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ABSTRACTS

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A. OPTIMIZATION OF MANUFACTURING PROCESSES AND SYSTEMS & COMPUTER AIDED DESIGN AND MANUFACTURING

A.1. DEFORMATION OF MATERIALS IN PRESENCE OF DIFFERENT CORROSIVE ENVIRONMENTS

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Abstract. Deformability of metals and alloys characterizes their ability to permanently deform without breaking the inner bonds and is defined as the extent of deformation possible to apply to a material, without cracks or it's breaking during deformation, under specific conditions of temperature and straining speed. The main factors of influence of deformability can be grouped as follows: factors related to the material - composition, structure, purity, metallurgical evolution, localization of the deformation; process related factors - deformation temperature, deformation speed, voltage and deformation state, hydrostatic pressure, tool/semi-finished friction, tool/semi-finished geometry. The samples analyzed were subjected to the corrosion process. Corrosive factors were salt solution with 7% and 11% concentration, environment, and microbiological environment. The conclusion of this study can be related to the chemical composition of metallic materials. The chemical composition of the materials influences the deformability characteristics of the metal sheets. Thus, steel sample has a high content of manganese and carbon resulting in lower deformability capacities. Purity positively influences the deformability of the material by ensuring homogeneous deformation, while impurities favor the generation of cracks at their interface with the metal matrix. The attack of microbiological agents on the quality of metallic materials and implicitly the decrease of their deformation capacity, evidenced by the low level of the deformation limit curves, is explained by the fact that the metabolism of fungi and molds develop a series of organic acids (the most common: tartaric acid, citric and oxalic) that solubilize metals and produce microbial cells of differentiated concentration that affect their structure.

Keywords: deformability, corrosive agents, metallic sheets.

A.2. EXPERIMENTAL INVESTIGATION ON THE IMPACT OF BURNISHING ON THE HARDNESS OF MACHINED MATERIALS

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Abstract. Monitoring the impact of burnishing on the hardness and surface condition of machined materials, as well as the effects of the cutting parameters associated with this technique, is crucial. The main objective is to explore how the burnishing process influences the strength and hardness of the machined materials by closely examining the different parameters used during machining to understand their contribution to these changes. This research aims to shed light on the relationships between burnishing, mechanical properties, material hardness, and cutting parameters, thus providing valuable insights for optimizing this process in various industrial contexts. The research methodology includes the

manufacturing of a burnishing tool, followed by various burnishing tests by varying the cutting parameters such as cutting speed, feed rate, and depth of cut. These tests will be accompanied by microhardness measurements of the machined parts in turning operations.

Keywords: burnishing, measurement, hardness, cutting parameters, turning.

A.3. ENHANCING EFFICIENCY IN ELECTRICAL DISCHARGE MACHINING: PREDICTIVE MODELING OF MACHINING PARAMETERS

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Abstract. This research focuses on examining the impact of machining parameters on the efficiency of electrical discharge machining. It distinguishes itself through the creation and implementation of an innovative experimental methodology to evaluate the performance of electrical discharge machining. Furthermore, a significant contribution lies in the development of a sophisticated predictive model aimed at comprehensively analyzing the influence of various machining parameters on the performance of this process. The results obtained are remarkably accurate, with an average deviation from experimental values not exceeding 5% for all measures of electrical discharge machining performance. This exceptional precision enhances the reliability and validity of the developed model, thus paving the way for a more effective and efficient utilization of electrical discharge machining in various industrial contexts.

Keywords: machining parameters, electrical discharge machining, predictive model, performance analysis.

A.4. OPTIMIZING MULTI-PASS TURNING: A HYBRID APPROACH FOR DETERMINING OPTIMAL CUTTING PARAMETERS

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Abstract. Determining optimal cutting parameters is a crucial step in planning metal parts manufacturing processes. This paper introduces a novel optimization strategy for multi-pass turning, focusing on the criterion of "minimum unit production time". A significant contribution of this research lies in the utilization of a hybrid approach, combining dynamic programming to determine the optimal number of passes and a genetic algorithm paired with sequential quadratic programming (SQP) to obtain optimal cutting condition values. The originality of this approach lies in the integration of these two techniques to effectively optimize cutting parameters. Furthermore, this research evaluates the convergence and robustness of the proposed method through comparisons with prior literature results. The findings highlight the superior efficiency of the proposed strategy compared to other techniques employed by various researchers, thus reinforcing its originality and contribution to the field of optimizing cutting parameters for multi-pass turning.

Keywords: optimal cutting parameters, multi-pass turning, optimization strategy, hybrid approach, genetic algorithm.

A.5. ENHANCING TRIBOLOGICAL PERFORMANCE OF ALUMINUM MATRIX HYBRID COMPOSITES: FUZZY LOGIC PREDICTION APPROACH

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Abstract. This work focuses on studying aluminum matrix hybrid composites. The combination of silicon carbide and graphite particles in the aluminum matrix results in improved mechanical and tribological properties, including increased strength, stiffness, hardness, wear resistance, and thermal stability. The main contribution of this study lies in the development of a method to predict the tribological behavior of these hybrid composites using fuzzy logic. The results obtained show good agreement between the values predicted by the developed model and the experimental values, with an accuracy exceeding 97% for both the wear rate and the coefficient of friction. This approach offers a new perspective for understanding and optimizing the tribological performance of aluminum matrix hybrid composites, which could have a significant impact on various industrial sectors requiring high-performance materials.

Keywords: aluminum matrix, tribological properties, hybrid composites, fuzzy logic prediction.

A.6. IMPACT OF DIGITAL TECHNOLOGIES ON STUDENTS FROM INDUSTRIAL ENGINEERING DOMAIN

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Abstract. Higher education institutions (HEIs) are involved in an evolution towards a new model of university called the digital university. This model involves not only the adoption of new technologies, but also the development of a strategic organizational transformation that includes information, processes, human aspects and more. Since the digital maturity of an organization correlates with the scope of its digital transformation efforts, this study aims to identify the Digital Transformation Initiatives (DTI) undertaken by higher education institutions, defining the new processes and technologies used to implement them. The main motivation is to get a true and clear view of how universities are transforming, discovering the most relevant DTI they have applied and whether they are doing so through an integrated plan aligned to a digital strategy, as recommended by experts. In this pilot study we aimed to identify how industrial engineering students (from "Vasile Alecsandri" University of Bacau) perceive this irreversible shift towards digitalization.

Keywords: digital transformation, technostress, higher education digital institution, digital education.

A.7. A STUDY OF A FLUID FLOW SIMULATION THROUGH A JET EJECTOR SYSTEM USED IN VARIOUS INDUSTRIAL APPLICATIONS

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Abstract. Jet ejectors have applications in various industries, including steam power plants, refrigeration systems, chemical processing plants, and HVAC systems. They are often used for tasks such as suctioning gases or vapors, mixing fluids, and boosting pressure in pipelines, particularly in application of fluid mechanics and thermodynamics. Jet ejectors operate based on the principle of momentum transfer. This uses a high-pressure fluid (often steam or compressed air) as a motive fluid to entrain and move another fluid (usually a gas or liquid) from a lower pressure region to a higher-pressure region. A typical jet ejector consists of several key components, including a motive fluid nozzle, a suction inlet, a diffuser, and a discharge nozzle. The motive fluid is typically injected into the device through the motive fluid nozzle, creating a high-velocity jet. The high-velocity jet of motive fluid creates a low-pressure zone near the suction inlet of the ejector. This low-pressure zone induces the flow of the fluid or gas from the surrounding environment into the ejector. As the motive fluid jet interacts with the surrounding fluid or gas, it entrains or captures it, creating a mixed flow of fluids inside the ejector. The mixed flow of fluids then enters the diffuser section of the ejector. The diffuser gradually increases in cross-sectional area, which causes the velocity of the mixed fluid to decrease and its pressure to increase. Finally, the mixed fluid exits the ejector through the discharge nozzle at a higher pressure than the surrounding environment. This process allows for the transfer of energy from the motive fluid to the entrained fluid, effectively increasing its pressure. If we compare them with other refrigeration systems, we notice that these ejectors have several important advantages, such as: simplicity in construction, high reliability and low cost. However, if we were to apply them on a large scale, it is more difficult because they have a lower performance coefficient than conventional systems. The current work wants to simulate the phenomena that appear in such jet ejectors and thus they can be better understood and can be optimized both from the point of view of geometry and heat transfer and the use of the correct working fluids to achieve this as best as possible.

Keywords: jet ejector, simulation, fluid flow, heat recuperation.

A.8. A REVIEW OF THE STRATEGIES USED TO INCREASE THE ACCURACY OF SPIFED PARTS

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Abstract. The new challenges of the global competitive environment, as well as the green and digital double transition, have necessitated the development of flexible processes suitable for small series and prototype production. In this context, a new class of processes, grouped under the name of incremental sheet forming, is becoming increasingly important due to their ability to meet current manufacturing trends. Among them, single point incremental forming is the most flexible and cheaper process, although it has two important drawbacks, namely low productivity and low accuracy, respectively. This paper reviews the published literature on this process, specifically the strategies used to increase the accuracy

of manufactured parts. Based on the survey findings, challenges and some potential research directions are discussed.

Keywords: single point incremental forming (SPIF), parts accuracy, improvement strategies.

A.9. SPECIFIC ISSUES WHEN MILLING PARTS WITH LOW RIGIDITY - A REVIEW

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Abstract. Milling parts with low rigidity, made of materials with special properties, is a complex process that requires high level of precision and expertise in order to obtain results that meet the increasingly demanding requirements of dedicated industries (e.g., aeronautics, automotive). Because of their low rigidity and constantly changing strength during machining, both static and dynamic phenomena occur that affect the process performance. The current paper aims to summarize the issues encountered when machining such parts, as well as the solutions proposed in the literature to address them.

Keywords: milling, low rigidity parts, dynamic issues, static issues.

A.10. STUDY OF INFLUENCE OF THE PROCESS PARAMETERS ON THE QUALITY OF ABRASIVE WATERJET MACHINED SURFACES

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Abstract. Abrasive water jet cutting (AWJC) is an unconventional machining process increasingly used by manufacturers due, on the one hand, to their attempt of aligning with the global requirements of ensuring a sustainable production, and, on the other hand, to a combination of advantages that this technology offers compared to other unconventional techniques (e.g., applicability on a wide range of materials, good quality of processed surfaces, safety for the operator) in case of machining hard-to-process materials. Titanium alloys belong to this category, leading to several issues in industrial practice such as excessive wear or even tool breakage, and inadequate quality of processed parts. The aim of the current paper is to analyze the influence of process parameters on the quality of abrasive waterjet machined surface of titanium parts.

Keywords: abrasive water jet cutting (AWJC), surface quality, process parameters, titanium alloy.

A.11. USING 3D PRINTING IN MANUFACTURING SPECIFIC TOOLS FOR STRETCH FORMING PROCESSES

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Abstract. Stretch forming is a metal forming process that utilizes tensile forces to plastically deform sheet metal into complex shapes. Traditionally, the tools used in stretch forming, such as clamps, dies, and formers, have been manufactured through subtractive methods like machining or milling. However, the emergence of 3D printing, also known as additive manufacturing (AM), presents a compelling alternative for fabricating these tools. This paper explores the potential of 3D printing for manufacturing specific tools in stretch forming processes. One of the key advantages of 3D printing lies in its inherent design flexibility. Unlike subtractive methods that remove material from a solid block, 3D printing allows for the creation of complex geometries with internal channels, lattices, and other intricate features. This design freedom enables the creation of customized tools optimized for specific parts and forming processes. For instance, 3D printed formers can be designed with integrated channels for water cooling, which helps to manage heat build-up during forming and improve part quality. Furthermore, 3D printing offers significant benefits in terms of lead time and cost-effectiveness, particularly for low-volume production runs or prototyping applications. Traditional tool manufacturing can be a time-consuming and expensive process, requiring skilled labor and specialized equipment. In contrast, 3D printing allows for rapid iteration on tool designs and faster production of low-volume batches. This reduces overall lead times and enables manufacturers to react more quickly to changing market demands or product modifications. The choice of materials for 3D printed tools in stretch forming is crucial. While traditional tools are often made from steel or other high-strength metals, advancements in 3D printing technology have opened doors for the use of alternative materials. High-performance polymers, for example, can offer advantages like lower weight and the ability to conform slightly during forming, potentially reducing springback effects. Additionally, metal 3D printing techniques are under continuous development, offering the potential for creating strong and durable tools directly from metal powders. However, there are also challenges to consider when using 3D printed tools in stretch forming. The mechanical properties of 3D printed materials may not always be on par with traditionally machined metals, potentially limiting the tool's lifespan or formability of certain materials. Additionally, surface quality and dimensional accuracy of 3D printed parts can be a concern, depending on the specific technology and printing parameters used. Despite these challenges, 3D printing holds immense promise for revolutionizing the way tools are manufactured for stretch forming processes. By leveraging the design freedom, rapid prototyping capabilities, and potential for material innovation, 3D printing can contribute to faster lead times, lower costs, and ultimately, the production of higher quality formed parts.

Keywords: stretch forming, 3D printing, design flexibility, material innovation.

A.12. THE IMPACT OF DIGITALIZATION ON ENGINEERING EDUCATION: A COMPREHENSIVE ANALYSIS

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Abstract. Digitalization has revolutionized the field of engineering education, bringing about significant changes in teaching methodologies, curriculum design, and student learning outcomes. This paper provides a comprehensive analysis of the effects of digitalization on engineering education. It explores how digital technologies, such as online learning platforms, simulations, virtual laboratories, and collaborative tools, have transformed traditional classroom settings into dynamic and interactive learning environments. The paper also examines the challenges and opportunities associated with integrating digital tools into engineering education, including issues related to accessibility, equity, and pedagogical effectiveness. Furthermore, it discusses the role of digitalization in promoting interdisciplinary learning, fostering innovation, and preparing students for the demands of the digital age. Overall, this paper highlights the transformative impact of digitalization on engineering education and provides insights into future trends and directions in the field.

Keywords: digitalization, engineering education, innovation.

A.13. EXPERIMENTAL STUDY ON THE INFLUENCE OF PROCESS PARAMETERS ON SURFACE QUALITY IN EDM

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Abstract. In engineering, the multidisciplinary approach and the use of advanced technologies have transformed the way projects are conducted and innovative solutions are developed. EDM stands as one of the key technologies utilized in engineering, providing precise and efficient material processing capabilities. The purpose of the current paper is to analyze the influence of the process parameters (i.e. IP, TON and TOFF) on surface quality. From the analysis of the experimental results it was observed that increasing the current intensity IP has the effect of reducing the quality of the machined surface, using longer discharge times TON leads to improved surface roughness, and increasing the value of the time between discharges TOFF has the effect of improving the quality of the machined surface.

Keywords: electrical discharge machining (EDM), C120, copper electrode, process parameters, surface roughness, surface quality.

A.14. THE IMPORTANCE OF CRYOGENIC ASSISTED MILLING ON SURFACE QUALITY OF AEROSPACE ALLOYS

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Abstract. The aerospace sector requires fine finishing for the best performance and safety of aircraft components. Hence, cryogenic assisted milling has become an important technique in increasing the quality of aerospace components. Cryogenic milling method involves the use of very low temperatures, usually below −150°C, utilizing liquid nitrogen as a coolant. The very low temperature has several advantages compared to conventional milling. One such advantage is the reduction of tool wear, which results in the extension of tool life and a reduction in milling costs. In addition, cryogenic milling significantly enhances the surface finishing due to a decrease of surface roughness. At the same time, surface integrity improves, built-up edge minimizes, while dimensional accuracy of the machined part is raised. In aerospace manufacturing, this is very important since the tolerances are tight, and dimensions of machined parts need to be very precise. Additionally, cryogenic milling allows the machining of heat-sensitive materials, such as titanium alloys and composites, with minimal deformation due to heat. Traditional milling methods often have a destructive effect on the integrity of these materials, developing thermal deformation and residual stresses. Low temperatures reduce the thermal softening of the work piece material, which results in better chip formation and enhanced surface finish. At the same time, the cryogenic environment enhances chip brittleness, ensuring easier chip breakage and evacuation. This paper presents a literature review regarding the use of liquid nitrogen cooling in aerospace alloys milling.

Keywords: cryogenic milling, surface quality, residual stress.

A.15. INFLUENCE OF TEMPERATURE OF THE WORKPIECE PROCESSED BY MILLING ON SURFACE ROUGHNESS

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Abstract. The influence of temperature on surface roughness of materials processed by milling is a crucial aspect in the metalworking industry. Studies show that higher temperatures can lead to an increase of roughness due to the uneven expansion of the material and changes in cutting parameters when ferrous materials are used. In contrast, lower temperatures can reduce roughness, thanks to better chip evacuation and reduced tool wear. The aim of the present paper is to investigate the influence of different cutting parameters such as depth of cut (0.5 and 0.75 mm), cutting speed (314, 785, and 1099 m/min, respectively), and environmental conditions on roughness. The nonferrous material parts

were submerged in liquid nitrogen at -1500C for three hours before machining. Aluminum 7075-T6 was used to investigate the above presented aspects. From the results, it can be observed that in dry milling, the increase of cutting speed leads to a decrease of roughness value. The use of cryogenic cooling led to a decrease of roughness value.

Keywords: surface roughness, cryogenic milling, dry milling.

A.16. INFLUENCE OF MACHINING PARAMETERS ON PARTICLES EMISIONS DURING ELECTRICAL DISCHARGHE MACHINING

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Abstract. Electrical discharge machining (EDM) is a material processing technique primarily used in industry for producing parts with complex geometries and tight tolerances. However, this process can generate airborne particulate emissions, including fine particles with diameters of 2.5 micrometers or smaller (PM 2.5) and particles with diameters of 10 micrometers or smaller (PM10), which can lead to health and environmental risks. The aim of the present paper is to analyze the influence of process parameters on the types of particle emissions. Three types of electrodes, two types of workpiece materials, and three working times were used. The methodology of measurement was carried out according to the regulations of EN 12341:2023 normative. The detection was made in three areas: inside the machine, at 2 m distance from machine, and on the operator's shoulder in order to have an accurate response. From the results it can be observed that the values of PM 2.5 often exceeded the normal EN acceptance by up to 100 times. The conclusions of this study indicate that the optimization of machining conditions can contribute to reducing PM 2.5 and PM10 emissions during EDM. These findings are relevant to the manufacturing industry and can serve as a guide for implementing more sustainable practices in materials processing.

Keywords: EDM, PM 2.5, PM10, particle emissions.

A.17. INFLUENCE OF CUTTING PARAMETERS ON RESIDUAL STRESS DISTRIBUTION IN SURFACE LAYER

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Abstract. Milling is a crucial technique in metal processing, used to obtain complex shapes and precise surface finishes. Milling parameters such as spindle speed, feed rate, and depth of cut play a critical role in determining the quality and properties of parts produced by milling. The aim of this study is to investigate the distribution of residual stresses in the

surface layer of parts obtained by milling and how it is influenced by milling parameters. By controlling the machining parameters, a smooth finished surface, free from defects can be obtained, essential for applications in industries such as aerospace or medical. In addition to the advantages gained in the machining process, it is important to evaluate the effects of residual stresses on material behavior. Residual stresses can occur in the surface layer of the part as a result of the milling process and can influence fatigue strength, corrosion resistance, and subsequent part deformations. In order to observe the influence of cutting parameters on the residual stress distribution in the surface layer, two types of materials were used, an Al 6061T6 alloy and a magnesium 99% alloy. The results showed that the use of aluminum alloy that has a higher thermal conductivity (237 W/mK) than magnesium (156 W/mK) lead to a lower value of residual stress in surface layer. The increase of the cutting speed led to higher tensile values for both materials. In conclusion, this study highlights the importance of machining parameters in obtaining high-quality parts by milling and underscores their influence on the distribution of residual stresses in the surface layer of the machined parts. Understanding and properly controlling these parameters are crucial for improving the performance and durability of parts produced by milling.

Keywords: residual stress, milling, surface quality.

A.18. THE ROLE OF TECHNICAL EXPERTISE IN ESTABLISHING THE DETERMINING FACTORS IN THE OCCURRENCE OF CAR ACCIDENTS

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Abstract. Limiting the causes that lead to the occurrence of accidents on public roads is a topic of interest given the large number of road events that often result in the loss of human lives. We will analyze how a judicial or extrajudicial technical expertise in the field of road vehicles makes its contribution to clarifying the causes of accidents when there are several reasons and it is not possible to establish the one who had the decisive contribution in the conditions in which, as a rule, we are in the presence of a number of factors that can generate different consequences through the influence of a single parameter. The correct establishment of the dynamics of the accident has the role of finding and implementing solutions to avoid road accidents.

Keywords: technical expertise, road accidents, motor vehicles, accident production dynamics.

A.19. STUDY OF ELECTRODE WEAR IN ELECTRICAL DISCHARGE MACHINING OF STEEL ALLOYS

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Abstract. Electrical discharge machining offers the possibility to process hard and extra-hard materials with low machinability by conventional machining methods. The quality of the machined surfaces is strongly affected by the electrode and the parameters of the

machining regime. The physical properties of the electrode material have a great influence on material removal capacity, electrode wear, machining speed, machining accuracy and stability. The purpose of this paper is to present a study on the degree of electrode wear in the processing of steel alloys. The experiments have shown that the electrodes made of brass produced a lower material removal rate and increased wear rate combined with an uneven wear of the frontal surface.

Keywords: EDM, material removal rate, brass electrode, tool wear rate, shape wear.

A.20. PARTICULARITIES OF TITANIUM ALLOYS TURNING FOR AERONAUTICS INDUSTRY

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Abstract. Titanium alloys machining is characterized by a series of technical problems due to their specific properties. High corrosion resistance and optimum strength to weight ratio make titanium alloys an ideal choice for aeronautics and biomedical industries. However, the high hardness and adhesion tendency are real challenges, making machining quite difficult. Therefore, finding the optimum machining parameters, using the right tools, and choosing the appropriate cooling conditions are of maximum importance in achieving superior surface quality, high precision, increased tool life and good productivity.

Keywords: Titanium alloys, turning, cutting tools, cooling, machining parameters.

A.21. BIODEGRADABLE POLYMERS - ANALYSIS OF THE MECHANICAL AND THERMAL PROPERTIES

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Abstract. The rapid decline of fossil resources and the impact of global warming have created a significant demand for the conversion of biomass resources into biodegradable products, addressing both economic and environmental concerns. Given the significant role that plastics play in various aspects of our lives and their widespread use across different industries, it is imperative to prioritize the development of a new biodegradable material that is competitive in every aspect. In order to develop new goods using renewable resources, it is necessary to conduct a multidisciplinary research at an advanced technological level. In anticipation of this requirement, the German Fraunhofer Institute for Chemical Technology, in collaboration with Tecnaro GmbH Company, has conducted research and created a thermoplastic material called "liquid wood." This material, derived from natural resources such as wood components, is deformable when exposed to heat and can be processed using the same methods as traditional thermoplastics. "Liquid wood" is offered in three variations: ARBOFORM® Liquid wood, which is 100% biodegradable and made from lignin, organic additives, and natural fibers; ARBOBLEND® plastic composite with 80% biodegradability, consisting of biopolymers such as lignin, starch, natural resins, wax, and cellulose; and ARBOFILL® bio polymeric composite with 60% biodegradability, a compound composed

of polymers and natural fibers that resembles natural cork. Regarding biodegradation, "Liquid wood" has similar behavior to wood as it breaks down into water, humus, and carbon dioxide. This demonstrates its superior eco-friendliness compared to plastics, which release harmful fumes when burned. Furthermore, the creation of "Liquid wood" does not require additional deforestation since lignin is a byproduct of the pulp and paper industries. This paper presents the results of a study on the simulation of the injection process for "liquid wood", including an analysis of its mechanical properties (tensile strength, flexural strength, impact resistance, micro and nano indentation tests, tribological properties, Dynamic Mechanical Analysis, surface analysis, scratch analysis, and the influence of technological parameters on mechanical properties). Additionally, the paper examines the electrical properties of "liquid wood" (changes in electrical conductivity, electric permittivity, and breakthrough voltage), as well as thermal and microstructural analysis (Differential Scanning Calorimetry, Differential Thermal Analysis, Fourier Transform Infrared Spectroscopy, X-Ray Diffraction, Scanning Electron Microscopy, and Energy-dispersive X-ray Spectroscopy). Based on the results obtained, it can be stated that the biodegradable thermoplastics engineering materials employed have high quality and strength that fulfill the technological requirements. These materials successfully replace the dominant plastic in all areas of activity.

Keywords: biodegradable polymers, mechanical properties, thermal behavior, injection molding.

A.22. THE USE OF LINEAR DISCRIMINANT ANALYSIS TO DETERMINE PRODUCTION LOCATION OF FLAT STEEL SHEETS

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Abstract. Türkiye ranks 7th in world steel production with approximately 36 million tons of steel production per year and has a very important position. Domestically produced steel sheets have various advantages over imported ones, such as cost and availability. For this reason, knowing whether a steel sheet with the required features can be found domestically produced provides useful information for manufacturers. In this study, it is aimed to determine whether any steel sheet is produced in Türkiye by Linear Discriminant Analysis, using the yield stress, breaking stress, material thickness and roll width parameters of the steel sheet. For this purpose, data obtained from 4800 different steel sheets were used. 75% of this data was used to train the model, while the remaining 25% was used to test it. After testing the assumptions of the discriminant analysis, breaking stress and material thickness parameters were determined as discriminant features and a discriminant function was created as a result of the analysis by using the SPSS software. The classification success of the discriminant function on the test data has been found as 92.59%. Thus, linear discriminant analysis provides a serious advantage of accurate grouping with statistical methods.

Keywords: linear discriminant analysis, steel sheet production, classification.

A.23. STUDY ON THE MACHINING OF ALUMINIUM ALLOY

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Abstract. It is known that the notion of surface quality processed by machining is related to two aspects. The first of these is the dimensional accuracy that can be achieved and the second is the roughness of the machined surface. It is also known that when machining aluminium alloys there is a tendency to obtain a higher roughness when the silicon content of the aluminium alloy is higher. This is caused by the formation of deposits on the cutting tool edge. These aspects determine that there are relatively few studies regarding the machining of aluminium alloys type. However, we believe that as the use of aluminium alloys expands, the aspects related to the machining of these alloys become more and more important. In this paper, the roughness obtained after the milling process of an aluminium alloy type, under the conditions of the variation of the cutting speed and the feed per tooth. Machining was done on a Haas VF-1 milling machine with three numerically controlled axes and the roughness was determined by measuring it with a Mitutoyo SJ-210 roughness meter. Measurements were made for seven cutting speeds and eight values of feed per tooth, maintaining the depth of cut and using coolant. Through the determinations made, it was intended to establish the influence of the parameters of the cutting regime during milling processing of the previously mentioned material. The determination of influence was achieved by training and querying a neural network, using the experimental data obtained by measurement. The conclusions obtained through this study indicate that the main influence is the cutting speed.

Keywords: machining, roughness, aluminium alloys.

B. OPTIMIZATION OF TECHNOLOGIES AND EQUIPMENT FROM PROCESS INDUSTRIES

B.1. THE GEOMETRICAL STUDY OF A GRIPPING AND LIFTING SYSTEM FOR A MEDIUM MASS LOAD

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Abstract. This paper presents a study on the behaviour of a system for gripping and lifting a medium mass load. The study involves the geometrical analysis of the mechanism under investigation. Within the literature there are many studies of a mechanism, which is analysed by structural groups. What distinguishes this paper from previous studies is the way in which the analysis is carried out, i.e. the mechanism is studied as a whole. The study has resulted in a description of the movement of the components of the mechanism under analysis. In order to verify the correctness of the results, a simulation was carried out using the Linkage simulation software, and by comparing the results the correctness of the analysis was verified.

Keywords: gripping mechanism, motion analysis, Linkage.

B.2. INNOVATION RESEARCH BENCH FOR TESTING MEDICAL EQUIPMENT INTENDED FOR OXYGEN THERAPIES

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Abstract. The article investigates respiratory support systems in response to heightened interest in new oxygen therapies for people with breathing disabilities or respiratory failure. Researchers focused on delivering oxygen-enriched air while effectively removing virus-laden and carbon dioxide-rich air in patient ventilation systems using a non-invasive ventilation helmet. Various helmet designs were explored globally to address these challenges and improve patient comfort and safety. Collaborative efforts resulted in innovative solutions, including a design to reduce carbon dioxide concentration while limiting airflow. A specialized testing stand was also developed to assess gas flow within helmets, enabling comprehensive evaluation of respiratory support systems.

Keywords: gas flow, non-invasive ventilation helmet, respiratory support systems, airflow.

B.3. IDENTIFYING THE MOTION OF A CRUSHER DRIVE MECHANISM USING ROBERTS SIMULATION SOFTWARE

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Abstract. For the analysis of the movement of some components of mechanical parts, different types of software are used on a large scale to understand them. In this study, a mechanism used to drive the moving part of a jaw crusher was analysed. The analysis was carried out using Roberts software, a specialised program for the design and study of mechanisms. The study revealed the behaviour of the various components of the driving mechanism of the mobile jaw, in particular the linear speed of the free end of the jaw.

Keywords: drive mechanism, ROBERTS simulation program.

B.4. SOFTWARE TECHNOLOGY APPLIED IN MECHANISMS

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Abstract. This presentation shown one matrix method for assisted analyze of the Kinematics and Dynamics in Mechanisms by using the proper Virtual LabVIEW instrumentation. This purpose offers the possibility for applicants to choose the best controlling algorithm of the movement after were analyzed the results of positions, velocities, accelerations, forces and moments characteristics. The virtual simulation of them assures the best choose of the mechanisms's movements with the minimum variation of the m. By applying the pounder theory, were established the best behavior between all analyzed movement cases: simultaneously, successive, simultaneously after successive in the acceleration period, or simultaneously and successive in the deceleration period, or successive movements with time delay. Other goals of the research were to show all components of the used virtual instrumentation (VI) and the obtained results after the simulation work. For generality of the study, the proper LabVIEW VI -s contents the tab and case control of different types of mechanisms that it is usually and the mathematical matrix model for positions, velocities, accelerations, forces and moments. This analyze offers to researchers one virtual instrument what could be used to choose the best solution of the robot's, or of the movements type, or of one special controlling algorithm for one application.

Keywords: kinematics and dynamics in mechanisms, Virtual LabVIEW instrumentation, controlling algorithm.

B.5. STRESSES AND DEFORMATIONS IN THE SEMI-ELLIPSOIDAL LID OF A SATURATED VAPOUR STORAGE VESSEL

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Abstract. Steam accumulators are pressure vessels used to store energy at times of surplus to be released later when there is a demand for it (they relieve the steam load on boilers). In this paper we have evaluated the state of stresses and strains in the case of a steam accumulator vessel, positioned on saddle-type supports, in the semi-ellipsoidal lid-manhole junction area, considering its eccentric positioning and the demands at internal pressure and working temperature of 250 ^{o}C. The evaluation was done analytically and by the finite element method (analyzing two constructive situations, with and without a compensation ring).

Keywords: pressure vessels, stress, deformations, semi-ellipsoidal lid.

B.6. STUDY ON THE EXPERTISE OF PRESSURE VESSELS

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Abstract. The life extension of pressure vessel is carried out in accordance with legislative norms and ISCIR documents. The procedure for drawing up an expert opinion is initiated by the following steps: - analysing the condition of the equipment/facility and determining the necessary examinations and tests to be carried out; - drawing up the programme of investigations/examinations according to PT ISCIR provisions; - ISCIR acceptance of the investigation/examination programme; - carrying out non-destructive/destructive examinations and analysing the results obtained; - drawing up the strength calculation/verification brief and establishing the remaining life of the equipment/installation; - drawing up the (final) technical report with conclusions on the possibility of safe operation of the equipment/installation; - ISCIR acceptance of the (final) technical report. In addition to a summary of the main theoretical information required for pressure vessel expertise, the authors also present a case study.

Keywords: pressure vessel, technical expertise, case study.

B.7. LAYERS OBTAINED BY HYBRID METHODS OF THERMAL SPRAYING - USED IN THE CONSTRUCTION OF EQUIPMENT FOR PROCESS INDUSTRIES

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Abstract. Apparently easy to do, the wire arc spraying process is used in various applications such as: anti-corrosive deposits, wear resistance and dimensional restoration utilized in the construction of industrial equipment. The improving of the deposits properties, obtained by thermal arc spraying, can be achieved by using a combination of thermal spray device (CTSD) which represents a combination between the classic wire arc spraying and the flame spraying procedure. By using CTSD, the wire melting is performed in electric arc by the combustion of gaseous fuel - CH 4 and it is maintaining the temperature high of the sprayed particles along the driving jet. The new method allows the obtaining of deposits with improved properties compared to the classic procedure of electric arc spraying at relatively low costs. Overlapping the thermal effects of the two processes, that occurs when using CTSD, imposes the realization of an adequate optimization of the process. This paper has as main objective the optimization of process parameters, by investigations carried out on the deposits properties so that to obtain preformat steel deposits, with wear resistant and relatively minimal cost. The optimization method chosen to achieve the main objective was the Taguchi method, well known for the good reappearance of experiments concerned only with the main effects of design parameters.

Keywords: thermal spray, combination of thermal spray device.

B.8. CHOOSING THE APPROPRIATE TYPE OF MAINTENANCE STRATEGY FOR AN MECHANICAL EQUIPMENT

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Abstract. The present paper addresses the approach designed to achieve the objectives of maintenance. There are several maintenance strategy types, but there is not a single best strategy, since there are many variables that influence this choice. Maintenance cost, downtime cost, the effect of equipment failure on the production, equipment reliability, availability of spare parts, maintenance team experience, environmental impact and safety considerations are just a few of the important factors in choosing a maintenance strategy. In a few words, the best strategy is the one that helps equipment function safely, and without too many costs. A correct selection of the most appropriate strategy enhances working conditions, machine performance, operation flow, avoids stops and gaps in production, meets the production plans achieving the target quality of products. Selecting the optimum maintenance type is a challenging task that involves multiple criteria working together. There is number of steps in establishing the optimal strategy for a given equipment as: the review of the different types of maintenance strategies, the analysis of the variables concerning the equipment and the production, the choice of the strategy, the adjustment of the strategy to the specific case. The decision to use a certain maintenance strategy is dependent on several factors, including downtime cost, frequency, machine age and item

reliability. Therefore, the balance between cost-cutting and maximization of safety and reliability may differ from one case to another, based on their assets and goals.

Keywords: maintenance strategy, corrective maintenance, preventive maintenance.

B.9. STUDY REGARDING NONLINEAR CONTROL SYSTEM FOR DISTILLATION COLUMN

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Abstract. The most of the literature addresses the control of distillation columns using linear systems. This is justified by the fact that most real-world systems exhibit (almost) linear behaviour and by the significantly improved prospects available in the linear case. However, occasionally a problem is encountered where nonlinearities are so important that they cannot be ignored. This paper provides a brief presentation to nonlinear control. The purpose of the paper, is to provide some simple extensions of linear strategies that might allow a designer to begin to tackle a nonlinear problem. As far as possible, the authors rely on linear methods to take full advantage of existing linear knowledge.

Keywords: distillation column, control system, nonlinear control.

B.10. APPLICATION OF THE RISK-BASED INSPECTION (RBI) CONCEPT FOR THE EQUIPMENT AND SPECIFIC FACILITIES OF AN OIL PLATFORM

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Abstract. This paper addresses the application of the risk-based inspection (RBI) concept for specific equipment and installations of an oil platform located 16 km from the Midia-Năvodari petrochemical complex, off the Black Sea. This approach aims to present one of the most modern and innovative conceptual models that use a specific application procedure with significant benefits and superior performance on improving the safety, structural integrity and reliability of equipment and facilities on the studied site. The oil platform is of the "single jacket" type and is equipped with 12 storage units for the primary oil mixture. These units are connected to a single production stream, which includes the following process equipment and facilities: two separators (high and low pressure), gas cleaning unit, oil pumps, sand removal unit, process water unit and two submarine pipelines (gas and oil) connected to the onshore refinery. For such equipment, the risk-based inspection application procedure consists of 6 basic technical steps: preliminary analysis; data collection and validation; Risk Analysis; decision process / action plan; implementation and evaluation of effectiveness. Moreover, adopting an RBI strategy is absolutely essential, as it allows moving away from a one-size-fits-all approach to inspections, recognizing that not all components present equal risks. Through a thorough risk assessment, critical areas prone to corrosion, fatigue or other degradation mechanisms can be identified. This targeted approach ensures that inspections are focused on high-risk areas, optimizing resource utilization and

reducing unnecessary downtime. Moreover, the RBI strategy provides a systematic framework for assessing the probability and consequences of failures, allowing a more precise determination of inspection intervals. By aligning inspection frequency with actual risk levels, structural safety is enhanced and the life of the high pressure separator is maximized. This shift to risk-based inspection is not just a cost-cutting measure, but a strategic move toward proactive equipment management, allowing the root causes of potential failures to be addressed, preventative measures to be implemented, and equipment reliability and integrity to be improved. In the long term, this approach ensures a more sustainable and economically viable operation.

Keywords: inspection, process equipment, risk of failure, risk matrix, structural integrity.

B.11. ASSESSMENT USING CAESAR II PROGRAM, OF THE POTENTIAL OF A PIPELINE AFFECTED BY CORROSION, TO REMAIN IN OPERATION

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Abstract. Complex industrial projects must be carried out in such a way that the essential security requirements stipulated in the applicable directives are rigorously met. The design of pipeline systems as an integral part of industrial projects must satisfy the requirements regarding functionality, structural integrity, and operability of the system. Considered critical components in process industries, piping systems must be monitored throughout their use, considering the effect of corrosion on the safety of efficient and safe operation. The work analyzes the stresses and flexibility of a pipeline affected by corrosion within an existing installation on a marine platform in the Black Sea using the CAESAR II program, modifying the configuration of the location of the supports, considering the results obtained from displacement, stress, reaction and equipment nozzle analysis of the piping system, so that the occurrence of dangerous phenomena is avoided.

Keywords: piping systems, effect of corrosion, CAESAR II program.

B.12. OPTIMIZING METHODS FOR THE MIXING PROCESS IN FOOD PRODUCTION

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Abstract. Optimizing the food mixing process is crucial for achieving consistent quality and efficiency in food production. By carefully considering factors such as mixing time, speed, and technique, manufacturers can ensure even distribution of ingredients and uniform texture in their products. Utilizing advanced mixing equipment with programmable settings allows for precise control over the mixing process, minimizing variations and maximizing product yield. Additionally, incorporating automation and monitoring systems can help identify and address any issues in real-time, further enhancing overall efficiency and product quality. With continuous refinement and optimization, food producers can streamline their mixing operations to meet the demands of modern consumers while maintaining high standards of excellence.

Keywords: optimizing, mixing process, food industry.

B.13. WASTE HEAT RECOVERY FROM CAPSTONE C30 FLUE GAS IN RANKINE CYCLE WITH ORGANIC FLUID. PERFORMANCE AND ECONOMIC EVALUATION

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Abstract. Gas turbine represents a conventional solution for high and medium level power generation. Due to the significant advantages of the gas turbines compared to reciprocating engines (e.g. lower maintenance costs, higher reliability and possibility of adapting for operation with different fuels) the development of micro scale turbines – of hundreds of kW and even less – was always a challenge. Capstone is one of the companies producing microturbines of 15 kW to 200 kW, typically used in combined heat and power (CHP) applications. A Capstone C30 microturbine natural gas fueled is operating into the Cogeneration and Trigeneration Laboratory of "Gheorghe Asachi" Technical University of Iași. The microturbine is connected with a heat recovery hot water boiler. In this CHP configuration, the unit produces 30 kW of electric power and 57 kW of heat in rated conditions. The benefits of any CHP unit are only valid if the heat demand exists. Otherwise, the efficiency is significantly reduced making the unit unprofitable. Besides, the unit is environmentally unfriendly in power-only mode because the flue gas is released into the atmosphere with the temperature they have at the turbine exhaust. This is unacceptable according to environmental regulations. There are many situations when heat demand is missing and only power is required. Accordingly, the most interesting is the conversion of the flue gas waste heat into electricity and not into thermal energy. In this view, the solution of C30 microturbine waste heat recovery in an organic Rankine cycle is analyzed in the paper. The performance of the combined gas – organic fluid power system based on C30 microturbine are assessed in terms of output power, efficiency and specific fuel consumption. The fuel savings and fuel savings costs are also estimated.

Keywords: waste heat, microturbine, power, organic Rankine cycle, performance.

B.14. DEGRADATION PROCESSES AND REPAIR TECHNOLOGIES TO IMPROVE THE PV PANELS OPERATIONAL LIFESPAN

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Abstract. Increased energy demand, along with environmental concerns, triggered implementation of energy conversion from renewable resource - solar, wind, geothermal, hydro and biomass -, but their sustainability advantages (abundant, ecological, low-cost, independent of imports) are shadowed by inconsistency in supply, storage capabilities and long-term dependability. Since the implementation of such technologies, particularly solar PV conversion farms, started decades ago, it is important to assess the changes in overall capabilities of PV cells/panels after long operational time spans, to identify defects and damages, as well as to perform onsite repairs on damaged components. Two important activities were identified, prevention maintenance and damage repair processes (partial of full). The repair processes consist in several steps, including cleaning, pretreatment, crack filling and sealing. Assessment, testing and characterization processes included visual evaluation and experimental methods, such as, adhesion, scratch, hardness and insulation

testing, color measurements, light and infrared spectroscopy, electrical characterization, as well as natural or artificial weathering. The results of the analysis emphasized that from technical point of view, investigated repair solutions fulfilled the requirements of operational compatibility and applicability. In some instances, where the damages (cracks) are important, the repair processes are unsuitable and unit replacement is recommended.

Keywords: process assessment, photovoltaic panels, repair technologies, tests and measurements.

B.15. A NEW APPROACH ON SEALING WITH SOFT GASKETS AND PRE-SEAL

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Abstract. This paper provides a new approach of soft gasket and pre-seal. Soft gaskets and pre-seals are mainly used in pressure vessel sealing. If the wall, lid or bottom of such a vessel is traversed by a shaft, actuating rod or other part which would need to be rotated or translated, fluid leakage is prevented with soft packing and pre-seal devices. The operation of the sealing is based on the elastic properties of the packing, which when pressed in the axial direction of pressure will result in a radial deformation that produces another pressure. An analysis of the different types of sealing materials has been carried out, taking into account the elasticity and deformability, the resistance to the action of the sealed medium at regime parameters, the stability at high or low operating temperatures, on the condition that the mechanical characteristics are preserved, a low friction coefficient is ensured and the possibility of soaking with a lubricant that can be preserved for a long time. The analysis concluded that the preservation of the sealing during operation is conditioned by the maintenance of the physical-mechanical characteristics of the seal material, such as elasticity, high temperature and corrosion resistance.

Keywords: sealing, sealing materials, soft seals, pre-seal, pressure vessels, sealed medium.

B.16. CAD DESIGN AND WIND TUNNEL TESTS OF A PASSIVE FLOW CONTROL PART FOR IMPROVEMENT OF FLOW SEPARATION AND AERODYNAMIC DRAG FORCE ON A GROUND VEHICLE MODEL

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Abstract. In this study, a passive flow control part was designed to delay the flow separation and reduce the aerodynamic drag force on a ground vehicle model. The vehicle model is a 1/15 scale widely used example used in passenger transportation. The developed passive flow control part is a spoiler mounted in the vehicle roof area and is mounted in the upper and middle parts of the vehicle roof area. The base vehicle test and spoiler models were designed in the SolidWorks® program and produced in a 3-D printer. The spoiler was mounted on the vehicle roof area at 5% (L/H) of the vehicle height. The wind tunnel tests were conducted at four different free-flow speeds. The drag coefficient was improved by 3.93% in model 1 and 2.86% in model 2. Flow separation was delayed and decreased by this flow control part application. These drag reductions can decrease the fuel consumption of vehicle models by about 2% at high speeds.

Keywords: CD coefficient, drag force, CAD design, wind tunnel, aerodynamic, passive flow control.

B.17. MULTI-LAYER POLYETHYLENE FILM IN BALLISTIC PROTECTION AGAINST RIFLE AMMUNITION – NUMERICAL APPROACH

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Abstract. In this paper, the impact resistance of multi-layer composites was investigated. Every panel of the composite was made of an ultra-high molecular weight polyethylene film - Endumax FX23. Polyethylene fibers are about 10 times stronger than steel and have about 40% higher tensile strength than aramid fibers. These fibers are characterized by the highest strength to weight ratio, which makes them a great material for production ballistic protection measures and allows for weight reduction. The dimensions of each panel were 200 mm × 200 mm × 16.2 mm and the total weight of 78 g. During ballistic tests, the samples were fired with 7,62×51 mm Ball ammunition with an initial velocity of 850 ± 10 m/s in accordance with the CEN EN 1522 standard. Then, numerical simulations were carried out in the ABAQUS/Explicit dynamic simulation program. The geometric model of the bullet was developed in Inventor 2023, then implemented into the Abaqus program, where the material was modeled using the Johnson-Cook constitutive model. The composite was modeled in three ways: as a uniform panel, divided into 3 large layers that separated during firing and 24 layers that could be separated during panel observation. Ballistic tests, during which the samples were fired with the previously mentioned ammunition, resulted in a complete penetration of the sample's material system. Similar results were obtained during numerical tests, which indicates the correct trend performance of simulations in the ABAQUS/Explicit program.

Keywords: multilayer ballistic composites, impact loads, rifle ammunition, FEM simulations.

B.18. STUDY REGARDING THE OPTIMISATION OF MODERN HEATING SYSTEMS FOR INDOOR SPACES

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Abstract. At present, for energy producers as well as for domestic, industrial or public consumers, the problem is to reduce the energy consumption needed to heat indoor spaces, be they residential, commercial, public or industrial (warehouses, production halls, offices, etc.). The aim of this paper is to present the ways for energy consumption more efficient and to reduce heating costs during the cold season by optimizing the heating system. There are many good reasons to upgrade or make a heating system more efficient. But it is not only the age of the heating system and its efficiency that has an important role. Environmental aspects, heating costs and comfort are also important motivations. The paper aims to provide concrete solutions for reducing heating costs and adapting them to the needs and financial resources of the user, while respecting environmental aspects, in the case of certain types of heating systems.

Keywords: optimisation, heating systems, efficiency, costs.

B.19. SELECTION OF ROAD SECTIONS FOR TESTING THE HIGH MOBILITY WHEELED VEHICLE

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Abstract. Durability assessment of selected components of a high mobility wheeled vehicle is a complex and difficult task to be performed. In principle, simulation analysis carried out in a virtual environment, stand tests using devices that replicate road loads, and direct vehicle profile ground tests are used. Each of the aforementioned methods has its own strengths and weaknesses. In the case of profile ground tests, the loads are derived from the vehicle's motion and depend on the road profile, driving speed, vehicle load and driver's driving style, among other factors. Hints for modeling vehicle test conditions are included in the life cycle environmental profile (LCEP [1]). The paper presents selected considerations for the selection of road test sections and the determination of driving speeds in profile ground tests of high mobility wheeled vehicles.

Keywords: high mobility wheeled vehicle, durability, profile ground tests.

B.20. ASPECTS REGARDING THE WEAR OF DIAMOND DISCS WHEN GRINDING MINERAL MATERIALS

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Abstract. The main purpose of the work is to establish through experimental research the wear of superabrasive tools used in the processes of grinding of mineral materials (granite, basalt, marble). The experimental research carried out for the studied mineral materials was carried out on the RPO200-AKS plane grinding machine, processing time $\Delta t = 10$ minutes, using the diamond roughing disck with the specifications: 1A1-200-10-3 D126 M75 H76, with a regime of dry cutting (no cooling-lubricating fluid), with cutting parameters: v = 31 m/s, f l = 4.08 m/min, a p = 0.03 mm. The paper presents aspects of the mass wear of the diamond disc used in the grinding process. Considering the values obtained through experimental determinations for the productivity of rectification Q [g/min] and according to the criterion of wear of the cutting tool for the investigated mineral materials, it was found that the productivity of rectification Q [g/min] is higher for marble followed by basalt and granite.

Keywords: ratio of grinding G, the percentage of wear φ, the productivity of the grinding Q [g/min].

B.21. APPLICATIONS OF BIHARMONIC MAPS IN MATERIALS SCIENCE

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Abstract. Biharmonic maps can be used in materials science to model and understand how different materials react in various conditions. They can be used to model elasticity as engineers did when the Bosphorus Bridge was constructed, or to model deformation and stress distribution for materials that are subject to external forces. This is essential in the evaluation of the structure of the materials to detect their defects, thus allowing the adjustment of the composition so that they are stronger and more durable.

Keywords: Biharmonic maps, spherical maps, materials science.

B.22. CONSTRUCTIVE DESIGN ELEMENTS OF SMALL DIMENSION CYCLONES – CYCLONETTES

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Abstract. The present study is dedicated to the verification of the geometry of small size cyclones - cyclonettes, used for the purification of dry industrial gases. The analysis presented can also be used to design the geometry of such a construction. The simplifying calculation assumptions and expressions specific to the quantitative assessment of stress states are specified. By comparison with the bearing capacity of the construction materials, the dimensions adopted in the initial phase are accepted or adapted. In this context, the plate for fixing the cleaned gas exhaust tube and the outer body of the cyclone is considered small. The constructive variant allows the possibility to accept the mutual influence of the marginal loads of the flat plate, in the fixing areas with the indicated components.

Keywords: small scale cyclones strain and stress states.

B.23. STUDIES AND RESEARCH ON HOW TO DETERMINE SPECIFIC MATHEMATICAL MODELS OF THE CUTTING PROCESS

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Abstract. Products of vegetable origin are characterized by a very wide range of textures that require processing by different methods, with different types of working devices to ensure their optimal processing. The study aims to identify a general equation specific to the shredding process, i.e. the cutting of hard-textured products processed by the torque method. After analysing the set of equations generated by the Table Curve 3D program using the specific method of filtering them, it was possible to identify an equation that characterises the cutting process.

Keywords: shredding, process, hard| texture, equation.

C. OPTIMIZATION IN ENVIRONMENTAL ENGINEERING AND ENVIRONMENTAL PROTECTION

C.1. TRANSLOCATION OF HEAVY METALS FROM SOILS IN INDUSTRIAL AREAS INTO PLANT SPECIES - BELONGING TO THE TYPHACEAE FAMILY

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Abstract. The main objective of the present research is to determine the translocation of heavy metals (Ni, Cr, Hg) from soils in industrial areas to plant species - belonging to the Typhaceae family i.e. the plant species Typha Latifolia. The heavy metal content of the soils at the study sites was highly variable, an indication of historical industrial pollution. Metal accumulation in aquatic plants depends on a number of factors, including the concentration of a metal and its availability in the substrate, physical and chemical characteristics of the water and sediment, species-specific uptake, plant growth requirements, time of sampling and the process of translocation within plants. Translocation coefficients were calculated as a ratio of total metal concentration in aerial parts (stems, leaves and flowers) to root metal concentration. The translocation of heavy metals from the root of the plant species Typha Latifolia to the upper aerial part of the plant was of the form Hg > Ni > Cr. According to the average values obtained for the coefficient translocation, capacity of heavy metals from soil in to the plant specie Typha Latifolia, it can be stated that the plant species Typha Latifolia is very suitable for use in the process of soil remediation by phytoextraction.

Keywords: translocation, heavy metals, Typha Latifolia

C.2 HEXANARY CO-FE-NI-MN-ZN-CU SINGLE SPINEL PHASE AS COMPLEX HETEROSTRUCTURED MAGNETIC NANOMATERIAL FOR PHOTOCATALYTIC WATER SPLITTING

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Abstract: In recent years the field of entropy nanomaterials, originally focused on alloys [1] and subsequently extending to other categories, including oxides [2] and nitrides [3], has experienced significant growth. While all the pioneering works performed have demonstrated the comprehensive examination of experimental parameters in the synthetic methods employed to produce highly active photocatalysts, the influence of a high number of metal/cations on the photocatalytic oxygen evolution performance of the final complex heterostructured nanomaterial remains largely unexplored. In this research, we reported on the synthesis and physico-chemical characterization of single spinel oxide phase consisting of six different metallic cations Co-Fe-Ni-Mn-Zn-Cu. Most of the synthetic techniques require elevated temperatures and prolonged durations, typically resulting in limited yields of desired samples with high phase-purity. Herein, a fast and low-temperature synthetic alternative is demonstrated for the preparation of a wide range of multinary metallic cation acommodating the spinel crystal phase. Synergistic interactions among various metal cations

within the crystal lattice have proven advantageous outcomes in the photocatalytic water splitting applications. Structural, morphological, optical and magnetic properties of the synthesized samples were comprehensively assessed through a vast variety of complementary characterization techniques such as powder X-ray diffraction analysis (XRD), field-emission scanning electron microscopy (FE-SEM), ultra high-resolution transmission electron microscopy (UHR-TEM) and X-ray photoelectron spectroscopy (XPS). Additionally, the magnetic properties were determined by vibrating sample magnetometry (VSM). This comprehensive approach facilitated a thorough understanding of the properties of the synthesized materials, essential for elucidating their potential applications in photocatalytic water splitting.

Keywords: entropy nanomaterials, spinel oxide phase, magnetic properties, photocatalytic water splitting.

C.3. DEVELOPMENT OF ALIOVALENT DOPED SRTIO3 ADSORBENT FOR CONGO RED REMOVAL: IMPACT OF DYE CONCENTRATION

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Abstract. The dyes from different industries (e.g., textile and paper sectors) represent the most frequent pollutants from wastewaters [1]. A category of dyes with negative impact on environment and human healts is Congo red, an azo dye type [2]. Therefore, the removal of this dye pollutant is necessary [3]. Ibrahim and co-workers [4] pointed out that the azo dyes show a high resistance to degradation so, the adsorption technique is recommended in order to remove this type of pollutant from wastewaters. In the present work, through a facile method, a material based on doped SrTiO 3 has been developed and tested as potential adsorbent for Congo red dye removal. The capacity of doped $SrTiO_3$ as adsorbent was investigated as a function of different initial dye concentration (10 – 100 mg/L). Before experiments, the synthesized material was characterized by SEM and EDX analysis, the results showing that the synthesis was succesfully performed. For the adsorption tests a quantity of 10 mg ads was mixed with 20 ml sol for 24 hrs. of contact time at room temperature. Further, the results were fitted by different isotherm models (Langmuir, Freundlich, Temkin), the adsorption isotherm parameters being established. According to data obtained, doped $SrTiO_3$ material can be apply as adsorbent for Congo red dye removal.

Keywords: Aliovalent doped $SrTiO_3$, Azo-dye, Isotherms, Water treatment.

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C.4 CONTRIBUTION OF MULTIVARIATE ANALYSIS AND GEOSTATISTICS TO THE STUDY OF THE PHYSICOCHEMICAL AND METALLIC QUALITY OF THE WATERS FROM THE LAKE TOGO-LAGOON OF ANÉHO COMPLEX (SOUTH EAST OF TOGO)

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Abstract. The Lake Togo-Lagoon of Aného complex is located in a watershed where phosphate mining takes place. This activity generates various types of waste that are dumped in nature without prior treatment. In addition, we are witnessing the contributions of its tributaries after leaching of agricultural and urban soils. This contributes to the degradation of the water quality of this ecosystem. Thus, this study aims to evaluate the physicochemical and metallic quality of these waters. For this, 60 water samples were taken in two campaigns. Physicochemical parameters were measured according to French standards (AFNOR). The trace elements were determined using an Atomic Absorption Spectrometer coupled to a hydride and cold vapor generator. The spatial distribution was evaluated using the Ordinary Kriging Interpolation method of ArcGIS 10.2.2 software. The results showed that these waters were very mineralized with an average conductivity of 15.51 mS/cm. The average contents (in µg/l) in trace elements are 31.96 for Cd, 141.63 for Pb, 133.02 for Cr, 83.28 for Ni, 85.12 for Cu, 2.46 for As, 19.63 for Zn and 28.75 for Mn. The average levels of Cd, Pb, Cr and Ni were significantly higher than the WHO standards. Trace elements and physicochemical parameters showed strong spatial variations over the entire water body with the highest values recorded downstream of the hydrosystem for most variables. This lagoon complex therefore deserves special attention in order to better plan its management.

Keywords: water, trace elements, PCA, geostatistics, contamination, Lake Togo, Aného.

C.5. CHEMICAL COMPOSITION (NUTRIENTS AND XENOBIOTICS) OF RHYNCOPHORUS PHOENICIS (FABRICIUS, 1801) (CURCULIONIDAE) AND ORYCTES MONOCEROS (OLIVIER, 1789) (SCARABAEIDAE), TWO COLEOPTERA CONSUMED IN TOGO

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Abstract. Rhyncophorus phoenicis (Fabricius, 1801) (Curculionidae) and Oryctes monoceros (Olivier, 1789) (Scarabaeidae) are two insects generally known as formidable oilseed pests. Although little known, different developmental stages of these insects are consumed in tropical regions. Chemical analyses were carried out on adults of both species collected in Togo, to highlight their nutritional quality. Protein content ranged from 44.3 to 45.89%. Lipid extraction rates fluctuated between 14.64 and 15.06%. These insects are therefore high-energy foods, with calorific values ranging from 1543.99 to 1563.11 KJ/100g. The lipids of both species are rich in unsaturated fatty acids, notably oleic acid, a

monounsaturated fatty acid whose content varies from 42.22 to 44.23%. The polyunsaturated fatty acid content of these lipids is relatively low. Linoleic acid content ranges from 2.61 to 2.62%. Linolenic acid content was 0.52% for O. monoceros et R. phoenicis. As for the mineral composition of the species studied, they are very rich in magnesium, calcium, phosphorus, potassium, iron, zinc, sodium, copper and manganese. The mineral contents of these two species are not statistically different. Furthermore, the insect species studied do not contain heavy metals such as cadmium and lead. Although little known, different developmental stages of these insects are consumed in tropical regions. Chemical analyses were carried out on adults of both species collected in Togo, to highlight their nutritional quality. Protein content ranged from 44.3 to 45.89%. Lipid extraction rates fluctuated between 14.64 and 15.06%. These insects are therefore high-energy foods, with calorific values ranging from 1543.99 to 1563.11 KJ/100g. The lipids of both species are rich in unsaturated fatty acids, notably oleic acid, a monounsaturated fatty acid whose content varies from 42.22 to 44.23%. The polyunsaturated fatty acid content of these lipids is relatively low. Linoleic acid content ranges from 2.61 to 2.62%. Linolenic acid content was 0.52% for O. monoceros et R. phoenicis . As for the mineral composition of the species studied, they are very rich in magnesium, calcium, phosphorus, potassium, iron, zinc, sodium, copper and manganese. The mineral contents of these two species are not statistically different. Furthermore, the insect species studied do not contain heavy metals such as cadmium and lead. The average nickel content of these species ranged from 0.0209 to 0.0767 mg/kg. Arsenic levels ranged from 0.0364 to 0.0073 mg/kg. As for pesticides, diuron was found in O. monoceros and permethrin in R phoenicis. In all cases, the levels of xenobiotics found in these species were low compared with the norms. The study highlighted the nutritional potential of both coleoptera species. These species can therefore make a significant contribution to combating protein-energy and micronutrient malnutrition in Togo and sub-Saharan Africa.

Keywords: rhynchophorus phoenicis, oryctes monoceros, nutrients, xenobiotics, Togo.

C.6. DETECTING AND REGULATING PFSA CONTAMINATION IN WATER: ADVANCEMENTS IN LC-MS/MS METHODOLOGY

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Abstract. PFAS are a group of synthetic compounds composed of carbon and fluorine atoms linked in a chain, widely used in the production of various industrial and household goods. They are classified into polymer and non-polymer PFAS, with the non-polymer ones further categorized as perfluoroalkyl carboxylates (PFCA) and perfluoroalkyl sulfonates (PFSA). PFAS have raised concerns due to their presence in the environment and the potential health risks they pose. Recent regulations aim to restrict and monitor the levels of PFAS in drinking water, with EPA proposing MCLs for six PFAS including PFOA and PFOS. The EU and various countries have also implemented restrictions on PFAS, highlighting the global concern over these substances. To meet the new requirements imposed by the current legislation, a newly developed LC-MS/MS method for the detection of PFAS in water samples has shown promising results, with detection limits ranging from ultra-trace levels for drinking water to low ng/L levels for surface water and wastewater. The method has proven effective in isolating and concentrating the target analytes from water matrices. This study contributes to the ongoing efforts to monitor and regulate PFAS contamination in water sources, showcasing the importance of addressing these emerging contaminants for environmental and public health protection.

Keywords: PFSA, drinking water, LC-MS/MS, contamination, regulation.

C.7. BIOCHEMICAL RESPONSE - A USEFUL TOOL FOR ASSESSING THE EFFECTS OF SOME PETROLEUM PRODUCTS ON WHEAT (TRITICUM AESTIVUM)

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Abstract. One of the biggest problems facing humanity today is environmental pollution. The pollutant can enter in the soil by various ways, such as: leaks from storage containers, faulty fueling of vehicles or wrong handling by working staff. However, one of the most common ways of polluting the soil is oil tanker breakdowns. Although environmental contamination with oil derivatives has been intensively studied, we believe that this niche must be explored much more. In this context, this study aims to investigate the effects of four types of petroleum products (various types of diesel and mineral oils) on the enzymatic activity of common wheat (Triticum aestivum) tissues, as well as its biochemical response to the action of oxidative stress. For this purpose, various spectrophotometric methods and techniques were used in order to determine the activity of some enzymes of major importance for vegetable organisms, such as: ascorbate oxidase (AO; EC 1.10.3.3), peroxidases (POX; EC 1.11.1.7) and polyphenol oxidases (PPOX , EC 1.3.3.4) or for studying the oxidative degradation of lipids by determining the degree of formation of malondialdehyde (MDA). In the case of MDA, for example, the presence of both types of diesel, considered in this study, in the soil (0.001%, the minimum concentration in this study) causes a significant increase of malonic dialdehyde, by more than 430%, while for a concentration of 1% the increase in aldehyde is much lower (140%). This shows that oxidative degradation of lipids is the dominant process at the minimum concentration of the pollutant. The results of this study demonstrated that the presence of these pollutants in the soil caused oxidative stress to wheat, leading to a significant increase in enzyme activity, or, on the contrary, to a total inhibition of it, depending on the concentration of the pollutant (0.001%, 0.01 %, 0.1% and 1%, respectively). Since diesels are much less viscous compared to motor oils, they infiltrate the soil with less difficulty, reaching the roots much faster and being absorbed much more easily at their level. On the other hand, the high degree of viscosity of the oils makes it difficult for them to infiltrate into the soil and be absorbed by the roots.

Keywords: bioindicator, AO, POX, PPOX, MDA, pollutant, diesel, oils.

C.8. MATHEMATICAL OPTIMIZATION METHODS FOR THE TREATMENT OF DOMESTIC WASTEWATER USING THE BSM-2 TYPE MODEL - TWO-DIMENSIONAL POLYNOMIAL APPROACH WITH MIXED TERMS AND THE VALIDATION OF THE OBTAINED MODELS

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Abstract. The domestic wastewater treatment process can benefit from mathematical methods to optimize efficiency and costs. The BSM-2 type model is a tool used for the simulation and analysis of biological treatment processes. The main mathematical methods relevant to the optimization of this process are: - Linear programming (PL): This method focuses on the maximization or minimization of an objective function, subject to linear restrictions; Nonlinear Programming (NLP): is applied when the objective function or constraints are not linear; Genetic Algorithms (GAs) are inspired by the processes of natural

selection and evolution; Method of Gradient (MG): MG is used to find the minimum or maximum points of a function; Monte Carlo Method – this method involves simulating a large number of random scenarios to estimate outcomes; Multi-objective optimization (OMO) is method focuses on finding solutions that balance multiple objectives (e.g., process efficiency, cost, and environmental impact); Regression methods and sensitivity analysis which can be used to identify relationships between process variables and to assess the impact of changes on performance. The studied method by our team is based on an innovative algorithm, using the MAPLE programming environment. The BSM-2 type model with two loops was considered, having as input parameters SN ref and respectively QCarb and as output parameter - SNH and the respective function of energy cost type - EQI. This study is important based on the purpose of integrating these mathematical methods into the BSM-2 model in order to adjust the process parameters to achieve an efficient and sustainable purification of domestic wastewater. A number of the 4 solutions obtained through a recurrent approach as well as the evaluation method are presented.

Keywords: wastewater treatment process, mathematical optimization methods.

C.9. THE MICROCLIMATE OF RESIDENTIAL BUILDINGS: CASE STUDY

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Abstract. When building a residential construction, e.g. a block a flats, the builders must take into account not only the type and stability of the soil, but also the surroundings and the local atmospheric parameters, such as air temperature, wind and humidity, both for the comfort of the future inhabitants, but also for the `health` of the building, i.e. the resistance of the materials in time. But both the building developers and constructors, and even more so, the inhabitants, must take into account that the new building will influence the surroundings in many ways, including the local atmospheric parameters, i.e. the microclimate. Thus, depending on the materials used for construction, on the position of the building with respect to the cardinal points and the surrounding environment, depending on the height of the construction and even on the number of inhabitants, the local atmospheric conditions can change significantly after building the block and also, different flats can present rather significant differences in terms of comfort as related to air temperature, sun exposure, air humidity and wind, which leads even to significant cost differences and selectivity on the real estate market. This paper presents a study of the most relevant atmospheric parameters around a block of flats within a medium-size town in Romania, namely Galati. The study was carried out along three months and comprised different floors and positions around the block, along with the park and the boulevard nearby, for comparison. All the investigated atmospheric parameters varied significantly with both location, month and time of the day, i.e. early in the morning as compared to noon. Local vegetation and urban traffic were found to definitely influence the microclimate.

Keywords: buildings, microclimate, temperature, humidity, wind speed.

C.10. PARTICULATE MATTER AIR POLLUTION IN ROMANIA: SPATIO-TEMPORAL EVOLUTION AND SOURCES

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Abstract. In recent years, air quality in Europe has improved considerably. However, there are still atmospheric pollutants that are found in high concentration, affecting the health of the population, especially in urban areas. Particulate matter (PM) in the air close to ground level are currently recognized as one of the three pollutants that most seriously affect human health. In 2023, according to the World Health Organization (WHO), the average PM2.5 concentration in Romania exceeded 3.1 times the WHO annual air quality guideline value. The objective of this paper was to study the spatial and temporal evolution of PM 2.5 and PM10 in Romania, as well as the contribution brought by various anthropogenic sources to the emission of these particles into the atmosphere. Several databases were used for this study: the dataset from OECD (The Organization for Economic Co-operation and Development), the National Air Quality Monitoring Network database and the European Environment Agency database. The PM2.5 and PM10 inventories are divided according to the production and consumption processes. The spatial variation of particulate matter on the Romanian territory was studied between 2018 and 2023. In 2022 and 2023, the most polluted cities in Romania were Santana de Mures, Ojdula and Cluj. The ranking was based on the annual average PM2.5 concentration (μg/m³). In 2022 and 2023, the cities of Galati and Braila had very good air quality, with a concentration between 8.5 and 7 μg/m³, based on the annual average PM2.5 concentration. Unfortunately, the declared values for the city of Galati come from only one station out of the four existing in the city within the national air quality network. The same situation occurs in other cities. Therefore, separate measurements of PM2.5 and PM10 concentrations were made over 11 points in Galati. One of these points was chosen at the GL2 station itself. Statistically significant differences appear between the officially-declared concentration values at this station and the measured values. Correlation coefficients were calculated to quantify the influence of some meteorological factors on the PM concentrations in the atmosphere. The t-test was run to study diurnal variations. The ANOVA method and Tukey's HSD were used for spatial variation.

Keywords: particulate matter, sources contribution, dynamics of PMs.

C.11. EVALUATION OF THE MUNICIPAL WASTE MANAGEMENT SYSTEM IN VIEW OF THE PERCEPTION OF THE POPULATION

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Abstract. This article presents some of the results of a study to identify the level of public information on the waste management system. The study was carried out in the period 12 Dec. 2022 and 14 Jan. 2023 and is specific to the Serbănesti district of Bacău. Data were obtained from a questionnaire that was distributed online and contained a total of 20 questions. A small part of the questions aimed at obtaining information on those who participated in filling in the questionnaire, but the majority aimed at obtaining information from the population on the waste management system. After processing the data generated

by the 191 respondents it could be concluded that 54% think that the information activity is good, however they think that the current management system needs to be improved.

Keywords: level of information, management system, online questionnaire.

C.12. STUDIES REGARDING THE EXPLOITATION OF ARONIA MELANOCARPA SPECIES, IN ECOLOGICAL AGRICULTURAL HOLDINGS

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Abstract. Black chokeberry (Aronia melanocarpa), is a fruit-bearing deciduous shrub of the Rosaceae family, originating in North America. It is not sensitive to environmental factors, tolerates many climates and soils, and does not require chemical protection against pathogens or pests. The plant is in the form of a bush with 5-8 stems grown from the crown area or headed with a trunk (monotulpine) of 40-50 cm and a crown formed of 4-5 skeleton stems on which annual shoots grow, reaching a height of about 1.5-2 m. In Eastern Europe and Germany, Aronia is cultivated as a decorative and secondarily medicinal plant because of the wide range of uses of the antioxidant and anthocyanin-rich fruit, but also because of the plant's fertility: one plant produces many fruits. A mature shrub produces 17-38 kg of fruits, the average lifespan being 20 years. It is intensively cultivated and grows well at all temperatures even in cold areas. Black chokeberry can withstand the climatic and soil conditions in Romania and can be grown organically, being classified as a plant of the future, providing a source of income for those wishing to work in organic farming. The present study refers to the black chokeberry organic crop, established in 2019 in Bacau county, Garleni commune. The average productivity of the plantation in fruit bearing was 5.6 kg fruit/plant. Monitoring biological and productivity indicators, directly influenced by environmental factors are some of our ongoing objectives.

Keywords: Aronia (Black chokeberry), organic farming| productivity.

C.13. INFLUENCE OF BIOFERTILIZERS IN THE GERMINATION OF SEEDS AND THE DEVELOPMENT OF BELL PEPPER SEEDLINGS (CAPSICUM ANNUUM L.)

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Abstract. The aim of this study is to analyze the influence of bacterial communities in the rhizosphere on the processes of seed germination and the development of bell pepper seedlings up to the seedling stage. For the experiment, bell pepper seeds from the Dariana

Bac variety of SCDL Bacau and rhizospheric bacteria from the Groundfix product with bioferilizing value (Healtyland, Germany) were used. This product contains a mixture of bacteria (0.5 – 1.5)×10 9 UFC/cm^3: Bacillus subtilis, Bacillus megaterium var. phosphaticum, Azotobacter chroococcum, Enterobacter, Paenibacillus polymyxa. The experiments were carried out both in laboratory conditions and in greenhouse conditions, using different concentrations of biofertilizer for both seeds and soil. The first observations showed a better branching of the radicle and a greater vigor of the hypocotyl in the samples that had contact with rhizospheric bacterial communities. The biometric measurements performed on the seedlings showed a more vigorous stem and a better branching of the root, than the control sample. After transplanting the germinated seeds, all seedlings were viable and resisted the action of Phytium spp.

Keywords: biofertilizer, germination, biometric measurements.

C.14. PERCEPTIONS AND PRIORITIES IN SUSTAINABLE DEVELOPMENT: AN ANALYSIS OF PUBLIC OPINION IN BACAU COUNTY

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Abstract. Sustainable development is a fundamental concept in the current context of environmental preservation and ensuring optimal quality of life for future generations. This concept entails meeting present needs without compromising the ability of future generations to meet their own needs. Over the past few decades, sustainable development has emerged as a priority goal globally, becoming an imperative necessity in the face of challenges such as climate change, environmental degradation, and depletion of natural resources. In this context, strategies and policies for sustainable development aim to promote a balance between economic, social, and environmental aspects, to ensure a prosperous and equitable future for all. Sustainable transformation requires society to change its development pathways to maintain ecological integrity and ensure basic human needs over several generations. In the context of climate change and its vulnerability, sustainable development solutions are essential. The Sustainable Development Goals (SDGs), known as derived from the 2030 Agenda, set a new development agenda, emphasizing articulated long-term solutions and social inclusion, recognizing the importance of women in achieving sustainable development. The SDGs represent a global effort to address current and future challenges, including ending extreme poverty, ensuring food security and safe drinking water, and promoting clean energy and sustainable economic growth. Sustainable urban development is one of the major challenges of today's world, and resource-based cities face complex dilemmas due to their special characteristics. This study proposes a research framework for the sustainable development of resource-based cities with the Sustainable Development Goals at its core. By investigating the impact of people's adaptation and response to environmental risks, their preferences for sustainable development strategies and the circular economy, it seeks to promote a harmonious approach between development and the environment. Financial development and geopolitical risks also play a significant role in the path to sustainable development. By deepening the link between financial development, environmental innovation and sustainable development, the impact of geopolitical risks on the sustainable development process can be examined. An integrated approach to the Sustainable Development Goals and the concept of sustainable development is key to effectively managing climate change and other major challenges of the 21st century.

Keywords: sustainable development, public opinion, implementation, Sustainable Development Goals (SDGs).

C.15. LONG RANGE TRANSPORT ANALYSIS BASED ON EASTERN ATMOSPHERIC CIRCULATION AND ITS IMPACT TO THE DUST EVENT OVER ECOTOXICITY ASSESSMENT OF SOME BIOFERTILIZERS USED IN ORGANIC FARMING BY TEST ORGANISMS

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Abstract. In today's context when the population's demand for food is increasing and its quality is becoming problematic due to the inputs used in agriculture, the use of effective methods for detecting and monitoring pollutants has become necessary. One of the objectives of OECD (Organisation for Economic Co-operation and Development) is to standardize effective methods for detecting the ecotoxicity of products used in organic farming. Thus, the use of test organisms is effective instruments for assessing the behavior of living organisms against different categories of fertilizers, insecticides, pesticides etc. used in agriculture. The present work examines the behavior of Folsomia candida test organism, promoted by OECD 232 against the Groundfix biofertilizer (Healtyland, Germany). The researches carried out under laboratory conditions aim to assess the degree of acute and chronic toxicity, evaluated after 28 days. Thus, the methodology applied in the present study can be an effective criterion in the choice of products used in organic farming.

Keywords: biofertilizers, ecotoxicity, test organism, OECD.

C.16. NEW ASPECTS ON TEXTILE REACTIVE DYE REMOVAL USING BIOCHAR-BASED ADSORBENT

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Abstract. This research work presents the main results of a preliminary adsorption study which use a cheap and easy to prepare 'non-conventional' and 'low cost' material consisting in the solid product (biochar) obtained after the rapid pyrolysis (300 °C) of freshwater algal (Spirogyra) biomass, for removal of residual Remazol Rosso RB dye from aqueous solutions, or simulated dye-containing effluents. The obtained results underlined the high adsorption capacity of tested material (biochar) to remove the residual dye from aqueous solutions in static regime and proposed the adequate variation fields of all operating variables, i.e. initial pH, biosorbent dose, dye concentration, contact time and temperature. The highest values of dye and color removals from aqueous solutions with around 50 mg/L dye content were of 83.03-90.31% dye and 65.17-65.18% color, working (up to 8 h, or 20 h) with 15.88-23.36 g/L of prepared adsorbent (biochar), at room temperature (22±3 °C) and pH 3-4. These findings indicate the possibility to use the pyrolyzed algal biomass (biochar) as an alternative adsorbent due to its beneficial action in removal of color and dye from aqueous systems.

Keywords: adsorption, sorption, biosorption, discoloration, process operating variables, pyrolyzed biomass, Remazol Rosso RB dye removal, residual Spirogyra green algae.

C.17. APPLICATION OF COMMERCIAL HYBRID FLOCCULANTS IN TEXTILE WASTEWATER TREATMENT

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Abstract. This research work presents the main results of a preliminary coagulation-flocculation treatment step applied in the case of synthetic textile wastewater for removal of turbidity (fine solids) and color working with hybrid materials. The study discusses the principal influence of certain process operating variables on the treatment efficiency such as pH, dye concentration, coagulant, and flocculant concentration, stirring time and rate, operating temperature, wastewater flow and operating regime. The jar tests were performed in one, two and multiple stirring steps dependent of the number and type of coagulants and flocculants used. Usually, the use of hybrid materials permits one single stirring rate at lower value (CETTA CLEAR eco-flocculants, etc.) (20-40 ppm) and those reported in the scientific literature is encouraging and permits textile WW discoloration, dye and turbidity removals higher than 70% under the optimal process operating parameters.

Keywords: coagulation-flocculation, dye, color and turbidity removal, synthetic textile wastewater.

C.18. STRATEGIES FOR SUSTAINABLE ECONOMY IN OPTIMIZING THE PROCESSES FOR REMOVAL OF THE CBO_5, CCO-CR AND MTS FROM THE USED WATER

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Abstract. According to the definition in the Water Law, the used water is the water used for home and industrial use, and which changed its initial chemical composition or physical properties due to the added impurities resulted from its usage. The water will contain pollution agents resulted either from its use by the human population for various activities, or from the interaction of the meteoric water (rain, snow) with products of the human activity which reside in the air or soil. The current research proposes to analyze and evaluate the impact of the Ferric Chloride in the wastewater purification process that uses biologic agents, focusing on the efficiency of the ellimination of various pollutants. Among the pollutants which have significant impact on the quality of the water, there are organic compounds like CBO_5, CCO-Cr and MTS. In this study we analyzed the efficiency of the Ferric Chloride (40% concentation) in the reduction of the pollutants concentrations, like CBO_5, CCO-Cr and MTS, targeting the optimization of the water purification process, and minimizing the environmental impact through the quality improvement of the purified water. Using mathematical modeling of the obtained results, the research identifies several opportunities for innovative strategies applicable in the sustainable economy, and, at the same time, it contributes to the optimization and improvement of the purification processes, and to the reduction of the environmental impact of the pollutants.

Keywords: reduction of environmental impact, technological process, mathematical modeling.

C.19. THE SYNOPTIC CONTEXT OF SAHARAN DUST EVENT IN THE EASTERN PART OF ROMANIA AT THE END OF MARCH 2024

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Abstract. March 2024 was the second warmest March in Europe on record, according to Copernicus with 2.9 degrees more than the 1990-2020 average. In the eastern part of Romania, the very high temperatures from the end of March to the beginning of April (the current year), compared to the climatological averages, were the result of the southern circulation, with an advection of tropical air from the North Africa, through the eastern-forward flank of a cyclone positioned in the Mediterranean Basin. In the analyzed interval, the highest temperature recorded was on the 1 st of April, at the Focsani meteorological station (in the southwest part of Moldova, 45º71′2″ N - 27.18 ′ 8 ″ E), with 30.5 ºC. Also on that day, the wind was blowing weakly, predominantly from the south-west sector. During 27 th – 28 th March and 1 st – 2 nd April, National Meteorological Administration issued an official statement regarding the advance towards the geographical region of Romania of a mass of air loaded with dust particles of Saharan origin, on the background of the south-west circulation. Analyzing the backward trajectories of the particles in a selected point in south-east of Moldova (45º44′9.3 ″ N - 28º03′2 .7 ″ E) for that period, a clear stratification in altitude was observed, but keeping the same origin: the north and north-west of Africa. Three different altitude levels were selected to analyze these layers: 500, 3000 and 5000 meters above ground lever (AGL). The particles that reached the low atmosphere of south-eastern Moldova (500 meters) on April 1 st and 2 nd , have their origin in the north of Africa (northern Libya), at approximately 1000 meters altitude, on a well-defined layer. The particles that reached the atmosphere of south-eastern Moldova, at altitudes of 3000 and 5000 meters AGL, traveled on air currents with the origin on western Algeria and northern Mauritania, on two well-defined layers. The dust particles were also captured by the MODIS satellite images, with the largest spread in eastern Romania on April 1 st. To confirm the origin of the particles, both AERONET (part of ACTRIS-RO) and the combined radar and ceilometer products, made available by the REXDAN cloud remote sensing facility (Galati, SE Romania 45°26′07.1″ N, 28°02′13.8″ E), were analyzed. Thus, on April 1 st, a considerable layer of aerosols was detected up at 4 km altitude, in the early hours of the morning, then it decreased to an altitude of 2 km starting at noon and until the end of the day. On April 1 st, in the selected area from the southeast of Romania (44°54′6″ N, 29°44′7″ E), the optical data showed that the dust particles had a desert origin. Regarding the dust forecast models, the multi-model provided by the WMO - Northern Africa-Middle East-Europe (NA-ME-E) Regional Center analysis was analyzed, and it accurately predicted the dust event. The scenario of the forecast models directs the Saharan dust origin to northern Europe, in the atmosphere of the Scandinavian Peninsula, on the ascending side of the altitude trough.

Keywords: Saharan dust, southern circulation, synoptic pattern, environment.

C.20. VISIBLE-LIGHT PHOTODEGRADATION OF AN EMERGENT PHARMACEUTICAL POLLUTANT: ASSESSING PROCESS EFFICIENCY AND PHYTOTOXICOLOGICAL IMPACT

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Abstract. The presence of emerging organic pollutants, particularly pharmaceutical compounds, in the effluents of wastewater treatment plants, has been frequently observed globally due to their resistance to secondary biological processes. Their widespread existence in aquatic environments is a matter of concern because they have a detrimental impact on living organisms and human health. This study focuses on the effectiveness of using a photocatalytic process with a ZnO catalyst/visible-light system for degrading pentoxifylline, an emerging contaminant found in aqueous fluxes. A significant aspect of this research involves assessing the toxicity of the treated solutions as part of analyzing the potential environmental risk associated with the photocatalytic process. Preliminary phytotoxicity tests were conducted using seeds from Lepidium sativum L., a higher plant species, to assess the environmental impact following exposure to phototreated solutions. It is important to note that transformation products could potentially exhibit greater toxicity than their parent compound in some cases. The results confirmed the successful elimination of the target molecule under visible light irradiation conditions through photocatalysis. Additionally, preliminary phytotoxicity tests indicated that untreated solution (containing 40 mg/L pollutant) led to inhibition in seed germination (80%) and root and leaf length likely attributed to its toxic nature and high initial concentration of the pollutant. Conversely, the treated solutions showed reduced growth inhibition in Lepidium sativum L. seedlings components, presumably due to the formation of less toxic molecules resulting from the transformation of toxic reaction intermediates during photocatalytic treatment. These results emphasize the applicability of visible-light photodegradation as a sustainable and environmentally friendly solution for the removal of pharmaceutical pollutants from water fluxes.

Keywords: photocatalysis, emerging contaminants, ZnO catalyst, phytotoxicity.

C.21. EXPLORING THE PHOTOCATALYTIC POTENTIAL OF CU-DOPED TITANIUM DIOXIDE NANOMATERIALS FOR THE REMEDIATION OF AN ENDOCRINE DISRUPTOR COMPOUND

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Abstract. The scientific community has increasingly focused on addressing the prevalence of emerging contaminants like endocrine disruptors in aquatic environments in recent decades. These substances require removal to mitigate their adverse effects on aquatic ecosystems, and photocatalytic degradation presents a promising solution due to its effectiveness in eliminating organic water contaminants. This research explores the utilization of titanium-based photocatalysts for environmental remediation. The study addresses information on the elaboration of various titanium dioxide (TiO_2) composites doped with copper (Cu) using a straightforward sol-gel method, employing different Cu doping concentrations, and assessing their efficacy in removing bisphenol A (BPA), an endocrine-disrupting compound, from aqueous solutions. Cu doping, as documented in literature, enhances visible light absorption by reducing the band gap energy. Batch experiments were conducted to evaluate the degradation of BPA by the synthesized composites. Initial experiments controlling photolysis and adsorption were performed to evaluate their impact on BPA removal, revealing minimal contribution from these processes in the elimination of the target molecule. The photocatalytic activity was then assessed by treating 5 mg/L BPA in aqueous solution under visible light irradiation for 6 hours. Obtained results revealed that the system Cu-doped (5%) TiO_2 photocatalyst exhibited the highest photocatalytic activity, achieving over 80% degradation efficiency at neutral pH and room temperature. Additionally, significant removal of total organic carbon (approximately 74%) was observed, indicating the ability of this system to mineralize the target contaminant. Moreover, this catalyst demonstrated stability and reusability over four consecutive cycles. These findings suggest that the designed catalyst holds promise as nanomaterials for BPA removal, proposing some directions to consider for the development of new strategies for water treatment.

Keywords: endocrine disruptors, photocatalysis, titanium-based photocatalysts, water treatment.

C.22. SOME EVALUATION OF ARTIFICIAL LIGHT POLLUTION

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Abstract. The development of technology meant, in addition to bringing benefits to human life, also the appearance of negative effects on the environment and people's health. Pollution is a negative phenomenon with serious consequences on life in general. Light pollution is

considered also the light that is projected on to the night sky. Because it makes the sky much brighter, light pollution has a major impact on astronomy, preventing the light of less bright celestial objects from reaching us. The main cause is the faulty design of the lighting, and it means lost energy - the light should reach the ground, not the sky. Light pollution can be amplified by air pollution, dust and smoke reflecting radiation in all directions, illuminating the sky more strongly. This type of pollution not only affects astronomy, but also animal life and human health. From an astronomical point of view the observation of the Moon and the planets does not raise problems in the urban area, but for the observation of deep-sky objects, star clusters, galaxies, and less bright gaseous nebulae it is absolutely necessary that the sky vault is dark. In recent years, the number of streetlights and illuminated facades has steadily increased, so that good locations for astronomical observations are those far from the urban area. In order, to limit light pollution, it is recommended that the lights no longer be directed towards the sky, and that the gardens and building facades are no longer extremely bright, the rational use of lighting inside and outside the house, the reduction of light signs in shops after the end of work, the elimination of light bulbs with red light that disturbs migratory birds, the use of ecological lamps, and astronomical observatories began to be built in isolated areas affected by light pollution, reducing the negative influence of photopollution, a fact that would facilitate the study of outer space.

Keywords: light pollution, human health.

C.23. LABORATORY APLICATIONS OF MUNICIPAL SLUDGE DEWATERING

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Abstract. In the complex domain of water and wastewater management, the challenges related to sludge treatment requires careful consideration of characterization, utilization, and disposal. Adequate resources must be allocated to effectively manage sludge, considering its varying quantities and complex composition. Adapting proper methodologies at each stage is essential, starting with preliminary assessments aimed at optimizing processes and minimizing costs. Often, these preliminary evaluations involve laboratory work such as simulations, small-scale testing, prototypes, and combinations of products. The objective of our study was to conduct laboratory experiments to evaluate the effectiveness of certain organic flocculants in dewatering municipal sludge. Our methodology used different doses of flocculants, studying the flocculation process, and separating solid and liquid phases. Through meticulous experimentation and analysis, we aimed to improve the dewatering process of municipal sludge, ultimately contributing to more efficient and sustainable wastewater management practices.

Keywords: sludge, dewatering, organic flocculants.

C.24. INTEGRATION OF UV AND OR AOP DISINFECTION PROCESSES AS A PRE-TREATMENT FOR THE OPTIMIZATION OF MEMBRANE FILTRATION PROCESSES OF EFFLUENTS FROM A POULTRY SLAUGHTERHOUSE

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Abstract. The nature of the slaughtering processes generates large volumes of effluent with a significant concentration of toxic pollutants. The use of conventional treatment processes does not fully meet the quality standards of the effluent from poultry slaughterhouses, especially if it is to be reused for different purposes, such as irrigation or production. Membrane technologies have proven to be effective in the final treatment of effluent, ultimately meeting the quality requirements for reuse. Polymeric materials used in membrane processes are more susceptible to deterioration due to factors related to the concentration of pollutants in the effluent, as well as operating and maintenance conditions. One of the best solutions to extend the life cycle of polymetric membranes is to integrate a UV disinfection pre-treatment with or without Advanced Oxidation Processes (AOP). In addition, UV-AOP processes have the ability to improve permeate flow and hence the quality of the effluent obtained.
Keywords: membrane processes, industrial effluent, poultry slaughterhouse, effluent reuse, polymer membranes, advanced oxidation processes (AOP).

C.25. THE IMPACT OF POPULATION OCCUPATION ON HOUSEHOLD WASTE MANAGEMENT

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Abstract. This article aimed to identify the impact that the occupation of a set of respondents has on the way they manage household waste. The study took place over 8 months and involved the analysis of 619 questionnaires, responses which were obtained from people in various locations throughout Romania. From the set of 45 questions, from which it was intended to obtain a series of information related to their knowledge and application on waste management, a set of 6 questions were chosen for this article, 3 of which are descriptive of the respondents and 3 on the management of household waste generated by the population. The analysis of the results shows that the predominant group of respondents are urban, predominantly female. By occupation, we identified two major groups of those who are still studying (i.e. pupils, students, masters and doctoral students), 31.5%, and those who belong to the second group (according to the structure of occupational qualifications in Romania), 26.5%. The majority of respondents (501 responses) have knowledge of how to manage waste. Due to the large number of respondents in urban areas, 43% of respondents take their rubbish to the bins provided by the local government (about 70% of respondents) every day.

Keywords: occupation of respondents, waste management.

C.26. THE EVOLUTION AT THE EUROPEAN LEVEL OF NOTIFICATIONS WITHIN THE SRAFF, IN THE PERIOD 2020 - 2023, FOR FOOD PRODUCTS THAT EXCEEDED THE LEVEL OF ACRYLAMIDE

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Abstract. The present study analyzes the evolution of notifications within the SRAFF regarding exceeding the level of acrylamide in food products during the period 2020-2023 at the European level. Acrylamide is a chemical contaminant formed in foods during baking or frying at high temperatures, especially in carbohydrate-rich foods. It has been associated with toxic effects such as neurotoxicity and carcinogenicity and is found in products such as cereals, baked goods, coffee, chips and more. The European Union, in order to ensure food safety, established the Rapid Alert System for Food and Feed (SRAFF) to facilitate the rapid exchange of information between the food authorities of the member states. This system allows the rapid notification of identified risks to public health and the implementation of the necessary measures to eliminate them. Under the 2017 and 2019 Regulations, food business operators must reduce the levels of acrylamide in certain products. The products that have been notified for acrylamide exceedances come from various countries, both in the EU and in third countries. Between 2020 and 2023, 40 notifications of acrylamide exceedances were submitted, mostly from countries such as Ukraine, the Netherlands, Bosnia Herzegovina and Turkey. The foods involved in these notifications were biscuits, potato crisps, crisps and pastries. Cookies were the category with the highest number of notifications (52%), followed by vegetable chips (22%), potato chips (18%) and pastries (5%), but the highest AA value of was identified in vegetable chips (14155 μg/kg). The number of notifications increased in 2022 and 2023. Detailed analysis of the notifications indicates that cookies have the highest level of acrylamide, which can be attributed to their content of sugars and asparagine which favor the formation of acrylamide during the baking process. In conclusion, these notifications emphasize the importance of monitoring and reducing acrylamide levels in food products to protect consumer health. It is important that authorities continue to monitor and manage these issues to ensure consumer food safety. The use of SRAFF and other similar tools for the rapid exchange of information between Member States and the application of the necessary measures is essential for the prevention and management of risks to public health.

Keywords: acrylamide, cookies, SRAFF.

C.27. SOLUTIONS FOR THE REHABILITATION OF THE TESLUI RIVER IN ORDER TO ACHIEVE ENVIRONMENTAL OBJECTIVES

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Abstract. The ecological rehabilitation of the Teslui River in Olt County aims to restore the health of the river ecosystem. By implementing various measures to conserve and improve water quality, including proper waste management and regeneration of local biodiversity, the aim is to improve the quality of life in the area. The construction of natural barriers and bank stabilisation helps prevent erosion and landslides. Local community involvement and

environmental education are key to the success of the project. These efforts aim to restore the natural balance and protect water resources for future generations.

Keywords: ecological rehabilitation, river, erosion, water resources.

C.28. STUDY ON THE MANAGEMENT OF SALT MINING WASTE

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Abstract. Waste management is part of the vision of sustainable development and is the embodiment of the concept of a circular economy based on recycling, reuse, conservation. This paper presents the results of a study on the management of waste generated in an industrial unit that operates salt extraction. The results showed that 22% of the waste produced is recovered and more than 70% of the waste is disposed of, leaving a very small percentage of waste in stock (less than 2%).

Keywords: waste, management, circular economy, recycling, reuse.

C.29. EVALUATION OF EFFECTIVENESS AND FACTORS AND REGRESSION ANALYSIS ON ZINC RECOVERY IN ROTARY KILNS

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Abstract. Recovery of zinc from secondary sources is an important step in the context of a circular economy. Global zinc production and consumption are increasing and primary resources are rapidly depleting. Recovery of zinc from secondary sources offers several advantages, including energy savings, increased resource efficiency, waste treatment, and reduced environmental and health impacts. Electric arc furnace (EAF) dust from secondary sources is rich in zinc content. Therefore, zinc recovery is an attractive option given its low production cost. In this study, zinc recovery processes in rotary kilns were examined in detail. The focus is on increasing efficiency and sustainability by optimizing zinc recovery processes through regression analysis. Multiple regression method was preferred in the study because the number of dependent variables was one and the number of independent variables was more than one. As a result of this regression model, it was determined that the amount of slag produced depends on the ratio of EAF powder, anthracite coal, coke, lime and iron in the EAF powder. This study can be used to develop strategies to improve zinc recovery processes.

Keywords: Zinc recovery, electric arc furnace (EAF) dust, regression analysis.

C.30. EVALUATION OF PARASITOLOGICAL AND BIOCHEMICAL PARAMETERS OF URINE AND TWO INFLAMMATORY PARAMETERS OF MEDICAL WASTE INCINERATOR OPERATORS IN TOGO

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Abstract. The activity of destruction and ash elimination of biomedical waste are currently a several risks. A lot of risks and domages are disburting the workers in medical waste incinerators then must have a regular follow-up. It is descriptive and cross-sectional study followed by fresh blood and urine sampling of 46 biomedical waste incinerator operators of public and private centers and 46 controls, that tooking place from march 5 to july 5, 2018. Blood was analyzed by the sedimentation rate with tubes of talki and c-reative protein assey carried out using CRPmulticare. While urine was analyzed by test strips followed and observation under an Olympus CH microscope at x40 of the pellet. The public centers, represented with 92.3% against 7.7% private centers. Significant proportion (11.5%) are anaphabets. There was also a significant increase (P).

Keywords: parasitological, inflammatory, urine, incinerator operators, biomedical, Togo.

C.31. THE ANALYSIS OF THE IMPACT OF LOADS SUPERPOSITION ON TECHNICAL STRUCTURES, THE ENVIRONMENT AND LIVING ORGANISMS

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Abstract. The current state of calculation the result of the superposition of loads, or their effects, on a material body is analyzed. The limits of the current calculation methods, based on strength theories, in the case of technical structures are shown. The results of experimental research that refer - in general - to the superposition of two loads of the same nature and without addressing problems of loads of a different nature (mechanical, chemical, electrical, magnetic, radioactive etc.), in the case of technical structures and the environment is analyzed. Starting from the principle of critical energy, which is based on the concepts of the total specific energies participation of the loads and the critical participation, general relations are deduced for these concepts, in the case of the nonlinear behavior of matter, as a function of power. These results are applied to the calculation of the superposition of loads of different nature on a technical structure, the environment and living organisms, taking into account the deterioration of matter. The influence of the loading speed (static, shok...) is taken into account based on the value of the exponent in the behavior law, which was not possible in the previous calculation methods. From the analysis of the results obtained in the paper, it is found the utility and the high degree of generality of the principle of critical energy and of the concept of the specific energy participation.

Keywords: specific energy participation, critical participation, superposition loads/effects, deterioration of matter, loads of different nature, the principle of critical energy.

C.32. EXPLORING THE VIRTUAL CLASSROOM: A PRACTICAL APPROACH TO BUILD EDUCATIONAL VR APPS WITH UNREAL ENGINE

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Abstract. Virtual Reality (VR) in education is popular. This is because teachers want better learning. Students often lose interest and comprehension in traditional text-based learning. VR technology's potential to boost student engagement, knowledge, and motivation is being studied in education. Flexible virtual worlds enable educators to give students unique and immersive learning experiences that encourage active participation in various theoretical topics. Several research projects on VR education examine students' VR technology use. Virtual reality helps students focus, learn, and remember educational content. Yet usability, cost-effectiveness, and safety issues remain, requiring ongoing research and development. VR is captivating and interactive, say students. However, it suggests improving transmission quality, lowering equipment costs, and helping non-technical students. Despite these obstacles, research suggests that virtual reality technology could transform education by providing immersive learning experiences. More research and improvements are needed to maximize VR's benefits and overcome its drawbacks.

Keywords: education, virtual reality, immersive, unreal engine.

C.33. COMPARATIVE ASSESSMENT OF POLLUTANT EMISSIONS BETWEEN BIOFUEL BRIQUETTES AND CHARCOAL: IMPLICATIONS FOR DOMESTIC COOKING FUEL SELECTION

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Abstract. The type of fuel used influences the indoor air quality in a kitchen. This study aims to evaluate and compare the emissions of carbon monoxide (CO), carbon dioxide (CO_2), and aerodynamic particles of sizes ≤ 2.5µm (PM2.5) from biofuel briquettes and charcoal commonly used by households. The combination of the Water Boiling Test (WBT) and the Laboratory Emission Monitoring System (LEMS) allowed for the capture and quantification of emissions. This approach facilitates the selection of a fuel based on its pollutant emissions. CO emissions ranged between 0.79 ± 0.014 and 7.43 ± 0.063 g/MJ delivered for biofuels and charcoal, respectively. The emitted CO_2 ranged between 2 ± 0.212 and 129 ± 1.41 g/MJ delivered for biofuels and charcoal, respectively. The PM2.5 emissions from biofuels and charcoal were 507.5 ± 61.5 and 256.50 ± 13.44 mg/MJ delivered, respectively. The specific fuel consumption varied between 4.16 ± 0.056 and 1.35 ± 0.120 kg/L for biofuels and charcoal, respectively. The Bravais-Pearson statistical tests revealed a strong correlation between pollutant emissions and certain fuel properties. The findings provide scientific evidence to support the promotion of biofuels for cleaner, affordable, and sustainable energy derived from sawdust, aiming to reduce deforestation.

Keywords: biofuel briquettes, carbon monoxide (CO), carbon dioxide (CO_2), pollutant emissions, particle sizes ≤ 2.5µm (PM2.5).

D. MECHATRONICS & ROBOTICS

D.1. OPTICAL PROPERTIES OF THIN LAYERS AND NANOSTRUCTURES WITH ZN AND AL OXIDES

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Abstract. In the paper, the optical absorption and photoluminescence spectra in the 350-600 nm wavelength range both of ZnO (d = 90 nm) and the multilayered ZnO-Al 2 O 3 (d = 70 nm) thin films have been investigated. The studied samples were obtained by thermal oxidation at temperature of 750 K in ambient conditions of the vacuum evaporated Zn and Zn/Al nanolayered thin films. The optical measurements were performed at the temperature of 78 K and 293 K, respectively. The PL spectra were ex c ited by nitrogen laser (h n = 3.68 eV). The density of beam was of 0.5-0.8 kW/cm 2 at temperature of 78 K. The investigated optical properties revealed that both ZnO and ZnO-Al 2 O 3 thin films can be successfully used as coating layers in optoelectronic devices.

Keywords: zinc oxide, thin films, nanostructures, optical properties, photoluminescence spectra, coating layers.

D.2. DEFECT PREDICTION OF DELTA ROBOTS USING MACHINE LEARNING

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Abstract. In recent years, Delta robots have started to be used more and more in various fields, due to their unexploited potential. Thus these robots are used in applications such as: 3D printing, PCB assembly, the pharmaceutical industry, the automotive industry, the textile industry, etc. In general, Delta robots are mostly used when it comes to handling small objects over short distances, at high speeds and accelerations. Failure of robots during operation can cause financial losses due to interruption of the manufacturing process. Under these conditions, it is necessary to identify defects long before they appear. In this paper, the authors propose a predictive maintenance system for Delta robots that allows the identification of defects before they occur. The system uses machine learning to make predictions.

Keywords: defect prediction, Delta robots, machine learning.

D.3. A REVIEW OF PROSTHETIC HAND GEAR TRAINS

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Abstract. Prosthetic devices play an important role in rehabilitation of people with upper limb disarticulation. In the confined space the motors and gears along with other parts need to fit. Consequently, reducing the number of motors has led to an improved design. Our aim was to study the existing literature on gear trains for prosthetic devices and choose a valid option for transitional upper limb prosthetics. We reviewed the literature and concluded transitional upper limb prosthetic devices may benefit greatly from a differential system. The work will aid in future research and improvement of prosthetic devices.

Keywords: Upper limb disarticulation, prosthetic devices, transitional prosthetics, differential mechanism, prosthetic gear trains, prosthetic design, adaptive grasping.

D.4. FEATURES OF THE THERMAL AND MASS TRANSFER PROCESS PRESENT IN THE PAPER DRYING PROCESS

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Abstract. In all currently used paper manufacturing methods, the drying process is required as a very important phase in the manufacturing process. In the case of many machines, the drying of the paper tape limits production. Even in the case of modern machines, great importance must be attached to the calculation of the drying part so that it allows the use of the total capacity of the rest of the paper machine. Air drying differs essentially from drying on steam-heated cylinders in that the process is not cyclical. Apart from this, air is the medium that circulates heat to the evaporation zone, and from here evaporated moisture is transported in reverse. The characteristic feature of air drying is that heat transfer is carried out by convection. It is well known that a boundary layer consisting of stagnant air adheres to the free surface of the layer moving through the dryer (wet paper tape). The technique of drying by filtering hot air is mainly used in the manufacture of thin, highly permeable papers. In principle, it resembles the technique of drying with jets of hot air, certainly unlike the paper backing is permeable, so the air can filter through the tape. Datorită filtrării aerului cald, are loc o dislocare a vaporilor de apă din banda de hârtie, procesul de uscare fiind mult mai intens decât uscarea cu jeturi de aer. Radiation drying means the drying of wet materials by heat transfer from surfaces heated by radiation energy. Properly designed and positioned IR radiation systems convert over 80% of the emitted power into heat energy into a substrate like paper. The drying of paper with high frequency currents allows to achieve very high heating speeds and wide possibilities of adjusting the distribution of temperature and humidity gradients, but it has the disadvantage of higher energy consumption and higher investment and operating costs than classical processes. Din acest motiv, în vederea raționalizării și optimizării consumului de energie, acest procedeu de uscare se utilizează combinat cu uscarea convectivă sau prin radiație. Since the beginning of this millennium, the process of pulse drying has been experienced in laboratory conditions, to a small extent, by pilot plants. The essence of this process lies in the fact that the paper tape dries under high pressure, tightened on the surface of very short-term intensive dry cylinders.

Keywords: heat and mass transfer, drying, paper machine.

D.5. POSSIBILITIES OF HEAT RECOVERY FROM THE STEAM-HOT AIR MIXTURE EVACUATED FROM THE DRYING SIDE OF A PAPER MACHINE

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Abstract. In the drying part of the paper making machine, the steam resulting from the vaporization of the water from the tape is continuously released, which is then discharged into the atmosphere in a mixture of hot air, with the help of the exaustors. The relatively low thermal potential of the resource raises problems with its efficient use in the drying process. The microclimate conditions imposed in the machine hall and the intensification of the mass transfer in the drying process require hot air which can be prepared using partially the heat contained in the exhaust mixture from the drying side. The water resulting from the condensation of the vapors in the mixture will be used as dilution water in the process of preparing the paper paste, resulting in reduced heat consumption necessary to preheat the paper tape when entering the drying part. Thus, in order to use for technological purposes the resource defined above, it is necessary to design a heat exchanger to ensure the most advanced recovery of the sensitive heat of the air-to-steam mixture and the latent heat of vapour vaporisation contained in the mixture. The paper presents the elaboration methodology for a complex recuperator that can be used singly or in groups, with parallel mounting, depending on the capacity of the paper making machine it serves, so the amount of recoverable energy resource resulting from the process.

Keywords: heat and mass transfer, drying, paper machine.

D.6. DESIGN AND OPTIMIZATION OF A MECHATRONIC SOLAR ENERGY CONVERSION SYSTEM

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Abstract. Solar energy is an abundant and sustainable renewable energy source that offers a promising solution to current energy challenges. The conversion of solar energy into usable electricity is achieved through photovoltaic (PV) systems. However, the efficiency of conventional PV systems is limited by a number of factors, such as radiation losses, electrical losses, and temperature losses. Mechatronic solar energy conversion systems provide an advanced approach to improving the efficiency and performance of PV systems. These systems integrate mechanical, electronic, and software components to track the sun, adjust the angle of PV panels, and optimize solar energy conversion. The design of the mechatronic solar energy conversion system involved a series of key steps: 1) Requirements definition: establishing system objectives, operating conditions, and design constraints. 2) Component selection: selecting appropriate mechatronic components, such as motors, actuators, sensors, and controllers. 3) Mechanical design: developing the mechanical structure of the system, including PV panels, sun tracking mechanisms, and mounting systems. 4) Electronic design: designing electronic circuits for controlling motors, actuators, and sensors. 5) Software design: developing software for system control and optimization, including sun tracking algorithms and energy management strategies. Optimizing the performance of the mechatronic solar energy conversion system can be achieved through various methods: simulation and modeling; data analysis; advanced sun tracking algorithms; energy management techniques. This paper focuses on component selection and mechanical design

for the solar energy conversion system and simulating and modeling utilizing computer simulations to evaluate system performance and identify potential improvements.

Keywords: solar energy, energy conversion, mechatronic systems, sun tracking, optimization, performance, efficiency, sustainability.

D.7. CONTROL OF MECHANICAL PROCESSES AS A DEFINING ELEMENT IN THE FIELD OF MECHATRONICS AND MACHINE LEARNING

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Abstract. The field of mechatronics, born from the synergistic integration of mechanical, electrical, and control systems, has always placed a premium on the precise control of physical processes. This paper delves into the continued relevance of control theory in the face of the burgeoning field of machine learning (ML) as applied to mechatronic systems. We argue that even as ML algorithms become increasingly woven into the fabric of mechatronics design, control theory remains a defining element. This paper explores how ML can act as a powerful tool to enhance control strategies by enabling real-time adaptation, improved fault tolerance, and optimization for complex and non-linear systems. While ML offers exciting possibilities for mechatronics, there are distinct challenges and opportunities that arise at the intersection of these two paradigms. One key challenge lies in ensuring the interpretability of ML models used within control systems. For engineers to have confidence in the behavior of their creations, it's crucial to understand not just the "what" of an ML model's output, but also the "why." This interpretability becomes even more important in safety-critical applications. Another challenge involves the efficient collection and utilization of data. ML algorithms are data-driven, and successful control through ML hinges on the quality and quantity of data used for training. In mechatronic systems, data collection from physical systems can be expensive, time-consuming, and even destructive. Finding efficient ways to gather representative data while minimizing disruption to the system is a crucial area of research. Beyond these challenges, exciting opportunities emerge from the marriage of control theory and ML. One such opportunity is the development of robust control architectures that leverage the strengths of both paradigms. Traditional control techniques can provide a strong foundation for system stability and safety, while ML algorithms can dynamically adjust control parameters in real-time based on changing environmental conditions or unexpected inputs. This hybrid approach promises to unlock a new level of control sophistication in mechatronic systems. Finally, this paper proposes future research directions for achieving intelligent control in mechatronics through a combined control and ML approach. Areas of exploration include the development of new interpretable ML architectures specifically designed for control applications, the creation of efficient frameworks for data collection and use within mechatronic systems, and the design of novel control architectures that seamlessly integrate traditional control methods with the adaptive capabilities of ML. By fostering a deeper understanding of the synergies between control theory and machine learning, researchers can pave the way for the next generation of intelligent mechatronic systems.

Keywords: mechatronics control, machine learning integration, hybrid approach, interpretability, intelligent control.

D.8. FINITE ELEMENT ANALYSIS OF A METALLIC EXOSKELETON FOR STRETCH-FORMING. INTEGRATION WITH AN EXISTING HYDRAULIC PRESS

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Abstract. Finite Element Analysis (FEA) is an essential tool for optimizing metallic structures. The 3D representation of the exoskeleton, specifying the characteristics of the materials, is meshed in a network of small parts. By implementing boundary conditions, such as fixed supports and loading conditions the analysis results illustrate the spatial arrangement of stress, displacement and strain over the structure, pinpointing regions that are susceptible to insufficient rigidity. FEA also forecast the overall forces necessary to get the desired shape, a critical factor in determining the suitable material and cross-section of the metallic exoskeleton. The results indicate where to optimize the design and this leads to costs less, enhances safety and efficiency of hydraulic press utilization.

Keywords: FEM, exoskeleton, stretch-forming.

D.9. THE ROLE OF MECHATRONICS SYSTEMS AND AI IN MODERN MILITARY APPLICATIONS

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Abstract. Mechatronics and Artificial Intelligence (AI) are transforming contemporary combat by improving accuracy, flexibility, and operational effectiveness. Mechatronic systems are utilized to control missiles, drones, and robotic combat vehicles, while AI enables independent decision-making, awareness of the surrounding situation, and the ability to engage in cyber warfare. In the future, warfare is expected to involve a combination of human experience, AI-powered technologies, and improved mechatronics, which will enhance the capabilities of the battlefield. Nevertheless, the utilization of autonomous weaponry and human-machine teaming necessitates careful consideration of ethical considerations, reliability, and security. For the successful integration of these technologies, it is crucial to prioritize responsible development, ethical considerations, and emphasize human-machine collaboration.

Keywords: mechatronics, artificial intelligence, warfare.

D.10. ML USING MULTI-LABEL IMAGE RECOGNITION IN SCRATCH DETECTION ON ALUMINIUM SAMPLES

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Abstract. Utilizing Machine Learning (ML), multi-label image recognition is an effective method for detecting scratches on aluminum samples. The process first gathering a substantial dataset of aluminum sample photos that exhibit different types and degrees of

scratches. This dataset is then used to train a model using Convolutional Neural Networks (CNNs) or Recurrent Neural Networks (RNNs). Finally, the trained model is deployed. ML has several advantages for scratch identification, such as precision, non-invasive testing, and the capacity to simultaneously identify and categorize multiple types of scratches. Machine learning models can be incorporated into automated inspection systems, simplifying the quality control process for aluminum production lines. Nevertheless, there are some obstacles to overcome, such as ensuring the accuracy and reliability of the data, providing clear explanations for the models' decisions, and having sufficient processing resources.

Keywords: machine learning, CNN, non-invasive testing.

D.11. PROPORTIONAL CONTROL OF A EXPERIMENTAL STANDS IN MATERIAL STRENGTH LABORATORIES USING A JOYSTICK

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Abstract. Using a joystick for proportional control in material strength labs is a straightforward and accurate approach for operating an experimental stand. The system comprises a dual-axis joystick, a controller unit, driver and two stepper motors. The joystick exhibits directional movement and a defined throw distance, while the controller unit converts the joystick's movements into electrical impulses. The gain establishes the relationship between the movements of the joystick and the stand in a proportional manner. The stepper motors are engaged, resulting in the movement of the stand in direct correlation to the input from the joystick and the gain configuration. The advantages of using a proportional joystick control system include its intuitive nature, allowing for accurate changes, and the ability to adjust sensitivity as desired.

Keywords: proportional control, joystick, strenght of materials.

D.12. THE DIAGNOSTIC SYSTEM OF THE TECHNICAL CONDITION OF A MECHATRONIC ASSEMBLY WITH THE HELP OF LABVIEW

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Abstract. The paper presents a model for analyzing the technical condition of a mechatronic assembly with the help of Labview. The mathematical model is based on the determination of the technical condition of the assemblies and functional subassemblies, based on the monitoring of the essential parameters. The NI UBB 6501 Board from National Instruments is used for data acquisition. Where it is not possible to determine the value of a parameter in real time, a model based on machine learning is proposed for its estimation. The obtained values can be displayed graphically or stored in various formats.

Keywords: LabView, monitoring, analysis.

D.13. REVIEW OF THE SMART LOCK SYSTEMS

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Abstract. Nowadays the mechatronics and informatics are presented in almost every aspects of our life. The intelligent houses include many devices which permit the control of the electric energy, heating system, closing and opening of the access door, the window blinds, adjusting the light intensity in a room, etc. The Internet of Things connects all devices and assures an optimal operation of them according to our preferences. One of the most important things of an intelligent house is the control of the entrance. During the years several control systems have been developed: with simple numerical code, with voice control, fingerprint lock, with Bluetooth, with Wi-Fi connection, etc. It should not be forgotten that all these control systems also actuate mechanical elements, more complicated or not, which actually perform the opening or unlocking of the door. The present paper makes an analysis of these systems using five criteria: system safety, installation, reliability, lifetime, reset possibilities, cost. For each criterion it is given from 1 to 5 point. The scores obtained will allow a ranking of the analysed systems. This ranking does not prevent the user from choosing according to the criterion he considers the most important for his own purpose.

Keywords: mechatronics, smart lock system.

D.14. ADAPTING A REPRAP HELIOS 3D PRINTER FOR SCARA ROBOT FUNCTIONALITY: A REPURPOSING APPROACH

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Abstract. This research investigates the potential of repurposing a RepRap Helios 3D printer into a Selective Compliance Articulated Robot Arm (SCARA) for performing specific tasks. SCARA robots are widely used in industrial applications due to their selective compliance in specific directions and their ability to perform high-speed, precise movements. However, their initial cost can be a barrier for smaller-scale applications. This paper explores the feasibility of modifying a RepRap Helios, an open-source 3D printer design, to achieve SCARA-like functionality. The existing RepRap Helios structure offers a readily available, cost-effective platform for such adaptation. The adaptation process involves modifying the RepRap Helios's kinematic structure to achieve the characteristic rotational movements of a SCARA robot. This likely entails reconfiguring the printer's linear axes into rotational ones around designated points. Additionally, the paper explores the reprogramming of the RepRap Helios's control system to accommodate the new movement patterns required for SCARA operations. The success of this adaptation would be evaluated based on the robot's ability to replicate key SCARA functionalities, including: Pprecise pick-and-place operations within a designated workspace; repetitive tasks requiring high movement speed and accuracy, trajectory planning and control for efficient task execution. By demonstrating the feasibility of repurposing a RepRap Helios into a functional SCARA robot, this research offers a cost-effective alternative for applications requiring precise, high-speed robotic movements. This approach can be particularly beneficial for educational institutions, small-scale industries, or individual makers seeking a budget-friendly robotic solution.

Keywords: RepRap Helios, SCARA Robot, Repurposing, 3D Printer Repurposing, Robotic Arm Design.

E. ECONOMIC ENGINEERING

E.1. ASPECTS REGARDING THE ORGANIZATIONAL FUNCTION IN PUBLIC LIBRARIES

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Abstract. Organization is an important management function in public libraries. In order to make the management more efficient at the "Elena Lahovary" Municipal Library, a study was initiated regarding the structural redesign of the development, records, collections processing department, which would lead to an increase in performance indicators and an increase in user satisfaction. In order to make the specific activity of the library more efficient, the structural unit was analyzed through the prism of staffing possibilities, the job descriptions and a semi-structured interview was applied to the librarians through which information was obtained that was the basis for developing an improved organization chart.

Keywords: Organization, organizational chart, job description, performance indicators, user satisfaction, public libraries.

E.2. EUROPEAN APPROACHES TO INDUSTRIAL PROPERTY: A COMPARATIVE ANALYSIS

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Abstract. This study approaches the means by which the European countrie-s manage to enforce, maintain and develope industrial property e-ntitlements including all forms of industrial property such as patents, trademarks, industrial design, designations of origin and utility models. The industrial property importance is longtime recognized, EU member states foster industrial property's role in - promoting innovation, encouraging economic growth, and maintaining the compe-titive environment in all industrie-s. The European Union (EU) legal frame-work offers a comprehensive- regulatory infrastructure for harmonizing and enforcing industrial prope-rty rights across its member states in a unitary manner. However, there are still some discrepancie-s in national legislation, as we can easily observ the different cultural attitudes and the particular industrial priorities, all of the above determining a more -nuanced and varied approach. Using a thorough contrast examination of selected EU states, this paper explores both legal and institutional framework as well as the policy governing industrial property rights. By reviewing the efficiency of pate-nt enforcement laws in promoting innovation and te-chnological development, the study also points out into the complicated assignment of harmonizing national priorities, re-gional interests and european goals. The research analyzes these contrasts, highlighting the diverse- approaches taken by member states in enforcing and applying industrial property. Using a comprehensive study of european member states patent legal frame-works, the study evaluate-s the suitabiliy of legal approaches in establishing, exploring and improve-ment of the main forms of industrial property. The peculiarity of the industrial property is that it has to ensure the perfect balance between re-strictive rights on one hand and public interest on the other hand, while in the same time fostering -the means for patent enforcement and offering the legal means in order to resolve all potential conflicts regarding the subject. In addition, we examine the role of trademarks in branding strategies, as well as the role they play in market segmentation and consumer protection, investigating the similiarities and the differences in trademark legal

framework and practices across the European Union. Furthermore, the article approaches the seizing of industrial designs, that allow both aesthetic innovation and functional creativity. We analyze the importance of products' design differences, in order to ensure both consumer welfare, as well as sustainable economic development. Moreover, the investigation te-nds to the difficulties that organizations and policymakers have to face in order to capitalize on industrial prope-rty rights while adjusting contending intere-sts and advancing reasonable and fairplay competition. By combining insights from legal specialists, e-conomic analysis, and policy discourse insights, this paper provides a compre-hensive understanding of Europe-an approaches to industrial property. It offers valuable- perspectives for policymake-rs, legal practitioners, and industry stakeholde-rs navigating intellectual property regulation complexities, enhancing innovation e-cosystems, and promoting sustainable economic de-velopment across Europe and be-yond.

Keywords: industrial property, European Union, economic development.

E.3. CIRCULAR ECONOMY INDICATORS OF WASTE MANAGEMENT DOMAIN IN ROMANIA

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Abstract. The circular economy concept must be applied in all economic spheres if we want a viable and healthy planet. The circular economy has many definitions but, in fact, it means keeping materials as much as possible in the economy, developing new products from those that have reached the end of their life cycle, using secondary products and waste, so that the amount of storable waste is as close to zero as possible. European Union defined five main domains which have to be supervised from the point of view of circular economy: Production and consumption; Waste management; Secondary raw material; Competitiveness and innovation. For all these areas there are indicators to measure the progress of the European Countries to circular economy implementation. The paper analyse the indicators from waste management area achieved by Romania in the last years. Complementary with waste generation (from Production and consumption area), the management of the waste are still a problem in our country even if important progress has been made. The Waste management quantifies the volume of the waste recycled and kept in economy for the production of new goods. The study takes in consideration both indicators: the recycling rate and specific waste streams.

Keywords: circular economy, waste management, recycling.

E.4. MANAGEMENT AND LEADERSHIP IN THE AREA OF CIRCULAR ECONOMY

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Abstract. The circular economy concept generated a lot of interest when it was officially launched in 2015, but its implementation in practice encountered difficulties, not only material or technological, but also psychological and attitudinal. People generally are against changes, especially those with years of experience. In this situation is the role of the management of the companies to convince the personnel about the importance and efficiency

of the new concept and to change mentalities. The manger role is to create the conditions for the achieving of the objectives, tasks and plan, or in few words "to assure order and consistency to work". The leadership is defined by Carpenter as "the act of influencing others to work toward a goal" . The transition to circular economy imposes the combination of these two roles. The manger has to become a leader, to make the people to accept this new way of working, to become enthusiastic in implementation of the new concept. The transition process required from the new position of manager-leader a high ability to motivate people, negotiation skills, persuasion, conflict management, teamwork, counting only a few of the necessary qualities. The paper analyzes the characteristics necessary for a successful entrepreneurship within the circular economy, developing and emphasizing the necessary transformations at the level of personnel and company management.

Keywords: management; leadership; circular economy.

E.5. AN IN-DEPTH ANALYSIS ON THE IMPLICATIONS OF AI ON HR PRACTICES

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Abstract. Artificial intelligence (AI) is transforming human resources (HR) practices by automating monotonous processes, utilizing data to make informed decisions, and enhancing the overall experience for job applicants. Nevertheless, artificial intelligence (AI) has the potential to reinforce prejudices present in the data used for training, which can result in biased practices in the recruiting process. Regular audits and human supervision are essential to prevent this. In order to maintain justice, it is imperative that AI systems are transparent and capable of providing explanations. Human interaction remains crucial, and the implementation of AI technology may result in job displacement within some HR tasks. As artificial intelligence advances, it is expected to provide more advanced methods for recruiting talented individuals, individualized learning experiences, and improved employee welfare. Nevertheless, ensuring responsible implementation necessitates meticulous examination of ethical ramifications and any biases.

Keywords: artificial intelligence, human resources, decision making.

E.6. ARTIFICIAL INTELLIGENCE IN BANKING: A NEW ERA OF FINANCIAL SERVICES

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Abstract. Artificial Intelligence (AI) is transforming the financial services sector through its ability to enhance client experience, facilitate personalized banking, detect fraud, optimize operations, enhance decision-making, mitigate cyberattacks, and automate regulatory compliance. Artificial Intelligence (AI) provides advantages such as enhanced productivity, heightened security, customized services, and informed decision-making based on data. Nevertheless, ethical considerations encompass the possibility of prejudice, openness, and the displacement of employment. Regular audits and human supervision are essential to guarantee equity, while reskilling activities are imperative to equip people for the changing

work environment. As artificial intelligence progresses, additional developments encompass robotic process automation (RPA), cognitive banking, and voice banking. By adopting AI in a responsible and ethical manner, banks can enhance the efficiency, security, and personalization of the banking experience, hence fostering a more competitive and innovative financial environment.

Keywords: artificial intelligence, banking system, ethical banking experience.

E.7. AI-SUPPORT IN ORGANIZATIONAL MANAGEMENT

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Abstract. The paper presents the specifics of organizations from the perspective of management, highlighting how organizations can be defined, from the perspective of modern management. In the paper, the authors have established definitions related to AI-support and present the key concepts associated with, exploring various areas where AI-support can be used in organizational management, such as decision-making, data analysis and process optimization. Also, some benefits of AI-support in organizational management are presented, such as: a). increased efficiency: it highlights how AI-support can contribute to increasing operational efficiency and reducing human errors; b). informed decision-making: AI-support can provide information and relevant analysis to the decision-making process; c). innovation and adaptability: AI-support can drive innovation and adaptability within organizations. Conclusions are dedicated to the process of implementation and integration of AI technologies within organizations, as well as ethical and security challenges: data privacy and ethical responsibility in the use of AI-support in organizational management.

Keywords: AI-support, security challenges, decision-making process.

E.8. EXPORTS AND ECONOMIC GROWTH IN ROMANIA

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Abstract. This paper aims to present the relationship between export and economic growth in Romania. The studies carried out so far show that, in many countries, there is a positive, rather than neutral or negative, relationship between export and economic growth. In Romania, after 1990, except for a few years, the evolution of the Romanian exports was positive. This upward trend of exports has positively reflected to a good extent the economic growth of Romania. In present, Romania mainly exports machinery and transport equipment (44.8% of total exports in 2023), manufactured goods (15.9%), miscellaneous manufactured articles (13.9%), and food and live animals (8.2%). The European Union is the main trading partner (72.6% of total exports)..

Keywords: export, economic growth.

E.9. ANALYSIS OF THE CARBON EMISSIONS TRENDS IN SPAIN, ITALY, GERMANY AND THE UK. A DESCOMPOSITION ANALYSIS

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Abstract. This work is aimed to investigate the carbon emissions trend in selected European countries. Logarithmic Mean Divisia Index and Tapio's methodology are used for decomposing the carbon emissions and investigating the decoupling factors respectively. Seven indexes are identified, namely carbon intensity of the energy sector, energy consumption structure, energy intensity, climatic factor, Gross Domestic Product per Capita, population distribution, and population evolution. These indexes are then grouped in three macro-categories, specifically technical factors, climatic effect, and socio-economic factors. The study covers the period 1995–2019 and considers 4 European countries at individual level.

Keywords: carbon emissions, descomposition analysis.

E.10. NEURAL NETWORKS – MANAGERIAL DECISIONS - KNOWLEDGE MANAGEMENT

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Abstract. More and more organizations in Romania are investing in neural networks, as support in the fundamental decisions they are about to adopt. Thus, they provide information extraction solutions for problems that have traditionally failed in first operational research. Even at the beginning, it must be specified the importance of neural network doors as an argument when adopting decisions based on concrete and logical elements, but especially on the employees' knowledge. The use of neural networks as a support in the development of strategic solutions for increasing the performance of an organization (such as: the level of sales, cash flows, assets and liabilities of the company, yield) depends on the way in which the decision-making authority is combined with the knowledge necessary to make each decision. The great advantage that the use of neural networks brings to organizational networks that are interested in this field is that through such regulated research it will favor the emergence of organizational intelligence. In this paper, we discuss the relationship between neural networks, decision process and knowledge management within organizations in Romania.

Keywords: neural networks, decision process, intellectual capital, knowledges, organizational intelligence, strategic advantage of organizations.

E.11. IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH IN ROMANIA

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Abstract. This paper aims to present the impact of foreign direct investment (FDI) inflows on economic growth in Romania. In recent years, several authors have tried to analyze the effects of FDI on the economies of FDI host countries. Most of them concluded that FDI has the effect of, among other things, the economic growth of host countries, especially in developing countries. Some authors believe that there is no interdependence between the level of FDI inflow and the economic growth of the FDI host country, or even that there is a negative relationship between these economic variables, at least in the short term. In the last years, in Romania, with little exceptions, the evolution of FDI inflows was positive. The present work tries to determine if there is an interdependence relationship between the flow of FDI attracted by Romania and the economic growth recorded by this country, the meaning and intensity of this relationship.

Keywords: foreign investment, economic growth, investment impact.

E.12. ENHANCING STATISTICAL CONTROL THROUGH ARTIFICIAL NEURAL NETWORKS

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Abstract. Statistical control in industrial engineering is essential for ensuring the quality and efficiency of production processes. This method utilizes statistical techniques to monitor and control product quality during manufacturing [1]. By collecting and analysing data in real-time, deviations and non-conformities in the process can be identified, allowing for quick interventions to correct them. This leads to reducing the risk of producing defective products and optimizing processes to meet desired quality and efficiency standards [2]. A new tendency in statistical control is the prediction made with the help of Artificial Neural Network (ANN). ANN are being used in statistical control to improve complex system monitoring. This integrates new machine learning tech into control processes [3] . The aim of this paper is to use the real statistical results in order to train and validate the data using ANN. For this purpose, a number of 1600 screws, type M10*20mm produced by a local company were investigated. After applying the statistical control method, the valid results were used to train the ANN. The prediction made by ANN was verified in production and the validated results reveal a confidence factor "R" equal to 0.8. In conclusion we can say that applying ANN optimization will lead to an improve of a system performance. Also the use of an ANN prediction function will lead to a cost reduction in the quality control department.

Keywords: Statistic control, Artificial Neural Network (ANN), Quality check.

E.13. FIRMS' PERFORMANCE IN TIMES OF CRISIS: THE EFFECTS OF THE FINANCIAL CRISIS AND THE EFFECTS OF THE COVID-19 PANDEMIC

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Abstract. Economic crises have a well-known negative impact on the performance on firms, regardless of their activity sector. However, did the medical crisis triggered by the covid-19 pandemic have the same impact? In 2019, ten years after the financial crisis, firms around the world were confronted with a new crisis, although not an economic or a financial one, but a strong crisis with effects on a large extent. The aim of our paper is to analyze the effects of the covid-19 crisis on the financial performance of non-financial, listed firms from Europe. Our purpose is to review the literature regarding this relation, with a focus on the factors that shape this impact, like managerial ability or governance support. Also, we employ an empirical approach and study the relation between the covid-19 pandemic and the financial performance of firms using the difference-in-difference methodology. In addition to this, we make a comparative analysis between the effects of the financial crisis and the pandemic on the firm' performance. Our results show that the pandemic negatively affected the economic and financial performance of firms and the results differ according to the activity sector of firms. Our study contributes to the growing literature that analyzes the effects of the pandemic on the economic and financial activity of firms.

Keywords: pandemic, financial crisis, firms' performance.

E.14. WHAT DRIVES ENTREPRENEURSHIP? DETERMINANTS OF THE ENTREPRENEURIAL INCENTIVES IN EUROPE

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Abstract. Entrepreneurship is one of the main forces that influence the economy. But what are the factors that influence the desire or the propensity of people to become entrepreneurs and to take the risks associated with the opening and managing a business? Also, to what extent does the entrepreneurial education influence these intentions? The aim of out paper is to analyze the determinants of the entrepreneurial decision. In order to do this, we employ an empirical approach with the purpose of determining the impact of access to financing, government support, the entrepreneurial education in school or the perspective of entrepreneurship as a good career option, on the entrepreneurial choice. Our analysis takes into account a comparative approach of the relation between entrepreneurship and its determinants in times of the financial crisis versus in times of the medical crisis imposed by the covid pandemic. Moreover, we investigate whether this relation differs in emerging versus advanced countries. The contribution of our paper is twofold. Firstly, we contribute to the literature analyzing the determinants of the decision to start a business. Secondly, we make a contribution to the literature that analyzes the economic behavior and, especially, entrepreneurship, in times of crises.

Keywords: entrepreneurship, entrepreneurial incentives, financial crisis.

E.15. CIRCULAR ECONOMY AND SUSTAINABILITY BENEFITS FOR BUSINESSES IN ROMANIA

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Abstract. After the pandemic, the new challenge facing the Romanian business environment is the transition to a circular economy – a unique economic philosophy that can sustainably satisfy people's needs in the long term. This creates new trends in productions, distribution, comparison and consumption modules. For businesses, the circular economy offers unprecedented tools to generate added value using fewer resources or a more efficient use of the resources that a company owns or reducing waste or reusing some resources, and obtaining the maximum with the minimum effort. The work focuses on two key areas: the circular economy and education for sustainability, essential pillars in the future socio-economic structure of a company. Thus, we propose to approach in a rigorous and multidisciplinary manner, the topic mentioned above, starting from the premise that it is essential to ensure a balance between economic needs, social needs and the needs of the environment.

Keywords: circular economy, business environment, resources, production and consumption, sustainable development, waste management.

F. CHEMICAL & FOOD ENGINEERING

F.1. THE INFLUENCE OF NON-CONVENTIONAL METHODS OF OBTAINING BIOLOGICALLY ACTIVE SUBSTANCES FROM JOSTA BERRY

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Abstract. The extraction of biologically active compounds (BAC) from plant raw materials is a current approach in scientific research. In order, to comply with the conditions of the circular bioeconomy, extraction methods must provide balance in product quality, process efficiency, production costs and be environmentally acceptable. The aim of this paper was to study the influence of non-conventional methods, assisted by ultrasound and microwave, on the extraction yield of biologically active compounds (total phenolics content and antioxidant potential) from frozen Josta berry. Harmless solvents, 60% hydroethanolic solution, were used for BAC extraction. Microwave-assisted extraction (MAE) conditions included magnetron power of 100, 180, 300W, extraction time 2, 4, 6 min. The research regaFding the extraction assisted by ultrasounds was performed at a frequency of 37 kHz, for 5, 10, 15, 20, 25, 30 min. The antioxidant activity was determined by the DPPH radical reaction method and the total phenolic content determined by the Folin-Ciocalteu method. The highest values with insignificant differences regarding both polyphenol content and antioxidant activity were obtained using ultrasound-assisted extraction for 20 minutes and microwave-assisted extraction at 300W magnetron power for 6 minutes. The action of ultrasound is explained by the cavitation process that leads to the creation of gases microbubbles dissolved in liquid that explode on the surface of a solid material, a process that generates microjets and shock waves directed at the solid surface. These microjets are used in the extraction of bioactive compounds from the plant matrix. Microwaves promote more intense hydrolysis processes of oligomers and polymers from the cell walls of the plant matrix that led to an increase in the concentration of polyphenols and flavonoids in Josta berry extracts. The non-conventional, environmentally friendly methods of extracting biologically active compounds, such as ultrasounds and microwave assisted extraction, offer much improved results, with reduced use of energy, equipment and solvent.

Keywords: bioactive compounds, environmentally friendly methods, microwave, plant based matter, ultrasound.

Acknowledgments: The research was supported by AUF project “Extraction ‘verte’, stabilisation et valorisation des composants bioactifs de *Ribes nidrigolaria* et *Cucurbita maxima*”.

F.2. PERSPECTIVES FOR THE USE OF LEGUMS AS SUBSTITUTES FOR ANIMAL PROTEINS

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Abstract. In recent years, due to health and environmental concerns, there is a great concern about the use of newly identified protein sources to replace all types of animal-derived proteins. This idea can be supported by the use of legumes that stand out for their appreciable protein content, rich in essential amino acids, and a high dietary fiber content. The purpose of this work was to identify the physico-chemical properties of legumes according to the content and quality of proteins in order to replace animal proteins in food products. Samples of lentils, chickpea and soybean were studied. Standard analysis methods were used to determine the physico-chemical indices for the analyzed samples (the content of dry substances, proteins, ash, foam capacity and stability). The obtained results showed that the soybean sample stood out with the highest protein content, followed by the lentils and chickpea. Lentils presented the highest content of dry matter and ash. The foaming capacity of the analyzed samples was shown to be higher for chickpea by 33 % compared to lentils and by 71 % compared to soybean. Foam stability was also higher for chickpea, followed by lentils and soybean. The foaming capacity is influenced not only by the protein content but also by saponins, by which the chickpea sample is highlighted. In order to solve environmental problems, social problems and to diversify the assortment of food products to meet the demands of different consumer groups, plant-based proteins can be used to replace animal-based proteins due to their balanced chemical composition, especially high protein content and foaming and gelling properties.

Keywords: chickpea, lentils, soybean, plant based proteins, protein replacement.

Acknowledgments: Moldovan-Turkish Bilateral Project 23.80013.5107.3TR Sustainable Nutrient-Rich New Generation Food Products Development: evaluating the relationship between ingredients, processing methods used, and techno- and bio-functional properties.

F.3. THE ANTIOXIDANT POTENTIAL OF LIGNANS EXTRACTED FROM FLAXSEED CAKE BY UNCONVENTIONAL METHOD

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Abstract. Flax (*Linum usitatissimum*) seed cake, a by-product of cold pressing oil technology, is an inexpensive but highly rich source of phenolic compounds, especially lignans. Lignans have attracted researchers' attention due to their antioxidant properties and natural cancer chemopreventive effects, along with other properties such as: cholesterol-lowering, cardioprotective, antiviral, antidiabetic, estrogenic/antiestrogenic, anti-inflammatory, antibacterial, antifungal, antidepressant etc. The most abundant lignan is the secoisolariciresinol diglucoside (SDG), which constitutes 95% of the lignans present in flax seeds. This lignan forms oligomers, built from five molecules of SDG linked by four units of 3-hydroxy-3-methylglutaric acid (HMGA). For the depolymerization and extraction of lignans, classical methods are applied, which are time-consuming and use aggressive

solvents. The aim of the research was to enhance the total polyphenol content and the antioxidant potential of hydroalcoholic extracts of flaxseed cake lignans by applying environmentally friendly microwave assisted extraction (MAE), with and without alkaline hydrolysis. In order to achieve this, flaxseed cake was degreased and degummed. The samples were combined with a hydroalcoholic solution of 70% ethanol, in a ratio of 1:19 (*m/v*); the pH of part of the samples was adjusted to 12 with a NaOH solution, followed by MAE at a power of 350W, for 7 min, at a temperature of 80 ± 5°C. The obtained extracts, I (hydroalcoholic solution) and II (hydroalcoholic solution, alkaline medium), were centrifugated. The proteins were sedimented from the supernatant. In the UV-Vis spectrum, peaks were recorded at λ=280 nm, characteristic of SDG, with a higher intensity for extracts II. Microwaves combined with alkaline hydrolysis depolymerized the lignan oligomers more extensively, releasing almost twice the concentration of SDG and phenolic compounds in extracts II compared to I. The DPPH antioxidant activity (in Trolox equivalents) for extracts II was twice as high, and the ABTS activity of both extracts was high, with a 1.5-fold increase in extracts II, accompanied by alkaline hydrolysis. Research has shown that microwave action contributes to better solubilization of phenolic compounds in both extracts, especially in an alkaline environment. Flax seed cake is an inexpensive and accessible source of biologically active compounds with high free radical scavenging capacity. Antioxidants from flax seed cake can be used as additives and natural preservatives in the food, pharmaceutical, and cosmetic industries.

Keywords: microwave, polyphenols, secoisolariciresinol diglucoside.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.4. MANUFACTURING PROCEDURE OF SPARKLING WINES IN PRESSURE VESSELS

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Abstract. The manufacturing cycle of sparkling wine in pressure vessels is 20-28 days. The contact of the wine with the yeasts is very short, compared to the production of sparkling wine according to the classical method, when the contact of the wine with the yeasts is at least 9 months. During the long-term contact of the yeasts with wine, as a result of the autolysis process, the wine is enriched with biologically active substances that improve the organoleptic properties of the sparkling wine, including the foaming and pearling properties. The aim of this work is to improve the foaming and pearling properties of sparkling wines produced in pressure vessels (acrotophores) as well as to improve their quality. The mentioned problem is solved by the fact that the manufacturing process of sparkling wines in pressure vessels includes: the preparation of the tirage and the use of "liqueur de tirage" enriched with biologically active substances and with surface tension; the enrichment of draft liquor with biologically active substances is done by administering in the "liqueur de tirage" with a sugar content of 600 ÷ 700 g/L, the preparation of dry yeasts for their plasmolysis under the action of osmotic pressure; the rest period after administration of the dry yeast preparation in tank liquor is at least 24 hours. The wine made according to the proposed process has obviously better the foaming and pearling properties than the wine made according to the known process. The foam and bubbles in the wine produced according to the proposed process are more dispersed, the duration of the pearling is longer, and the aroma and taste in the wine produced according to the proposed process have typical sunflower nuances for the wine produced according to the classical method in bottles. On

the basis of the research carried out, the PATENT of the invention "Procedure for manufacturing sparkling wine in pressure tanks" No. 1697 issued under Law No. 50/2008 on the protection of inventions was obtained. Date of publication of the decision to grant the Patent was on 2023.06.30, BOPI no. 6/2023industries.

Keywords: biologically active substances, sugar, plasmolyzed yeast, ”liqueur de tirage”, white wine.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 “Optimizing food processing technologies in the context of the circular bioeconomy and climate change”, Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.5. FUNCTIONAL BISCUITS ENRICHED WITH GRAPE SEED FLOUR

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Abstract. The purpose of the practical research consisted in the development of the technology of classical biscuits, using the *Pinot Grigio* and *Chardonnay* varieties dried grape pomace (flour). As a result, the description of the influence of grape flour on the biscuits baking and technological properties, the quality of the semi-finished product and the finished product were achieved. The ratio of functional flour ranged within 2, 4, 6 and 8 % of the wheat flour recommended in the technological recipe. Analyzing the moisture values of the semi-finished products, they vary between 2.43 ÷ 5.24 %, the alkalinity of the samples decreased with the increase in the content of grape flour, from 1.67 to 0.6, an effect described by the major content of grape seed flour in dietary fiber. The control sample of the analyzed biscuits has a light brown color, but with the increase in the weight of grape pomace flour, the color becomes significantly darker due to the relatively high content of tannins (the biscuit sample containing 8% has a dark brown color). Research has shown that grape pomace is a rich source of extractable phenolic antioxidants (polyphenols, especially flavanols, tannins), trace elements, non-fermentable sugars, pigments and other compounds with functional properties. It can be used to fortify food and as a supplement for a safety food.

K**eywords:** biscuits, grape seed flour, technological properties.

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F.6. EFFECTS OF REPLACEMENT OF CITRIC ACID WITH ACETIC ACID ON THE QUALITY OF VEGAN GUMMY CANDY

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Abstract. Citric acid is a commonly used preservative in drinks, sweets and canned food. But the number of people suffering from allergies is increasing every year due to widespread use and often in the form of synthetic additives. The purpose of the work was to develop alternative jelly sweets based on natural ingredients as a replacement for synthetic analogues, as well as the effect of replacing citric acid with acetic acid on the organoleptic and microbiological characteristics of sweets. In this study, vegan gummy sweets were made using local raw materials purchased from a local eco market. Developed gummy candies containing grape juice as a source of color, flavor and biologically active compounds. Organic wine vinegar has been added as a natural preservative and color stabilizer. The results obtained showed that the mass fraction of moisture in the developed candies is overestimated and ranges from 70 to 75%. This is explained by replacing sugar with honey and using liquid ingredients: juice and vinegar. At the same time, the samples turned out to be microbiologically stable, which indicates the positive antimicrobial effect of natural vinegar.

Keywords: vegan candies, citric acid, acetic acid, vinegar, preservatives.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 “Optimizing food processing technologies in the context of the circular bioeconomy and climate change”, Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.7. LIPOSOMES: A POTENTIALLY EFFECTIVE WAY TO DELIVER NUTRIENTS AND ACTIVE INGREDIENTS IN FOOD

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Abstract. Healthy lifestyle choices made by consumers have fueled the growth of innovative functional food products. In order to better explain the functionality of liposomes under various processing conditions, a recent study isolates functional products based on classed liposomes and determines the influence of each formulation ingredient and its stability. Prioritization is been given to the relationship between bioactive compounds, phospholipid type, cholesterol content, and different wall materials, as well as liposomal vesicle stability. Food-derived phospholipids are a term used to describe lecithin preparations that contain mixtures of phosphatidylserines (PS), phosphatidylcholines (PC), phosphatidylethanolamines (PE), and phosphatidylinositol (PI) along with other substances like sterols and free fatty acids (FFAs). In the experimental condition a phospholipid emulsion was used to fabricate liposomes, the subsequent test of their stability and the effectiveness of the active ingredient incorporation. Working conditions was: electric plate with magnetic stirrer 700-1000 rpm/min, standard working solution (2% dihydroxy-quercetin and 1.5% egg lecithin in ethyl alcohol pure), working emulsion (5% glycine solution in distilled water), stirring 700-1000 rpm, administration of DHQ/lecithin solution with flow rate of 1 ÷ 1.5 ml/sec (micropipette). Based on the experimental results, it is revealed that the liposomes produced in the study are of variable size (30-200 nm),

thermodynamically stable the first 20-25 minutes after preparation. For further studies, it is proposed to manufacture liposomes by other analytical methods, which would allow obtaining stable liposomes and evaluating the efficiency of practical liposomal encapsulation. To assess the therapeutic activity of natural substances, further biological research and clinical investigations using stealth-stimuli-sensitive, stealth-ligand-targeted, or theragnostic liposomes are needed to better understand digestive behavior, target mechanisms, and cellular absorption.

Keywords: bioactive compounds, liposomes, stability.

Acknowledgments: The research was supported by AUF Project *Valorisation des composés bioactifs issus de déchets agro-industriels par encapsulation lyposomale - ENcap-LYPOSOM*, being implemented at the Faculty of Food Technology, Technical University of Moldova.

F.8. EVALUATION OF THE CONTENT OF POLYPHENOLIC SUBSTANCES IN SEEDS OF FERMENTED MARC OF RED AND WHITE GRAPES

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Abstract. Grape marc, the byproduct of the wine industry, is an important source of antioxidants and dietary fiber with valuable nutritional properties. Due to the high concentrations of biologically active compounds, especially polyphenols, as well as the large volumes of waste produced annually, marc can become a promising and economically profitable source of nutraceuticals. Polyphenols are known for their properties to neutralize free radicals, transforming them into less harmful ones, and therefore can be applied as antioxidants in the food industry, pharmaceuticals, and other fields. The objective of this study was to evaluate the total content of phenolic compounds (TPC), which can be obtained from white and red grape seed powder with harmless solvents (hydroethanolic solution) and to determine the DPPH antioxidant activity (in trolox equivalents per gram of dry substance, DW) of the extracts. In order to achieve the goal, the separate seeds from the marc of 6 grape varieties grown on the vineyards of Moldovan wineries Cricova, Criuleni and Ialoveni in 2021 were studied. The white grape varieties - Chardonnay Criuleni, Chardonnay and Pino Meunier Cricova; the red grape varieties - Muscat Ialoveni, Pino Noir and Feteasca Neagră Cricova, were manually harvested, processed, and fermented in stainless steel containers at a temperature of 25-26°C at Cricova Winery, Chisinau. The grape marc was separated by pressing and stored at a temperature of -20°C. The biologically active substances from grape seeds were extracted with a 60% ethyl alcohol mixture, in a ratio of 1:30 (m/v), then macerated at room temperature for 24 hours in the dark. After maceration, the biologically active substances were extracted by the ultrasound-assisted method for 30 minutes at a temperature of 40°C (40 kHz), followed by centrifugation and spectrophotometric analysis of the supernatants. According to the bibliographic study, in hydrophilic reed seed extracts, the amount of total extractable polyphenols varies depending on the variety, between 42.9 and 114.8 g of gallic acid equivalents (GAE) per kilogram of dried seeds. In all extracts of the 6 grape seed varieties cultivated in Moldova, significant TPCs were determined, ranging from 97.4 to 173.17 mg GAE/g, the highest being recorded for red grapes Muscat, of 17.3 %. The antioxidant activity of all hydroalcoholic extracts had notable values. The correlations between antioxidant activity DPPH (mg TE/g DW) and TPC (mg GAE/g DW) values were detected using a simple linear regression model, $R^2 = 0.9795$.

The results of the present study indicate that grape seeds are a natural, valuable source of antioxidants. The fermentation of grapes does not diminish the content of extractable biologically active compounds, and polyphenols recovered with green solvents can be used as antioxidants to enhance the functional values of food, in cosmetology, pharmaceuticals etc.

Keywords: grape seed, antioxidant activity, polyphenols.

Acknowledgments: The research was supported by the AUF Project "Valorisation de composes bioactifs issus de déchets agro-industriels par encapsulation lyposomale (ENcap-LYPOSOM)

F.9. THE USE OF DIETARY FIBER IN THE CONTEXT OF THE CIRCULAR BIOECONOMY

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Abstract. Dietary fibers are biologically active substances that can serve as a food additive to enrich food products to make them functionally oriented towards the prevention of many diseases associated with digestive disorders, cardiovascular problems, and obesity. Currently there are many fiber extraction methods that are already widely used in practice - chemical, mechanical, thermal, and enzymatic. Dietary fibers can be introduced into products from different food industries. In the case of the bakery and pasta industry, they ensure increased hydration values of the flour during baking and improve the culinary properties of the pasta. In the dairy industry, dietary fibers are used to replace fat due to their gel-forming ability and to improve texture parameters. For meat products, the addition of fiber contributes to the increase in viscosity, has a beneficial influence on the structure and juiciness of the meat, and can reduce the energy value of the food. Thus, thanks to dietary fiber, it is possible to increase the range of functional food products and solve a few problems related to the irrational use of waste in the food industry. However, it is necessary to continue the study of dietary fibers, which can be obtained from different vegetable raw materials to identify more positive aspects or possible risks of their introduction into food. In addition, it is necessary to review the functional foods already consumed with dietary fiber to determine their acceptability for the population and future generations, as well as the rationality of their use for producers, for the country's economy and for the preservation of the ecosystem through the possibility of ensuring zero waste production.

Keywords: soluble fibers, insoluble fibers, agro-industrial waste, functional foods, quality.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 “Optimizing food processing technologies in the context of the circular bioeconomy and climate change”, Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.10. EVALUATION OF NUTRITIONAL AND PHYTOCHEMICAL COMPOSITION OF MOLDAVIAN DRIED PLUMS (PRUNUS DOMESTICA)

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Abstract. Plums are fruit crops that are frequently processed to preserve and diversify their assortment. The technological qualities, and especially the compositional ones, are influenced by the selected plum species and the drying method. Dried plums can be considered food products with quite high nutritional value, because in the drying process, which leads to a decrease in humidity from 85 to 30 %, an increase in the amount of sugars, organic acids, phenols, flavonoids, and anthocyanines per 100 g of product is observed. Dried plums have multiple technological uses, being crushed and syruped they serve to prepare desserts and fillings. Dried plums without pit of the Vengherca species generally weighed 6.76 ± 1.3 g were pre-packaged in polyester casseroles, were purchased from the local market. The product presented moisture of 28.6 %, ash content – 1.80 g/100 g, P – 22.9 mg/100 g, Fe – 1.10 mg/100 g, nitrates – 6.7 mg/kg. The preparation of samples for spectrophotometry included the extraction of components, the ratio of solvent to product was 20:1. For clarification, the samples were centrifuged (5 min, 3000 rpm). UV-VIS molecular absorption spectra were recorded in the 190 - 1100 nm range with a Lange DR-5000 spectrophotometer (Germany). It was determined that among the phenolic compounds in dried plums, caffeic acid predominates.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 “Optimizing food processing technologies in the context of the circular bioeconomy and climate change”, Bio-OpTehPAS, being implemented at the Technical University of Moldova.

Keywords: dried plums, nutritional value, UV-VIS spectra, phenolic acids, anthocyanines.

F.11. INNOVATIVE TECHNOLOGY FOR PRODUCING NATURAL YELLOW AND RED DYES FROM SAFFLOWER PETALS

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Abstract. Concern is growing among population about the consumption of safely foods. Great interest is manifested to natural dyes. The technology for extraction of chalcones from safflower petals was developed. The main feature of created technology is simultaneous production of yellow and red natural dyes. The production technology begins from petals hydrating (ratio petals : water is 1 : 10). The pigments extracting process takes place with a mixture of potable water with the sodium carbonate, Na_2CO_3. The extraction is carried out at the temperature of 20 ± 2°C, 15 minutes in a reactor equipped with a stirrer until the extract’s constant color. The petals separation and the extraction take place using pressing process and decanter. Four extraction cycles take place until the petals color disappear. Separation of the red pigment, Carthamin, occurs by its sedimentation in the solid form.

The liquid yellow dye and the solid red dye are supposed to concentration and dehydration by distillation and drying with IR rays, at the temperature of 60 - 70°C until the water activity a_w = 0.35 - 0.40. The advantage of the developed technology is obtaining of two natural dyes from the same batch of petals.

Keywords: chalcones, food additives technology, red and yellow dyes, safflower petals.

Acknowledgments: The research was supported by Institutional Project, Subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.12. EFFECT OF PLANT PROTEINS FINING ON PHENOLIC COMPOUNDS AND COLOR INDICES OF RARA NEAGRA RED WINE

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Abstract. Wine is a complex matrix which contains a wide variety of proteins, some of which are unstable, naturally forming an opalescence, so the wine will have an unpleasant appearance. From the oenological point of view, the protein stability process is considered to be the state of equilibrium, the main role being to preserve the clarity, the specific physical-chemical parameters and organoleptic properties of the variety. Considering the allergenic issues with using animal proteins in order to clarify the wines and the increased demand for vegan wines, new researches are needed to promote alternative wine fining agents like plant extracted proteins. The study was focused on comparing two plant proteins (pea, potato) and gelatin (pork origin) and their action on the phenolic compounds content and color indices of Rara Neagra red wine using spectrophotometric method, as well as the physical-chemical and sensorial assessment. Fining treatments produced no significant reduction of total polyphenolic compounds, ranging from 6 to 9 %, the greatest decrease being noticed in samples treated with gelatin. All fining agents produced a low decrease of color intensity, varying from 4 to 10%. Results showed that plant proteins could be used as effective fining alternatives to animal proteins like gelatin.

Keywords: fining, plant proteins; phenolic compounds, wine.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.13. ANTIMICROBIAL AND ANTIFUNGAL ACTIVITY OF PUMPKIN POWDER (CUCURBITA MOSCHATA)

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Abstract. Pumpkin (*Cucurbita moschata*) is famous for its nutritional value and beneficial health effects. It is consumed in abundance as a functional food and medicine to treat various health conditions. In this study, the antimicrobial activity of pumpkin powder against Gram-positive (*Staphylococcus aureus*, *Bacillus cereus*), Gram-negative (*Escherichia coli*, *Salmonella Abony* and *Pseudomonas aeruginosa*) and antifungal activity against *Candida albicans* was evaluated. The obtained results demonstrated that pumpkin powder has a bactericidal effect both on Gram-positive and Gram-negative bacteria, as well as on Candida yeasts. Pumpkin powder demonstrated antibacterial activity with the maximum zone of inhibition for *Candida albicans*, followed by *Pseudomonas aeruginosa*, *Bacillus cereus* and *Escherichia coli*. The lowest zone of inhibition was recorded for the species *Salmonella Abony*. The results of the study on the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values of pumpkin powder demonstrated that the highest MIC values were for *Salmonella Abony* strains, followed by *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The lowest MIC values were for *Bacillus cereus* and *Candida albicans*. In the case of MBC values, the highest values were obtained for *Salmonella Abony*, and the lowest for *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* strains. The antimicrobial effect of pumpkin powder is due to the high concentrations of polyphenolic compounds. These compounds are responsible for the antimicrobial activity due to the polar isopropyl functionality of the phenolic components that react with the cellular components of pathogenic microorganisms and lead to leakage of nucleotides and protein material into the extracellular areas. Thus, pumpkin powder can be successfully used in the manufacture of various food groups as a functional ingredient having antimicrobial activity against various microorganisms.

Keywords: Cucurbita moschata, Gram-positive bacteria, Gram-negative bacteria, yeast, minimum inhibitory concentration, minimum bactericidal concentration, polyphenolic compounds.

Acknowledgments: The research was supported by AUF project "Extraction 'verte', stabilization et valorisation des composénts bioactifs de Ribes nidrigolaria et Cucurbita maxima".

F.14. INFLUENCE OF STORAGE CONDITIONS ON THE ANTIOXIDANT ACTIVITY OF GRAPE MARC EXTRACTS

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Abstract. The biologically active compounds of grape marc can be used in the formulation of food matrices in order to replace colorings, antioxidants and preservatives of synthetic origin. This is why it is important to determine the optimal technological conditions that can influence their antioxidant activity. In order to obtain the extract, grape pomace (*Vitis*

vinifera) of red varieties was dried at a temperature of 65 ± 1 °C, ground into powder and sieved. The extraction was carried out in a 50% vol. ethanolic solution, in a solid:liquid ratio (1:10). High concentrations of polyphenols - 4814 mg GAE/L of extract and flavonoids - 3699 mg GAE/L of extract, were detected. The influence of storage conditions of grape pomace extracts on antioxidant activity was studied. The extracts were stored for two weeks at different temperatures: -2°C, 4 °C and 25-30 °C. The temperature range 25-30 °C was found to have a significant impact on the antioxidant activity of grape pomace, contributing to its increase from 31.16 mmol TE/L (fresh extract) to 33.46 mmol TE/L. Other storage conditions did not have a significant influence on antioxidant activity compared to fresh grape pomace extract. The identified compounds have antioxidant and therapeutic activity and could be used for new food formulations.

Keywords: antioxidant activity, biologically active compounds, grape marc.

Acknowledgments: The research was supported by AUF Project ”Valorisation de composes bioactifs issus de déchets agro-industriels par encapsulation lyposomale (ENcap-LYPOSOM)”, being implemented at the Technical University of Moldova.

F.15. PUMPKIN FLOUR – NATURAL INGREDIENT USED IN THE MANUFACTURE OF TRITICALE PASTA

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Abstract. Nowadays, culinary innovation has become a key factor in meeting consumer demands. A notable example of this gastronomic innovation is triticale pasta with pumpkin. This culinary creation brings together two basic ingredients, triticale flour and pumpkin, to create a particularly tasty and nutritious product that satisfies not only the tastes, but also the health requirements of consumers. In this context, the research and development of the use of triticale flour with pumpkin in the production of pasta is an area of increased interest in the food industry. The objective of this study was to investigate the effect of pumpkin flour in different concentrations (1.5 - 7.0 %) on dough rheological properties, sensory quality, physicochemical and color parameters of dry and cooked triticale pasta. Pumpkin flour proved to be a rich source of bioactive compounds (polyphenols, flavonoids, carotenoids) with high antioxidant potential. Compared to the control sample, the introduction of pumpkin flour influenced the decrease in elasticity and gum of the dough and led to the formation of dough with minimal resistance to deformation. The sensory analysis showed that the pasta with the addition of 5% pumpkin flour accumulated a high score. Thus, it is relevant to develop rational technologies based on science to obtain pasta based on triticale flour and pumpkin flour, with improved sensory qualities and high nutritional value.

Keywords: pumpkin flour, triticale pasta, dough rheological properties, sensory quality, physicochemical parameters, color parameters.

Acknowledgments: The research was supported by AUF project "Extraction 'verte', stabilization et valorisation des composénts bioactifs de Ribes nidrigolaria et Cucurbita maxima".

F.16. THE STABILITY OF BIOACTIVE COMPOUNDS IN LIPOPHILIC EXTRACTS FROM LOCAL BERRIES

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Abstract. Evaluating the stability of bioactive compounds in local berry extracts helps to assess the quality and antioxidant capacity of these products during storage. Oxidative stability is an important parameter to determine extracts quality and shelf life because low molecular weight compounds are produced during oxidation. This study aimed to monitor the stability of bioactive compounds from sea buckthorn, hawthorn and rosehips, which represent a natural concentrate of vitamins, carotenoids, folic acid etc. The values for antioxidant capacity of lipophilic extracts varies from 72.05 ± 1.90 % to 90.84 ± 1.90 %. This fact is explained by the rich content of biologically active compounds with an antioxidant character in the analyzed extracts and directly in the plant powders from indigenous berry fruits. The content of chlorophyll α and β, β-carotene, lycopene and zeaxanthin in the lipophilic extracts was determined spectrophotometrically. The results obtained show that the lipophilic extracts are characterized by a rich carotenoid content. RLE contains an essential amount of β-carotene (17.04 mg/L), RLE - 1.6 times less and SBLE 2.6 times less. After 3 months storage, the β-carotene content decreased for RLE by 15 %, SBLE by 5 % and HLE by 30 %. The use of local raw materials represents a particular advantage to considerably reduce production prices, so that the market price of the finished product is also affordable.

Keywords: antioxidants, carotenoids, oxidation, lipophilic, extracts.

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F.17. IN VITRO ANTIOXIDANT ACTIVITY OF OILS ENRICHED WITH HAWTHORN (CRATAEGUS) LIPOPHILIC EXTRACT

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Abstract. Various studies have been done to identify antioxidants from plant sources and efforts have been taken to incorporate it in food matrices as natural antioxidants. The vegetable oils enriched with hawthorn lipophilic extract have been evaluated for *in vitro* antioxidant activity (AA) using DPPH radical scavenging assay. The evaluation of the antioxidant activity following induced gastric digestion attested an essential increase for the enriched oil compared to CS whose values are 17.58 ± 0.90 %. For enriched oil the values are 39.29 ± 0.90%. The high values of antioxidant activity for lipophilic extract compared to CS after 2 hours of digestion are explained by the gradual release of biologically active compounds in the process of gastric digestion. The results after intestinal digestion show us that the antioxidant activity of the enriched oil is higher compared to CS. The antioxidant activity of sunflower oil is 4.26 ± 0.3 %, while for enriched oil the AA value is 4.56 ± 0.3 %. Following intestinal digestion, a gradual decrease in antioxidant activity is observed within 2 hours for both samples. This fact can be explained by the low stability of the biologically active compounds in the conditions of the alkaline environment and the formation of metabolites that inhibit the antioxidant activity of the biologically active compounds in the

studied products. The results indicate that hawthorn lipophilic extract is a significant source of natural antioxidants, which might be helpful in preventing the progress of various oxidative stresses.

Keywords: digestion, oxidation, lipophilic, extracts, antioxidants.

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F.18. TECHNOLOGICAL PROPERTIES OF OILSEED MEALS OBTAINED FROM THE LOCAL FAT AND OIL INDUSTRY

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Abstract. The Republic of Moldova possesses various by-products from the local oil and fat industry, including meals derived from sunflower seeds, linseeds, pumpkin seeds, walnuts, and almonds. These by-products can serve as accessible sources of dietary fibres, essential fatty acids, and vegetable proteins. The industrial process of obtaining oilseed meals significantly influences their physicochemical and technological properties. Samples collected from different parts of the receiving hopper were ground into flour and comprehensively analyzed to assess the quality of the raw materials. Oilseed meal typically has an uneven plate shape, requiring grinding, sifting and packaging to produce flour. Additional cleaning, especially during the sifting step, is critical for sunflower and pumpkin meals containing peels to ensure a fine and uniform product. Almond and walnut oilcakes obtained by pressing at a temperature of 50 – 60 °C are characterized by the presence of large particles (2...2.5 mm) and a yield of more than 45 %. This fact corresponds to the high content of total fat (18 – 20 %) in the composition of the by-products. Concerning water absorption capacity, except for pumpkin flour, all samples show high values, which requires the regulation of the amount of water in the production of pastry products. The identified technological properties of industrial meals can serve for the development of new food products with a high content of unsaturated fatty acids, protein and fibres.

Keywords: fibers, oilcake, oilseed meal, pastry products, unsaturated fatty acids, vegetable proteins.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.19. VALORIZATION OF VEGETABLE PROTEINS OBTAINED FROM LOCAL AGRO-FOOD WASTES

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Abstract In the modern world, the need for proteins and protein products is constantly increasing. According to the World Health Organization (WHO), the diet of more than 60% of the world's population is characterized by insufficient protein intake. The accessible

solution is the utilization of vegetable sources of protein. Obtaining proteins from local agro-food wastes is cheaper, fits veganism - the current trend, and doesn`t require more storage and transport expenses than raw materials of animal origin. The agro-food resources from secondary products of the local oil and fat industry (meals from linseeds, sunflower seeds, pumpkin seeds, hemp seeds, almonds and walnuts), due to their composition (20-35% protein content), can be used as accessible sources of vegetable proteins and fibres to obtain new products with increased nutritional value. The production of plant-based milk, fermented beverages, and derivative products is of particular interest. Walnut and almond oilcakes in this context stand out as promising sources owing to their high total fat content (18-20%), facilitating the formation of stable emulsions and imparting a rich nutty flavour to the final products. The popularization of protein compositions of plant origin will allow the production of different high-quality products while reducing raw material and energy costs.

Keywords: by-products, lactose-free products, oilcake, oilseed meal, vegetable proteins.

Acknowledgments: The research was supported by the Project 23.70105.5107.06T "Valorization of vegetable proteins from secondary products of the local fat and oil industry", being implemented at the Technical University of Moldova.

F.20. SEA BUCKTHORN PRESS RESIDUES AS A PROMISING RAW MATERIAL FOR DEVELOPING FUNCTIONAL PRODUCTS

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Abstract. *Hippophae rhamnoides* L. cultivated in the Republic of Moldova is a rich source of bioactive compounds, particularly carotenoids, flavonoids, ascorbic acid, and organic acids. The study investigated the sensory indicators, chemical composition (including moisture and ash content, titratable acidity, pH and water activity), phytochemical compounds, as well as the antioxidant and antibacterial properties of fresh berries and dried sea buckthorn pomace. The sea buckthorn that was tested was found to have high carotenoid content (404 mg/100 g DW), ascorbic acid content (192 mg/100 g DW), and organic acids (including: malic acid - 11.9 mg/100 g DW, citric acid - 0.2 mg/100 g DW, and succinic acid - 1.1 mg/100 g DW). The flavonoid content (275 mg/100 g DW) was also high, including flavanols, flavonols, and their glycosides, particularly isoramnetin-3-rutinoside, isoramnetin-3-glucoside-7-rhamnoside, and epigallocatechin. An interdependence was observed between the chemical indicators of *Hippophae rhamnoides* L. pomaces and its antibacterial activity against Gram-positive spore-forming microorganisms from *Bacillus* ssp., which are known to cause food poisoning. It was discovered that drying the sea buckthorn residual pulp at 50 ± 2 °C has minimal impact on its sensory, physicochemical, and bioactive parameters. Dried ground sea buckthorn pomace is a rich source of bioactive compounds and has high antioxidant potential. It can be used in the food industry for food fortification and preservation of microbiological stability during storage.

Keywords: *Hippophae rhamnoides* L., pomace, carotenoids, flavonoids, ascorbic acid.

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bioactives.

F.21. NATURAL BROWN INNOVATIVE FOOD COLOR BASED OF WALNUT KERNELS PELLICLE

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Abstract. Natural Brown dye for the foods is prepared by walnut kernels processing and contains natural phenolic compounds. These compounds inhibit lipid peroxidation, maintaining the organoleptic characteristics of the product as a whole for a longer time. Elaborated technology contributes to solve some problems of using agricultural and food wastes by extracting of biologically active compounds. Extraction was carried out using the hydro module from 10 / 15 to 10 / 35 using walnut kernels and a solution containing know-how amounts of ethanol and sodium carbonate. The dye extraction was accelerated by ultrasound, which contributes to the efficient diffusion of phenolic compounds from the pellicle into the extract phase. For the good extraction, in the same time, for the preservation of the biological value of the unsaturated omega-3 and omega-6 lipids in the walnut kernels subjected to the extraction, the strict conditions of temperature and time were respected. The extract was concentrated and transformed into a solid form, consisting of microgranules (2...20 microns) of calcium carbonate, on which natural phenolic compounds extracted from the walnut kernel's pellicle were fixed. The obtained solid colorant presents a dark brown fine powder that can be used for coloring of pastries, bread and sweets.

Keywords: adsorption, biologically active phenols, extraction, food dye, pastries.

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F.22. FUNCTIONAL CONFECTIONERY PRODUCT ENRICHED WITH VEGETABLE POMACE

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Abstract. Vegetable pomace is considered a functional food, the addition of which to confectionery products can improve their sensory properties and biological value. The aim of the work was to study the effect of pumpkin pomace powder added in different proportions from 10 to 30% on the sensory, physico-chemical quality, textural and color characteristics and microbiological stability of the foamy confectionery product. The biological value of pumpkin pomace powder (total content of polyphenols, carotenoids and antioxidant activity) was analyzed. In product samples sensory quality (taste and smell, shape, consistency and surface), physicochemical indicators (moisture content, ash content, pH, titratable acidity, water activity, soluble substance content), biological value (total polyphenol content and antioxidant activity), texture parameters (firmness, cohesion, elasticity, gumminess), color and microbiological stability during 45 days of storage were determined. Increasing the concentration of pumpkin pomace powder contributed to an essential change in the sensory characteristics, especially the color, consistency and taste. It was also revealed that there is a direct correlation between the total content of polyphenols and the antioxidant activity in samples with different concentrations of pumpkin pomace powder. Microbiological results demonstrated a high level of antimicrobial activity of pumpkin pomace powder that have

maintained product stability during storage. The best results were shown by samples containing 15-20% pumpkin pomace powder, which can be recommended for manufacturing under industrial conditions.

Keywords: pumpkin pomace powder, foamy confectionery product, textural parameters, microbiological stability, quality.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.23. INFLUENCE OF THERMAL PROCESSING ON CAROTENOID CONTENT AND ANTIOXIDANT ACTIVITY IN BERRIES PULP

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Abstract. The capacity to improve the health of the population depends greatly on the quality of the consumed food, which is in turn influenced by their thermal processing. Berries can be eaten fresh, frozen or dried. For research, 3 types of berries from the Republic of Moldova were selected: sea buckthorn (*Hippophae rhamnoides*), rosehip (*Rosa canina L.*) and mountain ash (*Sorbus aucuparia*), which can be recommended for producing functional food as a source of biologically active compounds as natural dyes and antioxidants. The aim of the study was to investigate the influence of thermal processing on carotenoid content and antioxidant activity in berry's pulp. Berries of native indigenous population were selected for the needs of the current study. Harvest took place from September to November 2023. Fruit was frozen at temperature of -18 ± 1°C and dried at room temperature and at temperature of 65 ± 1°C. The carotenoid content and antioxidant activity in berry's pulp were comparatively determined by spectrophotometric and high performance liquid chromatography (HPLC) methods. Antioxidant activity was determined using the method based on stabilized silver nanoparticles. In the case of frozen berries, the highest carotenoid content was recorded in rosehip, followed by sea buckthorn and mountain ash. Thus, the carotenoid content varied, for frozen berries, between 37.16 mg/100g DW and 68.73 mg/100g DW. The carotenoid content decreased by approximately 2-fold in the dried sea buckthorn, of 1.3 times in the dried rosehip and of 1.6 times in the dried mountain ash. The temperature of the drying agent did not essentially influence the carotenoid content of the dried berries. The antioxidant activity of the thermal processing berries was also investigated. In the case of frozen samples, the highest antioxidant activity was observed in mountain ash berry (with an average of 440.66 mg GAE/100 g DW) followed by rose hip berry (430.47 mg GAE/100 g DW) and the lowest in case of sea buckthorn (148.82 mg GAE/100 g DW). Antioxidant activity of dried berries at 65 °C was found to be higher than that of frozen samples. Thus, thermal processing has been found to have a different influence on the carotenoid content and antioxidant activity in the investigated berries.

Keywords: sea buckthorn, rosehip, mountain ash, antioxidant activity, carotenoids.

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F.24. THE INFLUENCE OF THE MICROWAVE METHOD REGIME ON THE ANTIOXIDANT ACTIVITY OF JOSTA BERRY

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Abstract. Nowadays nutrition focuses more on complementary aspects than simply covering the needs of major components. In this context, increased attention is drawn to forest fruits due to their antioxidant properties, which are related to the high concentration of polyphenols, vitamins, organic acids present in them. This group of fruits also includes Josta berry, cultivated in the Republic of Moldova. The target of this work was to investigate the influence of microwave assisted extraction (MAE) conditions: different magnetron power (100W, 180W, 300W) and extraction time (2, 4, 6 min) on the total phenolics content and antioxidant potential of frozen and dried Josta berry. The antioxidant activity was determined using the method by reaction with ABTS radical and total phenolics content ware determined using the Folin-Ciocalteu method. The best results were obtained at the magneton power of 180 W and 300 W and for 6 minutes. The slightly higher content of polyphenols was obtained for the dried Josta berry samples, because the drying process leads to the destruction of the cell walls in the plant matrix, thus contributing to the release of soluble polyphenols in the hydroalcoholic extract. However, the antioxidant activity of dried Josta berry samples is almost 5 times lower compared to frozen samples, because most of the vitamin C and flavonoids, especially anthocyanins, that are destroyed in the drying process. The extraction of quantitatively and qualitatively active biological compounds from Josta berry, which is a rich source in antioxidants, through non-conventional methods will allow the utilization of these fruits in obtaining food products with high biological value.

Keywords: anthocyanins, bioactive compounds, extraction methods, forest fruits, non-conventional, polyphenols.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.25. ULTRASOUND-ASSISTED EXTRACTION OF SOLUBLE DIETARY FIBER FROM QUINCE POMACE

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Abstract. Quince fruits (*Cydonia oblonga*) are a source of bioactive compounds including phenolic acids, flavonoids, organic acids and dietary fiber, which have various beneficial effects on human health. Due to their high hardness and sour, astringent and bitter taste, these fruits are not suitable for direct consumption and are usually used in manufacture of jam or juice. The processing of these products generates large amounts of biological waste. Quince pomace can represent a commercial alternative source of soluble dietary fiber. They are widely used in the food industry as emulsifiers, stabilizers and gelling agents. Soluble dietary fibers are also used as edible materials incorporating bioactive compounds (e.g. coatings and films in the nano- and microencapsulation techniques). Ultrasound-assisted extraction is considered a promising technique for obtaining dietary fiber. Numerous studies demonstrate that the use of ultrasound-assisted extraction improves the physicochemical characteristics,

microstructure and functional properties of the extracted dietary fibers. Therefore, the aim of this study is to determine the effect of classical acid extraction (AE) and ultrasound-assisted acid extraction (UAE) on the chemical composition and functional properties of soluble dietary fibers. The results showed that the applied extraction methods had significant effects on the extraction yield, molecular weight distribution, content of methoxyl groups, anhydrogalacturonic acid, degree of esterification and functional properties. It is worth noting that the soluble dietary fibers extracted by UAE have a lower molecular weight and better functional properties. These results suggest that quince pomace may be a natural source of soluble dietary fiber.

Keywords: quince pomace, soluble dietary fiber, functional properties, ultrasound-assisted extraction.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.26. COMPARATIVE ANALYSIS OF TESTING METHODS FOR THE CONTENT OF PHTHALATE RESIDUES IN WATER

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Abstract. The global consumption of drinking water, combined with the effect of climate change, causes risks of anthropogenic contamination with chemical residues and their transfer along the food chain. Phthalates are substances of industrial origin, which are used extremely widely, being especially used as plasticizers for polymeric substances (PVC) for their quality of printing plasticity, extensibility and resistance to breaking. In 2018, the world production of PVC was 44.8 million tons, with an annual growth rate of 2.0 % between 2011 and 2024, so the risks of environmental contamination persist and worsen. The main ways of contamination with phthalates are air emissions (degradation of PVC products, painted surfaces) and losses through solubilization (leaks from roofs and pavements during rains, cleaning vehicles, paints, etc.). The solubility of phthalates in water is inversely proportional to the chain length of the substituents. The purpose of the research consisted in the comparative analysis of the methods of testing the content of phthalates (DMP and DEHP) in water. The GC/MS method was used to test the residual content of phthalates in drinking water. The research was carried out by 2 methods: with the prior extraction of phthalates and subsequent analysis of the content of phthalates in the obtained extracts; by the method of direct analysis of phthalates with the application of microextraction in solid phase (HS-SPME-GC-MS method). The optimal regime for the extraction of phthalate residues in extrapure chloroform was established. Subsequently, the optimal conditions were established (GCMS-QP2010 x AOC-5000, "head space" injection mode). The results were compared with those obtained by the solid phase microextraction method, on a Carbowax-divinylbenzene fiber (HS-SPME-GC-MS, CW-DVB). Based on the experimental results, the chromatographic conditions were optimized (HS-SPME-GC-MS, CW-DVB). It was found that higher temperatures favor microextraction, because the pressure of the saturated vapors of the phthalates increases rapidly as the temperature rises. CW-DVB fiber has a higher affinity for lower molecular weight esters (DBP relative to DEHP).

The analysis of the results demonstrates the applicability of both methods. However, in the range of low concentrations (<0.05 mg/L) the sensitivity of the HS-SPME-GC-MS method is higher, while at medium and high concentrations (>0.1 mg/L) the HS-SPME- GC-MS has low repeatability.

Keywords: contamination, phthalates, PVC, microextraction, water.

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F.27. CORRELATION BETWEEN THE MICROBIOLOGICAL STABILITY OF WINE AND THE FORMS OF SULFUR DIOXIDE

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Abstract. Sulfur dioxide has been the most common additive used in winemaking for decades. The importance of SO_2 is emphasized due to its antiseptic and antioxidant properties, but it can have negative effects on human health. The purpose of the study was to elucidate the influence of sulfur dioxide forms on the microbiological stability of Chardonnay and Feteasca Regală dry white wines, produced within the Oenological Research Center at the Technical University of Moldova. The species of microorganisms studied were from the category of oenological yeasts (genus *Saccharomyces*), contaminating yeasts (genus *Brettanomyces* and *Saccharomycodes*), sporophyllous bacteria (genus *Acetobacter* and *Streptococcus*) and molds (genus *Aspergillus* and *Penicillium*). From a technological point of view, microbiological stability increases with increasing active form of SO_2. In the case of samples treated with 75 and 125 mg/L SO_2, wine characteristic yeasts and micromycetic species were identified, but other categories of microorganisms did not develop. For experimental samples treated with maximum doses of 150 and 200 mg/L SO_2, there was no evidence of the excessive presence of yeasts, nor of other categories of characteristic microorganisms present in the studied samples. The level of correlation of microbiological stability with sulfur dioxide forms was investigated. In samples with active sulfur dioxide content above 4 - 5 mg/L, lactic and acetic bacteria did not develop, which demonstrates the increased sensitivity of bacteria to this factor. Wine yeasts retain their vitality at concentrations of active sulfur dioxide greater than 8.8 mg/L. The decontaminating effect of sulfur dioxide solutions in wine at moderate concentrations of 150 mg/L can be enhanced by acidifying the wines to a pH of 2.8. At lower concentrations of molecular sulfur dioxide, yeasts can remain viable regardless of contact time. The most resistant oenological microorganisms are molds, for the destruction of which high concentrations of molecular sulfur dioxide are required - more than 35 mg/L. The antimicrobial effect of SO_2 forms on the microflora of wines was reconfirmed by the strongly negative correlation and linear dependencies ($r = -0.9031 \div -0.934$). From a technological point of view, microbiological stability increases with increasing active form of SO_2, a more significant effect being evident in molds ($r = -0.9602$) and yeast ($r = -0.94$) species.

Keywords: contaminating yeasts, oenological yeasts, molds, sporophyllous bacteria, sulfur dioxide.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 "Optimizing food processing technologies in the context of the circular bioeconomy and climate change", Bio-OpTehPAS, implemented at the Technical University of Moldova.

F.28. SOME CARACTERISTICS OF GRAPE SKINS LOCAL VARIETY, GROWN IN THE REPUBLIC OF MOLDOVA

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Abstract. Grape pomace local variety (Feteasca alba, Feteasca neagra), cultivated in the region of Republic of Moldova was evaluated in relation to chemical composition, content of minerals and bioactive compounds. For the evaluation of physico-chemical parameters of grape pomace powder analytical methods were applied in order to evaluate the bioactive potential of local plant resources. The results showed that the grape pomace powder is characterized by neutral pH (3.77 - 4.56), moisture (3.33 g/100 g), acidity of (4.60 - 5.20^0 / 100g), and ash (4.80 g/ 100g). The minerals including: iron, potassium, zinc, magnesium, zinc, manganese, and calcium were present in signicant concentrations. The results showed that the grape pomace are an important source of bioactive compounds: ascorbic acid (2.60-3.20 mg/100 g), polyphenols (2.048-2.268 mg GAE/ml extract), antioxidant activity (90.3-92.2%). The residues did not show microbiological contamination. The results showed that the grape pomace are an important source of nutrients and compounds with functional properties and can be incorporated for new products formulation.

Keywords: grape skin, physico-chemical parameters, minerals, bioactive compounds, microbiological quality.

Acknowledgments: The research was supported by Institutional Project, subprogram 020405 “Optimizing food processing technologies in the context of the circular bioeconomy and climate change”, Bio-OpTehPAS, being implemented at the Technical University of Moldova.

F.29. THE BEHAVIOR OF BREAD WITH THE ADDITION OF COCONUT SHELLS ACTIVATED CARBON

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Abstract. For decades coconut shells are sources used to obtain activated carbon for food applications. In recent years, there have been many food products colored black with activated carbon for sensory characteristics. Bread and bakery products have been part of the human diet since ancient times and are one of the most consumed main foods worldwide. The variety of flavors found in bread makes it an excellent tool for researching the creation of a new product. In the list of additives, vegetable charcoal is known as E153 and is part of the category of natural dyes. It gives a black color and is allowed to be used in any type of food, except for those for infants and small children and for adults it is considered harmless. In this work, several amounts of coconut shells activated carbon were varied and the behavior was followed from the perspective of organoleptic and physico-chemical analyzes of the final product. In the case of the bread with 1.2 % addition of coconut shells activated carbon, the color intensity was the most appreciated from organoleptic point of view. It has been observed that the porosity of bread with addition coconut shells activated carbon decreases greatly. For the sample with 1.2 % coconut shells activated carbon, values of 66 % were obtained compared to a control sample in which the porosity was 80 %. The humidity and

conductivity of bread with coconut shells activated carbon was much lower. The pH of the bread with coconut shells activated carbon increased from 5.7 to 6.1 in the control bread. The taste of the bread does not change perceptibly and the color characteristics of the coconut shells activated carbon are very stable under the baking conditions. Because activated carbon has very good adsorption properties, its addition into bread could influence the nutritional value of the final product. This topic deserves to be explored further in the future.

Keywords: bread, activated carbon, coconut shells, porosity.

F.30. PURITY EVALUATION AND MASS DETERMINATION OF NOVEL HYBRID COMPOUNDS FOR PRECISE INHIBITION OF HUMAN CARBONIC ANHYDRASE ISOFORMS

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Abstract. The purity evaluation and mass determination of several novel 2,5(H)-Pyrrol-2-one (DPO) derivatives as inhibitors of tumor-associated human carbonic anhydrase are thus reported here. DPO, a pivotal constituent in numerous bioactive compounds or their precursors, is abundantly present in pheromones, alkaloids, steroids, heme, chlorophylls, and various other substances. It serves as the foundation for a plethora of bioactive natural compounds, including pyrrocidine A, quinolactacin C, ypaoamide, holomycin, and thiolutin. Exhibiting a diverse array of activities, DPO showcases potent antibacterial properties, FPR1 antagonism, cytotoxicity, antitumor effects, tyrosinase inhibition, antioxidant activity, and modulation of the annexin A2-S100A10 protein interaction. The synthesis of DPO derivatives can be achieved through several methods, including the multistep approach, two-component synthesis, three-component method, multi-component synthesis, and others. A rapid, efficient and reproducible method for purity control of novel DPO derivatives as drug candidates has been developed using high performance liquid chromatographic (HPLC) technique. This method involves separation of synthesized compounds on a reversed phase ProntoSIL EuroBOND C18 (125 x 4mm, 5 µm) column using UV detection at 280 nm. All compounds were of > 95 % purity as determined by HPLC. MALDI-MS analysis was also used to confirm the reaction between para-amino sulfonamide, aldehyde derivatives, and pyruvic acid. A good correlation between the estimated mass and the experimental ones was found for each compound. Thus, the MALDI-MS method validated all hypothesized structures for all synthesized compounds.

Keywords: pyrrolo-2-one, 3-aminobenzenesulfonamide, carbonic anhydrase, HPLC, MALDI-MS.

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F.31. EXPLORING NOVEL HYBRID COMPOUNDS FOR TARGETED INHIBITION OF HUMAN CARBONIC ANHYDRASE ISOFORMS

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Abstract. The carbonic anhydrase (CA) enzyme plays a pivotal role in catalyzing the conversion of carbon dioxide to bicarbonate ions and protons, crucial processes for various physiological functions including gluconeogenesis, lipogenesis, and pH regulation. While extensive structural information is available for several CA inhibition pathways, including zinc binders and inhibitors blocking the active site's entry, there remains a gap in understanding the inhibitory mechanisms of certain compounds. Sulfonamides and their derivatives have long been recognized for their diverse biological activities, ranging from antibacterial to anticancer properties. Their structural versatility, pharmacological potency, and ease of synthesis make them attractive candidates for drug development. Particularly intriguing are bis-sulfonamides, compounds consisting of two sulfonamide groups, which have shown potential as apoptotic triggers in cancer therapy by disrupting cellular anionic homeostasis. In the pursuit of novel carbonic anhydrase inhibitors, we have focused on integrating sulfonamide and pyrrol-2-one scaffolds into hybrid compounds. Building upon previous research on pyrrol-2-one derivatives with sulfonamide substitutions, we aim to further elucidate the impact of sulfonamide positioning on carbonic anhydrase inhibition activity. This study represents a continuation of our efforts in exploring the pharmacological significance of these chemical motifs and their potential therapeutic applications. Thus, new 3-sulfonamide pyrrol-2-one hybrids possessing two sulfonamide moieties on the sides were created using a one-pot, three-component method, using trifluoroacetic acid as an effective catalyst. The chemical structure of newly synthesized compounds was verified through spectroscopic techniques. The obtained derivatives were tested against four selected human carbonic anhydrase isoforms (hCA I, hCA II, hCA IX and hCA XII). From a broad perspective, almost every chemical in this series showed noticeable selectivity for hCA II, particularly those with distinctive patterns of methoxy and hydroxy groups, such 4h, 4i, 4n, 4k, and 4j. Derivative 4o was also a strong and selective molecule against hCA II and hCA IX, showing substantial activity against both of these isoforms. As a selective agent for these two isoforms, 4l demonstrated strong inhibitory activity against hCA XII. Last but not least, only compound 4e in this series showed a predilection for inhibition against hCA XII.
C.M.A-M. acknowledge the support provided by the ICUB Fellowship for Young Researchers (A.C.M., Contract no. 13461/14.12.2023).

Keywords: pyrrolo-2-one, 3-aminobenzenesulfonamide, carbonic anhydrase, benzenesulfonamide.

F.32. DEVELOPMENT OF A NEW ELECTROCHEMICAL BIOSENSOR FOR PRECISE DETECTION OF PHENOLIC COMPOUNDS IN WATER SAMPLES FROM THE DANUBE RIVER

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Abstract: Contamination of water with phenolic compounds, from industrial, urban, and agricultural sources, poses significant environmental and public health risks. Detecting and quantifying these compounds in surface waters is vital for water quality management and ecological preservation [1]. Electrochemical biosensors have emerged as promising tools for such tasks, offering advantages in terms of sensitivity, selectivity, and portability [2]. This study presents the development and validation of a novel biosensor, GPH/PEDOT/Ty/SPE, tailored for the precise detection and quantification of phenolic compounds in water samples sourced from the Danube River. The biosensor was constructed by pre-modifying a screen-printed electrode with graphene and PEDOT, followed by tyrosinase immobilization. Through comprehensive experimentation, the biosensor's performance was rigorously assessed. The biosensor demonstrated exceptional precision in detecting phenolic compounds, with recoveries falling within a narrow range, indicative of its reliability and consistency. Furthermore, selectivity tests revealed the biosensor's capability to accurately distinguish phenolic compounds even in complex environmental matrices. Additionally, the biosensor exhibited a low limit of detection, enhancing its sensitivity for phenolic compound detection, although specific numerical values are omitted here for brevity. Analysis of various zones along the Danube River underscored the biosensor's practical applicability, with measured concentrations consistently meeting regulatory standards for water quality. Validation using the standard addition method further reinforced the biosensor's reliability and data consistency. Overall, the GPH/PEDOT/Ty/SPE biosensor emerges as a promising tool for precise and sensitive detection of phenolic compounds in surface waters, offering stability and accuracy crucial for effective water quality monitoring and environmental protection.

Keywords: biosensors, phenolic compounds, sensitivity, square wave voltammetry.

F.33. BIOSENSOR BASED ON HORSERADISH PEROXIDASE FOR DETERMINATION OF TYROSOL

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Abstract: Antioxidants play a crucial role in maintaining human health and provide protection against a wide range of diseases. Because of their importance in the diet, it is essential to analyse and determine the amount of these compounds in food. In recent years, many simple, rapid and economical analytical methods have been developed for the detection and measurement of the antioxidant activity of antioxidant compounds in food. Electrochemical sensors and biosensors are considered promising tools for antioxidant research as well as their high sensitivity, fast response time and miniaturization possibilities, and are used in various fields of food analysis, drug screening and toxicological research. This research aims the antioxidant detection by using sensors and biosensors based on nanomaterials and horseradish peroxidase, highlighting the basic principles, advantages and limitations in terms of the ability to identify a specific antioxidant or quantify the total antioxidant content. Both direct and indirect methods for the detection of antioxidants and

electrochemical sensors are reviewed, demonstrating how these technologies are reliable alternatives to traditional methods of antioxidant analysis.

Keywords: antioxidants, food, biosensors, horseradish peroxidase.

F.34. POLYPHENOLS DETECTION WITH BIOSENSOR BASED ON NANOENCAPSULATED TYROSINASE

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Abstract: The polyphenols are bioactive compounds of great importance in the human health being present in the foods tacking part of Mediterranean diet such as wine and olive oil. The quantity and the quality of these compounds in foods is strongly related to the authenticity of such foods. Therefore, the analysis of polyphenols is essential and the electrochemical biosensors feasible devices because they provide high sensitivity and selectivity. The immobilization of the enzyme on the electrode surface is one of the most important steps in development of biosensors and the nanoencapsulation process of enzyme preserve the biocatalytic properties. In this work, the tyrosinase was nanoencapsulated within liposomes of dipalmitoylphosphatidylcholine together with praseodymium bis-phthalocyanine and deposit on the electrode surface by immobilized using layer-by-layer technique. The working condition such as the pH, the concentration of buffer solution, applied potential and the temperature were optimized. The biosensor demonstrate enhanced sensitivity and selectivity in detection of polyphenols with detection limits in the range of ppm by using chronoamperometry such as detection technique.

Keywords: polyphenol, tyrosinase, layer-by-layer, chronoamperometry.

F.35. ELECTROCHEMICAL ANALYSIS OF ADULTERATED OLIVE OILS

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Abstract: Electroanalysis is a powerfull analytical tool for food analysis. Electrochemical sensor devices combined with chemometric tools have experienced great advances in the last years, being extensively used for food qualitative and quantitative evaluation, namely for olive oil analysis. Olive oil plays a significant role in the Mediterranean diet, providing distinct nutritional and health benefits along with highly valued sensory qualities. These favorable characteristics are primarily attributed to the abundance of bioactive compounds, including phenolic compounds, found in olive oil. This research aims to evaluate the application of electrochemical methods to identify the adulteration of extra virgin olive oil with sunflower oils. The experimental observations were correlated with statistical methods such as principal component analysis (PCA) and analysis of variance (ANOVA). The results demonstrated that the approach could successfully classify the unaltered samples into a separate group relative to the altered samples. Overall, the study demonstrated the feasibility

of the technique to identify the adulteration of extra virgin olive oil with different adulterant concentrations.

Keywords: olive oil, sensor, electroanalysis, analytical tool, PCA, ANOVA.

F.36. CHARACTERIZATION OF SCREEN-PRINTED CARBON, GRAPHENE OXIDE AND PHENANTROLINE MODIFIED ELECTRODES

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Abstract: In recent years, there has been a growing interest in the use of screen-printed carbonaceous electrodes due to their versatility across various applications. These electrodes have been used to identify active compounds in various samples, including pharmaceutical products [1]. Their rapid response, chemical stability, commercial availability, cost-effectiveness, and low toxicity make them an environmentally friendly choice. Carbon-based materials have earned significant attention because of their ability to be functionalized with a wide variety of organic molecules, biologically important compounds, and pharmaceuticals. In this study, we are using carbon electrodes and a phenanthroline (PHEN)-modified electrode. We have evaluated the performance characteristics of these sensors using cyclic voltammetry towards potassium ferrocyanide as the test solution. The cyclic voltammograms revealed a more pronounced peak for the modified electrode compared to the unmodified one, indicating enhanced performance. Additionally, the active surface area was found to be larger for the modified electrode. Therefore, the modifications are beneficial for the enhancement of sensing properties.

Keywords: screen-printed sensors, phenantroline, cyclic voltammetry.

F.37. LATEST ADVANCES IN SAWDUST-BIOMASS BASED MATERIALS FOR PERSISTENT ORGANIC POLLUTANTS REMOVAL FROM AQUEOUS MATRICES

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Abstract. Sawdust is a global waste resulting from wood processing and exploitation operations that is typically dumped or kept in unregulated settings, contributing significantly to environmental contamination. Over time, significant efforts have been undertaken to turn this waste into a carbon source for wastewater treatment, valuing its role in ensuring a sustainable environment while also contributing to the global waste management system. In last year's, sawdust-based adsorbents were increasingly used in wastewater treatment applications. They have numerous advantages, including renewable resources, relatively simple preparation techniques, and favorable structural and surface qualities for adsorption

purposes. They also provide environmentally friendly, efficient, and cost-effective contamination removal methods. This review summarizes recent advances in the development and application of sawdust-biomass-based materials as adsorbents for the removal of persistent organic pollutants from aqueous matrices. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, released in 2020, was used to select studies for this review (including checklists, explanation and elaboration, and flow diagram). The literature research strategy was designed using the PICO (Problem, Intervention, Comparison, Outcome) framework, which divides a topic into searchable components. In the first part, the effects of this type of waste on ecosystems were highlighted. An analysis of the main sources, the resulting quantities and the composition of these wastes in Romania was also presented. The main types and methods of obtaining adsorbents derived from sawdust-biomass based materials were discussed. Organic dyes, pharmaceutical compounds, and pesticides were the three types of persistent organic pollutants investigated in this study. A comprehensive review and the performance of sawdust-biomass-based adsorbents for each pollutant category were provided separately. Finally, suggestions and perspectives for future research on the use of sawdust-based adsorbents in wastewater treatment, which could lead to effective industrial applications, are provided.

Keywords: sawdust-biomass based adsorbents, organic dyes, pharmaceuticals, pesticides, wastewater treatment, adsorptive removal.

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F.38. PEARS BROWNING INHIBITION ASSESSMET USING HIGH FREQUENCY ELECTROMAGNETIC FIELD

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Abstract. Fruit dried chips are an important source of bio-active compounds. The main issue of the fruit chips industry is coming from the enzymatic browning process. In order to alleviate this issue, several classical methods are used, including applying high temperature or chemical additives. The PPO enzyme is responsible for this kind of browning process. There is well known that it can be inactivated around 70 Celsius degrees. Another issue is that the heat field generated by infrared based heat cannot penetrate the fruit chips fast enough to inactivate the PPO in all the chips volume just if the heat field is applied long time enough. In this situation at the chips surface can appear the calcination process that makes the chips not eatable. This situation is alleviated by using high frequency electromagnetic field (i.e., microwave, MW) that is heating the chips from inside out. The process is proved to be so fast that can perform the PPO total inhibition in all the chips volume. The DOE (Design of Experiment) include chromatic and imagistic computer analysis and PPO activity assessment. Sampling stage used WILLIAMS PEARS (*PYRUS COMMUNIS L.*) chips cut at 4 mm thickness and exposed at 440W microwave power at three times intervals: 3,0, 3,5 and 4 minutes, with four replicates for each time interval. The paper presents the results obtained following the colour analysis of the images of scanned pears chips at 600 × 600 dpi (1 pixel = 0.0423 × 0.0423 mm) optical resolution with CannoScan 900F, Canon Japan. The samples were scanned on both sides. The chromatic parameters (i.e., L*, a*, b* YI and BI) and imagistic parameters (i.e., Pulp, Brown_Pulp and Peal) of the pear chips samples was evaluated by classifying the pixels using CIE L*a*b* chromatic space. Following the analysis of the analysed parameters, it was found that with the decrease of the luminance (L*) and yellowness, YI, the slight increase of the chromaticity a*, b*, and browning index, BI,

the Pulp and Brown_Pulp parameters are almost constant for both control and MW treated samples, for all time intervals. The PPO activity (uA/min/g) was converted in residual PPO activity (%) and fitted by one-phase decay non-linear function. The results prescribe a PPO activity decrease 25 times than initial value after 3.5 minutes MW treatment. This is equivalent with residual PPO activity decreasing at 10 % and a predicted of residual PPO activity of 4 % at 5.5 minutes. This time interval is the one that one can consider the total inhabitation of the PPO activity. This results can be transferred directly in technological process in food industry.

Keywords: pear chips, high frequency electromagnetic field, colour image analysis, PPO activity, enzymatic browning.

F.39. APPROACHES ON THE SUSTAINABLE VALORIZATION OF AGRO-FOOD BY-PRODUCTS AND WASTE

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Abstract. Agro-food by-products and wastes contain rich organic matter which, if not managed properly, can create a serious threat to the environment and human health, making proper disposal of food waste a significant global problem. Fruits subjected to processing, in order to obtain products such as wine, juices, marmalade etc. produce large quantities of marc, comprising peels, seeds, stems and the remaining pulp. These marcs can retain nutritional and bioactive compounds, such as phenolic acids, flavonoids, anthocyanins, and carotenoids, with different biological activities offering great potential to convert these by-products and waste of agro-food origin into valuable products, in areas such as nutritional foods, biofertilizers, bioplastics, bioenergy, biosurfactants etc. Thus, marc resulting from the processing of grapes, sea buckthorn and blackcurrants, considering its composition rich in bioactive molecules, presents important biological activities with antioxidant, antimicrobial, antifungal and anti-inflammatory effects. Our research approaches have been focused on finding sustainable methods of valorizing these products either by obtaining new functional food products, through marc powder's incorporation, or by investigating the potential application of the marc extracts on *in vitro* and *in vivo* studies.

Keywords: agro-food, bioactive compounds, valorization, marc, food field, biotechnology.

F.40. COMPLEXES WITH NICOTINAMIDE WITH ANTIMICROBIAN ACTIVITY

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Abstract. Nicotinamide is used clinically in the treatment of pellagra, as a radiosensitizer in radiotherapy treatment of tumors, in the treatment of type I diabetes, and in neurodegenerative diseases such as Parkinson's and Alzheimer's**.** Also, nicotinamide possesses anti-inflammatory and antioxidant characteristics. Complex combinations containing biologically active molecules as ligands can exhibit enhanced biological activity compared to their constituents. The literature review indicates that there are very few examples of complexes with nicotinamide as the sole ligand. Combinations with mixed

ligands are much more numerous and can be mononuclear or polynuclear. However, there are few reports on their biological activity. Taking these considerations into account, four new cobalt (II) and nickel (II) complexes containing nicotinamide have been synthesized. These have been formulated as mononuclear, $[M(NCA)_2(H_2O)_4](Macr)_2$ (M: Co, Ni) and dinuclear, $[Co_2(NCA)_4(Macr)_4]\cdot 2NCA$, $[Ni_2(NCA)_4(acr)_3(acrpr)]$, where NCA represents nicotinamide, acr/Macr denotes the acrylate/methacrylate anion, and acrpr represents the ester of propionic acid with acrylic acid. All compounds were characterized by elemental analyses, IR, UV-Vis spectra as well by single crystal X-ray diffraction. The compounds exhibit good antibacterial activity against various types of bacteria and fungi.

Keywords: complex, cobalt, nickel, nicotinamide.

F.41. PHYSICO-CHEMICAL, PHYTOCHEMICAL AND SENSORIAL ANALYSES OF SOME ROMANIAN RED FRUITS TEA INFUSIONS

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Abstract. In many European countries including Romania, fruit teas and traditional herbal infusions are largely consumed because of their biologically active content. Red fruits represent an important source of natural antioxidants such as anthocyanins, flavonoids and phenolic acids, compounds responsible for the protection of human cells against the effects of free radicals. The infusion process might be influenced by some parameters (brewing water, temperature, time, etc.) with different impacts on qualities of the tea infusions. The present work aims to investigate the physico-chemical characteristics and phytochemical screening of some red fruits tea infusions from a Romanian manufacturer. In this view, infusions of five red fruits teas were carried out using different infusion times and types of brewing waters. The samples were analyzed to estimate some physico-chemical characteristics: pH, electrical conductivity, salinity, total dissolved solids, and oxidation reduction potential. These measurements were accomplished by electrometric method using Thermo Scientific™ Orion™ Versa Star Pro™ Multiparameter Benchtop Meter. Also, the samples were spectrophotometrically evaluated using Shimadzu Spectrophotometer UV-1280. The content of total polyphenols was also determined by the Folin-Ciocalteu method. Sensorial analysis was carried out through the 7-points hedonic scale method. Appearance, color, aroma, taste, and global impression of fruit tea infusions were evaluated. The preliminary obtained results highlight the influence of the infusion time and the type of water used on the quality of the infusion, regardless of the composition of the tea.

Keywords: red fruit tea, infusion, physico-chemical analysis, phytochemical evaluation, sensorial analysis.

F.42. PRODUCTION, CHARACTERIZATION, AND TESTING OF FERTILIZERS DERIVED FROM MARINE RESIDUES

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Abstract. Marine residues, which are currently underutilized, are rich in macronutrients and micronutrients beneficial for plant growth/development and could be effective and sustainable fertilizers. In this study, 3 types of fertilizers were obtained by drying, grinding, and pelletizing fish and seaweed residues, *i.e.*, cod (*Gadus morhua*) bone powder, common ling (*Molva molva*) bone powder, and pellets obtained by mixing small cod bone powder and rockweed (*Ascophyllum nodosum*) residues. A tabletop system was designed and constructed, in which two bare-root strawberry plants were placed in a peat substrate in each pot (48 cm × 18 cm × 16.3 cm). Five treatments were used for strawberry growth (10 plants per treatment), *i.e.*, cod bone powder (F1), common ling bone powder (F2), pellets from fish and alga residues (FA), chemical fertilizer (E), and a control (C). An outdoor experiment was performed for 6 months to evaluate the effects of different treatments on strawberry plants. The number of leaves and their nutrient content, fruit yield and quality characteristics (length, width, firmness, soluble solid content, titratable acidity, and pH) of the strawberries grown applying the fertilizers derived from marine residues were similar or better than those obtained with treatments E and C. Consequently, organic fertilizers derived from the residues of fish and seaweed could be a promising alternative to chemical fertilizers in strawberry production.

Keywords: fertilizer, fish residue, seaweed residue, tabletop strawberries.

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F.43. THE PHYSICO-CHEMICAL AND SENSORY CHARACTERISTICS OF MUFFINS WITH ROSEHIP POWDER ADDITION

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Abstract. The purpose of this work was to study the influence of the rosehip powder addition on the muffins quality obtained from white wheat flour 550 type. In order to estimate the physico-chemical and sensory characteristics of complex products with the addition of

vegetable powder, it was proposed to obtain muffins with rosehip powder in a ratio of 5 and 10%. The use of domestic raw materials represents a particular advantage to considerably reduce production prices, so that the market price of the finished product is also affordable. Rosehip fruits (*Rosa canina* L.) are used in food due to their rich content in bioactive compounds such as polyphenols, essential fatty acids, galactolipids, folates, antioxidants, vitamins and minerals, especially for vitamin C (ascorbic acid), rosehips being recognized as plant source rich in vitamin C. The increased antioxidant potential of plant powder from native plant sources was argued theoretically and experimentally through the analysis of quality indicators, antioxidant activity and CIELab color parameters. For the sensory analysis, 5 basic parameters were evaluated, namely: colour, taste, conscious, appearance, smell. The evaluation of each index was appreciated with a score scale of 1-5 points. Following the estimation of the organoleptic indices, it was established that the muffins with the addition of 5% rosehip powder have a pleasant color and smell and favorably influenced the organoleptic indices of the obtained samples and can be proposed for consumption by potential consumers on the market.

Keywords: wheat flour, rosehip powder, muffins, addition, quality.

F.44. THE CONTROL OF AIR RADIOACTIVITY AN IMPORTANT CONTRIBUTION ON SUSTAINABLE DEVELOPMENT GOALS

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Abstract: The paper approaches the evaluation of the radioactivity impact on the air considering it an interest tools in the assure of environmental protection and the context of fulfill the sustainable development objectives. The Gamma radiation dose and the meteorological parameters were monitored using an automatic station of the National Environmental Radioactivity Surveillance Network in Romania. The aim was to detect of any radiologically significant increases in the levels of environmental radioactivity as well as the warning - alarming action of decision makers. The increase of utilisation and diversification of radioactive isotopes and nuclear energy causes an increase in the radiocontamination risk of the environment and living organisms.

Keywords: gamma dose equivalent, radioactivity, sustainable development, air protection.

F.45. COPPER (II) COMPLEXES WITH TRIAZOLOPIRYMIDINE DERIVATIVES DEVELOPED AS BIOLOGICALLY ACTIVE SPECIES

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Abstract. As essential ion, copper ion regulates several biological processes. Some valuable properties as stereochemical and oxidation state versatility, acid borderline character, and lower systemic toxicity recommend this ion for the synthesis of complexes with a large variety of ligands, structures and biological properties. As result, many copper species with antitumor, anti-inflammatory or antimicrobial activity were designed. Most of these complexes contain mixed ligands, one being an N-N-chelating N-donor based heterocycle,

chosen both for its chelating ability and intercalative properties. As result several Cu(II) complexes of type $[Cu(N\text{-}N)_m(tp)_n](ClO_4)_2$ (n and m 1 or 2; N-N: 2,2`-bipyridine or 1,10-phenantroline and TP: 5,7-dimethyl-1,2,4-triazolo[1,5-a]pyrimidine (DMTP) or 5-methyl-7-phenil-1,2,4-triazolo[1,5-a]pyrimidine (MFTP)) with TP as auxiliary ligand. The features of complexes have been assigned from elemental analyses as well as IR, EPR and UV-Vis spectra. All compounds were characterized through single crystal X-ray diffraction that indicate the TP ligands behavior as unidentate and N-N as chelate ligand. A distorted square pyramidal or octahedral stereochemistries are completed by perchlorate as free ions. The complexes exhibit a good both antimicrobial (against both planktonic and biofilm embedded strains) and antitumor (against melanoma) activities accompanied by a low toxicity in healthy cells.

Keywords: antibiofilm, antimicrobial, antitumor, complex, copper, triazolopyrimidine.

F.46. DYNAMIC PARAMETERS DETERMINATION IN BINARY FLUIDIZED BED OF BENTONITE PARTICLES

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Abstract. Experimental investigations of the dynamic parameters at the incipient fluidization have focused on the binary bed of bentonite particles with different average diameter and particle density. The studied bentonite particles are sodium and calcium bentonite arranged in a transparent fluidization column in pseudo-homogeneous configuration. The influence of the average particle diameter and the fixed bed height of particles on bed porosity, and minimum pressure drop and minimum fluidization velocity at the incipient fluidization were studied. In order to choose the bentonite particles to form the binary bed it is necessary that these particles have similar minimum fluidization velocity. Two particles mixtures in pseudo-homogenous configuration are proposed to be studied in fluidization bed. The fluidization regimes in pseudo-homogeneous particles configuration are: fixed bed, partially segregated bed, well-mixed bed and fully-segregated bed. The influence of the bed weight, geometric bed ratios and mass fraction in sodium bentonite particles on bed behavior, and minimum fluidization velocities specific to the binary mixture and pressure drop at the incipient fluidization were determined experimentally. All these parameters are important to prevent partial or total segregation of the bed particles. Experimental values for the minimum pressure drop and for the minimum fluidization velocity for simple and mixture particles were compared with theoretical equations from the literature. Fluidized bed offers multiple advantages (high gas-solid contact surface, particle transport, intense particles mixing) and better dynamic conditions for efficient and effective utilization of the bentonite binary mixture in future adsorption processes.

Keywords: bentonite particles, binary mixture, minimum pressure drop, minimum fluidization velocity, empirical equations

F.47. THEORETICAL STUDY OF NEW NANOEMULSIONS USED FOR FOOD PROCESSING

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Abstract. Nanoparticles are characterized as ultrafine particles with a larger surface area, and less sensitivity to physical and chemical changes. Nanoemulsions are used in different industries, especially in the food industry to enhance the nutritional quality and shelf life of foods. These new nanoproducts must be characterized and optimized for use in the food industry. In food processing, nanoemulsions are used as coating materials, for encapsulation and formulation of new food products, and to improve food quality and taste. They also help to preserve fresh as well as processed foods. According to recent research, nanoemulsions are the potentially the most effective systems to protect the functional compound. Nanoemulsification is an ideal approach to prepare bioactive compounds in nanoform [1, 2]. Depending on the dispersed or continuous phase of oil or water, this mixture can be water in oil or oil in water. Emulsions are relatively stable mixtures containing immiscible liquids, usually water and oil. Emulsions can be divided into macroemulsions, nanoemulsions, and microemulsions according to their thermodynamic stability and physical characteristics. Nanoemulsions (mini-emulsions) are characterized by relatively small droplet sizes with average radii in the range of 10–100 nm, thermodynamic instability, usually low dispersion (<10–20%), and a transparent, translucent, or slightly creamy appearance ($r << \lambda$) [3-5]. Microemulsions are thermodynamically stable systems under certain environmental conditions (temperature, composition) that contain spherical or lamellar particles with sizes in the range of 10–100 nm, with a dispersion of less than 10% [4, 5]. Because the size of the particles is lower than the wavelength of light ($r << \lambda$), they are transparent.

Keywords: nanoemulsions, nutritional quality, encapsulation, films, safety.

F.48. TAURINE AND ENERGETIC BEVERAGES - *IN VIVO* EVALUATION OF THE POTENTIAL CYTOTOXIC AND GENOTOXIC

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Abstract. Taurine is one of the main ingredients used in energy drinks which are highly consumed, especially by adolescents for their taste and stimulating effect. With energy drinks becoming a worldwide phenomenon, the biological effects of these beverages must be evaluated in order to fully comprehend the potential impact of these products on the health due to the fact nutrition is closely related to science since the population consumes food to prevent certain diseases. Notable among the *in vivo* plant-based tests developed for toxicity screening is the *Allium cepa* test, which is based in particular on microscopic observations of the aberrations that occur in the root division zone during mitosis and cytokinesis and the subsequent effects on chromosomes, plants of *Allium cepa* growing in direct contact with the evaluated substances. Therefore, the aim of this study was to evaluate the comparative biological effects of taurine and sugar-free Red Bull® in order to check the beverages safety

and the nutraceutical potential of these compounds. In view of *in vivo* investigation, for cytogenetic analysis three aqueous solutions with different concentrations of taurine (0.1, 0.2 and 0.4 %) were carried out. Also, were tested: the sugar-free Red Bull® as such, without any dilution and another two diluted solutions of sugar-free Red Bull® (50 and 25 %). As control sample tap water was used. The solutions of taurine and sugar-free Red Bull® were analyzed to estimate some physico-chemical characteristics before *in vivo* biological evaluations. Furthermore, *in vivo* investigation of taurine and sugar-free Red Bull® aqueous solutions, respectively, was performed using the *Allium cepa* assay. Onion bulbs were placed in tap water for 72 hours. Then, series of 3 onion bulbs were maintained in all prepared samples for 48 hours in a LEEC growth chamber under controlled conditions. A microscopic evaluation of onion root tips was completed using an optical microscope at 10x and 40x magnification. Different stages of mitotic division and several types of chromosomal aberrations were observed. After the preliminary results, the cell division process does not seem to be affected, differences being observed between the tested samples.

Keywords: taurine, sugar-free Red Bull®, cytotoxic effects.

F.49. POTENTIAL OF NETTLE (*URTICA DIOICA* L.) AS BYPRODUCT WITH MULTIPLE USES

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Abstract. Nettle (*Urtica dioica* L.) is a plant species known and considered a weed in intensive agriculture. In addition, several studies have confirmed the presence of numerous active compounds, especially in nettle leaves (caffeic acid, acetic acid, formic acid, volatile oil ceramides, chlorophyll, *β*-carotene, essential fatty acids, fibers, vitamins, minerals, phytosterols, glycosides and proteins etc.), with the most promising application in the food/feed, medicinal and cosmetic industry. Studies indicate that this plant have properties such as: anti-inflammatory, antihemorrhagic, antitussive, analgesic, hepatoprotective, antioxidant, antiviral, antibacterial, antiandrogenic, anticancer, hypotensive, antianemic, immunostimulatory, diuretics, antiseptic, etc. In this study, the experimental extraction was focused on the selection of extraction methods for obtaining primary extracts of nettle (*Urtica dioica* L.) enriched in chlorophyll pigments (chlorophyll *a* and chlorophyll *b*) and carotenoids, with applications in the food, pharmaceutical and cosmetic industry. The extraction methods were ultrasound-assisted extraction (80°C and 40 kHz for 30 min), microwave-assisted extraction (119 W for 30 min) and the conventional extraction using a Soxhlet extractor (80°C). All this methods were used as green methods for primary extraction of leaves pigments. Chlorophyll *a*, chlorophyll *b* and total carotenoid contents were analyzed using UV-Vis Spectrophotometer at various wavelengths (470, 645 and 662 nm). The results obtained from this analysis show that ultrasound-assisted extraction method is the most effective. Following the market study carried out, the trend of choosing food, cosmetic and pharmaceutical products with the addition of nettle was identified, turning it into an opportunity for development and introduction of innovative and optimal products for health and environmentally friendly.

Keywords: nettle extracts, unconventional extraction methods, chlorophyll *a* and *b* pigments, carotenoids, market study.

F.50. GROWTH DYNAMICS OF YEASTS ON DIFFERENT NUTRITIONAL SUBSTRATES

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Abstract. The presence of gluten in bakery products can today constitute a health risk, especially for consumers with gluten intolerance. Intolerance can be expressed through a varied range of manifestations: from different types of allergies, inflammations and up to serious celiac diseases, in the conditions of a diet rich in floury products. Statistics estimate that 1% of the population suffers from celiac disease, a situation that requires the elimination of gluten from the diet. Wheat and other related grains (including barley, and rye) contain a mixture of two proteins glutenin and gliadin. When flour made from grinding these grains is mixed with water, the two proteins combine and form gluten. Without water, gluten is not formed. The category of gluten-free flours includes: buckwheat flour, millet flour, coconut flour, amaranth flour, chickpea flour, tapioca flour, hemp flour, almond flour, brown rice flour, yellow pea flour, soybean flour, potato flour. The yeasts (*Saccharomyces cerevisiae*) used in the leavening process produce the growth of the dough, also influencing the aroma and texture of the bread. The aim of this work is to evaluate the growth and development of yeasts on gluten and gluten-free substrates, by using as raw materials wheat and coconut flour, respectively. The objectives of the study are: the quantitative assessment of the biomass of yeasts obtained under the conditions of development on gluten and gluten-free substrates and the metabolic evaluation of yeasts grown under the same conditions by the Ostrovski method. The results obtained highlighted the fact that gluten-based nutritional substrates offer better conditions for yeast growth than gluten-free ones. As a perspective, we propose testing in the bakery industry, in the technological process of leavening the dough, some probiotics together with yeasts and their effect on gluten and gluten-free products.

Keywords: *Saccharomyces cerevisiae*, gluten, wheat flour, coconut flour.

F.51. INVESTIGATION INTO CO_2 CHEMISORPTION IN POTASSIUM CARBONATE SOLUTION ENHANCED WITH VARIOUS AMINES

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Abstract. Absorption is recommended for removing acidic contaminants from flue gases. Chemisorption with potassium carbonate solution and amines is popular for its cost-effectiveness and ease of regeneration. Recent studies assessed packed columns for CO_2 absorption, favored for efficient gas-liquid contact, high mass transfer efficiency, minimal

pressure drop, simplicity, and low pressure losses. The objective of the research is to assess the effectiveness of the semi-pilot packed column across different parameters (temperature, activator and potassium carbonate concentration, transformation degree). Gas measurements were taken and diluted with air to match various initial gas compositions. Concentration and temperature were monitored using a CO_2 analyzer and thermometers within the reactor. A 25 % K_2CO_3, promoted with 4% DEA, respectively MDEA solution was used. Density measurements were conducted between 293 K and 343 K under atmospheric pressure using a DMA 5000 Anton Paar vibrating glass tube, and the experimental data were correlated by equation: $\rho_{K_2CO_3} = 937.5 + 10.18 \cdot (\%C_{K_2CO_3}) + 0.9978T - 0.0027T^2$. Viscosity was determined using a capillary Ubbelohde tube, with temperature control ensured by a precise viscosimeter thermostat. The experimental viscosity data were correlated using an equation: $\log\mu = \frac{844.279}{T} - 2.8653 + 0.1458S_B + 0.0243\alpha_B$. Experimental has shown that MDEA has the capability to substitute DEA showcasing greater efficiency, particularly under conditions of high fluid flow rates.

Keywords: absorption, chemisorption, CO_2, amines, potassium carbonate.

F.52. THE SIGNIFICANT USE OF MILLET TO DEVELOP NUTRITIONAL VALUE CEREAL-BASED PRODUCTS

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Abstract: Globally, millets are recognized as an important cereal and are considered one of the oldest cultivated crops. However, they remain at least exploited. Their plentiful content of nutrients and health-promoting phenolic compounds, renders them suitable for both human consumption, offering potential benefits in mitigating risks associated with cancer, heart disease or gastrointestinal disorders. Furthermore, millet stands out as a gluten-free grain with diverse varieties including pearl, finger, kodo, proso, foxtail, little, and barnyard millet. Notably, it demonstrates remarkable resilience, capable of yielding substantial harvests per unit of land, even under adverse conditions such as drought and nutrient-depleted soil. Given its compositional and processing advantages, in recent years, millet has garnered increasing interest within the food industry. With a current emphasis on delivering quality nutrition to the burgeoning global population for improved health outcomes, millet has undergone a reevaluation as a viable raw material. Consequently, the year 2023 was designated by the United Nations General Assembly as the International Year of Millets. This review study provides insights into food products derived from millet, shedding light on novel ways to harness its technological potential either independently or in synergy with other grains.

Keywords: millet, cereal, nutritional value, health benefits, food applications.

F.53. MODELLING AND OPTIMIZATION OF ADIPIC ACID SEPARATION

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Abstract. Adipic acid is a material that is utilized in the production of nylon, polyurethanes, and other items of market value. Nitric acid oxidation of a mixture of cyclohexanone and cyclohexanol, known as "KA oil" (ketone and alcohol-oil), is the process used in the industrial synthesis of adipic acid. Acid rain, ozone layer degradation, and increased greenhouse gas emissions are all caused by the nitrous oxide produced during this process. Adipic acid is manufactured every year in quantities of 2.5 billion kg, of which around 60% is used as a monomer in a polycondensation process with hexamethylene diamine to make nylon 66. Polymers are also used in other important applications; they are a monomer used in the synthesis of polyurethane and their esters are plasticizers, particularly in PVC. In this research, we studied Adipic Acid, AA separation using heptane as organic solvent and 2 hydrophobic ionic liquids (CYPHOS IL103, CYPHOS IL104) as extractants. According to the best results, using this green process, hydrophobic ionic liquids may help recover adipic acid from diluted aqueous solutions as fermentation broths. The process was modeled and optimized using an Artificial Neural Networks (ANNs) and Differential Evolution (DE) algorithm. Artificial Neural Networks (ANNs) are complex mathematical models that determine non-linear interactions between a system's inputs and outputs. As such, simple or combined with other Artificial Intelligence techniques, they were efficiently applied to various types of processes and systems, examples focusing on reactive extractions of compounds such as 2-keto gluconic acid, malic acid, gallic acid , itaconic acid , tartaric acid. Although simple to use, the optimal ANN setup is a problem that must be carefully solved to ensure good results. The two main aspects that influence performance are: network topology (the structure of the network, such as the number of hidden layers and neurons in each hidden layer) and the network training (internal parameters such as weights, biases). Network topology is usually set through a trial-and-error approach, where different combinations are manually tested. Training is usually performed by a series of training algorithms (mainly gradient-based), the most known being BackPropagation. Compared with the classical approaches, this work applies the neuro-evolution principle to automatically determine the ANN's topology automatically. After the best model was determined, the impact of the inputs on the model outputs was determined using the SHapley Additive exPlanations (SHAP) strategy. Next, the DE algorithm was applied to optimize the process and identify the conditions leading to a maximum efficiency extraction of AA. Using this approach, for the majority of exemplars, the differences between the experimental and predicted values are small. The results of this investigation show that phosphonium-based ionic liquids can be used well for adipic acid extraction. Furthermore, the separation techniques were simple and devoid of volatile organic solvents.

Keywords: adipic acid, reactive extraction, modelling, optimization.

F.54. FRUIT AND FLOWER MEADS: OBTAINING, PHYSICOCHEMICAL AND SENSORY CHARACTERISTICS

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Abstract. Mead is a traditional alcoholic beverage produced by the fermentation of a diluted solution of honey. Fermentation of honey can be used to produce different varieties of mead, sherry, sparkling and fruit-honey mead and it may have different flavors depending upon floral source of honey, additives and type of yeast used in the fermentation. Thus, there are many variants of mead, ranging from the traditional to complex mixes of fruit juices and spices. The most common are metheglin (mead containing spices or herbs), melomel (mead with fruit juices), hippocras (pyment with herbs and spices) and sack mead (produced with superior concentration of honey). Honey which is the raw material to produce mead shows lot of variations in color and composition which are likely to affect the end product. The aim of this study was to determine the effect of some additives such as grapefruit juice and pomegranate juice or rose syrup on the course of the fermentation process of honey meads, and on their physicochemical and sensory properties. The experimental material included a mead (1:3 honey to water volume) manufactured under laboratory conditions: mead without additives used as a control sample (MW), mead with the addition of grapefruit juice (MG), mead with the addition of pomegranate juice (MP), and mead with the addition of rose syrup (MR). The meads were made of a linden honey obtained from local producers (Bacău, Romania). Two sets of experiments were carried out: with the addition of juice before and after alcoholic fermentation. Our research shows that different additives of fruit have a significant impact on the course of the mead fermentation process and on their sensory characteristics. Dynamics of the fermentation process is a key parameter enabling the control of its course and determination of its duration. Fermentation of the analyzed meads spanned for 14 days. Introduction of various additives in the mead making process may have a significant effect on their fermentation dynamics. A positive effect on fermentation dynamics was observed in the case of grapefruit juice, whose addition caused a much more rapid fermentation, compared with control sample. However, it was found that the samples in which the fruit juices are added after the alcoholic fermentation of the mead is finished have better organoleptic characteristics than those in which the juices were added before the fermentation.

Keywords: additives, honey fermentation, melomel, sensory characteristics, yeast.

F.55. THE METABOLIC BEHAVIOR OF VITAMIN C IN LEGUMES FROM CONVENTIONAL AND ORGANIC AGRICULTURE

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Abstract. Bell pepper (*Capsicum annuum* L), is part of the Solanaceae family and is known for its substantial micronutrient profile. Bell peppers have a high content of vitamins A, E and C, vitamin C (142 mg/100 g) having a strong antioxidant action that protects against the effects of free radicals and scurvy, a disease caused by the lack of vitamin C in the diet. In addition to vitamins, bell pepper has an important content of beta-carotene, which the body transforms into vitamin A, and capsanthin, a carotenoid pigment that is found in the largest amount in red bell pepper, both of which play an essential role in eye health. Another active principle is quercetin, a flavonoid known for its anti-inflammatory, vasodilator, antiobesity,

antihypercholesterolemic and antiatherosclerotic effects. Parsley (*Petroselium Crispum*) is a herbaceous plant in the Apiaceae family, also known for its high vitamin C content. In addition to vitamin C, parsley is a good source of vitamin K, carotenoids, phenolic compounds and flavonoids, especially apigenin, apiin and 6'-acetylapiin, myristicin, apiol, two essential oils with antibacterial effects. These compounds have a wide range of activities pharmacological, antioxidant, hepatoprotective and antidiabetic. Since significant amounts of pepper and parsley are consumed in traditional Romanian cuisine, the present study proposes the identification of the presence of vitamin C, by the iodometric method, in peppers and parsley from conventional and BIO agriculture. BIO farming involves using sustainable farming methods such as composting and avoiding pesticides and synthetic fertilizers. The results showed that bell pepper and conventional parsley accumulated higher amounts of vitamin C compared to BIO, a behavior that could be due to a possible exposure to heavy metals (Ni, Co, Cr, Zn). It is known that conventional agriculture allows the addition of pesticides both through irrigation and foliar in order to obtain a larger and faster harvest. This brings, implicitly, the accumulation of heavy metals in the plant. The results obtained are in agreement with Zengin Fikriye, 2013, who also reports increased amounts of vitamin C under conditions of stress caused by the accumulation of heavy metals. Also, the present study highlights the differences between pepper varieties. Red pepper has been observed to accumulate higher amounts of vitamin C than green pepper. In conclusion, we can state that the determination of vitamin C and the correlation of the results obtained with the normal reference ranges of vitamin C depending on the type and species of the plant could be an indicator of nutritional quality.

Keywords: bell pepper, parsley, vitamin C, heavy metals.

F.56. THERMOPHYSICAL PROPERTIES MATHEMATICAL MODELLING OF ETHYLENE GLYCOL – WATER BINARY SYSTEMS

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Abstract. The production of solvents, lubricants, conditioning and hygroscopic agents has made extensive use of aqueous ethylene glycol solutions. Therefore, the investigation of their physicochemical, thermodynamic, and transport characteristics is the subject of an increasing interest multiple researches being conducted in the field. Reliable mathematical correlations essential for regulation and simulation in the engineering process sector were established herein. Notorious fundamental thermophysical properties (density, dynamic viscosity, thermal heat capacity, thermal conductivity) were associated with two critical parameters – temperature and concentration – well-known as affecting the behavior of the binary liquid system containing water and ethylene glycol. The accuracy of the mathematical relations was analyzed through different statistical error functions. The obtained results disclose that a second order polynomial equation is appropriate to describe the evolution of the studied mixtures this conclusion being sustained also by the recorded values for sum of squares of the errors, average relative error, residual root mean square error, standard deviation of relative error, sum of absolute error and coefficient of determination.

Keywords: ethylene glycol, thermophysical properties, mathematical modelling.

F.57. UV-A SENSITIVE MESOPOROUS CATALYSTS TOWARD CLOFIBRIC ACID PHOTO-OXIDATION: SYNTHESIS, CHARACTERIZATION AND PERFORMANCE EVALUATION

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Abstract. The present work focuses on the synthesis of mesoporous TiO_2 catalysts using a combination of the sol-gel technique and a soft template method. For material preparation mixtures of $Ti(iPrO)_4$, alcohol (ethanol or isopropanol), and water were used. Additionally, cetyl-trimethyl ammonium bromide was incorporated as a template to generate a mesoporous structure, along with urea acting as a pH adjuster and stabilizer for the TiO_2 structure. Samples were activated by calcination at several temperatures in the 550 - 750 °C range and their photocatalytic activity was investigated for the degradation clofibric acid under UV-A irradiation conditions. X-ray diffraction analyses highlighted the significant role of solvent type on the achieved anatase-to-rutile ratios across different calcination temperatures. Determined specific surface area ranged from 9 to 43 $m^2 \cdot g^{-1}$. Also, it was found that the photo-reactivity of the catalytic systems was notably affected by the calcination temperature, with the highest activity observed for the sample calcined at 750 °C, displaying superior degradation and mineralization capabilities. Additionally, reusability tests confirmed the remarkable stability in reaction of this catalyst, underscoring its promising potential for future applications in water treatment.

Keywords: TiO_2, sol-gel, photocatalytic degradation, emergent contaminant.

F.58. ANTIFUNGAL ACTIVITY AND PHYTOCHEMICAL ANALYSIS OF WALNUT (JUGLANS REGIA) EXTRACTS

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Abstract. Walnut (*Juglans regia* L.) is a popular medicine due to its phytochemical composition (flavonoids, polyphenols, juglones, hydroxycinnamic acids, hydroxybenzoic acids, etc.) with multiple benefits on human health such as antibacterial, antioxidant, anti-inflammatory, analgesic, antidiabetic, hepatoprotective, etc. and important phytosanitary properties (antibacterial, antifungal and insecticidal). In the present study, aqueous and hydroalcoholic extracts of green and dry walnut bark, green and dry walnut leaves were physico-chemically characterized and tested for antifungal potential against *Alternaria* spp. and *Aspergillus* spp. in PDA and Sabouraud medium. The microbiological analyses were

performed both for fresh extracts and for those stored at 4ºC for 3 months. It was observed that on the PDA culture the antifungal effect of the extracts for the two microorganisms is greater than on the Sabouraud medium. Also, the inhibition rate recorded is higher for *Alternaria* spp. than *Aspergilius* spp. In the case of extracts stored for 3 months, no antifungal activity was observed on *Aspergillus* spp.

Keywords: walnut, extracts, antifungal activity, *Alternaria* spp., *Aspergillus* spp.

F.59. EXAMPLE OF CHEMICAL ENGINEERING IN HYDROMETALLURGICAL PROCESSES: COPPER CEMENTATION IN FLUIDIZED BED

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Abstract. Numerous methods or process were developed to recover metal ions in solution. One is electrochemical cementation, where spontaneous heterogeneous reduction of a metallic ion occurs when a more electropositive sacrificial metal is added in the solution. For its low energy consumption and its easy put into use, this technique is widely used in hydrometallurgy, surface and industrial waste treatments. Hence cupric ion cementation onto iron shots was studied in a semi-industrial scale pilot, combined with the application of a transverse electromagnetic field. Indeed, the use of electromagnetic field enables the stabilization of the bed. The highest the field applied is, the strongest the stabilization is, thus permitting to work at flowrate higher than minimum fluidization flowrate. Beyond this point the bed offers the coins of the fixed bed (i.e., copper dendrites growth) and the one of fluidized bed (increase of mass transfer due to higher flowrate). Effects of different operating parameters (pH, temperature, initial cupric ion concentration, iron sphere diameter, zinc fraction …) on hydrodynamic behavior kinetic rate are scanned.

Keywords: Copper, electrochemical cementation, fluidized bed.

F.60. ORGANIC WASTE VALORIZATION THOUGH ANAEROBIC PROCESSES: ADVANCES AND NEW TRENDS

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Abstract. The valorization of organic wastes, including agricultural and food wastes, is a fundamental aspect of the circular economy which is able to address the depletion of non-renewable carbon resources, such as bio-based materials or bioenergy. Therefore, the aim is to review and discuss the main potential routes for organic waste biorefineries able to produce platform molecules and bioenergy. The necessary biomass pretreatments will also be discussed, as well as the main building blocks of these biorefineries, with particular emphasis on the most recent advances. Finally, bottlenecks will also be analyzed, taking into account technological aspects, economic viability, and environmental sustainability.

Keywords: anaerobic digestion, dark fermentation, biological methanation, CO_2 reuse.

F.61. OPTIMIZATION OF THE TREATMENT OF ANAEROBIC LIQUID DIGESTATES FROM ANAEROBIC DIGESTION PLANTS BY PHYSICAL, CHEMICAL AND ELECTROCHEMICAL METHODS

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Abstract. Bioenergy production from organic waste contributes to the achievement of the sustainable development goals. One of the most interesting environmentally friendly energy sources is the biogas, a methane-rich mixture produced by the anaerobic digestion of organic feedstocks. Biogas can be used traditionally for power generation through cogeneration or, after purification, injected in the natural gas grid. Meanwhile, large quantities of liquid effluents (digestates) rich in ammonia, phosphorus, and carbon are produced. Their management is a major challenge. This work aims to propose an optimized digestate treatment process by sequentially combining electrocoagulation, chemical coagulation, and filtration. The results are promising as the reduction yield of the main parameters used to measure pollution in liquid effluents reached 30.0% for ammonia, 57.0% for the chemical oxygen demand and almost 86.0% for total phosphorus.

Keywords: anaerobic digestion, biogas, digestate, filtration, (electro)coagulation.

F.62. PURIFICATION OF ANAEROBIC DIGESTATE FROM ANAEROBIC FERMENTATION OF FOOD WASTES BY ELECTROCOAGULATION

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Abstract. Food wastes have good potential for energy production and can avoid or limit the conflict bioenergy - food security in many countries. The digestate obtained after bioconversion of food wastes contains large quantities of water but also carbon source useful for other biotransformation processes. The main objective of this study was to proof the feasibility of electrocoagulation in a dynamic system for separation and purification of short chain fatty acids from the digestate produced by the anaerobic fermentation of food waste. The results shows quite higher removal yields for chemical oxygen demand (around 40%), total nitrogen (around 30%) and total carbon (around 30%).

Keywords: anaerobic digestate, electrocoagulation, fatty acids, purification.

Acknowledgements: The authors thank the French National Research Agency (ANR) and the European Union (EU H2020 program) for funding the ERA CobioTech OLEOFERM project (ANR-21-COBI-0002).

F.63. EXTRACTION AND ANTIOXIDANT ACTIVITY OF ALGINATES AND FUCOIDANS EXTRACTED FROM CYSTOSEIRA MYRIOPHYLLOIDES FROM SIDI BOUZID MOROCCAN COAST

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Abstract. The aim of this study is to evaluate the antioxidant activity of two polysaccharides, i.e. alginates and fucoidans, extracted from the brown seaweed *Cystoseira myriophylloides.* The seaweed was harvested in the area of Sidi Bouzid, El Jadida, Morocco. Sequential extraction was used to recover pigments, lipids, alginates and fucoidans from the seaweed and the antioxidant activity was evaluated using several in vitro assays: DPPH, FRAP and TAC. The two polysaccharides exhibited concentration-dependent activities. Alginates and fucoidans had an antiradical activity with IC50 close to 545 and 378 µg/mL respectively, their reducing powers increased to reach 1.05 and 1.9 at a concentration of 1.0 mg/mL respectively and the OH radical scavenging capacities were 70.2% and 62.6% at the same concentration of polymers. The results show that the alginates and fucoidans from *Cystoseira myriophylloides* present an interesting antioxidant potential and can be used as natural ingredients in formulations for various industries.

Keywords: *Cystoseira myriophylloides*, alginates, fucoidans, antioxidant activity, DPPH, FRAP, TAC.

Acknowledgements: The authors thank the French National Research Agency (ANR) and the European Union (EU H2020 program) for funding the ERA CobioTech OLEOFERM project (ANR-21-COBI-0002). This work was financially supported by PHC Toubkal Program (project number: 21/117, 45883YJ), implemented by the French Ministry for Europe and Foreign Affairs, the French Ministry of Higher Education and Research and the National Centre for Scientific and Technical Research from Morocco.

F.64. BIOCHEMICAL CHARACTERIZATION AND POTENTIAL IN BIOREMEDIATION OF PHARMACEUTICAL POLLUTANTS OF GREEN MICROALGA COELASTRELLA THERMOPHILA ISOLATED FROM AN ALGERIAN HOT SPRING

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Abstract. Green microalgae *Coelastrella thermophila* species was collected and isolated from an Algerian Hot Spring. *C. thermophila* was characterized with regard to growth kinetics, biomass composition, and content of specific products. Its efficiency in

bioremediation of pharmaceutical pollutants such as diclofenac was established at different initial concentrations of pollutant (25.0 to 200.0 mg L^{-1}) in the culture medium. The results shows that *Coelastrella thermophila* biomass is rich in lipids (until 41.0%) and contains also sugars (15.0%), soluble proteins (9.0%), and pigments (7.0%). This microalgae is able to metabolize diclofenac and the removal yields depends on the initial diclofenac concentration, i.e. 70.2% for 25.0 $mg.L^{-1}$ and 27.3% for 200.0 $mg.L^{-1}$. In conclusion the biomass of *C. thermophila* emerges as a potential source for lipid-based bioenergy production. The results also show that the green microalgae could support a sustainable approach for bioremediation of pharmaceuticals.

Keywords: microalgae, *Coelastrella thermophila*, diclofenac removal, bioremediation.

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F.65. HEXALOBUS MONOPETALUS (A. RICH.) ENGL. & DIELS AS SOURCE OF ANTIOXIDANT AND ANTI-INFLAMMATORY COMPOUNDS

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Abstract. *Hexalobus monopetalus* (H.M) is a medicinal plant widely used in traditional medicine in Chad, traditional medicine represents a cultural and economic heritage of undeniable importance. This study focuses on the extraction of phenolic compounds from the roots of *Hexalobus monopetalus* from Chad, using different solvents of increasing polarity. High Performance Thin Layer Chromatography (HPTLC) was used for the first time for a qualitative screening of polyphenolic and flavonoid compounds, and was followed by quantification of total polyphenols by the Folin - Ciocalteu method and of flavonoids using $AlCl_3$. Antioxidant activity was assessed in vitro using electron/hydrogen transfer methods, like DPPH free radical scavenging method and the ABTS method. The extracts' anti-inflammatory activity was assessed in vitro by the egg albumin denaturation test induced by heat treatment. The in vitro tests used to assess the antioxidant capacity and anti-inflammatory activity confirm the effectiveness of natural substances in modulating inflammatory pathways and their ability to neutralize the free radicals responsible for oxidative stress, to justify the use of this plant species in traditional medicine in Chad. The hydromethanolic extract (20 : 80 v/v) has higher activities, while the dichloromethane extract showed inferior biological activities. *Hexalobus monopetalus* (H.M) is a medicinal plant widely used in traditional medicine in Chad, traditional medicine represents a cultural and economic heritage of undeniable importance. This study focuses on the extraction of phenolic compounds from the roots of *Hexalobus monopetalus* from Chad, using different solvents of increasing polarity. High Performance Thin Layer Chromatography (HPTLC) was used for the first time for a qualitative screening of polyphenolic and flavonoid compounds, and was followed by quantification of total polyphenols by the Folin-Ciocalteu method and of flavonoids using $AlCl_3$. Antioxidant activity was assessed in vitro using electron/hydrogen transfer methods, like DPPH free radical scavenging method and the ABTS method. The extracts' anti-inflammatory activity was assessed in vitro by the egg albumin denaturation test induced by heat treatment. The in vitro tests used to assess the antioxidant capacity and anti-inflammatory activity confirm the effectiveness of natural substances in modulating inflammatory pathways and their ability to neutralize the free radicals responsible for oxidative stress, to justify the use of this plant species in traditional

medicine in Chad. The hydromethanolic extract (20:80 v/v) has higher activities, while the dichloromethane extract showed inferior biological activities.

Keywords: polyphenols, flavonoids, antioxidants, anti-inflamatory activity Hexalobus monopetalus (H.M).

F.66. EXPLORING BREAD PRODUCTION WITH FUNCTIONAL INGREDIENTS, APPROACH ON BREWER'S SPENT GRAIN

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Abstract. Brewer's spent grain (BSG) is one of the cheapest and most valuable by-products of the brewing process. This study evaluates the technological aptitude of oat-based BSG (OS) and buckwheat-based BSG (BWS) in bread making, either in its natural form (nF) or lactic acid fermented (F) using natural yogurt culture, in two variants (1: 5% and 2: 15%) substituting for wheat 650 type flour. A control bread sample, without BSG, was also prepared. Results showed that BSG, in all proposed variants, produced bread acceptable to trained sensory panels, with buckwheat-based samples being preferred. Both fermented BSG variants resulted in lower bread weight but longer leavening duration, especially with F1-OS and the lowest with nF1-OS. Total titratable acidity was higher in all bread samples compared to the control, with BWS bread samples exhibiting higher acidity. The evaporation coefficient during baking was highest for nF2 samples, followed by F1 samples. Also, buckwheat-based samples show higher values than oat-based ones. These findings are correlated with the data collected for the porosity and elasticity of the crumb. Considering all physical-chemical and sensory characteristics, the best results were observed for the F1-BWS sample, followed by the F1-OS sample, suggesting a 5% substitution positively affects bread quality. In conclusion, the present work describes new insights into the potential of lactic acid fermentation for the valorization of BSG in the bakery industry.

Keywords: brewer's spent grain, lactic fermentation, functional ingredients, bread.

F.67. BIOSORBENT BASED ON RESIDUAL BIOMASS OF SACCHAROMYCES PASTORIANUS USED IN ORANGE 16 RETAINED IN DYNAMIC PROCESS

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Abstract. Recent EU documents, national reports and statistics, as well as recent international scientific research studies that highlight the growing importance of environmental protection and preserving human life quality in today's society, all support the use of industrial byproducts to produce materials with added value. In this context, new value-added bioproducts that make use of the by-products have been produced in the

industrial process by immobilizing residual microbial biomass (RMB), an industrial by-product, and exploring its potential to be employed as a biosorbent in biosorption processes to retain some chemical contaminants in wastewater. This work investigates the biosorptive capacities of a novel residual biomass of *Saccharomyces pastorianus* (*S. pastorianus*), an interspecies hybrid between Saccharomyces cerevisiae and *Saccharomyces eubayanus*. Sodium alginate was used to immobilize the biomass waste from the brewing process of S. pastorianus, and this dynamic technique was then used to biosorb reactive Orange 16 textile dye from aqueous solution. The impacts of several experimental factors, including the amount of biosorbent, the concentration of dye, and the flow rate of the column, were examined. First, the breakthrough curves were created using the experimental biosorption data, emphasizing how these parameters affected the dye's retention efficiency on the biomass under study. The outcomes validate the findings from a static regime, suggesting that the waste biomass under investigation is a suitable biosorbent for use in dynamic systems to treat wastewater containing trace levels of organic dyes.

Keywords: biosorption, Orange 16, residual biomass.

F.68. EVALUATION OF THE PROPERTIES OF OLEOGEL BISCUITS AS MARGARINE SUBSTITUTES

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Abstract. In this paper, the use of oleogels (oil-wax structured fat systems with reduced total and saturated fat) is proposed to replace margarine in biscuits. Biscuits are popular snacks consumed by a large number of people around the world. The term biscuits refers to products containing three ingredients: wheat flour, sugar and fat. The effect of oleogels on the rheology of cookie dough and subsequently their effect on the quality of the finished product were studied. The objective of this study was to investigate the potential application of two different oleogels containing carnauba wax (CW) and candelilla wax (DW) to replace margarine in biscuits. Incorporation of 7 g/100 g and 9 g/100 g wax in cold-pressed olive oil (OO) resulted in stable oleogels with rheological properties that revealed a shear-dependent behavior. CW and DW oleogels produced a dough with margarine-like properties. In terms of sensory quality, fat is one of the main ingredients that has an influence on the overall texture of biscuits. As shown in numerous previous studies, the replacement of fat with oleogels or other fats has a significant influence on the texture characteristics of biscuits. The baked product obtained with oleogels in percentages of 7 and 9% presented a harder texture compared to margarine. However, the texture was greatly improved by keeping the biscuits in a polyethylene bag at a temperature of 22°C and a relative humidity of max. 60%. It was observed that the hardness of the product was greatly reduced during 30 days. Although the use of oleogels in short dough biscuits would offer significant improvements in terms of fatty acid content, further optimization is required to match the quality characteristics of biscuits made with margarine.

Keywords: replacement, short dough, rheology, texture.

F.69. SUGAR REDUCTION IN ICE CREAM: A MINI REVIEW

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Abstract. Ice cream is one of the world's most popular frozen dairy desserts today (global consumption of 2 L per person per year) among people of all ages, and global consumption is on the rise because of its delicious, wholesome, and nutritious properties. The World Health Organization estimates that by 2035 the number of people with diabetes will reach 471 million. This has prompted the ice cream industry to produce reduced glycemic index (GI) food, mainly targeting consumers suffering from diabetes. Conventional ice cream contains a high amount of carbohydrates, which may cause such diseases as obesity and diabetes. Therefore, it is no wonder that different substitutes have recently been tested in the ice cream field, to increase the quality and sensory properties of the finished product, resulting in many ingredients already being used on the market. The search for sugar substitutes from natural sources has led to the discovery of several substances that have an intensely sweet or taste-altering taste. About 150 plants have been found to taste sweet because they contain high amounts of sugars and/or polyols or other sweet constituents. This paper presents these possibilities for replacing sugar in ice cream manufacturing recipes.

Keywords: carbohydrates, substitutes, natural sources, sensory properties.

F.70. PREVALENCE, DETECTION AND MONITORING OF LISTERIA MONOCYTOGENES SPECIES IN DAIRY PRODUCTS

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Abstract. Any step of the food preparation process can result in cross-contamination with foodborne microorganisms. Due of *Listeria monocytogenes*' exceptional tolerance to a wide variety of temperatures and pH levels, the food industry faces significant and persistent problems. The prevalence of systemic listeriosis is significantly higher in vulnerable groups, such as the elderly, expecting mothers, and people with weakened immune systems. More outbreaks with fewer cases each epidemic have been identified as a result of recent advances in detection technology. A successful environmental monitoring program is required to monitor and confirm the effectiveness of control measures. Setting up protocols for sampling and detection, determining when and how often to sample, designating sampling zones, and implementing remedial measures are just a few of the components that make up a robust, scientifically based environmental monitoring program. This study proposes a review of the specialized literature on the prevalence, management, and surveillance of Listeria monocytogenes species in milk and dairy products.

Keywords: contamination, tolerance, listeriosis, monitoring program, surveillance.

F.71. STUDY OF FREEZE-TOLERANT YEASTS AND THEIR BREAD DOUGH FERMENTATIVE PROPERTIES

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Abstract. The concept of using freeze-tolerant yeast strains has long been considered to be against biological design. Both physiological conditioning and the selection of freeze-tolerant strains have proven inadequate to completely resolve the decrease in fermentative activity induced by freezing resistance. Freeze-tolerant yeast strains have been selected from strain collections or have been isolated from natural sources such as soil, grains, and fruits, as well as traditional corn and rye bread doughs. Although strains of Saccharomyces cerevisiae are commonly used in bread making, studies have also been reported on strains of *Torulaspora delbrueckii, Torulaspora pretoriensis*, whose strains generally show better frost tolerance than conventional yeast strains of baking, but are often compromised due to maltose fermentability. In general, classical breeding approaches have proven inadequate for the development of industrial strains suitable for frozen dough applications. A major problem associated with altering fundamental yeast characteristics, such as stress resistance, is the almost inevitable change in other desirable properties. This happens so often that, for example, rapid growth and fermentation were previously thought to be incompatible with high stress resistance. The paper summarizes the freeze-tolerant yeast strains that can be used to obtain frozen dough.

Keywords: fermentative activity, conventional yeast, frozen dough, stress resistance.

F.72. ECO-FRIENDLY BIOSORBENT FOR THE SUSTAINABLE REMOVAL OF ANTIMICROBIAL PHARMACEUTICAL COMPOUNDS FROM AQUEOUS SOLUTIONS

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Abstract: Reports of emerging contaminants (ECs) in the environment have increased worldwide in recent years, owing mostly to the expansion of the industrial and medical sectors. Among the contaminants included in ECs, the following stand out: pharmaceuticals, illicit narcotics, food additives, phthalates, hormones, steroids, personal care and veterinary products. Pharmaceutical products, by their presence in the environment, pose a significant risk to human health and ecosystems. Over the previous three decades, pharmaceutical residues have been discovered in almost every environmental matrix on every continent. These include surface water (lakes, rivers and seas), groundwater, effluents from wastewater treatment plants (WWTPs), sediments, and sludge. A variety of methods have been used to remove drugs from aqueous media, such as membrane separation, ozonation, flocculation, advanced oxidation, microbial degradation, electrochemical processes, and adsorption. Adsorption is the most promising technique for drug removal from aqueous solutions, however it is mostly used in laboratories or on a limited scale. As a result, research is needed to create more efficient and cost-effective pharmaceutical removal technologies that can be

implemented quickly and on a wide scale. In this context, the current study focuses on the removal of an antimicrobial compound from aqueous solutions using a biosorbent based on *Lactococcus lactis* biomass immobilized in a calcium alginate matrix. Ethacridine lactate (EL) was chosen as the target pharmaceutical compound because it is a dangerous drug with both acute and chronic health consequences, as well as high toxicity to aquatic life. The biocomposite material used as biosorbent was synthesized, characterized, and evaluated for its ability to remove EL in a batch system from aqueous solutions. The investigation emphasized the three main operational parameters that influence the biosorption process's efficiency: the initial concentration of the EL solution, the dose of biosorbent, and the initial pH of the EL solution. The synthesized biosorbent, LLA 5%, was characterized using scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR). In addition, the particle size and point of zero charge were established. The results obtained in the biosorption experiments indicated that the 5% LLA biosorbent has an excellent EL removal efficiency of up to 80 %, for all tested initial EL concentrations (20÷60 mg/L) with an initial solution pH of 3.0 and a biosorbent dose of 2 g/L. Taking into account the significance of equilibrium isotherms in the design and operation of adsorption processes, several models were used to evaluate and fit the experimental data. Riedlich-Peterson, Freundlich, Hill, and Temkin models are useful to depict the experimental data, based on correlation coefficient values. The biocomposite developed by immobilizing *Lactococcus lactis* biomass in calcium alginate were discovered to be a promising biosorbent for antimicrobial pharmaceutical compound removal from aqueous solution due to the biosorption effectiveness, inexpensive cost and eco-friendly nature.

Keywords: *Lactococcus lactis*, natural polymer, biosorption, Ethacridine lactate, emerging contaminants, equilibrium isotherms.

F.73. DETERMINATION OF PROTEIN AND POLYPHENOL CONTENT OF WHITE WINES TREATED WITH POROUS MATERIALS

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Abstract. White wines contain a wide variety of proteins, some of which are unstable, which naturally form an opalescent precipitate that leads to an unpleasant appearance of the wine, making it unmarketable. Because of this, by removing the proteins and obtaining a protein-stable end product is very important. Protein stability tests are varied, being applied different temperatures. In this study, the protein test was performed at room temperature, followed by a series of determinations. These include: the degree of swelling in the wine (sediment level), the amino nitrogen content related to the pH of the wine, the polyphenolic level in wine (total polyphenols, cinnamic, flavonoids), oxidative test, spectrophotometric determinations. Before performing the protein stability test, a young white wine from Sauvignon Blanc variety was treated with three types of sodium bentonite: natural bentonite (from Valea Chioarului), American bentonite (purchased from American Elements) and Asian bentonite (purchased from Environmental Protection Technology Company, Ltd, China). After carrying out the spectrophotometric analysis in the ultraviolet range, the 268 nm wavelength has been determined to be the maximum adsorption. The wine treated with Asian bentonite shows an increase of protein compounds adsorption by a maximum of 37 %. The saturation point is reached at the concentration of 0.4 mL of absorbent. American bentonite, has an adsorption efficiency increase

of only maximum 30 %, followed by its regression at concentrations above 0.3 mL sorbent / 10 mL wine.

Keywords: bentonite protein stability, white wine, polyphenols, aminic nitrogen, level sediment, UV-Vis spectrophotometric analysis.

F.74. RETENTION OF 2, 4, 6 - TRINITROTOLUENE WIDELY USED IN THE MILITARY INDUSTRY ON PILLARED CLAYS

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Abstract. Modern military explosives are generally aromatic compounds containing nitrogen. They are the most used in military operations and in terrorism, being widely used in the composition of artillery or aviation munitions worldwide. As the main chemical component of active munitions, high explosives pose a significant risk to the environment, primarily from toxicity to environmental receptors. The most commonly used secondary explosive is 2, 4, 6 - trinitrotoluene (TNT). TNT and similar compounds are toxic to humans, animals and plants. The risk of TNT contamination is greater when there is an aquifer in the vicinity. There is also a risk in sandy soil that does not contain organic material, as TNT will not be degraded by it as quickly and may migrate into groundwater or leach into surface water. Clays represent a category of minerals with particles below 2 μm, with very good adsorption properties. The properties are derived from the chemical compounds present in their structure, from the symmetrical arrangement of atoms and ions, as well as from the forces that hold them together. Their structure is layered, of T-O-T type (tetrahedral sheet, octahedral sheet, tetrahedral sheet). Overlapping tetrahedral and octahedral layers form 2:1 type packings in the case of montmorillonite. These stacks of layers consisting mostly of Si oxide and Al oxide are linked by de cations Na^+, K^+, Ca^{2+}, Mg^{2+}. This specific structure gives them certain properties such as high ion exchange capacity, increased swelling capacity, porosity and selectivity by shape and by surface properties. They thus have high capacities for adsorption and retention of some molecules between the interlamellar layers. Montmorillonite type clays can be improved by intercalation and pillaring processes with certain polyhydroxycations in order to increase the specific surface area and porosity by stabilizing the structure at high thermal treatments. In this way, large interlamellar spaces are created that will play a role in the adsorption and fixation of pollutant molecules. The present study proposes an analysis of the adsorption properties of some adsorbents based on montmorillonite clays on TNT diluted solutions. In order to optimize the adsorption process of the organic pollutant, several factors such as: pH, contact time, concentration of the pollutant and the amount of adsorbent material used are varied. Two clay-based materials were involved in the adsorption process: commercial K10 montmorillonite and pillared clay with aluminum and impregnated with vanadium (Al-V-PILC). These materials led to obtaining satisfactory yields in terms of TNT molecules retention capacity in a basic medium (pH 12) and short contact time (20 min).

Keywords: clays, pillaring, adsorption, trinitrotoluene.

F.75. THE INFLUENCE OF SOME VEGETABLE ADDITIONS ON THE QUALITY OF ORGANIC HENS EGGS

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Abstract. The present study addressed the implementation of ecological plant materials in the feed of a batch of laying hens. For the production of eggs in an ecological system, an important aspect is the quality of the materials used for the nutrition of the hens. They must come from an ecological system, and for regional development, it is preferable to come from regional productions. Mainly the composition of feed for laying hens is mainly based on several important components. An important constituent element of nutrition is given by the presence of amino acids. An adequate amount of protein in chicken feed ensures good development, good health and adequate egg production. The main amino acid necessary for nutrition is represented by methionine. Methionine intake has a direct influence especially on egg weight, but it also contributes significantly in other directions such as feather formation. Lysine is also important because it is largely responsible for weight gain in chickens. In order to have a quality ecological fodder, cereals, legumes, micro and macro elements of ecological quality must be used in the composition of the fodder. In order to improve the quality of the eggs and the health status of the laying hens, we consider it beneficial to add to the feed some amounts of plant material with a supposed probiotic role on the digestive system of the hens. The present study investigated the effects of the addition of sea buckthorn and walnut leaves on the quality of the eggs obtained. Egg quality has been studied both for the whole egg and for its components: yolk and white. The parameters studied were egg size, yolk color, pH and rheological behavior. All materials in the feed composition were of ecological quality. The results obtained by adding plant-based components to egg nutrition were promising, with an improvement in egg size and quality and, last but not least, an improvement in the health of the laying hens.

Keywords: nutrition of laying hens, eggs, vegetable additives.

F.76. SEASONAL VARIATIONS IN THE COPPER, ZINC, IRON AND MANGANESE CONTENT OF SWEET SORGHUM JUICE

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Abstract. Juice from sweet sorghum stalks is a liquid extracted from the stalks of the sweet sorghum plant, a versatile agricultural crop known for its ability to grow in drought conditions and less fertile soils. This juice is rich in natural sugars, predominantly glucose, fructose, and sucrose, and is commonly used in the production of biofuels, especially ethanol. Due to its high sugar content, sweet sorghum juice is also being researched for other industrial and food applications. In addition to its industrial uses, there is interest in exploring the use of sweet sorghum juice in the food industry, due to its naturally sweet profile and potential as an ingredient in beverages and other food products. This paper brings an extension to the studies regarding the concentration of metals (Cu, Fe, Zn, Mn) of sweet sorghum juice. Flame

Atomic Absorption Spectrometry (FAAS) was used to determine these metals from sweet sorghum juice. Atomic Absorption Spectrometry (AAS) is a technique or instrument used in analytical chemistry for the swift analysis of trace metals. This method relies on the absorption of light by atoms.

Keywords: Sweet sorghum juice, cooper, zinc, iron, manganese, F-AAS.

F.77. CLAY BASED MATERIALS FOR AMMONIA REMOVAL FROM POULTRY FARMS

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Abstract. Eastern part of Romania, represented by the NE Development Region, is an economically disadvantaged habitat. However, in this part of the country there is, among others, a group of companies that deal with the breeding, processing and marketing of poultry meat. From an economic and social point of view, any viable investment proposal in this regard can find industrial utility. Apart from the big producers, there are small producers all over the place, who deal with the raising and marketing of birds. In any poultry farm, regardless of size, there are problems with unpleasant odors due to poultry manure. In this work, it was proposed to analyze the possibility of reducing these odors from poultry farms using porous clay-based materials. Several types of clay were used: natural bentonite, Al-pillared clay, and Boltron dendrimer-impregnated pillared clay. Samples of chicken droppings, originating from farms, were prepared to which the clay-based materials were added. A blank sample containing no added material was also prepared. The samples were incubated at 250˚C and the amount of NH_3 released was measured on the day of preparation and then on the fourth, eighth, tenth, twelfth, thirteenth and fourteenth day. By using clay-based materials, the amount of NH_3 released on the last day of the experiment was considerably reduced; practically the total amount of NH_3 released by the chicken droppings decreased. The best results were obtained with a dosage of 3% clay-based materials, and of these the best results were found when using pillared clay material and then impregnated with Boltron dendrimer.

Keywords: poultry, released NH_3, clay-based materials.

F.78. COMPARATIVE STUDY BETWEEN CLAY-BASED ADSORBENT/CATALYST MATERIAL AND BIOLOGICAL MATERIALS DERIVED FROM CYPRINUS CARPIO

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Abstract. The raw materials used in the synthesis of adsorbents/catalysts impregnated with vanadium precursors were: natural clay from Valea Chioarului, pre-impregnated with Al_{13} - Keggin ions and then calcined at 400 ^{o}C (Al-PILC); the bladder obtained from the species *Cyprinus Carpio*, as well as fish scales from the same species. In the synthesis of Al-PILC incorporated with vanadium, the active compound was loaded to the pre-synthesized Al-PILC support by use of O_5SV as the metal source with wet impregnation (WI), washing after wet impregnation (WWI) or impregnation from aqueous solution (I) as the incorporation methods. The two newly synthesized biological materials were prepared using the same impregnation method. The newly synthesized materials were characterized using the following methods: X-ray powder diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), and the BET method was used to determine the specific surface area (Brunauer, Emmett, Teller). Regarding the material based on natural clay, namely Al-PILC, the incorporation of vanadium led to decreases in the basal level away from the typical layered structure preserved. The three synthesized and characterized materials were tested for the retention and catalytic destruction with ozone of the food dye Malachite Green, as well as of the organic pollutant 4-nitrophenol. Among the advanced oxidation processes (AOP), heterogeneous catalysis proved to be an effective method of real interest for the degradation of organic contaminants from different environments.

Keywords: clay, pillared clay, vanadium, bladder and fish scales, adsorption, catalytic ozonation.

G. INDUSTRIAL POWER ENGINEERING & COMPUTER SCIENCE

G.1. CURRENT STUDIES REGARDING THE SIMULATION OF AN EMBEDDED MULTICORE RTOS

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Abstract. The paper is part of a series of papers aimed at documenting and obtaining a practical solution for simulating a modified RISC-V architecture, with integrated real-time operating system hardware. Various attempts and successes of the academic and industrial world in transitioning software elements into hardware are discussed. Advantages such as increased reaction speed and enhanced predictability are noted, at the expense of flexibility and overall resource costs. Recurring themes include the importance of the simulator as a software tool for analysis and validation, and the significance of FPGA as a hardware tool for performance analysis. Simulators that have been prominently mentioned in the specialized literature over the past 5 years include Spike, Verilator, and gem5, which are used at various stages of RISC-V architecture development. Their open-source nature provides the flexibility needed to adapt them to the system architect's requirements. This conclusion is carried over into the next paper, which takes on the responsibility of documenting their adaptation to a new architecture.

Keywords: risc-v, simulation, ISA RTOS, embedded, multicore.

G.2. DECISION MAKING SYSTEM FOR SMART AGRICULTURE BASED ON FUZZY-TEMPORAL LOGICS

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Abstract. The health and well-being of a modern civilization depends primarily on the quality of the food consumed and the state of the environment. In turn, the quality of food products and the state of the environment depend on the primary products provided by agriculture, which in recent decades has made significant progress through the application of various innovative techniques and technologies, bio-technologies and genetic engineering. All this is at the core of smart agriculture, which is oriented towards the application of information technologies and advanced digital solutions to improve production processes, increase efficiency and correctly manage resources. Smart Agriculture includes the use of a variety of techniques and technologies such as smart sensors, edge computing, data analytics, artificial intelligence, agricultural robots, precision farming and IoT to monitor, control and optimize agricultural activities [1]. The algorithmic, technical and technological complexity of smart agriculture is determined by the multitude of functions, technological processes and activities carried out simultaneously, which include: crop monitoring and management, irrigation and water quality control, resource efficiency, automation and robotization of agricultural processes, data analysis and decision making [2]. The research carried out in this paper is oriented

towards the development of decision support systems based on Fuzzy-Time logic for application in Smart Agriculture. Time logic is used to formally describe the relationships between events and their state. It allows the expression and analysis of the temporal properties of events, their order, consequences and behavior over time. Time logic includes a set of temporal operators that are applied to express the temporal properties of events and may include operators for past, present, future, simultaneity, succession, and others [3-5]. In turn, Fuzzy Logic provides the model for decision making with reasoning and inference under uncertainty, allows representation and manipulation with uncertain variables or events characteristic of Smart Agriculture. The integration of the fundamental properties offered by Fuzzy and Temporal logic ensures the development of decision models to address uncertainty problems that evolve over time.

Keywords: smart agriculture, decision making, temporal logics, Fuzzy logics, event, Fuzzy-temporal logics, operator and operand.

G.3. CREEPER RECOGNITION - DETECTION SOFTWARE FOR CARS THAT TRACKS YOU IN TRAFFIC BASED ON ARTIFICIAL INTELLIGENCE.

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Abstract. The "Creeper Recognition" project proposes the development of an innovative application for reading vehicle license plates, with the main goal of identifying and monitoring vehicles involved in tracking behavior in urban traffic. This application focuses on leveraging advanced image recognition and data processing technologies to extract critical information from video streams from vehicle cameras. The ultimate goal is to provide users a proof of concept for effective tools to detect potential threats and ensure a higher level of personal security in urban environments.

Keywords: image recognition, artificial intelligence, security, environment.

G.4. ASPECTS REGARDING THE DESIGN OF A COMPUTER NETWORK IN NON-FORMAL EDUCATION

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Abstract. The main purpose of the work is to establish the design stages of a computer network in non-formal education that will contribute to the computer-assisted training of students in the profile circles, karting-road education and environmental protection-ecology. In the framework of the research methodology and the design of the computer network, information from specialized literature and web sources were used. The Cisco Packet Tracer Student package was successfully used to configure the computer network.

Keywords: Computer-assisted training, non-formal education, LAN type network, computer network topologies.

G.5. STUDY ON INCREMENTAL CONDUCTANCE MAXIMUM POWER POINT TRACKING METHOD FOR PHOTOVOLTAIC SYSTEMS UNDER PARTIAL SHADING

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Abstract. This paper presents a study on the performance of incremental conductance maximum power point tracking (MPPT) control algorithm for photovoltaic (PV) systems during various partial shading solar irradiance and temperature operating conditions. The analysis of incremental conductance MPPT method is proved in detail through modeling and simulation in Matlab/Simulink of a PV solar array under partial shading in different configurations with bypass and blocking protection diodes connected to a resistive dc load through a boost dc-dc converter to control the output solar power. The results show the performances of the incremental conductance MPPT control system during partial shading to follow the global maximum power point (GMPP) of PV solar arrays and to extract the maximum available energy from the PV solar arrays.

Keywords: incremental conductance, modeling, partial shading, photovoltaic (PV) arrays, simulation.

G.6. DETECTION OF MIMIC-GESTURE MOVEMENTS USING THE ROMANIAN SIGN LANGUAGE SYSTEM

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Abstract. Sign language is one of the oldest and most natural forms of language used for communication. In this work, a real-time method based on neural networks was developed to enable hand gesture recognition using Romanian sign language. Automatic recognition of human gestures from images captured by a camera is an exciting topic in artificial intelligence development. For this purpose, it was proposed to use a convolutional neural network (CNN) to recognize hand gestures in human actions captured in an image captured by a camera. To train and test the CNN neural network and the MediaPipe and OpenCV libraries, hand position and orientation data were used. To do this, the hand in the captured image is first passed through a filter, and then the hand gestures are classified into a certain category using a specific classifier. The calibrated images are then used to train the CNN neural network itself. This approach based on artificial intelligence techniques is an important step in the development of systems capable of interpreting and understanding hand gestures in the

context of everyday human activities, thus helping to improve the interaction between technology and humans.

Keywords: artificial intelligence, CNN, mime-gesture, OpenCV, Mediapipe.

G.7. LESSONS LEARNED FROM POWER SYSTEM BLACKOUTS TO INCREASE OPERATIONAL SAFETY

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Abstract. Ensuring the operation of a fully integrated European internal energy market, which allows the free movement of energy through an adequate infrastructure and without technical or regulatory barriers, is one of the objectives of the European Union's energy policy. The current challenges facing the power systems include aspects related to the growing share of renewable energy sources but also the need for more transparent, integrated, and interconnected energy markets. In these conditions of physical and commercial interconnection, incidents can easily propagate between neighboring power systems. The paper presents comparative aspects of two major incidents that took place in the European power transmission system: January 8, 2021, and November 4, 2006. The two blackouts had approximately identical triggering causes, being the result of a sequence of unfavorable events because of high energy flows on the transmission lines. Both incidents resulted in the loss of stability of the interconnected power system and the failure (collapse) of more or less extensive areas of the system. The incident of January 8, 2021, is considered severe but not as serious as that of November 4, 2006, when approximately 15 million customers were affected for a duration of almost two hours. The lessons learned from such events are very useful for the current operative staff but also for the future workers to prevent similar events and implicitly increase the operational safety of interconnected power systems.

Keywords: power systems, blackout, operational safety, lessons learned, renewable energy.

G.8. AN HYBRID SVM-BASED APPROACH FOR DIMENSIONLESS REMAINING USEFUL LIFE PREDICTION IN ROLLING ELEMENT BEARINGS

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Abstract. Rolling element bearings play a crucial role in the performance of rotating machines, directly influencing the Remaining Useful Life (RUL) of the machinery. Efficient RUL estimation facilitates proactive maintenance strategies and mitigates unexpected shutdowns. This paper introduces an innovative RUL prediction method for bearings, employing dimensionless measurements to evaluate the degradation stage. Two novel measurements, reflecting vibration intensity in relation to normal values, are introduced to enhance sensitivity to incipient defects, reduce fluctuations, and eliminate individual differences among bearings. To assess the degradation stage, a Support Vector Machine (SVM) classifier is utilized, showcasing high classification accuracy owing to its excellent generalization ability and mathematical foundation. The SVM classifier is trained using fitted measurements based on a generalized degradation model. Five degradation

stages are defined as output, providing a comprehensive understanding of the bearing's health. Actual measurements are incorporated during the prediction process, and a hybrid degradation tracing model is employed to exploit optimal RUL prediction by tracking the degradation process. The proposed methodology is validated on public IMS bearing datasets. Performance comparisons with IMS datasets demonstrate the effectiveness of the proposed approach within specified error margins.

Keywords: Rolling Bearings, Remaining Useful Life (RUL), Vibration Analysis, Hybrid Degradation Tracing Model, Support Vector Machines (SVM).

G.9. DESIGN OF A COMPUTER NETWORK AT "EMIL BOTTA" NATIONAL COLLEGE - ADJUD

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Abstract. The main purpose of the work is to establish the design stages of a computer network within high school education that will contribute to the computer-assisted training of students to their access to the latest news as well as the support of the National Evaluation and Baccalaureate exams. A high-performance computer network was designed and implemented according to current standards, recommending the use of cutting-edge components and materials. In the framework of the research methodology and the design of the computer network, information from specialized literature and web sources were used. The Cisco Packet Tracer Student package was successfully used to configure the computer network.

Keywords: Computer-Aided Instruction (AID), IP Addressing and Subnet Planning, Network Security, LAN, Computer Network Topologies.

G.10. ICT SOLUTIONS FOR PHYSICAL RESILIENCE ASSESSMENT AND MODELING

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Abstract. Over the past decade, science and research increasingly focus attention on physical security and critical infrastructure protection, in particular on the protection of critical infrastructure elements, with a focus on energy, transport and ICT. New technologies for the physical monitoring of the critical infrastructure are studied with specific attention to the radio spectrum monitoring and the protection of wireless communications, the monitoring and protection of the physical layer of cabled communications, robotic solutions for the inspection and surveillance. Also, modeling and risk analysis of the selected infrastructure systems aim at creating an evaluation and optimization tool for infrastructure stakeholders for determining resilience thresholds in their infrastructures with consideration of relation among resilience and sustainability aspects. Advances in technology, such as Internet of

things (IoT) sensors, robotics, artificial intelligence (AI) and specialized software are used to mitigate the security threats by applying an integrated approach including organizational aspects, training, technologies for monitoring, modeling, and UAV-based surveillance to enhance the capacity for physical resilience in critical entities. Our current research is focused on the development of physical methods for measuring environmental factors, computational modeling, analysis, and risk forecast to increase the resilience to biotic and abiotic factors. Use of drones with small size and weight of pollutants collection device allows solid particle collection at various altitudes and over extended areas, as well as the possibility to study directly airborne microparticles collected on different substrates. In particular, systemic approach inspired by the interdisciplinary applications, computational modeling of environmental factors, UAV-based 3D mapping through Pix4Dmapper photogrammetry allow formulation of scientifically based recommendations regarding the adjustment of technological processes with the aim of reducing the effects of atmospheric pollution, soil surface degradation and the instability of urban and natural ecosystems, e.g., solid pollutant particles are collected from diesel exhaust and examined directly by means of optical microscopy and AFM. The UAV LiDAR system will be further introduced as an UAV-based platform, which can be used for the real time point cloud visualization, and launched as a fully automated, cloud-based LiDAR post-processing solution to capture topography, inspect utility installations and construction sites, map disaster areas, and conduct research of critical infrastructures. Integration of the eALERT platform for real-time environmental monitoring and instant warning into an integrated monitoring and surveillance platform in the Chisinau city, integration of the LiDAR technology into an advanced monitoring and surveillance platform, and the development of physical technologies with the UAV application in the monitoring and precise quantitative analysis of critical infrastructures, including also selection of sensors and protocols for monitoring and alert systems, represent the main research developments.

Keywords: real-time monitoring, critical infrastructure, wireless network, sensors.

G.11. STUDIES ON THE AUTONOMOUS FLIGHT CONTROL OF QUADCOPTER DRONES

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Abstract. The objective of the work is to design a quadcopter type drone, capable of performing autonomous missions. For the hardware part, the following were used: single-board computer type Raspberry Pi 4 motel B 8GB RAM, Navio2 Autopilot flight controller, electronic speed controller ESC Turnigy AE-30A, Raspicam video camera with orientation system. At the level of software components, the following were used: Emlid Raspberry OS – proprietary NAVIO2 operating system running ArduPilot, OlliW's o323BGCtool - Windows application for calibration, MissionPlaner – for programming and planning autonomous missions and ROS (Robot Operating System). Algorithms were developed to interpret sensor data, plan flight paths and execute autonomous missions. The implemented system allows selection of a flight mode: such as manual mode, semi-automatic control mode or autonomous mission mode. In the latter case, the mission must be previously programmed in MissionPlaner. To deal with critical situations and bring the drone back, the RTL (Return to Launch) system was configured. The control system of the drone has implemented algorithms for recognition and tracking of some subjects with the help of the video processing system.

Keywords: flight control, NAVIO2, quadcopter drones, autonomous mission.

G.12. ADVANCEMENTS IN HUMAN ACTIVITY RECOGNITION: A TECHNICAL REVIEW OF SENSOR AND VISION-BASED APPROACHES

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Abstract. Human Activity Recognition (HAR) has evolved significantly with the integration of deep learning (DL) and transfer learning techniques, enhancing the detection and analysis of human motions and activities across various domains. This review examines the technological advancements and methodological approaches that have shaped HAR over the past decade, with a focus on sensor-based and vision-based systems. In HAR, activities are often categorized into single-person, multi-person, and group activities, each requiring distinct approaches for accurate recognition. The core of HAR lies in effective feature extraction and classification, where deep neural networks (DNNs), particularly Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), play pivotal roles. These networks handle the spatial and temporal aspects of activity data, respectively. Transfer learning has proven indispensable for leveraging pre-trained models on new, sparse datasets, significantly reducing the need for extensive data labeling while maintaining high accuracy. Additionally, the fusion of sensors and adaptive algorithms has facilitated the development of robust HAR systems capable of operating in dynamic, real-world environments. This review also highlights the shift from traditional machine learning models, which assume homogeneity in training and testing datasets, towards more flexible, data-driven architectures that adapt to the variable nature of human activities. The integration of transfer learning not only addresses the challenge of data scarcity but also enhances the generalization capabilities of HAR systems across different contexts and environments.

Keywords: Human Activity Recognition, Deep Learning, Transfer Learning, Convolutional Neural Networks, Recurrent Neural Networks, Sensor Integration.

G.13. DESIGN OPTIMIZATION IN USING VIRTUAL REALITY (VR) TRAINING ENVIRONMENTS TO ADDRESS DEFICITS IN SOCIAL INTERACTION SKILLS OF AUTISM SPECTRUM DISORDER

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Abstract. Persons with autism spectrum disorder are often characterized by deficits in social interaction and communication that can be attributed to their restricted patterns of interest and behavior and difficulties in carrying out complex fluid reciprocal social interactions along with infrequent engagement in social interactions, there are barriers with regard to accessibility. The second limitation is the modality used for delivery of interventions, specifically, such specialized intervention services requires very expensive long hours of one-on-one sitting of the interventionist with the child that can be challenging, given the limited trained resources. Amidst the different types of technology-assisted systems, VR can offer easily design communication scenarios set in social contexts like learning environment for a person in an individualized manner, ensuring the ease of

accessibility and affordability to the user. Also, the system keeps a record of the improvement in performance of the learner, thereby helping the caregivers and clinicians to monitor the progress (in skill learning) of the learner. A python-based Vizard software from WorldViz LLc. was used to design the user interface. The avatars were programmed to narrate their personal experience to the user while being embedded in relevant social contexts. For narration, a database of stories was created. As far as the social contexts were concerned, a repository of contexts depicting scenes relevant to the experience was created that was narrated by the avatar in the form of a story. the VR environment was modulated to depict scenes that were relevant to the narration by the avatar. The avatar's narration was based on a variety of relevant topics, e.g. a sport of choice, events related to a special day in the life, trip in the countryside with friends, etc. For each social context, the avatar was programmed to make a one-on-one interaction with the user. An important part of the optimization process is the component of social bidirectional communication interface which offer the ability to interact with and reciprocate to a social partner. The menu choices were offered so as to serve as an (1) easy reference to the individual with autism for communication and (2) give a structure to the two-way communication. The task required the participant to extract a piece of information from the avatar categorized as (1) 'Benign', (2) 'Projected Contingent' (targeting information beyond what was described by the avatar during the task presentation), and (3) 'Sensitive' (one related to the personal feeling). Additionally, based on the category of the information to be extracted by the participant from the avatar, the tasks were designed to belong to three interaction challenge levels (i.e. difficulty levels of interaction) such as 'Easy', 'Medium', and 'High'. Again, extraction of information belonging to the three categories (as mentioned above) needed the participant to go through different lengths of conversation threads. The maximum scores that could be achieved while using the bidirectional social conversation module were 30, 50, and 70 for Easy, Medium, and High levels of interaction difficulty, respectively. Additionally, the system allotted a penalty factor for an irrelevant choice made by a participant while interacting with the avatar (an irrelevant choice referred to one not maintaining the expected order of asking the questions to the avatar). Also, the performance score was labelled as Adequate (in case the total score was ≥ (image) 70%) or Inadequate (otherwise). Using the above-mentioned system, an experimental study was designed for individuals with autism. High-functioning teenaged individuals (ASD1–ASD8) with autism (Mean (SD) = 15.76 (1.89) years) were recruited to participate in this study. The participants were tested using Peabody Picture Vocabulary Test (PPVT) test scores, Social Responsiveness Scale (SRS), Social Communication Questionnaire (SCQ), Autism Diagnostic Observation Scale-Generic (ADOS-G), and the Autism Diagnostic Interview-Revised (ADI-R). On an average, the scores were Mean (SD) = 112 (20.51) for PPVT score, 77.25 (13.28) for SRS score, 17.5 (5.57) for SCQ score, 9 (2) for ADOS-G, and 43.33 (16.26) for ADI-R score. The signals from the task computer were routed to a second monitor for the experimenter, a therapist, and the participant's caregiver to observe how the task progressed. Finally, once the participants expressed their willingness to start interacting with the VR-based tasks, the experimenter started the computer-based tasks. Results. None of the participants left the tasks in the midway in spite of given an option to discontinue from the tasks in case one felt uncomfortable at any point during the task execution. The average minimum percentage performance score was 80%. In conclusion, that synthetic training environment might be devoid of the subtle niceties of the real one, yet the flexible, controllable, and cost-effective VR-based platform can be potent to offer initial skill training to this target group. Being affordable, the proposed training platform can be easily accessed by many while addressing at least some of the core deficits. Thus, it can serve as a complementary tool for the OT interventionists, in a direct manner or telehealth networks services.

Keywords: virtual reality, design optimization, social interaction skills, autism.

G.14. PREVALENCE STUDY OF INTERNET ADDICTION PRESENCE IN A SAMPLE OF BACĂU STUDENTS

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Abstract. Over the past 20 years a vast increase of Internet addiction disorder (IAD) has been established in world, mainly because has become a serious mental health condition. The new approach of research domain criteria (RDoC) considers re-evaluating DSM-V, because of the change in global prevalence of IAD from 0.3% to 38%. Treatment of IAD is still unsolved due to the lack of concrete evidence, knowledge, and information about the disease. A cross-sectional study sample comprising of 250 students of the" V. Alecsandri" University of Bacău. 224 from 250 of students respond to questionnaire (Response rate was 89.6%). Of the 224 students who took part in the study, 86 (38.4%) were male and 138 (61.6 %) were female. The mean age of students was 21.05±0.1 years. To assess the risk of IAD, the Romanian version of IAT (Internet Addiction Test, K. Young) was used. It is a self-assessment scale with 20 items utilized to evaluate quantitatively the connected risk with excessive and/or problematic usage of the Internet, considering the working and social dysfunctions. It is possible to deduce also, which area of a person's life is more compromised by the pathological use by six areas: i. Compromised social quality of life [4, 5, 9, 13, 16, 18 item]; ii. Compromised individual quality of life [2, 12, 14, 19, 20item]; iii. Compensatory usage of Internet [7, 11, 15 item]; iv. Compromised academic performance [6, 8 item]; v. Compromised time control [1, 17 item]; vi. Excitatory usage of the Internet [3, 10 item]. The internal reliability of the IAT has been found to be 0.90 ÷ (image) 0.93. After collecting data, coding and entering to SPSS software version 19 , analysis was done by, χ 2 (image) , significant level considered at 0.05. Descriptive analyses were calculated using frequencies and percentages for categorical variables and means and Standard Deviations (SDs) for continuous variables. The majority of respondents were classified as normal users of the Internet (81.12%), 18.33% were moderately addicted and 0.54% was seriously addicted. The prevalence of IAD was very low in that sample, almost 54% of students had an IAT score > 40, a result that is linked with a pathological use of Internet (PUI) and, therefore, with a higher risk of developing IAD. In the whole sample, only 1.14% students exceed the cutoff of 70 in IAT score, and 53.83% of the subjects were found to be at risk of development of IAD (IAT score from 40 to 70; mean IAT=41.80, SD= 9.93). Most of these students were part of EF (mean IAT=41.33, SD= 9.66). In particular, three EF students (1.20%) had scored more than 70 points and 129 EF subjects (5333%) show a score between 40 and 70. In other groups (mean IAT=42.16, SD= 10.06), three students (1,2%) had more than 70 points, while 152 students had more than 40 (54,5%). Important is to notice that this data does not show great gender differences. Comparing the genre and the main use of the Internet in IAT score >40 students, the main use of the network was music and video downloads, social network (like Facebook) and messaging (i.e. , WhatsApp). In particular, boys prefer to download from Internet and messaging; girls download, surf on social networks and text in equal measure. Bias may also occur since the average value of students in the Engineering Faculty (EF) vs. scientific/ mathematical/ linguistic/sport and health departments is relatively higher than other and this observation may affect the results. In conclusion, this study showed that the prevalence of excessive internet use among students of the "V. Alecsandri" University Bacău area was of 0.54%. Variability in prevalence rates can be explained by the faculty domain of samples showing the role of specialization context in affecting Internet usage. Clinical and psychological implications of pathological Internet use and future directions for research are discussed. Same, the results of this study confirm the role of experts dealing with addiction to

implement cognitive-ergonomics education programs for primary and secondary intervention among students.

Keywords: internet addiction disorder (IAD), working and social dysfunctions, cognitive-ergonomics.

G.15. ANALYSIS OF THE POSSIBILITY OF USING PATTERN RECOGNITION APPLICATIONS TO DETERMINE THE TIME OF OCCURRENCE OF DEFECTS IN ELECTRICAL EQUIPMENT

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Abstract. The article analyzes the studies carried out in the field of the use of machine learning algorithms used to detect the occurrence of faults in electrical switching equipment. Although the switches with gas insulation (GIS - Gas Insulated Switchgear) that are made in encapsulated construction and declared as "maintenance free" (without maintenance) in the manufacturing process and during operation (switching on load and short circuit) are they can produce small defects that will disrupt their proper functioning.

Keywords: Gas Insulated Switchgear, pattern recognition, learning machine.

G.16. THE STUDY OF EVOLUTION OF ENERGY CONSUMPTION PER CAPITA AND BY SOURCE CATEGORY IN ROMANIA AND HUNGARY COMPARED TO THE EUROPEAN ONE

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Abstract. The energy consumption per capita in Romania and Hungary slightly exceeded 7Mwh/person at the level of 2020 (2.7, respectively 4.4 Mwh/person), being among the smallest in the European Union. At the other pole, the Nordic countries have the highest consumption: Iceland 51Mwh/pers., Norway 23 Mwh/pers., Finland 14.7Mwh/pers., Sweden 12.3 Mwh/pers. The European Commission proposes to reduce per capita consumption. The article aims to evaluate the extent to which the two countries can reduce their energy consumption or if the share of green energy in per capita consumption can be increased. Government programs supporting photovoltaic facilities in both countries will be considered in the analysis. The data required for the analysis are extracted from the databases of the National Institute of Statistics in Romania and its counterpart in Hungary, as well as from EUROSTAT.

Keywords: energy consumption per capita, sources categories.

G.17. UNVEILING THE POWER OF NAMED ENTITY RECOGNITION (NER) IN NATURAL LANGUAGE PROCESSING

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Abstract. Named Entity Recognition (NER) emerges as a pivotal component within the realm of Natural Language Processing (NLP), revolutionizing information extraction and semantic understanding across diverse textual domains. This abstract elucidates the fundamental principles, methodologies, and applications driving the efficacy of NER, showcasing its indispensable role in deciphering the intricacies of unstructured textual data. NER, a subtask of information extraction, endeavors to identify and categorize named entities within text, encompassing entities such as persons, organizations, locations, dates, quantities, and more. Through the synergy of rule-based approaches, statistical models, and advanced deep learning architectures, NER algorithms navigate the linguistic complexities inherent in textual data, discerning entities amidst linguistic ambiguity and variability. The abstract delves into the underlying methodologies powering NER, ranging from rule-based systems leveraging linguistic patterns and gazetteers to statistical models harnessing machine learning algorithms, such as Conditional Random Fields (CRFs) and Hidden Markov Models (HMMs). Furthermore, it explores the paradigm shift ushered in by deep learning frameworks, exemplified by state-of-the-art models like Bidirectional Encoder Representations from Transformers (BERT) and Long Short-Term Memory networks (LSTMs), which excel in capturing contextual dependencies and semantic nuances crucial for accurate entity recognition. In conclusion, NER stands as a cornerstone of NLP, unraveling the semantic fabric of textual data and empowering machines with a deeper understanding of language. As NER continues to evolve alongside advancements in computational linguistics and artificial intelligence, it paves the way for transformative innovations, bridging the gap between human cognition and machine intelligence in an era defined by the abundance of unstructured textual information.

Keywords: NER, NLP, CRF, HMMs, BERT, LSTMs.

G.18. PREDICTION OF THE REMAINING USEFUL LIFE OF LI-ION BATTERIES OF ELECTRIC SCOOTERS

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Abstract. In recent years the number of electric scooters has increased due to the fact that they offer an efficient and environmentally friendly way to travel medium or short distances. They are easy to maneuver within urban areas and are a faster alternative to travel than walking or using public transport. Li-ion batteries are used to power the Brushless DC Motors in the electric scooters. Therefore, it is necessary to estimate the Remaining Useful Life (RUL) of Li-ion batteries. In this paper, the author proposes a RUL prediction method for Li-Ion batteries in electric scooters using a data-driven approach.

Keywords: RUL Li-ion, machine learning, electric scooters.

G.19. UTILIZING HYBRID PHOTOVOLTAIC-THERMAL PANELS FOR ELECTRICITY AND HEAT IN RESIDENTIAL NEARLY ZERO ENERGY BUILDINGS

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Abstract. The nZEB (Nearly Zero Energy Building) standard mandates that a building achieves very high energy performance, where the near zero or very low amount of energy required is largely met by renewable sources either produced onsite or nearby. In Romania, the energy used to maintain a building's interior microclimate, derived from renewable sources, must constitute less than 30% of its total primary energy consumption. nZEBs play a critical role in reducing greenhouse gas emissions and addressing global warming. Hybrid photovoltaic-thermal (PV/T) panels serve a dual purpose: they generate electricity and collect heat. Similar to standard PV panels, PV/T panels convert sunlight into electricity using photovoltaic cells. Additionally, they capture solar heat, which can be utilized for space and water heating. This dual functionality allows for improved overall energy efficiency. This paper explores the incorporation of a PV/T panel system into a residential building's electricity and heating systems. It highlights the economic and energy-related benefits and drawbacks of employing these panels in residential settings, underscoring their potential to enhance energy efficiency.

Keywords: PVT panels, electricity, hot water, household consumers, nZEB.

G.20. PRACTICAL CONSIDERATIONS FOR USING HYBRID PHOTOVOLTAIC-THERMAL PANELS IN ELECTRICITY AND HEAT PRODUCTION

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Abstract. Decarbonizing Romania's energy sector by utilizing renewable energy sources is crucial in the context of climate change and transitioning towards a more sustainable economy. In 2020, Romania achieved its target of deriving 24% of its total energy consumption from renewable sources. The Romanian government has now set a new target of 30.7% by 2030, planning to add 7 GW of renewable capacity to meet this goal. In this scenario, using hybrid photovoltaic thermal (PV/T) panels to convert solar energy into both electricity and heat presents a viable and sustainable option. These panels have diverse applications across residential and commercial buildings, Nearly Zero-Energy Buildings (NZEB), industrial processes, and agriculture. This paper evaluates the energy efficiency of PV/T technology based on experimental results obtained from a research installation featuring a PV/T panel at the "Vasile Alecsandri University" Thermal Power Plant in Bacau. It discusses variations in electrical, thermal, and overall efficiency under different climatic conditions and at various times of the day.

Keywords: PV/T panel, heat, electricity, efficiency.

G.21. UTILIZING ARTIFICIAL INTELLIGENCE, VIRTUAL/AUGMENTED REALITY, AND A FUZZY EXPERT SYSTEM FOR PERSONALIZED THERAPIES IN MODERN EDUCATION OF PATIENTS WITH SPECIAL NEEDS

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Abstract. This article presents the utilization of Artificial Intelligence (AI), Virtual/Augmented Reality (VR/AR), and a Fuzzy Expert System (FES) to provide personalized, accurate, and efficient therapy in the learning process for individuals with special educational needs (SEN). Mach in eLearning is used to analyze and understand patterns and trends in patient data, helping to identify the most effective therapeutic strategies for each individual, while Virtual Reality (VR) and Augmented Reality (AR) can provide the optimal environment for interactive and immersive therapies tailored to the individual needs of each patient. The Fuzzy Expert System (FES) is used to establish specific parameters related to the duration and frequency of therapy sessions, as well as the content, methodology, and objectives of therapy, along with the assessment and monitoring of progress, for educational purposes facilitated through presentation, analysis, processing, and storage of information. These parameters are determined and adjusted using an FES, which can take into account multiple variables and contexts to provide personalized, accurate, and efficient therapy in the learning process for individuals with special educational needs (SEN), who can express choices, desires, and requirements through keyboard and mouse input, contributing to the acquisition of knowledge skills, and improvement of practical abilities for both children and adults. With this technology in the learning process, there are several evident advantages, allowing individuals with special needs to transition from being passive observers (using the computer for sensory stimulation) to active participants (interacting with the learning environment), and ultimately to creators (modifying the environment according to their desires, aspirations, and interests). This serves not as an end in its own right but as a means to fulfill specific requirements through which the learning process for individuals with special needs becomes increasingly personalized, individualized, adapted, and efficient.

Keywords: learning, personalized special education/therapy, speech therapy, fuzzy expert system -FES, FCL language, fuzzy logic, AR.

G.22. ADVANCEMENTS IN NEURAL MACHINE TRANSLATION ALGORITHMS: A FOCUS ON ROMANIAN TRANSLATION

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Abstract. Neural Machine Translation (NMT) has revolutionized the field of language translation, offering unprecedented accuracy and fluency. We explore recent advancements in NMT algorithms, with a specific focus on translation in Romanian. NMT systems leverage artificial neural networks to translate text from one language to another, eliminating the need for handcrafted linguistic rules and enabling a more robust translation process. The abstract delves into the architecture of NMT models, highlighting the key components such as encoder-decoder structures, attention mechanisms, and transformer

architectures. These components work synergistically to capture complex linguistic patterns and dependencies, facilitating more contextually relevant translations. Furthermore, recent developments in self-attention mechanisms have significantly enhanced the ability of NMT models to handle long-range dependencies and improve translation quality. In the context of Romanian translation, NMT algorithms have demonstrated remarkable efficacy. Romanian, a Romance language with its unique syntactic structures and vocabulary, presents challenges for machine translation systems. However, advancements in NMT algorithms have addressed many of these challenges, resulting in more accurate and fluent translations between Romanian and other languages. Moreover, the abstract discusses the role of parallel corpora and data augmentation techniques in training NMT models for Romanian translation. These methods enable the model to learn from a diverse range of linguistic contexts, enhancing its ability to produce high-quality translations across various domains and styles. Furthermore, the abstract explores evaluation metrics for assessing the performance of NMT systems in Romanian translation. Metrics such as BLEU (Bilingual Evaluation Understudy) and TER (Translation Edit Rate) provide quantitative measures of translation quality, allowing researchers to compare different NMT models and fine-tune their architectures for optimal performance. In conclusion, NMT algorithms represent a significant advancement in the field of machine translation, offering unprecedented accuracy and fluency in translating between languages. With a specific focus on Romanian translation, recent developments in NMT architectures, data augmentation techniques, and evaluation metrics have led to remarkable improvements in the quality of translations, paving the way for more effective cross-linguistic communication and collaboration.

Keywords: NMT, BLEU, TER, language translation.

G.23. ADVANCED TECHNOLOGIES IN THE PROCESSING, ANALYSIS, DISTRIBUTED PROCESSING, AND FUZZY QUERYING OF DATA FROM WIRELESS SENSOR NETWORKS (WSN)

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Abstract. Wireless Sensor Networks (WSNs) are used for disaster monitoring, natural calamities, underground environments, and military systems. In the case of underground mining, WSNs could favor the prevention or even elimination of catastrophes due to the explosive environment by creating and using more compact and robust command and control systems based on WSNs, eliminating the need for long classic wire connections. The traditional approach involves transmitting information to/from the process through a large number of cables, requiring the use of complex, costly, and heavy equipment that primarily affects safety. The solution proposed with WSNs is under continuous research and development, considering that sensor networks should be as affordable as possible, have high transmission and processing capacity for large amounts of " big data," and be scalable and reconfigurable. Programmable WSNs us e PLCs (anti-explosion) with programmable ports for monitoring and controlling the atmosphere or detecting intrusions, transmitting information remotely to decision centers. Fuzzy queries request data from distributed databases populated with sensor data, which are slower than autonomous databases. The cooperative system attempts to part it ion into subqueries and find successful queries that are as clos e as possible to the original query, called Maximum Success Subqueries (XSS). Modern modeling and simulation methods have been used for analyzing, refining, and validating the results of using the created network, along with optimizing the model parameters. The system uses an open-source framework for distributed data processing

called Hadoop, is error-free, and can self-configure based on the environment in which it is used.

Keywords: data processing, distributed databases, wireless sensor networks (WSN), control, transmission, modeling/simulation, distributed queries, fuzzy querying, Hadoop, HDFS.

G.24. DETERMINATION OF ENERGY LOSSES THROUGH THE CORONA EFFECT ON A 400 KV LEA

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Abstract. This paper presents considerations of energy losses due to the Corona effect on a 400 kV power transmission line. The route was analyzed under the aspect of meteorological conditions. Longitudinal and transversal parameters of the power line, power losses through the Corona effect and through Joule effect were determined. The paper deals with a comparison of losses according to the number of conductors per phase. In order to achieve the reduction of own technological consumption on the analyzed 400 kV LEA and especially the losses due to the Corona effect, the following measures are required in operation: - installation of meteorological stations at specific points on the route of the line with the transmission of information to the dispatcher point; - reducing the operating voltage level of the line towards the maximum admissible limit, upon the occurrence of weather conditions that lead to an increase in Corona losses; - achieving line loading at a load positioned around their natural power value.

Keywords: energy losses, Corona effect, 400 kV LEA.

G.25. ANALYSIS OF THE EQUIPMENT REABILITY OF SOME DIESEL-ELECTRIC LOCOMOTIVES USED FOR TRAINS IN ROMANIA

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Abstract. In order to highlight some design problems of diesel-electric locomotives, a study was made regarding the failures of various equipment that were used in the construction of a diesel-electric locomotive. Thus, the breakdowns that occurred in the partially modernized 060 DA diesel-electric locomotive, with Romanian equipment, and the fully modernized one, with General Motors equipment, in the towing of passenger trains for 5 years, were analyzed.

Keywords: equipment, wheel, locomotive, motor.

G.26. INCREASING THE ENERGY EFFICIENCY OF A SUBSTATION

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Abstract. Substations are the main elements of an energy system that must ensure evacuation of power produced in the power plants, connection of lines to transit a power, distribution electricity to consumers. Reliability of a substation is essential for the role it plays in the energy system. For operation of substation equipment is required energy that is provided by DC and AC auxiliary systems. By upgrading equipment or good housekeeping measures that do not affect reliability, power consumption of the auxiliary systems can be reduced. Making an energy audit of the substation is required. The energy audit analyzes how energy is used and identifies specific solutions to reduce energy costs. In this paper, we made an energy audit of a substation with multiple functions in the energy system, we proposed some measures to increase energy efficiency. The lighting installation for the 400 kV substation are realized with 22 electronic ballast neon lamps of 125 W while the lighting installation for the 110 kV substation has 26 electromagnetic ballast neon lamps of 250 W. If the latter installation would replace its electromagnetic ballast lamps with electronic ballast lamps about 30% of the consumed electricity could be saved, or about 5000 kWh / year. The building heating which includes the control room, the rectifiers, the batteries, and the diesel group is made with an electric power plant of 24 kW. Heating of the relays booths is realized with fans blowing hot air on electric resistances. During the summer the air conditioning is used. If these spaces would be heated using a heat pump air conditioning system, it would save energy.

Keywords: energy efficiency, substation, lighting installation, building heating.

G.27. SMARTHAUL – ADVANCED MONITORING FOR DUMP TRUCKS AND MIXERS

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Abstract. In the construction industry, traditional methods for determining vehicle load based on weighing systems exhibit significant limitations in terms of cost and reliability. This study introduces an innovative device aimed at monitoring and optimizing the load status of dump trucks and concrete mixers. The proposed device integrates an advanced hardware platform with machine learning algorithms to improve the accuracy and efficiency of logistical operations. The hardware components include an acceleration sensor for monitoring the tilt and speed of movement, an ultrasonic sensor for measuring the distance between the chassis and the rear axle, and a Bluetooth Low Energy module for proximity identification of a loader. Data are preprocessed and recorded using an ATmega32U4 microcontroller and a Raspberry Pi Zero W. The detection algorithm was developed in Python, utilizing TensorFlow, NumPy, and Pandas libraries, and is intended for implementation on an ESP32-S3 circuit in the final devices. Preliminary results indicate a significant improvement in data management and loading processes, with the potential for local recalibration and continuous improvement of the model through a "learning" mode. This solution promises to redefine standards of efficiency and precision in construction logistics.

Keywords: BLE, Construction, Efficiency, ESP32-S3, Loading, Machine-learning, Monitoring, RaspberryPi, TensorFlow.

G.28. SUSTAINABILITY IN COMPUTER SCIENCE ENGINEERING EDUCATION: CHALLENGES AND OPPORTUNITIES ACROSS GLOBAL CONTEXTS

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Abstract. This research addresses the imperative to integrate sustainability principles into Computer Science Engineering (CSE) education amidst ever-increasing environmental challenges and technological influence. Engaging a mixed-methods approach, it explores global challenges and opportunities in integrating sustainability into diverse CSE contexts. The study identifies obstacles, including the lack of standardized frameworks and institutional resistance, and proposes strategies such as interdisciplinary collaboration and innovative pedagogies. Despite challenges, it underscores the potential for progress and emphasizes the vital role of pedagogy and curriculum design. Recommendations advocate for interdisciplinary curricula, academia-industry partnerships, and educator training to integrate global sustainability in CSE education.

Keywords: Sustainability, Computer Science, Sustainable Engineering.

G.29. DEVELOPMENT OF AUTOMATION OF AN INDUSTRIAL SPACE

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Abstract. This paper presents the development of automation for a production hall or other type of industrial space that consists of several subsystems, such as temperature-dependent ventilation control, energy efficiency of the lighting system, and fire alarm and extinguishing. The system is controlled from an online dashboard, from where all sensors can be viewed both in text and graphic form and different components can be operated through buttons and sliders. The aims of the realized system are to be operated remotely, to have a current and voltage monitoring system, to have a fire alarm and extinguishing system, to have a dynamic lighting system depending on movement, and to have a temperature-controlled ventilation system. The main components used are Development Board, Orange Pi, IR Sensor, DHT 11, INA219, Flame Sensor, 12V Pump, 12V Led, 12V Fan, Transistor Module, 12V Source and Relay Module. As a conclusion, one problem was connecting the Arduino to the Raspberry Pi, this was first tried via I2C with a dedicated Arduino library. The documentation being minimal and this not being open source, a USB cable connection over serial was used. This has proven to be very stable and practical, the only limitation being the current drawing that Arduino can draw.

Keywords: Arduino, Automation, Orange Pi, System.

G.30. MODELING THE OUTPUT POWER OF A WIND FARM USING RETSCREEN

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Abstract. Wind power is one of the most discussed topics when it comes to renewable energy sources. As an incredible source of energy, the power generated by wind turbines is becoming more appreciated and desired in many areas of the Earth. First, wind energy is a non-polluting source of energy, no gas emissions, no fuels, just the power of the wind, which makes the implementation of wind turbines in areas with potential to bring a boost to the area's economy, nature's health, and people's health. Secondly, as far as Romania is concerned, our country is among investors' favorites when it comes to renewable energy. Why Romania? Because most areas in the country are consistently windy, and the roads to bring the turbine components and install them are accessible. In Romania, so far, a lot has been invested in wind energy use projects and the investments continue, according to the statements of the National Electricity Transmission Company Transelectrica S.A. The paper presents the modeling of the production of a wind farm using the RETScreen program. The wind power plant has an installed power of 5 kW and is located in the eastern area of the city of Bacau.

Keywords: Efficiency, RETScreen, Wind energy, Wind power, Wind power plants.

G.31. FUEL CELL AS AN ELECTRICITY STORAGE DEVICE FOR WIND-TIDAL REAL TIME EMULATOR DEVELOPMENT

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Abstract. The flexibility of a multi-function wind-tidal emulator should allow the use fuel cell storage to study the reliability and the efficiency of existing power systems. The storage of electrical energy is needed because it meets two goals: economical one, searching the minimum cost of electrical energy, and second technological, contributing to the systems services. It allows adjust the "production" and the "consumption" of energy by limiting the losses. The energy, stored when its availability is superior to needs, can be restored at a moment when the demand turns out more important. In the face of the irregularity or the fluctuation in production of wind and marine currents energies, this storage operation also allows to answer a constant demand. We have highlighted in this paper that the hybridization of two different resources, wind, and marine current, to generate electrical power, is conditioned by adding a storage system to overcome to the resource's lack even considering theoretically that the profiles of wind and marine current could be from an energetic point of view complementary. The need for an energy storage system as fuel cell could be a choice to ensure power generation, when one of the energy sources reduces its power level or suddenly cut off. Furthermore, storage systems based on fuel cell technology also allow the separation of the electricity storage from power conversion functions in the same global energetic system. Thus, each of these functions may be optimized individually for performance, cost, or other installation factors. Storage of electricity using fuel cell would reduce the fluctuations in the output of wind-tidal power systems, making them more reliable and available during peak demands.

Keywords: real time emulator, wind tidal system, fuel cell, hybridization.

G.32. INTELLIGENT VEHICLE DIAGOSIS BASED ON AUTEL MAXICOM MK808 ANDROID BASED SCANNER AND SUBSEQUENT PROTOCOLS

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Abstract. As the automotive industry evolved considerably in the last years, the demand for functionalities generated the need of implementing more electronic control modules significantly increased as well. Consequently, the architectures of systems integrated a higher number of dedicated sensors and actuators, generating a higher level of complexity. This brought into play the need of adaptation of the industry to use diagnosis and testing instruments and scenarios that are even more sophisticated. The purpose of this study is to analyze the process of automotive smart diagnosis, based on a set of specific tools and instruments. Some of the most important standards and communication protocols will be described as well, such as ISO 9141 and SAE-J1850, in order to create a reliable image of the systems behaviors. These relatively longstanding protocols have been revised and adapted for the new environments.

Keywords: intelligent vehicle diagnosis, standards, communication protocols, ECUs.

G.33. SYSTEM FOR AUTOMATIC ORIENTATION OF PHOTOVOLTAIC PANELS BASED ON THE MODICON M221

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Abstract. The aim of this work was to create an automatic system for orientation of photovoltaic panels according to the sun by adjusting the position on two axes. The electric drive system is a simple one, being made up of two DC motors that ensure the rotation of the system in the horizontal plane (orientation according to the cardinal points) and in the vertical plane (inclination). The orientation of the photovoltaic panels is made according to the current position of the sun. This position was calculated based on astronomical equations with date and time as inputs, respectively geographic coordinates (latitude, longitude and altitude). The calculation algorithm was implemented on the Modicon M221 controller, equipment that also ensures the control of photovoltaic panels. Programming was done in EcoStruxure Machine Expert. The orientation of the photovoltaic panels was made according to the calculated position of the sun, taking into account the deflection of sunlight by the atmosphere. Control on the two axes was carried out in a closed loop by permanently comparing the calculated angular coordinates with the data from the sensors. An R1655 analogue magneto-electric compass type sensor was used to provide the angle to the cardinal points and a digital inclinometer from SmartTool Technologies connected to the serial port of the controller was used to measure the inclination. To stop the movement of the panels during the shadow period, a light sensor was used that provides digital information if the light is efficient. The orientation system can operate manually (for tests and maintenance) or automatically. The chosen controller represents an economic variant, covering the need for analogue inputs from the magneto-electric sensor of the compass type, the serial input from the tilt sensor, the need for digital inputs 7 and the need for digital outputs 4. This orientation system was compared with a system in which the orientation is performed according to the

luminous flux and a higher efficiency was found, given the operation of the direct current motors as much as necessary and the capture of all periods of sunshine.

Keywords: automatic orientation, tracking PV, Modicon M221, two axis control, closed loop.

G.34. AUTOMATED REMEDIATION OF ERRORS WHEN TRANSFERRING DATA FROM SPREADSHEETS TO AN INTEGRATED DATABASE. A CASE STUDY FOR A COMPANY RAPIDLY EXTENDING INTERNATIONALLY

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Abstract. Tremendous amounts of data - in all areas of human activity - are stored in spreadsheets, because these are expressive, easy to use, and intuitive for human understanding. However, most of the spreadsheets cannot be trivially converted to database relations, therefore data cannot be analyzed with powerful data tools. Our paper is based on the experience of a small company, with rapid development in multiple, far-between locations, for which the management faced the necessity of developing an application to migrate data from spreadsheets to a relational database management system.

Keywords: spreadsheet, database, data tools.

G.35. EXPERIMENTAL STAND FOR THE STUDY OF THE AUTONOMOUS THREE-PHASE SYNCHRONOUS GENERATOR

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Abstract. This paper presents an experimental stand used to determine the operating characteristics of an autonomous three-phase synchronous generator. The experimental stand was made in the Machines and Electric Actuators laboratory of the Faculty of Engineering in Bacau. The rotor of the three-phase synchronous generator is driven in rotation by a three-phase asynchronous motor fed from a static frequency converter by means of an elastic coupling. The excitation winding of the three-phase synchronous generator is powered by a DC voltage variation. The intensity of the current in the excitation winding is changed with the help of a PWM signal generated by an Arduino Uno development board. A three-phase power resistor is connected to the terminals of the phase windings of the stator. The voltage from the output terminals of the three-phase synchronous generator, the current intensity through the excitation winding, the current intensity through the load resistance and the rotor speed are measured. The idle operation characteristic, the external characteristic, the adjustment characteristic and the internal characteristic were determined. It was found that the shape of the characteristics obtained based on the experimental results coincides with the shape of the theoretical characteristics for the three-phase synchronous generator.

Keywords: synchronous generator, PWM signal, experimental stand, Arduino Uno.

G.36. CHANGING THE LEARNING PARADIGM BY INTEGRATING MIXED REALITY IN TEACHING PRACTICAL ACTIVITIES WITHIN UNIVERSITY

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Abstract. The education system faced many challenges, especially during the Covid period and continues to face them. The rethinking of the educational process from that period led to a change in the way this process was perceived, by integrating another style of communication, mostly based on technology. Some methods and techniques of teaching and evaluation have not withstood the passage of time, but others have proven their usefulness. Among the technologies, virtual and augmented reality have seen an upward trend, especially in the university environment. The article describes the adoption of mixed reality and its implications, in the process of teaching, learning and evaluation of practical activities in the university. Several case studies are presented, and their implications analyzed.

Keywords: teaching, didactics, mixed reality.

G.37. COOPERATIVE DELIVERY TANDEM USING TRUCKS AND DRONES

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Abstract. This paper proposes an innovative approach to optimize the delivery process by developing and implementing a hybrid transportation system that integrates trucks and drones. In an era where the demand for delivery services is continuously increasing, efficiency and speed become increasingly important for logistics companies and consumers alike. Thus, integrating modern technologies such as drones into ground transportation networks can bring significant benefits in terms of delivery time and associated costs. In this context, the study aims to analyze and optimize logistics networks across Romania to create a hybrid transportation model. To achieve this goal, OR-Tools, a powerful library developed by Google, specifically designed for optimizing routes and planning programs, is utilized. OR-Tools offers advanced optimization capabilities, allowing for the optimal calculation of routes for both trucks and drones in a reasonable time frame. By using real distances between locations, the proposed algorithm can generate efficient routes for both types of vehicles, taking into account their specific characteristics. Thus, an optimal balance between costs and delivery times can be achieved, providing a comprehensive and viable solution for logistics companies. The computational experiments conducted have demonstrated that the proposed method is fast and reliable, providing precise and consistent predictions regarding delivery times and associated costs. In conclusion, the integration of ground and aerial transportation using state-of-the-art technologies and efficient optimization algorithms may represent the future of modern logistics, ensuring fast, efficient, and sustainable delivery services across Romania.

Keywords: OR-Tools, hybrid delivery system, drones.

G.38. EVOLUTION OF ROMANIAN AND HUNGARIAN RENEWABLE ELECTRICAL ENERGY PRODUCTION

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Abstract. This paper presents the evolution of renewable electrical energy production, and the production capacities in Romania and Hungary. The continuous increasing of energy demand is followed by the increasing of energy generation. In Europe increasing of electrical energy demand is covered with increasing of number of renewable sources, compare to China where the electrical energy demand is covered with increasing of number coil based power plants. The European trend is follow by Hungary and Romania too. In case of Europe 40% of electrical energy are coming from renewable sources. Both countries use quite the same type power plants as nuclear, thermal, hydro, wind and solar. There are some particularities, for example in Hungary the energy from nuclear plant has a higher proportion compare to Romania, where the energy from hydro and wind power plants have a higher proportion compare to Hungary.

Keywords: renewable energy, solar, wind, hydro, geothermal nuclear, coal power plants

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