account the significant influence of the substage of blanks manufacturing in the structure of the technological process on the formation of technological parameters and operational characteristics of parts.

Title: *Development of a functional model of the technological inheritability mechanics of parts properties*

Authors: Y Kusyi, V Stupnytskyy, A Kuk and V Topilnytskyy

Abstract: The development of a methodology for end-to-end automated rational technological process planning based on the principles of the technological inheritability mechanics requires the creation of normalized calculation procedures using the provisions of the phenomenological theory. It requires structural and informational integration of a significant amount of technological information using modern CALS-technologies that describe the concept and ideology of PLM (Product Life Cycle Management). The structural analysis methodology SADT (Structural Analysis and Design Technology) with the development of a set of functional models, process models, and state models of the surface layer of parts is used to effectively solve the technical problems posed using the product model and its Life Cycle. A parent model of the technological inheritability mechanics of parts properties is developed. The decomposition of the functional model from the position of the mechanics of deformation and fracture of the load stages is carried out in uniform terms and categories of the technological inheritability mechanics of parts properties. The main parameters of SADT diagrams for various stages and substages of the Life Cycle of a Part are described. The technological inheritability of parts properties is presented in the form of a regularity when the program and the load history at this quasimonotonic stage determine the accumulation of deformations and the exhaustion of plasticity reserves.

Title: *A novel device capable to generate propulsion using rotating masses*

Authors: A Gerocs, Z I Korka, G R Gillich, D Nedelcu and I Biro

Abstract: The paper describes a device capable of generating net impulse using rotating masses. Additionally to the detailed description of the mechanical design of this device, special attention is paid to the theoretical treatment of the original principle on which the system bases. In more detail, the device consists of a disc on which are attached in a point placed eccentrically to the center of the disc a system of six articulated rods with weights. Based on the equations of motion of the rotating masses, it was found that the device is capable to generate unidirectional propulsion. Supplementary, reduced but promising experimental results are presented. These findings confirm the ability of the device to generate linear movement.

Title: *Evaluation of gear pitting severity by using various condition indicators*

Authors: C R Sfetcu, Z I Korka and A V Bloju

Abstract: Gears are critical components in various industrial applications, because their unexpected failure may produce serious economic losses. Therefore, gear fault diagnosis has been subjected by intensive researches. Generally, rotating machines and particularly gears do not fail or break down without transmitting warning in form of increased vibration or acoustic emission. By measuring, collecting and analyzing the gear's vibration it becomes possible to establish both the severity and nature of the fault. Therefore, early gear defect detection of gears is possible by vibration monitoring using various condition indicators. As every indicator has its own capability to predict the appearance of gear faults, a question was asked regarding which one is more sensitive and worthy to predict gear failures as pitting. Thus, on an own developed stand were tested gears with four different stages of pitting, by measuring the vibration levels. The collected signals were analyzed using different condition indicators. A comparative study of RMS, Crest Factor, Kurtosis, FM0, FM4, M6, NA4, NB4 and Energy ratio has been done and it was concluded regarding the sensitivity of these condition indicators.

Title: *Scheduling of preventive maintenance of an power equipment of the agricultural enterprises*

Authors: I Trunova, O Miroshnyk, O Savchenko, O Moroz, V Pazyi, T Shchur, R Kasner and P Bałdowska-Witos

Abstract: Presented paper deals with the topic of preventive maintenance of an power equipment of typical agricultural enterprises. A decision support method was designed, incorporating the analysis of annual schedules of load diagrams of the typical agricultural enterprises and the planning of preventive maintenance of the power equipment with month priority during which maximal consumption of electric energy take place. The correction of typical load diagrams on the basis of the fact sheet about electric loading of the consumer is possible. The designed method optimizes maintenance costs without supplementary investment and running costs. An algorithm of the designed method is offered and a case study of its implementation is described in the paper.

Title: *The separation assessment of the small-seed mixtures of agricultural crops*

Authors: S Kovalyshyn, V Ptashnyk, O Shvets, I Fedir, B Nester, R Kasner and P Urbańska

Abstract: One has carried out investigations on the example of a small-seed mixture of winter rapeseed and its hard-to-separate weed

– catchweed. One has established that their geometrical and mass parameters, as well as friction properties, are practically the same. Therefore, it is impractical to use these properties in the separation process of such a mixture as separation features.

Having researched the electrical properties of the components of the studied mixture, we have revealed a significant difference in the values of their relative permittivity and the relative permittivity angle over a wide frequency range. The revealed patterns made it possible to determine the amount of electric charge that can accumulate on certain seeds during separation, and therefore the force of electrical interaction of the seed – separating surface.

One has proposed the method of electrical separation of the studied seed mixture, which is implemented on an electro- friction separator. Its tool has been a moving plane in an electric field. Concerning such a separator, one has determined the angles of equilibrium of seeds of winter rape and catchweed for diverse values of regulated parameters – the velocity of plane motion and the applied electric field strength. Taking into account the obtained results, one has confirmed the possibility to achieve a significant difference in the equilibrium angles of seeds of crops and weeds, which is 12-15°, and to ensure their complete separation. This is a confirmation of the possibility of using the equilibrium angles of the components of the seed mixtures as signs of their separation at the electro-friction separator. One can use the determined equilibrium angles to optimize the structural and technological parameters of the electro-friction separator.

Title: *Impact of contaminants on engine oil: a review*

Authors: S Rațiu, A Josan, V Alexa, V G Cioată and I Kiss

Abstract: Contaminants in engine oil alter its structure in different ways, depending on their nature, leading to the degradation of the lubricant and, if it is not replaced in time, even to loss of engine performance and its failure. Consequently, both for environmental reasons and from an economic point of view, it is important to be aware of the danger that these substances may present. This paper offers an investigation of the engine oil contaminants in general, emphasizing the most dangerous ones. It also includes the causes that contribute to their appearance, the types of contaminants, the way they act, the processes that result from contamination and the impact

they have on engine components.

Title: *Development of a novel model for emptying of a self-pressurising nitrous oxide tank*

Authors: D Kardaś and J Szymborski

Abstract: Self-pressurised, or vapour pressurised system is a system that maintains operational pressure in ambient conditions, with no need for additional pressurisation. An example of such system is a tank filled with nitrous oxide, which keeps pressure of 50.35bar at 20°C. Self-pressurised tanks are used in hybrid rocket engines, due to low weight and simple construction. At the same time, accurate prediction of the dynamics of these systems during emptying creates a significant challenge, due to occurrence of near equilibrium two phase flow and rapid changes in pressure and temperature.

The authors have developed several numerical models with aim of capturing described phenomena. The development started with basic assumption of lumped parameters approach and using mass and energy balance equations. First model featured two elements, one for the investigated fluid and second for the tank walls, with assumption of fluid in equilibrium, having single pressure and enthalpy. Such approach, while capturing major trends, lacked accuracy. To order to improve it, fluid was divided into two separate elements, one with saturated vapour and the second with the two-phase mixture. This proved to be more useful for predicting mass flow, but still did not offer accurate results. Further development included treating both fluid elements as two phase mixtures, first being mostly vapour and the second being mostly liquid and required additional equation describing tank's internal dynamics. Resultant model allows for significantly higher pressure prediction accuracy than previously and gives better prediction of parameters of fluid flowing out of the investigated tank.

Title: *A method to determine the severity of transverse cracks in beams*

Authors: M Pop, G R Gillich, C Tufisi and C Chioncel

Abstract: Vibration-based damage detection is a topic that concerns the attention of the researches because it signalizes the occurrence of cracks in the circumstance that the structure is globally evaluated. Methods relying on this approach need precise models, which include both the effect of the crack severity and position. Existing methods to determine the relation between the crack depth and severity are developed involving the fracture mechanics approach. This approach involves numerous experiments on the particular class of structures considered (especially as regards the shape of the cross-section). The approach involves resource and time-intensive consumption. Differentiating from this approach, we propose a method that takes into account the loss of energy due to the weakening of the structure, reflected by the increased deflection under the dead mass. In fact, the method consists of finding the deflection of the free end of a cantilever beam in the healthy state and after a crack propagates. The deflection evolution is permanently monitored and correlated with the natural frequencies of several out-of-plane modes. In order to obtain precise estimates, the position of the crack is removed from the fixed beam end to the free end, in a narrow range and a trend-line plotted for the deflection and the frequency evolution. Eventually, the severity is estimated for the value indicated at the fixed end by the regression curve. The proof the achieved results are accurate is made involving numerical simulation.

Title: *A method to detect cracks in the beams with imperfect boundary conditions*

Authors: D Lupu, G R Gillich, D Nedelcu and N Gillich

Abstract: Non-destructive testing of structures involving vibration-based damage detection methods implies knowing the beam's boundary conditions. For perfect boundary conditions numerous damage detection methods are developed and ensure more or less accurate estimation of the crack type, position and severity. On the contrary, for imperfect boundary conditions, there are only a few dedicated works. This paper presents a model of the beam with imperfect fixation at one or two ends, together with a methodology that allows the identification of both the weak grip and a crack if it exists. In this model, the soft fixation is modeled as a defect that produces an identical RFS for all vibration modes. Therefore, to find the defect and the weak grip (also a defect in essence) is done by applying the principle of superposition. The method is implemented as an application written in the Python programming language. Tests show that defects are successfully identified even if there are uncertainties about the fixing of the beam.

Title: *Conformity assessment of metal framing elements*

Authors: E Bajramovic, E Bajramovic and F Islamovic

Abstract: Metal framing elements made of thin sheets in combination with gypsum boards panels make the system widely used in constructions primarily for partition walls and suspended ceilings. The quality of the metal framing elements depends on the quality and metal sheet thickness from which they are made, the geometric shape of the profile, the equipment on which it is made, etc. Before placing on the market all products used in construction and manufactured in manufacturing facilities must meet prescribed technical requirements and specifications.

The paper will present the conformity assessment of metal framing elements type CD 60 and UD 30 in accordance with the European harmonized standard EN 14195:2014 and Regulation on Construction Products No. 305/2011. The Regulation defines the conditions for the marketing of construction products on the EU internal market, as well as methods and systems for evaluation to demonstrate the continuity of the characteristics of construction products.

Title: *Analysis and assessment of the 2.3MW wind turbine impact on the environment*

Authors: A Sobczak and P Urbanska

Abstract: Analysis and assessment of the impact of a selected wind turbine on the natural environment. For the analysis, a division into types of impacts resulting from the operation of a wind turbine was used, as well as highlighted elements of the environment that are exposed to threats. The analysis was based on the technical and technological characteristics of the selected wind turbine model and the location in which the selected model is located. Impact assessments were made in a subjective manner on the basis of the results of tests carried out before the construction of the object and the analysis of the environmental impact of the object.

Title: *Analysis of the impact of solar farm on the environment*

Authors: P Urbanska and A Sobczak

Abstract: Photovoltaic is the most rapidly growing renewable source of energy in Poland. More and more people invest in the PV industry. The subject of the article is to show the potential of energy obtained from the Sun on the example of 1 MW photovoltaic farm, which is located in Poland. The article presents characteristics of farm elements and an analysis of the impact of this farm on the environment. The analysis is based on the technical characteristics of the selected farm

and the location in which the selected farm is located.

Title: *Design features of comminution disc and their relation with CO₂ emission in disc life cycle*

Authors: W Kruszelnicka

Abstract: The construction form of the comminution discs has the greatest impact on the efficiency and energy consumption in the comminution process and on the fragmentation degree of product. Manufacturing, use and utilization of machine components carries environmental burdens in the form of emissions and energy consumption. The purpose of the work was to analyze the impact of the design features of the comminution disc (the material from which the disk is made, the number and diameter of holes in the disk) on the amount of CO₂ emissions in their life cycle. The 3D model of discs was made in SolidWorks and then the analysis of CO₂ emission on the basis of the LCA and CML method in SolidWorks Sustainability was done. It was found that energy consumption and CO₂ emissions were higher in the life cycle of steel discs than those made of PE HD. Emissions of carbon dioxide over the life cycle of the working disk decrease as the diameter and number of holes drilled in it increases. Regression equations describing the relationship between the diameter, number of holes in the disc and the amount of CO₂ emissions over the life cycle were obtained on the basis of multiple regression analysis.

Title: *Investigation of the separation of combed heap of winter wheat*

Authors: O Lezhenkin, S Halko, O Miroshnyk, O Vershkov, I Lezhenkin, O Suprun, T Shchur, W Kruszelnicka and R Kasner

Abstract: The article deals with the problem of separation of combed heap of winter wheat with an experimental working unit consisting of a segregator and a sieve. In order to expand the range of information on the qualitative side of the functioning of the working unit, it is suggested to introduce an additional assessment parameter – the impurity separation efficiency coefficient. Experimental studies of the technological process of the working unit were carried out using the mathematical theory of experimental design, where the response function was represented by the functional dependence of the change in the impurity separation efficiency coefficient on the specific feed of the combed heap, the oscillation frequency of the working unit and the diameter of the sieve openings. To conduct the experimental studies, the Box-Behnken design was selected. Verification of the significance of the obtained coefficients according to Student's t-test showed that all the coefficients were significant. The adequacy of the model was assessed according to Fisher's test. As a result of the calculations, it was established that the model was adequate and could be used for further research.

Title: *Investigation of the influence of the cutter-tool rake angle on the accuracy of the executed helices in the tapered thread machining*

Authors: O Onysko, V Panchuk, V Kopei, Y Havryliv and I Schuliar

Abstract: Tapered thread joints used in drill pipes largely determine the productivity of drilling processes and their environmental reliability. The quality of these joints depends on the values of the rake angle of the cutting insert of turning cutters used for making tapered threads. Modern manufacturers, because of the absence of algorithms for calculating the precision of the execution of the tapered thread spiral, depending on the size of the rake angle use the cutters only with a zero value of this angle. This greatly limits the possibility of producing drill pipes from high-strength materials, which is absolutely necessary in the modern drilling methods: obliquely directional and

horizontal. The kinematic analysis presented in the article proves the difference between the theoretically specified spiral and its realized in the course of machine processing with cut tools with non-zero values of the rake angle. The deviation of the thread incline angle that is realized during turning is not regulated by standard requirement, as it is variable. The precision of the pitch of the tool-joint tapered thread is regulated by standard and must be ensured by the kinematics of the lathe. However, when screwing, the spiral screw lines of the pin and the box thread may not match, provided that they are made with using of tools with different values of the rake angle. Thus, it is lead to exceed the tolerances by one pitch. The algorithm allows to calculate the axial deviations of the screw line, depending on the value of the rake angle of the cutter for any of the points of the thread profile. It brings the fit of the cutters with a rake angle up to 5° to ensure the accuracy of the executed helices in the tapered thread machining.

Title: *A method of detecting the feature of cylindrical pin based on machine vision*

Authors: Y F He and G O Tirian

Abstract: As a common mechanic part, cylindrical pin is mainly used for positioning the parts in assembling process. Chamfer angle is an important feature of cylindrical pin, which guides the pin into the pin hole. Manual method is used by cylindrical pin manufacturer to detect the chamfer feature and so as to filter the defective products. But it is found that many problems including inevitable subjective error, high intensity of labor, and low detection efficiency exist during manual operation. A new method based on machine vision is proposed in this paper to detect the chamfer feature and size of cylindrical pin. Contour of cylindrical pin is obtained by camera, chamfer feature and size is then extracted through image analysis. Experiment result proves that the method is feasible.

Title: *Study on the influence of fabric characteristics on mechanical properties of textile composite materials*

Authors: V G Cioată, I Kiss, V Alexa, S Rațiu and A Dascăl

Abstract: The composite material represents a set of distinct materials, which has characteristics that the constituent materials do not possess in part. Constituent materials maintain their identity separately in composite, however their combination generates all properties and characteristics different from those of the component materials in part. Fibres are the element that gives the assembly the stress-resistance characteristics. The fabric is one of the most widespread forms in which to find textile composite materials. The paper presents a study on the influence of the geometry of natural fiber fabrics on the mechanical properties of composite materials reinforced with them. The following characteristics of the fabrics were taken into account for the study: types of fibre materials, section geometry of fabrics fibre, type of braiding/woven etc. Their influence on the usual mechanical properties of composites is shown: longitudinal and transverse elasticity modules, Poisson coefficient, tensile strength etc. Finally, conclusions are drawn on these influences.

5MaE – MATERIALS ENGINEERING

Title: *Electrochemical study of borided Ti-6Al-4V titanium alloy*

Authors: A Kaouka, H Allaf and M A Khamed

Abstract: This work carried out an electrochemical study of the titanium Ti-6Al-4V alloy. The effect of surface treatment by boriding is also considered. The electrochemical behavior of this alloy was evaluated with respect to three aggressive media: an alkaline solution at 5% NaCl, 0.1N sulfuric acid and nitric acid. The polarization curves plotted at different scanning speeds (5, 1, 0.5 and 0.25 mV/s) in the three study environments show the existence of a large passivation domain. The corrosion current remains overall very low. These observations clearly confirm the very good stability of the film passive. We have also studied the influence of boruration treatment in the electrochemical behavior of the Ti6Al4V titanium alloy. The objective sought being to highlight the advantages and disadvantages brought by this treatment. Microscopic observations allowed us to delimit the boride layer. Imagery by SEM has clearly shown the existence of porosity on the surface of the treated material. The boriding treatment led to an increase in surface hardening by a factor of three times compared to that of the matrix following the formation of titanium borides. X-ray analysis of the treated samples allowed us to identify titanium boride TiB and Ti₂B formed on the surface.

Title: *Improvement of the tribological properties of titanium alloy Ti-6Al-4V surfaces*

Authors: M A Khamed, A Kaouka and H Allaf

Abstract: In this work, a boriding treatment was carried out on titanium alloys Ti-6Al-4V, at 950 °C for 6 h, to study the effects of microstructures on tribological performances of the surface. The tribological behaviour of the treated titanium alloy was evaluated at low load using a ball-on-disk cycle tester. Friction studies have been conducted using a tribometer, while the topography of wear was characterized by optical microscope, scanning electron microscopy (SEM), and contact profilometry. The results show that the coefficient of friction as well as the overall surface wear can be reduced by boride samples. The treated surfaces can decrease friction due to the diminution of the contact between two surfaces. The diffusion of boron enhanced the wear resistance and reduced the friction coefficient of the treated titanium alloy. Thus, the diffusion of boron on the surface of titanium had a synergistic effect to improve the tribology behaviour.

Title: *The behavior of structures CuSn12-C bronze obtained by heat treatments at erosion of the cavitation*

Authors: D V Bazavan, I Lazar, I Bordeasu, I Mitelea, L D Pirvulescu, C L Salcianu and M Popoviciu

Abstract: The CuSn bronzes are some of the materials most used in the casting of freshwater ship propellers. By using the heat treatment, the microstructure and hardness of these bronzes change substantially from the initial state. On these considerations, the paper highlights the change in the behavior and the resistance to the vibratory cavitation erosion of the microstructures of the CuSn12-C bronze, as a results of the application of two heat treatments (one quenching from 700 °C with cooling in water and one quenching from 700 0C with cooling in water, followed by tempering to 500 0C with cooling in air). Experimental tests, conducted on the vibrating apparatus, with piezoceramic crystals, within the Cavitation Laboratory of the Polytechnic University of Timisoara, shows significant increases in the resistance to cavitation erosion,

compared to the semi-manufactured state (initial).

Title: *The behavior of structures CuZn39Pb3 brass obtained by heat treatments at erosion of the cavitation*

Authors: I Lazar, I Bordeasu, L D Pirvulescu, M Hluscu, I Mitelea and C Ghera

Abstract: The paper highlights the behavior at the vibratory cavitation erosion of CuZn39Pb3 brass microstructures, obtained by heat treatments. It is analyzed two heat treatment regimes (one quenching from 800 °C with cooling in water and one quenching from 800 °C with cooling in water and followed by tempering to 400 °C with cooling in air). The micro-hardness measurements show that the change of the microstructure, relative to the delivery status (semi-manufactured), led to higher values of the micro-hardness. The researches on the cavitation erosion, generated in the vibrating apparatus with piezoceramic crystals, from the Cavitation Laboratory of the Polytechnic University of Timișoara, presented in the paper, shows significant increases of the surface resistance to the solicitations of the cavitation micro-jets, compared to the delivery state (semi-manufactured).

Title: *Impact of silicon carbide reinforcement on characteristics of aluminum metal matrix composites*

Authors: A K Sharma, R Bhandari, A Aherwar and C Pinca-Bretotean

Abstract: The consumption of composites has gradually raised in recent times and is incredibly likely to expand more in the future. Metal Matrix Composites (MMCs) provide an extensive range of benefits when compared with the common materials in certain conditions. Aluminum and its alloy-based composites in the current manufacturing scenario have a significant role to play in the advanced technological fields. Typically Aluminum Metal Matrix Composites (AlMMCs) used for its good strength, less density, excellent stiffness, lightweight, toughness, resistance to corrosion, fatigue, creep and wear relative to non-reinforced alloy. The AlMMCs, since their combination of the above-mentioned properties, are ideal suitable materials for many applications. Enhancement in these properties is accomplished by adequate customizing reinforcements in the base metal matrix. It is commonly used therefore in the aircraft, automobile, marine, leisure, telecommunications industries. In assessing the overall effectiveness of the composites there is a significant factor is reinforcement materials. The decision of a suitable type of reinforcement materials and volume are also important challenges Within this paper the impact of different amounts of reinforcement has been studied. The silicon carbide (SiC) used as reinforcement material and Al6061 used as Matrix material in AlMMCs are addressed. The effect of SiC on characteristics of AlMMCs explored in brief.

Title: *A systematic overview on fabrication aspects and methods of aluminum metal matrix composites*

Authors: A K Sharma, R Bhandari, A Aherwar and C Pinca-Bretotean

Abstract: AlMMCs have been incredibly popular in different industries because of their well-known properties as good formability and high castability. AlMMCs have exceptionally good mechanical characteristics and fairly low costs, so they are a very feasible choice for various applications. The popular materials for specialized applications, are primarily AlMMCs, as their characteristics can be customized by selection of reinforcement materials according to

requirements. AlMMCs are preferred and extensively used in industries as well as other domestic applications. One of the versatility of such composites is that their mechanical properties can effectively be configured in any manner by choosing their composition of reinforcing and matrix materials. But AlMMCs have significant weaknesses in terms of production expense. Research is required to build AlMMCs that are cost-effective and work on high-temperature industrial applications. The key goal is therefore to develop a cost-effective manufacturing process. The emphasis of this paper is on the effective and popular methods for fabrication of AlMMCs including liquid, solid and special fabrication routes such as compo-casting method, stir-casting, squeeze casting and powder metallurgy. This paper discusses the benefits and drawbacks of these production processes. This article aims to include a literature analysis of the current basic approaches utilized to produce AlMMCs and their technological applications.

Title: *Management of the activity of quality assurance of cast iron castings in foundries*

Authors: A Josan, E Ardelean, M Ardelean, V Puțan and D Josan

Abstract: In Romania, at present, the process of casting the parts is used under different methods. Thus, castings have different configurations and are used in various fields of technology, such as for the automotive industry, motorcycles and engines, electrical and electronics, space, computing and office equipment, agricultural machinery, aeronautics, woodworking or household industry. There is also a wide variety of materials used in casting these types of castings. The quality of the castings is found in the final product and, therefore, a special importance is attributed to the management activity to ensure the proper management of all processes in the foundry. For this, methods, techniques and management tools are used and applied so as to continuously optimize processes and activities and to be in accordance with the objectives of the system, respectively the continuous quality assurance and customer satisfaction. The paper presents the possibility of obtaining the quality of vermicular graphite cast iron castings, of the gate valve type.

Title: *Degradation of azo – dyes using green synthesized silver nanoparticles*

Authors: A A Sorescu, A Nuta, I R Suica-Bunghez, R M Ion and V Raditoiu

Abstract: This research paper describes the degradation of three azo-dyes, namely Direct Brown 2, Direct Orange 26 and Direct Black 38 using different colloidal suspensions of green synthesized silver nanoparticles from plants with significant pharmaceutical properties (e.g.: Sea buckthorn, Dwarf everlast, St. Benedict's herb, Gooseberry and Sorrel). Silver nanoparticles (AgNPs) were prepared using two routes, both using the aqueous extracts of the above-mentioned plants: at room temperature, in the dark, for 24 hours and at 50⁰C under a constant stirring of 600 rpm for 30 minutes. The degradation of the three azoic dyes was evaluated using UV-Vis spectroscopy by recording the absorbance at specific wavelengths for each dye. Also, the antioxidant activity of the green-synthesized AgNPs was evaluated using the DPPH method and compared to that of the aqueous extracts.

Title: *Rumex acetosa – mediated one pot green synthesis of noble metallic nanoparticles*

Authors: A A Sorescu, A Nuta and I R Suica-Bunghez

Abstract: Green chemistry represents a suitable alternative to conventional chemical synthesis because it is cost affective and does not involve toxic chemicals. This research paper presents the environmentally-friendly synthesis of AgNPs and AuNPs from the aqueous extract of Sorrel (*Rumex acetosa*), a leafy vegetable rich in vitamin C with numerous health benefits: aids digestion, regulates

blood pressure, boosts immunity, etc. The aqueous extract prepared from dry Sorrel leaves was mixed with a solution of 10^{-3} M silver nitrate (for AgNPs) and 10^{-3} M tetrachloroauric acid (for AuNPs) using two different routes: at room temperature, in the dark, overnight and at 50°C , with constant stirring. The visual modification of the aqueous extracts is considered the first proof that AgNPs and AuNPs are formed and UV-Vis spectroscopy confirms their formation. Green synthesized AgNPs and AuNPs were also investigated using Fourier transformed infrared spectroscopy (FTIR) and dynamic light scattering (DLS) and the results prove that *Rumex acetosa* can bioreduce the silver and gold ions.

Title: *Half-hard cast-Iron rolls: statistically research of the manufacturing technology for increase their quality and safety in exploitation*

Authors: I Kiss, V Alexa, V Cioată and S Rațiu

Abstract: The rolls represent the deforming support in the hot rolling process, being among the most expensive parts of the rolling sectors. By coming into direct contact with the hot material and taking over the deformation effort, the rolls are subjected to heavy working conditions (temperature, pressure, friction). In order to withstand the multiple and complex demands to which they are subjected, the requirements imposed on the rolls are resistance to dynamic and static demands, wear resistance in durability conditions and resistance to high temperature. In addition, it must ensure satisfactory catching of the laminate and a convenient surface. Some of the conditions imposed are more difficult to achieve. Thus, if mechanical resistance and shock resistance are at odds with wear resistance, a compromise is required that is made according to the specifics of the laminates. These properties can be obtained by a suitable choice of the material and technology of rolls manufacturing in accordance with their destination. The technological manufacturing process of the cast rolls, as well as the quality of material used in manufacturing them, can have a different influence upon the quality and safety in exploitation. Our research propose to analyse the cast-iron rolls, an analysis defined by the statistically analyse of the cast rolls manufacturing technology, using the modelling phenomenon and the mathematical approach. The optimization model is based on industrial data, obtained from half-hard cast-iron rolls. Their analysis shall lead to the optimization pattern, through the prism of the multicomponent correlations, enounced by mathematical formulae.

Title: *Elementary chemical analysis of different clay types*

Authors: S Aluvihara, C S Kalpage and K L Lemle

Abstract: Clay is a useful raw material for most of industrial manufacturing processes because of the unique physico-chemical properties and chemical compositions of such clays. The analysis of chemical compositions of some clay is an important strategy that related with the usages of such clay for various industrial purposes. In the existing research there were expected to test and analyze the chemical compositions of three different clay types that available in various locations in Sri Lanka using the X-ray fluorescence (XRF) technique. The clay samples were collected carefully from the available locations and stored well. The clay samples were labeled as anthill clay, brick clay and roof tile clay based on the applications and origins of such clays. A sufficient portion from each clay sample was selected and those samples were oven dried for 24 hours under the temperature 110°C and sent for the X-ray fluorescence (XRF) analysis. As the results for the investigations, there were observed the elements of Fe, Ti, Ba and K in the amounts of 82.08%, 4.84%, 0.79% and 12.28% from anthill clay, Fe, Ti, Ca and Ba in the percentages of 84.38%, 5.92%, 7.56% and 2.14% in brick clay and Fe, Ti, Ba, Zr and K in the percentages of 75.72%, 2.95%, 5.30%, 3.36% and 12.67% from roof tile clay.

Title: *Fundamental physico-chemical and mechanical analysis of different clay types*

Authors: S Aluvihara, C S Kalpage and L D Lemle

Abstract: Clay plays an important role in the most of industries that related with water treatment and food stowage industries. The adequate physic-chemical properties are the most recognized factor for the wide range of applications. The investigation of the fundamental physico-chemical and some mechanical properties of such clay is an insistent task before the selection of some material for some specific role. The analysis of the fundamental physico-chemical and grain size analysis of grain sizes of three different types of selected clays were the aims and objectives of the existing research. The clay samples were collected from three different locations in Sri Lanka and stored well. The clay samples were named as anthill clay, brick clay and roof tile clay. Some portion from each clay sample was separated and such separated clay samples were oven dried for 24 hours under the temperature 110⁰C. Each of dried clay sample was separated again and the separated portions were prepared for the test of moisture content, dry sieve analysis and wet sieve analysis. As major results of the experiment especially there were obtained 14.49%, 21.45% and 25.97% moisture contents with respect to anthill, brick and roof tile clays, well graded particle arrangement in roof tile clay, gap graded particle arrangement in anthill clay and uniformly graded particle arrangement in brick clays. In addition that according to the obtained results there were seen the finer particle weight percentages as 59.90%, 37.36% and 72.38% with respect to anthill clay, brick clay and roof tile clay.

Title: *Experimental research with the help of thermal - derivatographic analysis on coal powder that can be blowed in the blast furnace*

Authors: V E Caloian, E M Vlad, C Pandelescu, E F Plopeanu, V Oancea, V Rucai, N Constantin and M Hritac

Abstract: In an integrated steel flow, the costs related to the consumption of metallurgical coke represent approx. 25% of the production cost of the shards obtained by continuous casting. As the price of coal returns to about 50% of that of coke, the technology of insufflating coal dust at the blast furnaces mouths, which transfers the coking process to the blast furnace, can reduce the cost of slag by 4-5%. It cannot be used to blow into the furnace any type of coal. The coal used must meet certain requirements, based on its physical and chemical properties.

By thermo-derivatographic analysis, important properties of coals can be established.

The authors present in this paper the results of thermal derivatographic analyzes performed on certain types of coal.

Title: *Experimental research on the effect of additives on the sintering process of alumina-based refractory materials*

Authors: E M Vlad, V E Caloian, C Pandelescu, E F Plopeanu, V Oancea, V Rucai, N Constantin and M Hritac

Abstract: This experimental study refers to the obtaining of refractory materials based on alumina, by adding different amounts of TiO₂ and MnO₂, as sintering agents, to the initial mixtures of raw materials (alumina, chamotte), followed by the sintering of the masses different temperatures between 1300 °C and 1700 °C. The effects of the use of additives on the sintering temperature, as well as on the microstructure and, consequently, on the properties of the sintered materials were analyzed on both the added and non-added ceramic samples, considered as

comparative benchmarks.

Title: *Experimental analysis of the influence of clogging on the filtration process for internal combustion engines*

Authors: R Bucevschi, V Socalici, A Budiul Berghian and C Birtok Băneasă

Abstract: This article presents the analysis of the laboratory tests results carried out to investigate the effects of the clogging phenomenon developed at internal combustion engine filters. A classical filter module from an aspirated engine was used to carry out the tests, composed of air ducts, filter housing and a standard panel filter element made of paper, mounted on the test stand designed by the authors, for analysis of flow state parameters in dynamic mode.

Title: *Manufacturing process management for cast iron brake blocks*

Authors: F Bucur, A Josan, O Gaiianu and A Socalici

Abstract: In order to ensure a proper management in cast iron foundries it is necessary to coordinate all the processes that are involved in manufacturing cast parts. The organization management offers the necessary conditions for developing activities, with great emphasis on the activity of quality control. The paper presents the necessity of establishing a management strategy which can lead to the supervision of the entire manufacturing cycle of cast iron brake blocks for rolling stock. To this end, it is necessary to measure, monitor and analyze the results obtained in the industrial practice and to compare them with product standards.

Title: *Research on the influence of casting powders on the increase of the quality of cast continuous semi-finished products*

Authors: M Radu, T Heput, E Ardelean and A Dascal

Abstract: As a result of the modernization of steel processing and casting technologies, currently over 90% of liquid steel is cast continuously. The quality of the cast products is influenced by: the temperature and speed of casting, the flow of cooling water, the characteristics of the casting powders. The investigations focussed on a low-alloy manganese steel (grade X60QS) made in EBT type electric furnace, capacity 100 tons and cast on a 5 strand continuous casting machine. The paper presents the results of research on the variation of carbon, manganese and sulfur contents on the cast product for each casting wire and each wire rod. Based on the research, it was possible to determine the causes that cause deviations from the chemical composition required for these elements as well as the possibilities of eliminating them. The results obtained have applicability in research and practice.

Title: *Processing of ferrous iron and steel waste in the context of the circular economy*

Authors: O Lupu, A Socalici, E Popa and O Gaiianu

Abstract: The paper presents the possibilities of exploiting the small and powdered ferrous waste with the production of lighters that can be used as a raw material in the loading of the steel processing units. The capitalization of small ferrous and powdered iron and steel wastes is an important problem, because their transformation into by-products, so in economic goods can lead to a rational exploitation of the resources of raw materials and energy, thus ensuring both the needs of the human society and the protection of the environment surrounding.

Title: *Technology of thin metal sheet cutting with fiber laser*

Authors: L Zgripcea, V Putan, M Ardelean and C Birtok Baneasa

Abstract: Laser cutting is a thermal cutting process where it is made use of the physical fact that laser light is absorbed in materials. The process is used for many materials in the manufacturing industry. Nowadays, the most suitable laser regarding range of materials, cutting speed, cutting quality is fiber laser. The article studies the correlation between cut quality and process parameters for thin plates, steel and aluminum. The laser machine used for experiments is a Continuous Wave fiber laser with 1000W power source.

Title: *Managerial analysis of technological production processes in the metallic materials industry*

Authors: D C Labes, A Ioana, N Constantin, D F Marcu and P S Trandafir

Abstract: A good management of technological processes requires knowledge of their typology. Consequently, our article has as a starting point the classification of technological production processes and enterprises in the metallic materials industry. The classification is based on several criteria: according to the correlation of the finished product - raw materials (direct production processes, synthetic production processes, analytical production processes); according to the way of participation in obtaining the finished product (basic production processes, auxiliary production processes, serving production processes); according to the technological nature (physical-chemical processes - elaboration, processing processes, assembly-assembly processes, transport processes); by the degree of continuity (continuous production processes, discontinuous production processes); according to the degree of periodicity (cyclical production processes, non-periodic production processes).

Title: *Comparative managerial analysis of production enterprises in the metallic materials industry*

Authors: P S Trandafir, A Ioana, N Constantin, D F Marcu and D C Labes

Abstract: Our starting point is a rigorous classification of the types of production companies in the metal materials industry. Thus, we present and compare the types of enterprises based on the following classification criteria: by the form of ownership of the enterprise (private enterprises, public enterprises, semi-public enterprises, private public enterprises); by the economic branch to which the enterprise belongs (enterprises of the extractive industry, processing enterprises); by size of enterprise (small enterprises, medium enterprises, large enterprises); by type (character) of production of enterprises (enterprises with mass production, enterprises with mass production, enterprises with single production); by the degree of specialization of enterprises (specialized enterprises, universal enterprises, joint ventures); by the degree of mechanization, automation and robotization (predominantly manual labor enterprises, predominantly mechanized labor enterprises, enterprises with automated and robotic technological processes).

Title: *The importance of recovering precious metals from waste electrical and electronic equipment*

Authors: M Ardelean, E Ardelean, G Mihut and O Gaianu

Abstract: The evolution of electronic equipment in recent decades is experiencing a remarkable development. Due to increasing of consumption and also a very fast replacement rate due mainly to obsolescence, the amount of resulting electrical and electronic waste (WEEE) is increasing. The WEEE term includes all of electrical and electronic equipment starting from mobile phones,

computers, video cameras to tv set, washing machines, refrigerators. In other words, all electrical and electronic equipment from a household, electronic equipment from automotive or industrial electronic components.

Now in all worldwide it is estimated that WEEE represents about 5% of all municipal solid waste. The recovery process can be taken into account only if the cost of recovery is much lower than the value of the precious metals recovered from this. Regarding to waste disposal restrictions and strict environmental regulations, are needed economically viable and environmentally friendly technologies.

The paper presents the results of laboratory experiments on the recovery of precious metals, especially gold, present in various electrical and electronic components. WEEE used in the experiments was used from mobile phones, computer motherboards, computerized microprocessors and various types of gold-plated contacts.

Title: *Reduction of pollution by controlled disposal of hazardous pharmaceuticals*

Authors: E Ardelean, V Ordodi, M Ardelean, A Socalici and K L Lemle

Abstract: Human activities generate a series of waste increasingly more complex and difficult to manage (through the containment, inertization or destruction). Particular attention must be paid to hazardous waste with a high risk of environmental pollution but especially for infestation to the human generator.

In this context, we considered the possibility of integrated waste management resulted from the pharmaceutical industry, which is frequently mishandled and ends (reach) in the environment. This paper proposes a method for neutralizing some hazardous pharmaceutical waste, using electrochemical methods for inactivation, respectively an electrochemical reactor with asymmetric current densities. The results obtained in the laboratory for four of these substances leads to the generation of viable solutions that can be used in practice.