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ABSTRACTS

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

A.1. CONSIDERATIONS ON IMPLEMENTATION PROCESS IN EDUCATIONAL ACTIVITY OF CLOUD-BASED CAD APPLICATIONS - CASE STUDY

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Abstract. In addition to conventional CAD systems, newer, cloud-based CAD software systems have been available for several years. These CAD systems designed according to the principle of software as a service (SaaS) differ in some important features from conventional CAD systems. Thus, these CAD systems are operated through a browser and it is not necessary to install the software on a computer. All CAD data are stored in cloud and not on a local computer or central server. This new approach should also facilitate data sharing and management. Finally, many of these new CAD systems are available as free software for educational purposes, so universities can save on licensing costs. This article examines one of newly developed, cloud-based CAD systems, Onshape. In the context of a case study, the application of this new CAD systems have been investigated in the training of engineers in design training. Thus, students compare a conventional CAD system and a cloud-based one, as part of a 3D design and modelling exercise for parts and assemblies. Subsequently, students starting from zero to an assembled model using advanced techniques, collaborative engineering techniques, design variables, animations etc, Versions and history This analysis evaluates various criteria, such as ease of use, tutorial support, and learning effort.

Keywords: onshape, cloud-based CAD software, design intent, technical skills.

A.2. ACTIVE LEARNING IN ENGINEERING EDUCATIONS: EXPERIENCES IN COVID 19 PANDEMY

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Abstract. Active learning aims to build knowledge and skills, overcoming traditional, passive, classroom instruction. The benefits of active learning are many: it facilitates the retention of new knowledge, it goes beyond the objectives of memorizing and understanding concepts, building students' ability to analyse new information, apply it in practice, and explain it to others. It also builds high-level thinking skills that are transferable to the real world. Despite the benefits of active learning, it is not widely applied in practice. Lack or inadequacy of physical infrastructure is a significant obstacle. The pandemic period of Covid 19 brought new problems in technical higher education and with a major impact in lowering the quality level of learning. The teacher has been faced with new challenges, traditional learning techniques are not effective and it is time to rediscover and apply new methods and techniques on their own. Even when there are laboratories, the equipment is outdated and limited in the software it can support. There is a lack of openly available software applications that can be implemented in educational contexts as complementary learning tools. The limited training of instructors on how to exploit IT and combine it with emerging learning pedagogies further discourages the implementation of active classroom approaches.

This paper presents an educational intervention that aims to introduce active learning as a strategic educational approach in engineering higher education in Romania. The educational intervention has a vertical design and aims to address the obstacles that inhibit the widespread adoption of active learning. The intervention includes the development of digital active learning strategies in engineering. In addition, it involves the use of an e-learning digital platform that acts as a repository of e-learning activities based on digital applications, such as learning games and simulations, accompanied by guidelines for teachers on how to best integrate.

Keywords: problem-based learning, active learning, research-based learning, simulations.

A.3. FEM ANALYSIS OF INITIAL TEMPERATURE INFLUENCE ON SURFACE RESIDUAL STRESS DISTRIBUTION IN SURFACE LAYER

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Abstract. Milling is the most widely used machining operations in the world. An easy way to optimize machining parameters in the case of milling is to use finite element analysis (FEM). Using FEM leads to several benefits including: lower costs, avoiding accidents that can result during chip removal (for example in the case of slightly volatile alloys that can ignite in contact with moisture in the air); decreasing processing time. Another aspect treated in the literature refers to various cooling / heating heat treatments that favour the machinability of the processed components. In the scientific literature it is shown that interfacial friction between the sample surface and the anvils during hot deformation affects the flow behaviour of the material. Determination of residual stress distribution in surface layer involves the use of either destructive (cheaper) methods or the use of x-ray equipment which can be very expensive. Under these conditions it is desirable to initially use FEM in order to obtain the optimal values for the cutting parameters that could be used later experimentally tested to validate them. The aim of the present study was to observe the influence of the initial temperature (0, 20, 60, 600 ° C) of the machined part on the residual stress distribution. The results showed that the increase of the initial temperature of the pre-machined part lead to an increase compression value of the residual stress In (up to -100 MPa) in surface layer (up to 0.3 mm depth), while the use of ambiental temperature (equal to 20 ° C) of machined part lead to a low value of compressive stress in surface layer.

Keywords: Milling, FEM analysis, Residual stress, Machining.

A.4. A FEM ANALYSIS OF CUTTING PARAMETERS INFLUENCE IN TURNING OF MAGNESIUM ALLOY

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Abstract. Magnesium alloys are intensively used in the aeronautical industry both due to its physic-chemical properties and its good workability. The behaviour of magnesium alloys in

the cutting process makes finite element analysis a good starting point for simulations in two directions, costs reduction and safety (avoiding possible accidents caused by ignition of magnesium chips in contact with humid air). The aim of this paper is to determine how different machining parameters (machining speed, feed rate, machining depth) affect the quality characteristics of a magnesium alloy machined by turning. In order to perform these analyses, a specialized analysis software was used - Advantedge 7.5. For a more accurate overview, 3 different parameters were varied: the processing speed between 100 and 1500 m/min, the feed rate between 0.2-1 mm/rot, and the cutting depths between 0.25 and 1 mm. From the results it can be observed that the use of high speeds and cutting feeds lead to high compressive residual stress amount in surface layer. Also it is observed that the depth of cut and the feed, and the interactions feed – depth of cut, have the most significant influence on the residual stress distribution and cutting force.

Keywords: Magnesium alloy, cutting force, FEM.

A.5. EFFECT OF CUTTING PARAMETER ON PM2.5 POLLUTANTS AMOUNT GENERATED BY MILLING OPERATION

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Abstract. Lately the air quality in the working environments become an important matter for health and safety. Many of the manufacturing processes involve aerosols formation that can impact workers' health. Epidemiological studies linked PM2.5 with significant health problems, including aggravated asthma, decreased lung function, increased respiratory symptoms such as irritation of the airways, coughing or difficulty breathing. Milling is one of the most common machining operation used in the manufacturing industry. The removal of the material through milling is a high productivity process, but it also generates small polluting particles such as PM 2.5 or PM10 which can affect both the health of the operator and the industrial environment. The aim of present study is to observe the influence of cutting parameter in dry milling on the generated amount of PM 2.5. The research was conducted on Aluminium alloy 6061-T6, a material often used in aircraft industry due to its good workability. Three cutting speeds (150, 300, 600 m/min), cutting feeds (100, 200, 300 mm / min) and cutting depths were used (0.25,0.5,0.75 mm). The P2.5 amounts were measured with BSIDE air quality meter which was attached on operator thus situated at 1 m from the cut probe. The results showed that an intense cutting regime lead to the release of a high amount of PM 2.5 particle.

Keywords: milling, cutting parameter, industrial working environment.

A.6. A STUDY ABOUT THE IMPLEMENT OF CAD/CAM/CAE INTEGRATED TECHNOLOGY IN INDUSTRIAL ENGINEERING

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Abstract. In modern industry, the use of virtual models is considered and at the same time the realization of products based on the results of engineering analyses through simulations in order to make a decision before the manufacturing process. By using a CAD/CAM/CAE integrated system, any problems with the product can be identified and these can be minimized and eventually eliminated from the design phase. CAD (Computer-Aided Design)

helps to design a new product efficiently, based on an engineering analysis. By CAE (Computer-Aided Engineering) can be predicted and evaluated future functionalities, such as: durability, stresses, pressure, structural strength etc. By using CAM (Computer-Aided Manufacturing) system, the type and directions of movement of the tools are taken into account, the realization process coming from the initial engineering analysis, these containing information related to the geometry of the product to be made, the materials that can be used and the boundary conditions. It is possible to achieve an optimization by simulating the assisted manufacturing in order to reduce the risk of collisions, to reduce the total processing time, to the optimal use of cutting tools, to check the processing in specialized programs. The competition that exists in the case of industrial products requires the minimization of the time allocated to product development, this can be achieved by developing computer-assisted products by simulation and analysis in advance, this being generally valid for all industries. Ergonomic analysis and various biomechanical studies can also be performed by simulating and optimizing material flows in industrial systems, as well as performing work procedures for specific applications in specialized software. Assisted design for industrial engineering, with the integration of CAD/CAM/CAE system technologies, leads to parameterized modelling and design of products, simulation of the operation of various assemblies, programming of machines and machining centres with numerical controls, optimization of machining trajectories for complex surfaces. This paper proposes to analyse an industrial product in an integrated system, in which different stages of development can be analysed simultaneously, and with the help of computer simulations, development time can be greatly reduced, product quality can be improved and at the same time this can lead to the launch of products on the market in a shorter time

Keywords: computer, design, engineering, simulation, industry.

A.7. STUDY ON THE POSSIBILITY OF USING A RECYCLED VEGETABLE OIL AS DIELECTRIC IN ELECTRICAL DISCHARGE MACHINING OF A TOOL STEEL

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Abstract. Waste recovery is the focal point of the new model of sustainable development, known as the circular economy. According to this model, when a product reaches the end of its life, the materials from which it is made are kept in the economy whenever possible. They can be used over and over again, creating added value. Thus, reuse, repair, renovation and recycling of existing materials and products as much as possible extends their life cycle, with beneficial effects on the environment, economy and society. The aim of this paper is to investigate the possibility of using a recycled vegetable oil as dielectric for electrical discharge machining (EDM) of the C 120 tool steel and to determine if and to what extent the performance of the process is affected.

Keywords: electrical discharge machining (EDM), recycled vegetable oil, tool steel.

A.8. RESPONSE SURFACE METHODOLOGY APPLIED FOR MODELLING IN MACHINING

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Abstract. Metal cutting, or machining, is a process subjected to an extended array of factors influencing the outcomes. Surface roughness and hardness, residual stresses, dimensional and shape precision, temperature, cutting forces, tool wear and others are deeply influenced by a multitude of factors, such as: cutting speed, feeding speed, depth of cut, tool geometry, tool material, part material, the use of cooling liquids and the methods used to apply them, as well as many others. Process modelling is important for finding the relationship between the incomes and the outcomes of the process and offers the means for the optimization. Design of experiments (DOE) is a set of statistical methods that have been successfully used for modelling in many engineering applications. In this study response surface methodology (RSM) is used to organize a series of experiments, analyse the results and generate a mathematical model linking the outcomes of the machining process with some of the most important control factors. An optimization of the process is also achieved.

Keywords: machining, Response Surface Methodology (RSM), optimization.

A.9. STUDY ON THE INFLUENCE OF THE FOCUSING TUBE'S LENGTH ON THE QUALITY OF CUT PERFORMED BY ABRASIVE WATER JET CUTTING OF THE AL6061T651 ALLOY

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Abstract. Abrasive water jet cutting technology is one of the solutions increasingly used in the machine building industry to ensure a sustainable production due to its important benefits such as the ability to process metallic and non-metallic materials, low environmental impact and safety for the operator. The process performance is affected by a series of factors such as processing pressure and speed, amount of abrasive material, nozzle's diameter, diameter and length of the focusing tube. Among them, in this paper the influence of the focusing tube's length on the quality of cut, when processing with abrasive water jet cutting the Al 6061T651 aluminium alloy, is analysed.

Keywords: abrasive water jet cutting (AWJC), aluminium alloy, length of focusing tube.

A.10. THE CORRELATION BETWEEN THE PHYSICAL-MECHANICAL AND TRIBOLOGICAL CHARACTERISTICS OF COMPOSITES MATERIALS REINFORCED WITH CARBON FIBERS

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Abstract. The purpose of this paper is to highlight a number of factors that influence the physical-mechanical and tribological characteristics of sintered composite materials. Such factors are grouped generally in two categories: technological parameters (pressure compacting, sintering temperature, sintering duration, heat treatment) and the receipt of sintered composite materials. In this paper is presented a program of experiments developed both in composite materials sintered polymer matrix (non-metallic) and in the metal matrix (eg., Al) which was prepared in advance a methodology original production and research for this particular type of materials. The experiments have focused development and testing of a number of 14 polymer composite and 5 composite sintered Al base, in both situations armed with carbon fiber in various forms. Tribological tests followed the establishment of the coefficient of friction and wear rate of the sliding speed at the constant values (v = 7.2 mm/s) and the normal load (N = 8 daN) and for different orientations of the fibers to the direction of sliding: normal (N type), parallel (P) and antiparallel-perpendicular (AP type).

Keywords: materials, tribology, composites, carbon, fibers.

A.11. THE VOLUME FRACTION INFLUENCE ON THE WEAR BEHAVIOR OF THE FIBER REINFORCED COMPOSITE SYSTEMS

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Abstract. This paper contains an analysis of the factors that have an influence on the tribological characteristics of the composite material sintered with metal matrix reinforced with carbon fibers. These composites are used generally if it's needed the wear resistant materials, whereas these composites have high specific strength in conjunction with a good corrosion resistance at low densities and some self-lubricating properties. Through the knowledge of the better tribological properties of the materials and their behavior to wear, can be generated by dry and the wet friction. Thus, where necessary the use of high temperature resistant material with low friction between the elements, carbon fiber composite materials are very suitable because they have: mechanical strength and good ductility, melting temperature on the higher values, higher electrical and thermal conductivity, lower wear speed and lower friction forces. For this purpose, this paper also contains an experimental program based on the evidence of formaldehyde resin made from fiber reinforced Cu-carbon with the aim to specifically determine the volume of fibers fraction for the consolidation of the composite material. In order to determine the friction coefficient and the wear rates of the various fiber reinforced polymer mixtures of carbon have been used special devices with needle-type with steel disc. These tests were conducted in the atmosphere at the room temperature without external lubrication study taking into consideration the sliding different speeds with constant loading task.

Keywords: materials, tribology, composites, carbon, fibers.

A.12. COATING OF BIODEGRADABLE POLYMERS

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Abstract. The demand for high-quality composite materials is growing and is clearly moving towards a responsible alternative that will reduce the harmful effects of plastic materials. The present study aims to investigate the structure of the Arboblend V2 Nature bio-based polymer reinforced with silver nanoparticles (AgNP's) and also of samples, coated with thin ceramic layers. The micro powders used for the ceramic coatings were Amdry 6420 (Cr2O3), Metco 143 (ZrO 2 18TiO 2 10Y 2 O 3), and Metco 136F (Cr 2 O 3 -xSiO 2)-yTiO 2). The main goal of the silver nanoparticles reinforcement was to demonstrate the antibacterial effect of the uniform distributed nanoparticles (in the sample mass), those facilitating the use of this one in the food industry. Regarding the coatings with ceramic layers, it was desired to obtain fine and uniform layers in order to increase the tribological and anticorrosive characteristics so helpful in operation in the automotive industry field but, not only. Taking into account the good results obtained can be concluded that the used biodegradable material has superior characteristics that meet the technological demands, being able to gradually substitute the plastic from important activity areas.

Keywords: ceramic layers, AgNP's, surface characterization, tribological, anticorrosive characteristics.

A.13. STUDY REGARDING THE PROCESSING OF C120 AND 304L MATERIALS BY ELECTROEROSION WITH FILIFORM ELECTRODE

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Abstract. In the first part of the paper, theoretical aspects and the current state of research on the electroerosion with filiform electrode (WEDM) process are presented, consisting of a brief history of the process and its applicability, the influence of process parameters on the quality of parts, the common processed materials and the optimization methods of the WEDM process. The purpose of the current paper is to analyze the influence of process parameters on the dimensional accuracy and roughness of parts from C120 and 304L materials, using the wire electrical discharge machining (WEDM). Three working regimes were used and the processing quality were quantified by measuring the dimensional accuracy of four parameters (two lengths, a radius and the circularity). It was inferred that very good dimensional accuracy and very low roughness could be obtained in this process.

Keywords: electroerosion, filiform electrode, C120, 304L, process parameters, dimensional accuracy, roughness.

A.14. INVESTIGATING THE RELATIONSHIP OF CUSTOMER EXPECTATIONS TO PRODUCT QUALITY IN A STAINLESS STEEL FACTORY

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Abstract. Today, the implementation of total quality management activities almost everywhere and the increasing competitive environment with economic and technological developments have made customer satisfaction the main goal of the enterprise. Customer satisfaction resulting from meeting customer expectations is very important for businesses in terms of both cost and prestige. Today, quality control for businesses has taken the form of carrying the quality above the targeted and expected standards, taking into account customer expectations as well as measuring within the framework of certain global standards. Considering customer expectations for businesses also provides a cost advantage. The increase in customer satisfaction in businesses that carry out production processes by focusing on the customer will ensure the continuity of the business. In this context, customer groups and complaints from these customers in an enterprise that produces stainless steel sheet were examined in detail and activities aimed at reducing the complaints were carried out. Complaints from customers were classified and it was concluded that customer groups also have different quality expectations within themselves. Based on this result, it was decided to open separate order codes by dividing the customer groups into subclasses.

Keywords: Customer Complaints, Quality, Stainless Steel.

A.15. PROFILING OF THE HOB TOOL FOR WORM SHAFTS DEFORMATION

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Abstract. The paper presents an algorithm for profiling the hob tool designed to generate by plastic deformation the worm shafts from the composition of worm-wheel gear type, used in the seat adjustment mechanisms of some Audi and Mercedes cars. The active surface of the hob tool is a cylindrical helical surface of constant pitch. Two such tandem tools are used for deformation, the semi-finished product being positioned between them. During generation, the tools rotate around their own axes, which, combined with their helical surface, causes a helical movement of the blank. The active surfaces of the tools are mutually winding on the helical flanks of the generated worm. The profiling algorithm is based on the intermediate surface method and the originality of the method is that this surface is determined by the "virtual pole" method. In the paper, two applications were developed for the generation of worms whose dimensions were determined by 3D scanning.

Keywords: „virtual pole" method, hob tool, helical surfaces.

B. OPTIMIZATION OF TECHNOLOGIES AND EQUIPMENT FROM PROCESS INDUSTRIES

B.1. ENERGY SAVINGS AND ECONOMIC ANALYSIS OF HYBRID DOWNDRAFT EVAPORATIVE COOLER

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Abstract. When compared to the benefits, the expense of using a refrigerated-based air conditioning system at Bayero University Kano is exorbitant. As a result, energy conservation measures must be implemented to achieve energy and cost savings as well as long-term operation. The purpose of this research is to assess the energy savings and economic potential of utilizing a hybrid downdraft evaporative cooling (HDEC) system as a replacement for a refrigeration-based air conditioning system. The HDEC system's environmental benefits were calculated using energy savings and CO2 emissions reductions, while the economic benefit was calculated using the payback time economic analysis measure. The annual energy savings and CO2 emissions reduced by using the HDEC system are 1484.88 kWh and 1060.96 kg CO2, respectively. The annual cost of saving energy and lowering CO2 emissions is ₦75001.29 and ₦1957.34, respectively. Based on the economic research, the average payback period for HDEC systems is 2.75 years, with HDEC systems using around 38% of the energy utilized by refrigeration-based air conditioning systems. This implies that HDEC systems are a cost-effective option for Bayero University Kano in the short and long run.

Keywords: evaporative cooling system, energy savings, cost savings, payback period.

B.2. NUMERICAL INVESTIGATION OF THE EFFECT OF WINDOW GEOMETRY ON INDOOR AIR QUALITY OF AN OFFICE BUILDING EQUIPPED WITH A HYBRID DOWNDRAFT EVAPORATIVE COOLER

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Abstract. The window geometry plays a significant role in the indoor air quality (IAQ) of a space conditioned by a Hybrid Downdraft Evaporative Cooler (HDEC) because of its cooling by humidification. This paper investigated the effect of window geometry in terms of window-to-wall ratio (WWR) on the IAQ of an office building equipped with an HDEC system in Bayero University Kano. The model of the building was created using DesignBuilder software while DesignBuilder CFD was employed for the parametric simulation using IAQ as the objective function. WWR of 10%-50% step 5% were employed for the parametric simulation. The mean age of air (MAA) and air change effectiveness (ACE) were the indicators of IAQ employed in this study. The results showed that better IAQ with ACE of 1.0486 and MAA of 121.09 seconds was obtained with a WWR of 25%. This information could help to build designers and engineers in sizing windows for buildings equipped with the HDEC system.

Keywords: Indoor air quality, office building, evaporative cooling system, window geometry, mean age of air, air change effectiveness.

B.3. EXPERIMENTAL OPTIMIZATION OF AERODYNAMIC DRAG COEFFICIENT OF A MINIBUS MODEL WITH NON-SMOOTH SURFACE PLATE APPLICATION

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Abstract. The flow control and flow separation of road vehicles are major research and development subjects of researchers and designers in aerodynamic studies. Aerodynamic drag force is directly related to fuel consumption and the exhaust emissions of vehicles. Therefore, it is very important to examine the flow around the vehicle with experimental or numerical methods and to optimize the vehicle in terms of aerodynamics. In this study, non-smooth surface plate applications have been experimentally conducted to flow control around a scaled minibus model in a wind tunnel. 1/15 scaled minibus vehicle model and non-smooth surface plate were designed in SolidWorks® Cad program and produced in 3-D printer. It was focused on decreasing of drag coefficient of vehicles with non-smooth surface plates by reducing flow separation. The experimental tests carried out 4 free stream velocities between the speed of 13.90-27.40 m/s and 2.62x105-5.18x105 Reynolds numbers. In wind tunnel tests Reynolds number independence was used to ensure dynamic similarity. The blockage rate was 10.68 %. It was determined that the user of non-smooth surface plate e on the front roof area of the minibus model was decreased to drag coefficient by an average of 1.03%. This reduction rate can decrease the fuel consumption of vehicle about 0.5% at high speeds.

Keywords: drag coefficient, wind tunnel, aerodynamic, minibus model, non-smooth surface.

B.4. OPTIMIZATION OF THERMOPHYSICAL PROPERTIES, COMBUSTION PERFORMANCE AND HARMFUL EXHAUST GASES OF BIODIESEL FUEL WITH NANOPARTICLE ADDITIVES

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Abstract. Increasing use of diesel products causes a decrease in oil reserves, global warming, an increase in the world average and adverse effects on human health and the environment. Emissions from combustion in engines are directly related to the quality, properties and combustion characteristics of the fuel. Since the physical and chemical properties of the fuel affect the atomization characteristics, it is important for increasing the combustion efficiency. The most important fuel properties affecting the combustion of diesel fuel are cetane number, viscosity, density and calorific value. There are many applications in improving the chemical and physical properties of the fuel. One of them is nanoparticle (NPs) additives added to fuel. This study, it was aimed to improve fuel properties with an optimum additive ratio by adding CeO_2, TiO_2 ve Co_3O_4 nanoparticle additives into biodiesel which are produced from cotton and canola oil. The effects of NPs additives on fuel properties such as viscosity, density, lower calorific value and flash points were investigated.

Keywords: environmental pollution, Global warming, CeO_2, TiO_2, Co_3O_4, Nanoparticles, Fuel properties.

B.5. GEOMETRIC CALCULATION OF THE INFLUENCE OF AN OSCILLATING SIEVE'S ACTUATION MECHANISM POSITION ON IT'S MOTION

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Abstract. This article presents a general solution for the generation and analysis of a 4-bar mechanism, from a geometric point of view. There are many methods in the literature to analyze such a mechanism. As a field of use, the crank mechanism is found in various machines and industrial work systems. In addition to the determination, from a geometric point of view, of this mechanism, an analysis of the influence exerted by its position was carried out by the drive system in relation to the tie rod, respectively the support system of an oscillating site. Following the analysis, from a mathematical point of view, it is found a direct influence of the position of the drive system, respectively the position of the connecting rod-crank mechanism, on the behavior of the other elements within the assembly, components that are actuated.

Keywords: crank mechanism, mathematical coordinates, description of motion.

B.6. INFLUENCE STUDY OF CORROSIVE AGENTS ON THE SURFACE OF METALLIC MATERIAL LIKE STEEL

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Abstract. Corrosion is a process that involve the action of different agents on material surfaces. Corrosive agents in corrosion field can be ambient, saline and microbiological mediums. This agents can influence the mechanic properties of metallic material like steel. The aim of this research is to present the mechanic properties of sheet steel submitted at the action of corrosive agents. The metallic samples were analyzed in order to determinate the resistance at corrosion by stress-strain curves, deformation limit curves and AFM images. Relative results are obtained in the case of saline medium corrosion, meaning that the saline medium corrosion influences the metallic sample, in proportion to the degree of salinity. Also, the AFM images and topographies of metallic surface confirm this conclusion.

Keywords: saline corrosion, microbiological corrosion, sheet steel, mechanic proprieties.

B.7. THE RECENT DEVELOPMENTS IN AGRICULTURAL MACHINERY DESIGN, CONSTRUCTION AND MAINTENANCE

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Abstract. Agriculture's relative importance in the context of a national economy varies by country, but it remains the most important branch of the economy in all countries, including the most developed. Agriculture cannot solve the world economy's problems, as the last decades have demonstrated. As a consequence, the benefit of adopting contemporary agricultural equipment has been enforced, resulting in agricultural processes getting maximized while using minimal resources. Agricultural mechanization has advanced significantly in recent years. To improve productivity, new gadgets have been created. There is now a new generation of agricultural machinery with probes and sensors, such as tractors, seed drills, threshers, and reapers. As a result, they are directly connected to a centralized system, GPS. Even from a remote sensing database, these machines may be operated. Additionally, if your older agricultural equipment is damaged, you may find the spare components you need on online. The expansion of problems about maintaining the quality and availability of agricultural equipment plays a significant part in the current context of globalization and the expansion of the competitive market. In this situation, the existence of high precision and productivity work equipment helps to improve the quality of the production process. Production activities must be carried out continuously, which demands the availability of industrial equipment that ensures the activity's continued operation and, in the event of failure, the minimum possible downtime. The paper uses case studies to show all of these elements.

Keywords: agricultural machinery, agricultural development.

B.8. TENSOMETRY ANALYSIS OF THE STATE OF STRESS AND STRAIN OF A PIPE-TYPE CYLINDRICAL STRUCTURE TO A HYDRAULIC PRESSURE TESTING

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Abstract. The paper concerns an experimental study on stress and strain state analysis for a pressure pipe structure. A unified approach to increase the safety and integrity of the use of mechanical structures under pressure in the process industries, can represent a modern maintenance system by means of innovative and integrative techniques for the estimation of the remaining lifetime of these technological structures.

Keywords: stress, electro-resistive transducer, pipe, structural integrity.

B.9. IN THE STUDY OF MECHANICAL STRUCTURES UNDER PRESSURE, STUDY INTO THE USE OF THE FINITE ELEMENT METHOD IN COMBINATION WITH NONDESTRUCTIVE TESTING. CASE STUDY

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Abstract. The insertion of an ultrasonic beam into a material and examination of beam propagation disturbances in the target material are the fundamentals of non-destructive ultrasound testing. There will be a characteristic of ultrasound reflection at the interface between the base material and a specific defect (crack, segregation, blowing, etc.) due to the different elastic properties between them, which will allow emphasizing, locating, and measuring. Acoustic examination leads to the detection of non-conformities and defects as well as the monitoring of structural integrity in real time. It is obvious that this principle of operation is an advantage in the case of pressure structures, the risk in the operation of this equipment being significantly reduced. The paper presents the identification of areas of high risk of occurrence of defects for a chlorine transport tank by rail, by the finite element method. Subsequently, ultrasonic sensors will be installed in these areas.

Keywords: acoustic examination, ultrasonic sensors.

B.10. IDENTIFICATION OF WELDING BEAD DEFECTS, AND THE CAUSES OF THESE DEFECTS, IN TUBULAR HEAT EXCHANGERS. CASE STUDY: TWO-PASS TUBULAR FASCICLE HEAT EXCHANGER

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Abstract. Many of the heat exchangers operate in corrosive environments and at high temperatures and pressures, which over time affects the construction materials of the exchangers. The areas where most problems occur are the areas of the welding bead, where various discontinuities occur. In the case of tubular fascicle heat exchangers, the most common defects are fissure that appear in the area of the partition wall that divides the cover, through which the working fluid enters and leaves. The paper presents a case study for a two-pass tubular fascicle heat exchanger, which is part of an agricultural fertilizer production installation, positioned on the main nitric acid cooling route. The verification, performed visually and with magnetic powders, was done at the expiration of the expected life that the designer has established for the heat exchanger. Following the magnetic powder inspection, unacceptable discontinuities were identified, such as a fissure on the partition wall of the cover, where the main working fluid (nitric acid) enters and leaves. In order to establish the remaining service life, it was recommended to repair the defective weld bead, followed by restoring the control.

Keywords: heat exchanger, weld bead, remaining life period.

B.11. NATIONAL COMPANY FOR THE CONTROL OF BOILERS FOR LIFTING INSTALLATIONS AND PRESSURE VESSELS (C.N.C.I.R) - A HIGH-PERFORMING INSTITUTION

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Abstract. National Company for the Control of Boilers, Lifting Installations and Pressure Vessels S.A. (C.N.C.I.R.) - the most important Romanian provider of professional inspection, verification, testing, certification and professional training services that ensures the safe operation of installations and equipment. CNCIR S.A. is a high-performing institution which through its positioning, wants to ensure balance and transparency in all industrial activities. CNCIR ensures, both at national, regional and local level, an attractive work environment, based on individual and team recognition procedures, to support the ability to provide technical expertise, and performance at the highest level. The mission of CNCIR S.A. is to increase the safety of the operation of industrial equipment, in accordance with the regulations in force, through the activities of technical inspection, technical verifications, certification, training, technical expertise, destructive and non-destructive tests.

Keywords: pressure vessels; safe operation; CNCIR S.A.

B.12. SOME ASPECTS REGARDING THE MAINTENANCE OF THE PIPES, AT THE HEAT EXCHANGER WITH THE TUBULAR FASCICLE. CASE STUDY

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Abstract. The current maintenance of the heat exchangers is limited to visual inspection, and to the tightening of the flange joints. During these operations, the heat exchanger remains connected to the circuit. The cleaning operations of the heat exchangers are also performed during the maintenance operations, but they require the appliance to be switched off and switched off. In the case of repair of heat exchangers, several operations are performed: disassembly of the appliance, establishment of degradation and defects, repair of tubular plates, repair of the transfer surface (coils, pipes), repair of the heat exchanger body; inspection and replacement of gaskets and removable assemblies, installation and testing of the heat exchanger. Heat exchangers are apparatus which are used to perform heat transfer operations from one fluid to another. These installations have the construction made by delimiting two spaces, for the circulation of the two fluids between which the heat transfer takes place, the separating wall being the transfer surface. The work was carried out on the basis of a case study, for a heat exchanger, from the water cooling circuit, which was initially used for the cooling of nitric acid, from the patrimony of a fertilizer factory. Both working fluids are water, which is a highly corrosive environment for the pipe material, which is also subject to sudden temperature changes. Due to these factors, the pipes are subject to very high corrosion. The maintenance program of the heat exchanger also included the pressure test of the pipes, to find out if the pipes which are not armoured, need repairs. Following the pressure test, it was found that one of the pipes had failed, it was necessary to carry out its armoured, so that the heat exchanger could operate in optimal parameters, and that the two working fluids do not interfere during operation of the installation.

Keywords: corrosion, heat exchangers maintenance, working fluid, pressure test.

B.13. STUDY ON THE CONSEQUENCES OF NON-COMPLIANCE FOR MAINTENANCE PROCEDURES, IN THE CASE OF REMEDIAL OPERATIONS, OF DEFECTS IN A PIPE-LINE NETWORK. CASE STUDY

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Abstract. In the most localities, the water transport network to consumers is old and is made in a unitary process; it is often undersized because transport capacity has decreased due to clogging, pipe damage; rainwater flows have increased (the rainfall regime has changed quite a lot in the last 20-30 years); at the same time, the loss of water from the network leads to endangering the functioning of the drinking water distribution network, to the pollution of the local aquifer, and to distortions in the operation of the treatment plant (fermentation processes develop in the network), but also the deterioration of the environment in the locality (fermentation gases reach to the street). Also, open rehabilitation in the trenches, can lead to a series of complications, which only increase the state of discomfort, which already exists by the occurrence of the malfunction; it can completely block traffic, over a long period of time, it can reduce full access to emergency services, may reduce or hinder supply, etc. The paper presents a case study regarding a supply installation of the thermal agent to the population, during the cold season, when a malfunction entails another malfunction, if the intervention procedure is not observed. A fault has been reported with the water heater installation. The pipe-line, already filled with water, has not been emptied. Because the ambient temperature dropped to a temperature well below zero degrees, water freezed inside the pipe. Under these conditions, the pipe-line and the related route were destroyed, with all the subsequent consequences.

Keywords: water transport network, pipe-line, malfunction.

B.14. NEXTGEN: A POWERFUL AND FEATURE-RICH SOFTWARE FOR PRESSURE VESSEL AND HEAT EXCHANGER DESIGN

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Abstract. NextGen is the new software for mechanical design and verification of pressure vessels and heat exchangers in accordance with ASME VIII Division 1, Division 2, EN 13445-3, EN 13480 and AD 2000, with options for calculating in wind and earthquake conditions according to NTC, Eurocodes, UBC 97, ASCE 7-10, modules for the calculation of loads on nozzles according to WRC 107/297/537, tubesheets to TEMA IX and to perform structural analysis of vertical columns. The software also includes the database of the most common standard components used in pressure vessels, like ASME/ANSI B16, B31, EN 1092-1, EN 1759-1, etc. The aim of this software is to produce a calculation report suitable for the certification of the equipment, which can be submitted both to the customer and to the inspection authority. At the same time the software allows the design engineer to optimize every single part of the equipment without exceeding the limits laid down in the

reference code. Sant'Ambrogio software not only meets the standards but reduces design time and optimizes the time of construction and use of materials. In other words, Sant'Ambrogio Pressure Vessel Software is DESIGN ORIENTED: of course it is possible for the user to provide a calculation report in accordance with the selected standard starting from an existing fabrication drawing, but the main goal of our software is to supply the data which are needed to prepare the fabrication drawings and to order the materials, giving a guidance to the user in order to almost automatically select the less expensive solution among all the possible solutions permitted by the standard.

Keywords: Sant'Ambrogio Pressure Vessel Software, pressure vessels, heat exchangers.

B.15. IMPLEMENTATION OF MODERN METHODS FOR IDENTIFYING RISK FACTORS IN THE TEACHING-LEARNING PROCESS, IN TECHNICAL EDUCATION

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Abstract. Given that workers work in a work environment specific to their profession and perform tasks with the necessary means of work, we can define occupational risk as the possibility that an executor may suffer an accident or an occupational disease in the system. Regarding the concept of "PROFESSIONAL RISK," its perception depends on the level of training and professional experience of the participants involved in the work process, in specific, concrete work situations. The specifics of the activity carried out involve a series of demands of a physical, orthostatic, thermal, chemical, and biological nature, which can generate the occurrence of occupational accidents and diseases. Therefore, it is very important that both employers and employees are aware of the existence of these occupational risks and the need to reduce or eliminate them. The paper presents several case studies on modern methods of capturing students' interest in the need and importance of identifying risk factors for various professions.

Keywords: work environment specific, carried out, identifying risk factors.

C. OPTIMIZATION IN ENVIRONMENTAL ENGINEERING AND ENVIRONMENTAL PROTECTION

C.1. RESPONSE TO STRESS CAUSED BY LEAD, CADMIUM AND NICKEL TOXICITY IN OREGANO (ORIGANUM VULGARE L.) SEEDLINGS

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Abstract. Culinary herbs of the Lamiaceae family are widely consumed either fresh or dried, are commonly used in cosmetics and pharmaceutical products, being also known to be safe for use in traditional medicine. Oregano (Origanum vulgare L.) is a very appreciated culinary herb which is used especially in South European and Latin America cuisines. Its leaves and essential oil have been also considered in medical purposes for centuries. The toxic effects caused by heavy metal contamination of the biosphere correlates with cellular damage of the plants, growth inhibition and allergen production. The aim of the present study was the investigation of the stress and ecotoxicological effects of three heavy metals (Pb, Cd, Ni) to the aromatic plant oregano. In this preliminary study, some important stress indicators to heavy metal pollution were determined: seed germination, radicle, hypocotyl and leaves elongation, tolerance, toxicity and vigour indexes. The seeds contamination consisted in 11 treatments for Pb(II) (5 mg/L to 500 mg/L) and 8 treatments for Cd(II) and Ni(II) (2.5 mg/L to 100 mg/L). A blank sample was also prepared for comparison purposes. All the experiments were carried out in triplicate and the data reported were expressed as ± standard error of the mean. After the 21-day germination period, oregano seedlings were collected to identify the degree of germination and radicle, hypocotyl and leaves elongation. This study showed that with the increase in the concentration of heavy metals, their toxicity caused an inhibition in growth of the seedling's components. The fastest toxicity rate increase could be identified in the case of Ni(II) contamination. At a concentration of 5 mg/L of Ni(II) in solution, the degree of toxicity for the radicle exceeded 60%, while at concentrations between 10-100 mg/L the degree of toxicity was ≥ 90%. A hierarchy of toxicity caused by heavy metals exposure was found as follows, radicle > hypocotyl > leaves, with small differences for the concentration of 5 mg/L Cd(II) and Pb(II), when the toxicity was identified as being in the order, radicle > leaves > hypocotyl. The laboratory tests performed to show the response of oregano to heavy metals contamination indicated an increased inhibition of the seedlings especially for Ni(II) pollution.

Keywords: aromatic plants, ecotoxicological effects, germination, heavy metals, pollution.

C.2 BEHAVIOUR OF MEDICAGO SATIVA L. (ALFALFA) IN THE PRESENCE OF COBALT IONS: A PRELIMINARY APPROACH

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Abstract: Pollution of soils with cobalt is mainly caused by human activities such as mining and smelting, sewage sludge and fertilizer use. The presence of cobalt ions in higher concentrations may affect the soil structure and fertility, the growth and development of plants and finally causing different effects on human body such as allergic reactions, heart and lung diseases, and also disturbance of nervous system. Several plants possess the ability to tolerate and to remove heavy metals from contaminated medium, one of them being Medicago sativa L. In this regard, this paper presents a laboratory experimental study which evaluate the behavior of Medicago sativa L. under cobalt ions stress in liquid medium. Therefore, seven concentrations of cobalt ion aqueous solutions (25 mg/L, 50mg/L, 100mg/L, 150 mg/L, 200 mg/L, 250 mg/L, 300 mg/L) were prepared in three replicates per treatment. The experiments were developed in laboratory conditions for one week using Petri dishes with diameter of 10 cm, considering 10 seeds of alfalfa in each plate and 3 mL of Co (II)) solution of known concentration. The results showed that the germination degree (GD%) of alfalfa seeds in the presence of cobalt ions was 100% for the concentrations between 25 mg/L to 100 mg/L, while for higher concentrations (from 150 mg/L to 300 mg/L), the germination process was completely affected since the seeds did not germinate. In case of roots and shoots lengths, for concentration of 25 mg/L, the tolerance index (Er%) was 65.71 % for roots, and 96.49 % for shoots, respectively, while in case of cadmium concentration of 100 mg/L the tolerance index was 16.69% for roots, and 59.80% for shoots. In conclusion, Medicago sativa L. may develop a good tolerance to cobalt in the range of Co(II) concentrations between 25 mg/L and 100 mg/L, with no significant effects on the morphological state of plant, and may be considered as a possible plant for phytoremediation of moderated cobalt polluted soil.
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Keywords: alfalfa, cobalt, tolerance index.

C.3. A STUDY OF MUSTARD SEED GERMINATION AND GROWTH UNDER THE INFLUENCE OF ZINC STRESS

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Abstract. Heavy metals are among the most dangerous pollutants due to their non-degradability and long persistence in the environment. The study of environmental pollution caused by heavy metals is highly topical due to their complex negative effects on the

environment and human health. Heavy metals are toxic and can affect the quality of life when they reach concentrations close to the maximum allowable limit (MAL) in environmental components. In terms of the quality of soils contaminated with heavy metals, the global effect of heavy metal pollution is to decrease soil fertility and worsen plant nutrient conditions. Zinc (Zn) is an essential element for living organisms, but also one of the most common soil pollutants. In this context, the fundamental objective of this work is to investigate the tolerance ability of mustard (Sinapis alba) in the presence of different Zn concentrations in aqueous solution (25-300 mg Zn(II)/L). To carry out the experimental plan, mustard seeds were previously sterilized with NaOCl and synthetically contaminated with a certain volume of Zn(II) solution, which contains a well-known quantity of metal ion. Experiments were performed in Petri dishes containing a layer of Whatman filter paper and a number of 10 mustard seeds in each dish. Subsequently, 3 mL Zn(II) solution of known concentration was added, ranging from 25-300 mg Zn(II)/L. The duration of the experiment carried out in triplicate was 5 days. After that, it was determined the degree of seed germination, the relative growth of roots and seedling stems and the toxicity index of metal ions. Results showed that the germination rate of mustard seeds under the influence of metal stress was relatively constant in the range 25-250 mg Zn(II)/L, with the inhibitory effect of zinc ions on germination becoming evident with increasing concentration to 300 mg Zn(II)/L. Also, a development of mustard seedling components was found only in the range 25-150 mg Zn(II)/L, the toxic effect of the metal being visible with the increase of the concentration to 200 mgZn(II)/L. Following the results obtained, we can conclude that mustard is a plant tolerant to zinc ions in relatively low concentrations.
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Keywords: germination, metal toxicity, phytoremediation, Sinapis alba, zinc.

C.4 HAZARDOUS WASTE ADVANCED MANAGEMENT IN A POLAND – CASE STUDY MALOPOLSKIE REGION

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Abstract. This article presents a study on hazardous waste management in the Malopolskie region - Poland. The study was based on the information obtained during 3 years, 2016-2018, and following this analysis, it was found that in 2016 there was the highest amount of 24,872.13 tons hazardous waste produced, of which only a 3-fold lower amount was disposed of. In this study, various types of hazardous waste were analysed, including the waste from construction materials and asbestos. The predominant share of 50% in the mass of analysed hazardous waste felt on generated one. Waste recovered in installations had a lower share of 43%, with a significant and favourable increase of over 5,000.00 tons. In the contest of the correctness of environmental aspects, it was considered an advisable solution that would optimize the treatment conditions and at the same time to minimize the costs of hazardous waste management, in the contest of the correctness of environmental aspects.

Keywords: hazardous waste, generation, recovery, disposal, installation.

C.5. EFFECTS OF METALS STRESS ON THE DEVELOPMENT AND GROW OF SINAPIS ALBA (WHITE MUSTARD) IN URBAN SOILS

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Abstract. The pollution of soils with heavy metals became a serious environmental issue due to their high toxicity and negative impacts on human beings. These metals are released during different human activities (metal plating, mining, fertilizer, tanning, battery manufacturing, paper industry and pesticides). Unlike some organic compounds, such as POPs (persistent organic compounds), heavy metals are not subject to degradation and cannot be destroyed. However, some plants developed effective strategies and mechanisms for survival in heavily polluted site, being widely used in phytoremediation/phytomining of polluted soils. In this regard, our work tested the ability of Sinapis alba (white mustard) to tolerate and grow in soil polluted with Cu(II), Co(II), Ni(II) and Zn(II) ions in different concentrations (10, 100, 300, 500, 700, 1000 mg/kg). The plants were grown in pots containing 1000 grams of urban soil collected from Iasi city area. Ten seeds/plant species / pots were sown at a depth of about 2-3 cm in the soil. After sowing, 5 seedlings per pot were preserved (the most vigorous). The experiments were performed in greenhouse conditions for 41 days. A thermal regime of 25-30 ºC during the day and 15-20 ºC during the night was ensured. Our results showed that Cu(II) and Zn(II) in high concentrations (100-1000 mg/kg) induce positive effects on the germination of mustard seeds. Obvious effects of stress on the germination degree of mustard seeds occurred for Co(II) and Ni(II) at concentrations of 300-500 mg/kg. At higher concentrations (Cu(II) and Co (II): 300-500 mg /kg; Ni (II): 500 mg/kg and Zn (II): 1000 mg /kg), all these metals negatively affect the plant development in terms of roots, stems and leaves length and the effects become more and more visible as the concentration of metals increases. In conclusions, it can be said that Sinapis Alba can be effectively used for phytoremediation of soil polluted with heavy metals at moderate concentrations.
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Keywords: heavy metals| phytomining| urban soil| white mustard.

C.6. STATISTICAL ANALYSIS AND OPTIMIZATION OF LEAD BIOSORPTION FROM WASTEWATER BY NON-VIABLE BIOMASS OF ARTHROBACTER VISCOSUS

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Abstract. Heavy metals are toxic compounds to all living organisms, even in low concentrations, leading to serious ecological and health hazard due to their solubility and mobility in environmental compartments. In this paper, the removal of lead (Pb^{2+}) from synthetic aqueous solution was performed by non-viable biomass of Arthrobacter viscosus . The main objective of our study is to apply statistical designs analysis to optimize the conditions for Pb^{2+} biosorption by A. viscosus in order to achieve the best performance of wastewater bioremediation at large scale. The process modeling and optimization was performed with the help of Minitab 17 software. Statistical analysis such as factor analysis was used as a screening method to identify the effects of some variables (pH, initial metal concentration, biosorbent dose, contact time and temperature) on metal biosorption, while the relations between different variables were analyzed considering response surface methodology (RSM). In order to determine the importance of the factors in the experimental phase, the analysis of variance (ANOVA) was also used. The results of factor analysis method showed that initial concentration, pH and temperature have significant effects on process efficiency. Based on ANOVA results, the relationship between the considered influencing factors and the Pb^{2+} removal efficiency is described with high accuracy by the polynomial equation of second degree. The graphical representation by contour lines highlighted that the best results are obtained for a long contact time (more than 47 hours) and at the lowest initial concentrations (25 mg/L). Process optimization showed that the highest probability that the selected biosorbent to reach the maximum efficiency (99.95%) will occur in the following conditions: contact time of 48 h, maximum initial metal concentration of 26.5 mg /L and temperature of 30 ºC. Finally, A. viscosus proved to be an efficient biosorbent in the removal of lead ions from aqueous solutions considering optimum parameters.
Acknowledgements: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-2430, no. 439 PED/2020, within PNCDI III.

Keywords: ANOVA, biosorption, factory analysis method, response surface methodology, optimization.

C.7. PRELIMINARY STUDY ON THE INFLUENCE OF COPPER ON RAPESEED GROWTH AND DEVELOPMENT

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Abstract. In recent decades, the industrial revolution, urbanization and uncontrolled anthropogenic activities have led to environmentally worrying effects. Heavy metal soil pollution, especially agricultural soil contamination, has become a major global impact issue. The ability of heavy metals to bioaccumulate, their non-biodegradability and persistence in agricultural land and crops can have significant negative effects on harvest production or human health, along the food chain. Therefore, in order to eliminate alarming situations, it is necessary to develop sustainable, environmentally friendly and efficient methods of removing heavy metals from the soil. In this framework, phytoremediation is proving to be a promising green technology, gentle with contaminated soils, based on investigating the relationship between plant tolerance to metal toxicity. The main objective of this paper is to establish the potential of rapeseed (Brassica napus) to tolerate different thresholds of copper concentrations in the soil. In the experimental program, rapeseed was subjected to synthetic contamination with Cu(II) solutions, using polypropylene vessels, with a content of 15 g soil and 10 mL metal solution in the range of 50-1000 mg/kg. The toxicity of copper ions on rapeseed growth and development was tested taking into account phenological observations and determinations based on different growth indicators: seed germination rate, elongation rate (tolerance index) of the root system and the aerial part of the plant, and inhibition rate (toxicity index) of root elongation and the upper parts of the rapeseed plant. Following the experiment, it was observed that the germination of the seeds was not affected by the presence of Cu(II) ions with the increase of copper concentrations in solution. Also, analyzing the evolution over time of rapeseed plants under the influence of copper ions in the soil, it was found that at the concentration of 1000 mg/kg Cu(II), plant growth was not significantly affected compared to the control sample, maintaining an approximately constant ratio of plant length over the entire experimental duration. In view of these preliminary results, rapeseed (Brassica napus) can be considered as a potential plant applied in phytoremediation of lands contaminated with copper ions, and the biomass obtained could be used as a secondary source of Cu(II).
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Keywords: Brassica napus, copper, environment, phytoremediation, soil pollution.

C.8. A BINARY RETENTION OF LEAD AND NICKEL ONTO CLAYEY AND CLAYEY ORGANIC SOIL

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Abstract. The use of treated wastewater for agricultural soils irrigation is an alternative to the lack of water that affects Tunisia. However, treatment plants rarely takes into account the elimination of heavy metals such as lead and nickel which are very toxic to the environment

and especially to surface and groundwater. The competition between those two-metal cation is always present, it is thus interesting to make their study together in order to quantify their adsorption capacities compared without competition. The soil used is a clayey soil at first and then a soil contain 2.7% of humic acid was prepared by adsorption-desorption experiences of humic acid in clayey soil. The work objectives is to quantify the risk of groundwater pollution in the nickel and lead adsorption with humic acid and in competition mode. The retention isotherms on all cases and the extended Langmuir, Langmuir modified and competitive, extended Freundlich, Redlich Peterson unmodified, Redlich Peterson modified and competitive, extended Sips multi-compounds models were applied. All experimental isotherms have been successfully adjusted using Redlich Peterson modified and competitive (R^2=0.96) expression for the different soil. The amounts of nickel and lead retained by the clayey soil, for an initial pollutant concentration equal to 1 mmol/L, were evaluated at 0.007 and 0.009 mmol /g respectively and with humic acid were evaluated at 0.01mmol/g for both of pollutants. This amount is 0.02 and 0.008 mmol/g for the lead and nickel and 0.006 and 0.008 mmol/g in the same clayey soil with and without humic acid but both of heavy metals are presents in the solution. At least, the nickel present the greatest risk to contaminate the groundwater in all the cases but the humic acid is a good barrier to prevent the water underground of these contaminations.

Keywords: heavy metals, humic acid, competition, soils, adsorption isotherm.

C.9. MATHEMATICAL MODELING FOR THE TRANSFER OF CHROMIUM FROM THE SOIL IN THE CASE OF PHRAGMITES AUSTRALIS PLANT

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Abstract. The main objective of this article is to observe the transfer of chromium from the soil in the case of Phragmites Australis plant type. The program TableCurve 3D was used for modeling the transfer of chromium from the soil in the case of Phragmites Australis plant type. The results obtained from the experimental determinations show that the transfer capacity of heavy metals from the soil in the plant Phragmites Australis species was depending on the distance from the water-soil interface from which the plant samples were taken and on the concentration of heavy metals in the soil. Following the analysis of the mathematical model for the transfer of chromium from the soil to the plant species Phragmites Australis, the correlation coefficient obtained had values between 88 and 99 %.

Keywords: chromium, transfer, mathematic model.

C.10. MATHEMATICAL MODELING OF THE LEACHING SPEED OF LIQUID POLLUTANT IN THE SOIL

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Abstract. This paper proposes a tridimensional mathematical model for the leaching speed of liquid pollutant in the soil. The program TableCurve 3D was used for mathematical modeling leaching speed of liquid pollutant in the soil. The variables taken into consideration were measurement position, porosity and time. The results indicate that the proposed mathematical models offer a viable and reliable method for determining leaching speed of liquid pollutant in the soil, in various soil samples (clayey, sandy, clay loam), depending on soil porosity and time. Following the analysis of the mathematical model of the leaching speed of liquid pollutant in the soil, the correlation coefficient obtained had values between 96 and 99%.

Keywords: leaching speed, porosity, time, mathematic model, liquid pollutant.

C.11. TECHNOLOGICAL OPTIMIZATION AND EMPIRICAL MODELING OF BRILLIANT RED HE-3B DYE BIOSORPTION ONTO RESIDUAL BIOMASS OF SACCHAROMYCES PASTURIANUS ENCAPSULATED IN SODIUM ALGINATE

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Abstract. The principal aim of this research work is to present the main technological optimization aspects followed in the retaining of Brilliant Red HE-3B (BRed) dye from aqueous solution using a batch biosorption-based treatment onto residual biomass of Saccharomyces pasturianus encapsulated in sodium alginate, for which the principal three influencing factors were considered to be the residual biomass concentration (1.90-22.00 g/L of yeast, with size in the range of 0.5-1.5 mm), the dye concentration (16.36-83.64 mg/L of Bred dye) and biosorption contact time (2.47-7.72 h). For this research work, an empirical model of three variables was applied based on a 2 3 central active compositional rotatable experimental design where the biosorption treatment efficiency (%) related to BRed dye was chosen as optimization criterion. The highest biosorption treatment degree was of 52.878% referring to dye retention in the studied experimental variation field of each independent variables, relatively good enough in the operating regime (70 mg/L of BRed dye, 18 g/L of residual biomass and at least 6 h of biosorption contact period). This proposed empirical model was found corresponding for the static treatment step based on dye biosorption onto residual biomass of Saccaromyces pasturianus encapsulated in sodium alginate (average deviation of -2.081%, being in the agreed deviation limit of ± 10%) which can be used for discoloration of aqueous colored systems, especially for recycling and/or other reuse facilities.

Keywords: iosorption treatment, brilliant Red HE-3B dye removal, central active compositional rotatable design of 2^3 type, mathematical model, residual biomass of Saccharomices pasturianus.

C.12. ASPECTS REGARDING THE TECHNOLOGICAL DESIGN OF A WASTE SLUDGE TAHK

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Abstract. This paper highlights some theoretical and applied aspects related to the design of a sewage sludge fermentation tank for the purpose of biogas production in order to capitalize on it for energy purposes. This is possible due to the fact that the sludge resulting from the wastewater treatment processes in the urban treatment plants, although it is a waste, can be recovered. We will refer to a number of 10,000 LE (equivalent inhabitants) in an urban area, of which only about 40% are connected to the sewer system.

Keywords: fermentation tank, biogas, wastewater.

C.13. POTENTIAL OF MICROALGAE TO PRODUCE SUSTAINABLE BIODIESEL FROM INDUSTRIAL WASTEWATER

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Abstract. Microalgal biomass cultivation is a promising way to meet sustainable sources of energy and has attracted considerable attention. However, optimization of the mass culture conditions has yet to be understood. This study aims to examine the effectiveness of the application of microalgae strains for an economically effective and environmentally sustainable biodiesel production using wastewaters derived from petroleum industries, allowing simultaneously nutrients remova l. Two species: Chlorella sp. and Scenedesmus sp. were selected and cultured in refinery wastewater, then, various culture parameters and biodiesel productivity were discussed. It was found that the average biomass production analyzed under daily temperature is 1.3 g/L - and 1.02 g/L - respectively, in the acclimated culture media of Scenedesmus sp. and Chlorella sp. The results revealed that Scenedesmus sp. had the highest lipid content of 12.3% while indicated 7.5% for Chlorella sp.; moreover, linoleic acid achieved around 59.4% in Scenedesmus sp., however further studies are required to generate high potential biodiesel combined with wastewater effluent valorization

Keywords: biodiesel, wastewater, fatty acids, scenedesmus sp., Chlorella sp.

C.14. VISIBLE-LIGHT PHOTOCATALYTIC PERFORMANCE OF AL:SRTIO$_3$@Δ-COOOH CORE@SHELL NANOHETEROSTRUCUTRES

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Abstract. Strontium titanate ($SrTiO_3$) is widely used in photocatalytic applications like photocatalytic degradation of organic dyes or antibiotics which are encountered in wastewater or water splitting. This perovskite is an excellent photocatalyst, but it shows photocatalytic activity only in the presence of UV light due to the high value of their band gap (3.2eV). In order to obtain a material that is active under visible light, $SrTiO_3$ nanoparticles were surface decorated with double co-catalyst system consisting of Al_2O_3 and cobalt oxyhydroxide (CoOOH). Strontium titanate nanoparticles were prepared by ceramic method using stoichiometric amounts of strontium carbonate (SrCO3), titanium dioxide (TiO_2) and aluminum oxide (Al_2O_3) which were grinding in presence of ethanol and furthermore annealed at 1000 °C for 10 hours. The deposition of cobalt oxyhydroxide on the surface of perovskite particles was achieved by the oxidation of Co^{2+} ions to Co^{3+} ions followed by their precipitation. The obtained material (Al:$SrTiO_3$@CoOOH) was characterized in terms of structure and optical properties and their visible-light photocatalytic activity was also evaluated by performing degradation test over Tropaeolin 00 dye (Orange II). The photocatalytic test results indicate that the tested material was able to decompose 95% of the dye in 45 minutes.
Acknowledgements. This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project numbers PN-III-P4-ID-PCE-2020-1385 and PN-III-P1-1.1-TE-2019-2037, within PNCDI III.

Keywords: core@shell, nanoheterostructures.

C.15. STUDY REGARDING THE DETERMINATION OF THE DUST CONCENTRATION LEVEL IN THE CENTER OF BACAU CITY

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Abstract. The paper presents a study on the level of dust generated by road traffic in the central area of Bacau at the fact that dust is among the most important air pollutants in terms of emissions, human health, and environmental impact. As a case study, two roundabouts and a section of road with a length of approximately 300 m in the city of Bacau were chosen in the center of the city. The entire studied road surface has a two-lane transport capacity in each direction of traffic, the traffic being given by the circulation of small capacity cars and buses for public transport. In the central area of Bacau there are six Public Transport stations of the Municipality, on which there are buses with lines 17; 18; 22, of which a station is located within the perimeter of the study area. The station is located at the Cathedral Park which belongs to the transport line no. 18. The streets are very well maintained and well-demarcated by road markings in the central area. The monitoring was performed in 12 points established in key points of the studied route, for 7 days, between 13:00 and 16:00. Following the monitoring, it was found that the level of dust concentration exceeds the limit threshold imposed by the legislation in law on Mondays, Tuesdays, and Thursdays, in measurement points 1, 2, 4, 10, and 12 in the time interval 15:00 - 15: 30 - 16:00. Thus, during the working days, frequent exceedances of the level of dust concentration in the monitored area were found. During the weekend, Saturday and Sunday, there were no exceedances of the

maximum permissible limit of powder concentration. As a result of the study, it is recommended to adopt solutions to reduce the concentration of dust resulting from road traffic by using wind barriers to reduce the transport of street dust, increase the surface of green spaces, which play an important role in self-purifying the air; street washing, use of street sanitation equipment, which is not currently used.

Keywords: dust, air monitoring, pollution, traffic.

C.16. MICROBIAL REMOVAL OF THE PHARMACEUTICAL COMPOUNDS

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Abstract. The consumption of pharmaceuticals has increased worldwide, and new compounds are continually being introduced in the market. Organic micropollutants such as pharmaceuticals enter the water cycle either as the original compound or in a metabolized form at low loads resulting in relatively low concentrations, that is, in the ng/L–µg/L range. Studies on the occurrence of pharmaceuticals show that the widely used pharmaceuticals diclofenac and acid clofibric are present in relevant concentrations in the environment. Bioremediation techniques, based on augmentation strategy, have received the most attention, because it is friendly to environment and implies relatively low cost. The potential of microorganisms to catabolise and metabolise xenobiotic compounds has been recognized as a potentially effective means of toxic and hazardous waste disposal. The aim of this work was to study the potential ability of the white-rot fungus to transform clofibric acid and diclofenac in order to establish their resistance of target compound toxicity and evaluation of rate of biotransformation during submerged cultivation.

Keywords: pharmaceuticals, clofibric acid, diclofenac, bioremediation.

C.17. EVALUATION OF THE AIR MICROBIOTA INSIDE UNIVERSITY SPACES, DURING AND AFTER THE RESTRICTIONS CAUSED BY THE COVID-19 PANDEMIC

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Abstract. The quality of the air inside the spaces where different activities are carried out, represents an environmental component with a special impact on the state of health, but also

on the productivity of the people. The quality of the air inside some public spaces, of educational institutions type, depends on the type of activities carried out, the population density/m^2, the degree and type of air ventilation, the elimination of waste and the cleaning of these spaces. The microbiota of the air inside these spaces includes all the viruses, bacteria, fungi present in the air adhering to dust particles, lint, pollen that form "bioaerosol". Knowing the density of bioaerosols in different rooms (laboratory, classrooms) is of great sanitary-epidemiological importance. It is an important indicator for assessing air quality, hygienic conditions in various enclosed spaces. The limit values of bioaerosol accepted by the EU in indoor spaces should not exceed values of 5000 CFU/m^3 in the case of bacteria and 150-1000 CFU/m^3 in the case of molds. (Dales R. si colab. 2008, Directive 1989/654/CEE.) The present study aims to evaluate the air microbiota in several spaces of the university in conditions of ventilation and non-ventilation of the air. The research was conducted under the restrictions imposed by the COVID-19 pandemic (May 2021) and after their lifting (May 2022). The results obtained by the Koch sedimentation method showed values between 2 CFU/m^3 in the COVID-19 pandemic restriction and 3600 CFU/m^3 after restriction in the case of bacteria and 0-1280 CFU/m^3 in and after pandemic COVID-19 restriction in the case of fungi.

Keywords: air microbiota, bioaerosols, indoor spaces, COVID-19 restriction.

C.18. SOME APPLICATIONS OF THE ORGANIC FLOCCULANTS IN THE SLUDGE TREATMENT. CASE STUDY: LABORATORY MUNICIPAL SLUDGE DEWATERING

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Abstract. In the extended and complex context of the water and wastewater problems, the generated sludge management involve serious evaluations related to the treatment, utilization, and elimination. So, important resources must be oriented to the sludge treatment considering in principle the quantities and complex composition. The proper methodologies applied during each stages involves preliminary evaluation considering the processes optimization and const reduction. In many cases, preliminary evaluation refers to laboratory stages that can be simulations, small scale testing, prototypes, product combinations etc. The aim of the present work was to treat in laboratory conditions of some organic flocculants in the municipal sludge dewatering. The laboratory methodology included some flocculants doses evaluation, flocculation process, solid-liquid phases separation etc.

Keywords: municipal sludge, flocculant's, laboratory methodology, dewatering.

C.19. HIERARCHICAL CARBON BASED-$NIFE_2O_4$ COMPOSITE NANOSTRUCTURES WITH EXCELLENT LIGHT RESPONSE AND MAGNETIC PERFORMANCE SYNTHESIZED TOWARD ENHANCED PHOTOCATALYTIC DEGRADATION OF ACTIVE PHARMACEUTICAL INGREDIENTS

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Abstract. The combination of nanotechnology with the solar energy can lead to innovative visible-driven materials for using in technologies for water purification. Emerging pollutants are synthetic or naturally occurring chemicals that are known or suspected of causing negative effects on human health and environment. Specifically, pharmaceutical industry has contributed to the presence of pharmaceuticals in aquatic matrices and, at moment, the wastewater treatment plants are not complete capable to remove these molecules, because wastewater treatment plants are not designed to be able to destroy these contaminants during the wastewater treatment, releasing them back into the environment. This extended discharge of persistent and bio accumulative pharmaceuticals in effluents produces negative effects on human health and environment. Therefore, advanced treatment processes by using cost-effective and stable materials may be necessary to provide further reduction of these compounds, in order to minimize environmental and human exposure and preventing the future problems. In the present study, hierarchical carbon based-$NiFe_2O_4$ composite nanostructures was prepared and complementary analytical characterization techniques were performed to assess the physico-chemical characteristics including powder X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), UV-visible diffuse reflectance spectra (UV−Vis DRS) and XPS. The carbon based composite material, $NiFe_2O_4$@MWCNTs shows a high degradation efficiency over tetracycline of 91.16% under visible light irradiation.

Keywords: composite nanostructures.

C.20. INCORPORATION OF MICROBIAL BIOREMEDIATION IN WASTEWATER TREATMENT PLANTS FLOW FOR PERSISTENT POLLUTANTS REMOVAL

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Abstract. The conventional wastewater treatment plant is in generally designed to remove the biodegradable organic matter and nutrients. The heavy metals, antibiotics, pesticides, personal care products and pharmaceuticals usually are not completely removed and often

their concentrations in treated wastewater exceeds the permissible limits. Thus, for the removal of these pollutants it is necessary to apply an additional treatment (tertiary treatment) with the aim to reduce overall the effluent emissions followed by reuse of treated wastewater (zero emissions) or to minimize the costs related with generation and disposal of wastes resulted. Microbial bioremediation processes of persistent pollutants have been shown at laboratory level to be feasible alternatives for clean-up of various types of industrial effluents. Therefore, in this paper, based on literature studies, wastewater treatment plant flow diagrams that include the biosorption and bioaccumulation of persistent pollutants were proposed. The treatments included in each flow diagram were selected taking into account the influent characteristics, the legislative wastewater regulations, the performances of selected treatments under specific conditions, as well as the optimal conditions necessary for the application of microbial bioremediation processes. The microbial bioremediation processes can be applied as pre-treatment for certain industrial effluents, for example those from the pharmaceutical industry or as post-treatment for the treated wastewater to comply with the legislative norms for discharge into natural receptors or to be used in various activities (e.g. in agriculture).
Acknowledgements: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-2430, contract no. 439 PED/2020, within PNCDI III.

Keywords: biosorption, bioaccumulation, heavy metals, persistent organic pollutants, wastewater reuse.

C.21. QUANTIFICATION OF THE ENVIRONMENTAL IMPACTS GENERATED BY THE REMOVAL OF HEAVY METALS FROM AQUEOUS SOLUTION BY INACTIVE YEAST

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Abstract. Release of heavy metals into the environment due to anthropogenic activities poses serious environmental and human health hazards as a result of their incapacity to degrade and remanence in the ecosystem for a long period of time. In this study, we propose an assessment on the removal of 25 mg/L Cd(II) and Cr(VI) from aqueous solution by Saccharomyces cerevisiae inactive yeast, from a life cycle perspective. Quantification of the environmental impacts generated by the removal of Cd(II) and Cr(VI) by yeast biomass was made following the four steps of Life Cycle Assessment (LCA) methodology, assisted by GaBi software. The results obtained by applying the LCA methodology show that the highest value of the environmental impact, both in the case of the removal of Cr(VI) and Cd(II) ions by S. cerevisiae, was obtained for the impact category ionizing radiation (17,8 pers. equiv. for Cd (II) and 17 pers. equiv. for Cr (VI)). A negative value was identified for the impact category human toxicity cancer (-38,9 pers. equiv.) in the case of Cr (VI) removal by S. cerevisiae biomass indicating that there is no quantified environmental impact at this level. For the same category, however, in the case of biosorption of Cd(II) ions by S. cerevisiae , there is a quantified impact regarding the human toxicity cancer (0,458 pers. equiv.). The LCA methodology gives an overview of environmental impacts generated by each process stage, in this case the biosorption/bioremoval step.

Keywords: bioremoval, heavy metals, Life cycle assessment, category impacts.

C.22. TOXIC EFFECTS OF SINGLE AND BINARY MIXTURE OF LEAD, CADMIUM AND NICKEL ON BASIL (OCIMUM BASILICUM L.) GERMINATION AND EARLY GROWTH STAGES

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Abstract. Heavy metals are widely encountered in all environmental systems, are difficult to be removed and cannot be biodegraded. Their high toxicity is making heavy metals one of the most dangerous pollutants for all living organisms. Excessive pollutants from the heavy metals category can easily enter in the food web trough plant products, by dietary medicine or skincare products and then accumulate in the body, posing a significant threat to human health. Basil (Ocimum basilicum L.) is used in gastronomy, in alternative medicine, essential oils, perfumery and cosmetic industry. In this paper, the toxic effects of heavy metals on basil germination process and early growth stages were investigated. The main aim of our paper is to study the individual and combined phytotoxic effects of heavy metals including Pb(II), Cd(II) and Ni(II) to the development of basil seedlings by assessing different indicators such as morphological indicators and tolerance, toxicity and vigor indexes. Heavy metals solutions were applied as treatments in single and binary systems to selected basil seeds in Petri plates sealed with parafilm, in order to assess their phytotoxic effects by the investigation of the following parameters: radicle, hypocotyl and leaves length, germination, tolerance, toxicity and vigor indexes (%). The heavy metal contamination in the single system consisted in 11 treatments with Pb(II) (5-500 mg/L), 8 treatments with Cd(II) and Ni(II) (2.5-100 mg/L) and 3 treatments in the binary mixture (V1 – Pb(II) 50 mg/L + Cd(II) 2.5 mg/L; V2 – Pb(II) 50 mg/L + Ni(II) 70 mg/L, V3 - Cd(II) 2.5 mg/L + Ni(II) 70 mg/L). The number of germinated seeds was counted every day over a period of 14 days. All the experiments were carried out in triplicate and the data were expressed as ± standard error of the mean. The seedlings length decreases with increasing concentration of metal in the solution. In conclusion, the study identifies the metal ion Ni(II) to have the highest inhibitory effect on the basil seedlings, their length decreasing by 94.29%, compared to the control sample. For basil seedlings, the toxicity degree reaches 92.24% for 100 mg/L Cd(II) treatment, for 500 mg/L Pb(II), it reaches 71.12% and in the case of 100 mg/L Ni(II), it gets at 94.22%. In case of heavy metals mixture, it was observed that for the treatment consisting of 50 mg/L Pb(II) and 2.5 mg/L Cd(II) (V1), the toxicity index for the radicle is 0%, for hypocotyl is 39%, while for leaves it reaches 40 %. For the variants V2 (50 mg/L Pb(II) + 70 mg/L Ni (II)) and V3 (2.5 mg/L Cd(II) + 70 mg/L Ni(II)), the toxicity index hierarchy is represented by radicle > hypocotyl > leaves. Basil seeds exposure to single and binary mixtures of heavy metals shows different patterns when it comes to plant growth and inhibition at the studied environmental concentrations.

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Keywords: heavy metals, environmental contamination, inhibition, Ocimum basilicum L., toxicity.

C.23. IMPACTS OF PB(II) BIOACCUMULATION FROM WASTEWATERS USING BACTERIAL BIOMASS CONSIDERING PROCESS LIFE CYCLE ASSESSMENT

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Abstract. The metal removal capacity of different types of biomaterials from wastewaters has been successfully analyzed so far as alternatives to the traditional physico-chemical methods, including the case of microorganisms which have demonstrated excellent performances. The current study aims to contribute through Life Cycle Assessment (LCA) of Pb(II) removal by bioaccumulation process using Arthrobacter viscosus bacterial biomass. The LCA methodology was applied according to the ISO 14040 and ISO 14044 international standards with the fulfillment of all mandatory stages: goal and scope definition, inventory analysis, impact assessment and interpretation. The optimized data obtained for the lab-scale process was analyzed using Gabi software and by applying the ReCiPe 2016 (endpoint) method. The established functional unit was 1 L of treated wastewater by A. viscosus living biomass. Results of the applied LCA analysis showed that the bioaccumulation process of a concentration of 25 mg/L Pb(II) by A. viscosus with a 114.94 mg/g removal capacity indicates as the highest impact coming from ionizing radiation (IR) (37.2 pers. equiv.) impact category, while the lowest impact was identified in case of stratospheric ozone depletion (SOD) (0.33 pers. equiv.). These results show that the Pb(II) bioaccumulation process is mainly impactful through the generated emissions to air (89.4%). The emissions could be reduced through the replacement of conventional energy production with renewable methods, thus making the remediation process more sustainable.

Keywords: life cycle assessment (LCA), microorganisms, bioaccumulation, wastewater treatment, sustainability, lead.

C.24. ANALYSIS OF THE HOUSEHOLD WASTE MANAGEMENT SYSTEM AND THE HEALTH AND ENVIRONMENTAL IMPACT IN THE MUNICIPALITY OF KASA VUBU, CITY OF KINSHASA IN THE DEMOCRATIC REPUBLIC OF CONGO

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Abstract. One of the important areas in the interaction between human and environmental activities is waste management. In low-income countries, in this case the Democratic Republic of Congo in general and the city of Kinshasa in particular, the most widely used method is uncontrolled dumping. However, if this solution is the easiest to implement and the least expensive, the fact remains that it must, to achieve its goal, respect certain rules, which is very rarely the case. Disposing of garbage in inappropriate places can be extremely harmful to the environment and to human health. As part of this study, the observations, interviews and surveys carried out in the field with local populations as well as the sampling of physico-chemical parameters using the EXTECH portable multi-analyzer device, model

433201, have determined several obvious nuisances such as odors, smoke, the proliferation of insects, the attraction of mice and dogs. And several diseases have been identified by the presence of this pirate dump, that is, 67% of the population suffers from malaria, 17% sulfur from amoebic dysentery, 10% from typhoid fever and 7% from diarrhea. This situation is particularly due to the absence of the evacuation of uncontrolled landfills; the population is not better informed about hygienic standards for waste management; the absence of transit sites for the deposit of household waste; the absence of a sorting and Waste recycling center; the lack of awareness of the populations of the danger that awaits them by the omnipresence of uncontrolled landfills; the lack of intervention and monitoring of public and municipal services on the ground and of political will for the establishment of waste management structures. These are the problems that household waste management is experiencing throughout the city of Kinshasa in general and the municipality of Kasavubu in particular..

Keywords: management system, household waste, health, environmental, impact.

C.25. REVIEW OF SOLAR AIR HEATERS EMBEDDED WITH PHASE-CHANGE MATERIALS (PCM) FOR BETTER PERFORMANCES

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Abstract. The technology of solar air heating systems is one of the branches that is of great importance in capturing and capitalizing on solar energy. This type of systems shows high thermal efficiency during periods when the solar radiation is high and continuous, being totally dependent on its availability. Due to the variation in atmospheric conditions and alternative periods of day/night, solar air heating systems are not so extensive compared to other renewable sources. This paper presents a summary of the literature on solar air heating systems embedded with materials that have the ability to retain thermal energy, during periods of maximum intensity of solar radiation and its release, when solar energy is reduced or missing for a period of time. It presents the designed and carried out systems by different researchers and the thermal performances obtained in the period of 2017-2021

Keywords: Energy Storage, Solar Air Heater, Phase-Change Material, Thermal Efficiency, Absorption Plate, Paraffin Wax.

C.26. BETTER EFFICIENCIES OF SOLAR AIR HEATERS ACHIEVED WITH DIFFERENT AIRFLOWS - A BRIEF REVIEW

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Abstract. The use of solar air heating systems brings with it the convenience of having hot air at discretion for heating households with quite low prices compared to the use of conventional heating sources. The desire of the researchers to achieve the highest thermal efficiency of these systems has led to the emergence of different ways of improvement, among which the use of absorption surfaces made of different materials with high solar radiation capture properties, the use on the absorbent surface of some shapes in order to create air whirlwinds that efficiently take over the temperature, the use of thermal energy storage materials as well as the use of different types of air flow. The present work is focused on the available literature in the field of solar air heating systems made with different types

of air flow. The paper also presents the different designs for the realization of airflow types used by researchers for high efficiency during the years 2017-2021.

Keywords: airflow, solar air heater, thermal efficiencies, heat transfer, fluid flow, convection, helical flow.

C.27. REVIEW OF MONITORING TECHNOLOGIES USED IN PHOTOVOLTAIC HYBRID SYSTEMS

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Abstract. In the present context, due to the increase in global energy demand and the need to reduce greenhouse gases, hybrid systems that produce electricity and heat from renewable sources have been proposed, designed and implemented. Most of the available solar energy is captured using photovoltaic systems and converted into electricity. Today's modern systcriems refer to combinations of photovoltaic and thermal panels (PV/T) to obtain electricity and domestic hot water, and systems consisting of photovoltaic panels with wind turbines which provides only electricity. With an optimal design, PV/T systems can provide buildings with 100% renewable electricity and heat. This is done in a more cost-effective and efficient way compared to using photovoltaic and solar thermal systems separately. The areas required to install photovoltaic systems can be reduced by using hybrid energy production systems. The introduction of a hybrid photovoltaic-wind system reduces the land area from 1.5 ha/MW to 0.4 ha/MW. Due to the influence of environmental factors affecting the functionality of hybrid systems and the need to achieve optimal performance, the development and implementation of advanced monitoring methods has become a mandatory requirement. The paper presents different methods of monitoring hybrid systems, their progress and performance.

Keywords: technologies, monitoring, photovoltaic, hybrid systems, solar, wind.

C.28. RECENT TENDENCIES IN PVT SYSTEM PERFORMANCE-A REVIEW

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Abstract. The capacity, performance and ease of photovoltaic/thermal systems in producing electricity and heat at the same time have made this technology one of the most important in terms of energy, worldwide. In recent years, researchers have focused their work on obtaining new configurations of hybrid PVT systems that are sustainable, solve problems related to the space on the roof of buildings, lead to reduced emissions of greenhouse gases (GHG) and protect our natural environment by using renewable resources. This paper presents the recent trends of hybrid PVT systems and their performance. Also, the electrical and thermal efficiency are indicated for each studied article.

Keywords: photovoltaic, thermal, hybrid systems, performance, efficiency, technology.

C.29. CONTRIBUTIONS IN THE AUTHENTICATION OF WORKS OF ART AND ARCHAEOLOGICAL ARTIFACTS

ION SANDU

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Abstract. The experience of authentication of Cultural Heritage assets is a very laborious research activity and at the same time the most attractive in the field of scientific investigation of newly acquired artifacts, less known or recently discovered. If until recently the art historian - the traditional expert - established the author and the year of implementation through the specific methods of plastic/technical-artistic and historiographical analysis, he proved powerless when it comes to a false notoriety and lack of basic elements. used by the author. Counterfeiting and counterfeiting today have materials and procedures very close to those used to make the originals. Moreover, authentication does not only mean dating, the author and the area of implementation, currently there are a number of attributes of authentication related to heritage characteristics and functions, of which very important are: patina of antiquity, nature of materials and condition their conservation, implementation technique, owner/custodian, transfer/itineraries, catalog or stock exchange quota, patrimonial classification and classification system, etc. All this requires methods of investigation through modern systems of co-operation and corroboration between interdisciplinary techniques. A special place is occupied by the researches regarding the identification of some archaeometric characteristics of the surface structures and of the volume phase, respectively the chemometric ones, with archaeometric value, which allow the establishment of the antiquity and the historical contexts in the evolution of the artefacts, until they are displayed in the museum or included in collections. The paper presents the most representative results obtained by the author in the authentication of newly acquired works of art and recently discovered archaeological artifacts. Among these we mention: the dating of cellulose supports by glycolysis rate or white degree, the determination of historical contexts in metal artifacts, involving the three groups of surface structures (noble or primary patina, poor or secondary patina, contamination or lying patina in the site archeological), chemometric characteristics related to the variation of water balance in organic substrates, variation of acid-base modules for ancient ceramics, chemometric characteristics for wood substrate, related to the ratios of radial (R), transversal (T) and longitudinal (L) sections, evolution composition ratios (C/O, C+H/O, volatile organic components/hygroscopic water, ash/pH, etc.), the evolution of porosity, specific gravity (density), the evolution of surface color (chromatic deviation - CIE L*a* b*) and other.

Keywords: authentication, archaeological artifacts.

C.30. OPERATIVE SOLAR LIGHT-DRIVEN PHOTOCATALYTIC DEGRADATION OF ACTIVE PHARMACEUTICAL INGREDIENTS OVER SPONGE-LIKE $SRTIO_3/NIFE_2O_4$ /$MWCNT_S$ NANOHETEROSTRUCTURES

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Abstract. Nanotechnology plays a major role in performance improvement through the development of innovative methods to produce new products, to substitute existing production equipment and to reformulate new advanced nanomaterials resulting in less consumption of energy and materials and reduced harm to the environment as well as environmental remediation. In the present study, we reported on the production of porous heterostructure 75%STO/25%NFO@MWCNTs photocatalysts by a multistep synthesis method. The chemical vapor deposition was involved for the production of carbon nanotubes-based composites Concern about the effect of tetracycline (TC) on the ecosystem has been increasing due to its endurance and low degradation. We used a series of spectrophotometric techniques, including powder X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), UV-visible diffuse reflectance spectra (UV−VIS DRS), XPS to investigate the structural, morphological, optical, and photocatalytic properties of the synthesized samples. As revealed by FE-SEM analysis and textural characteristics 75%STO/25%NFO nanocomposite self-assembled into a porous foam with an internally well-defined porous structure. The carbon composite materials, 75%$SrTiO_3$/25%$NiFe_2O_4$@MWCNTs and $NiFe_2O_4$@MWCNTs lose a little bit of crystallinity compared to the starting support materials, but this translates into the extraordinary improvement of the morphology and the textural characteristics. The TC degradation efficiency and COD removal rate reached 96.6% and 91.16% within using 75%STO/25%NFO@MWCNTs as photocatalyst and 140 min under VIS light irradiation, which showed the absorbability and photocatalytic performance of the new photocatalyst.
Acknowledgments. This work was supported by a grant of the Ministry of Research, Innovation and Digitization,CNCS/CCCDI –UEFISCDI, project numbers PN-III-P2-2.1-PED-2019-4215 and PN-III-P1-1.1-TE-2019-2037, within PNCDIIII.

Keywords: operative solar light, nanoheterostructures.

C.31. CONSIDERATIONS REGARDING THE USE OF BIOGAS OBTAINED FROM THE PROCESSING OF ORGANIC WASTE IN ECOLOGICAL DEPOSITS, FOR THE PURPOSE OF ENERGY PRODUCTION

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Abstract. The paper highlights the issue of energy processing of organic waste from an ecological landfill through theoretical and applied aspects specific to a biogas plant. This installation is located on the outskirts of a residential complex in a developed rural area.
Also, the infrastructure includes a biogas electricity cogeneration plant to provide the necessary electricity to all individual households and local micro-enterprises.

Keywords: biogas, organic waste, ecological deposit.

C.32. SOME CONSIDERATIONS ON THE ENERGY POTENTIAL OF VEGETABLE WASTE AND AGRICULTURAL BIOMASS IN ROMANIA

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Abstract. The paper presents synthetically some viable solutions regarding the possibilities of management, processing and energy recovery of vegetable waste and agricultural biomass, from the domestic, commercial or industrial field. These organic resources are materials with significant energy value and an increasingly important role in renewable energy production systems. Also, the paper highlights the need to improve energy efficiency by increasing the use of renewable energy resources to replace fossil fuels and, respectively, to promote the energy potential of plant waste and agricultural biomass.

Keywords: vegetable waste, agricultural biomass, energy potential.

C.33. STUDY ON THE EFFICIENCY OF MONITORING AND REPORTING AIR EMISSIONS AT THE NATIONAL LEVEL

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Abstract. This paper is intended to be a study of the current state and trends at European and national level in the exchange of information on scientific and technical research and development in the field of air emissions in view of their role in improving the means of reducing emissions. The study will identify the main information networks in the field of air emissions at European and national level and will analyze the role, importance and how they contribute to the identification of solutions that facilitate the reduction of emissions. The study aims to highlight the importance of cooperation and coordination within national and European organizations and how they contribute to the identification of solutions, scientific and technical development.

Keywords: atmospheric emissions, research, development, networks, information, solutions.

C.34. STUDY ON AIR EMISSION INFORMATION NETWORKS AT EUROPEAN AND NATIONAL LEVEL

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Abstract. The paper presents synthetically some viable solutions regarding the possibilities of management, processing and energy recovery of vegetable waste and agricultural biomass, from the domestic, commercial or industrial field. These organic resources are materials with significant energy value and an increasingly important role in renewable energy production

systems. Also, the paper highlights the need to improve energy efficiency by increasing the use of renewable energy resources to replace fossil fuels and, respectively, to promote the energy potential of plant waste and agricultural biomass.

Keywords: vegetable waste, agricultural biomass, energy potential.

C.35. STUDY ON THE PURCHASE OF GREEN PRODUCTS AMONG CONSUMERS

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Abstract. With the growing concern for environmental protection, sustainable development has increased the population's interest in clean production for products that cause as little environmental impact as possible. The transition to sustainable production and consumption patterns involves the development of environmentally friendly products as well as educating consumers about the environmental benefits of purchasing these types of products. The paper presents the results of a market study conducted within the project Life + - Promoting green products, a study that aimed to identify the concern of consumers regarding the option to purchase green products. The results showed that 30.91% of respondents purchased green products, 31.66% of respondents identified green products on Romanian markets, 47.36% of respondents had difficulty identifying green products.

Keywords: environment, green products, purchases, consumers.

C.36. STUDY ON THE EFFICIENCY OF STREET LIGHTING IN THE COMMUNE OF MARGINENI BY USING SOLAR ENERGY

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Abstract. The aim of the paper is to identify the options available for replacing electricity-powered street lamps with an autonomous system that has the reliability to operate in different weather conditions. The renewable energy source selected for this project is a solar photovoltaic panel. The study was conducted to determine the capabilities of a stand-alone system and to determine whether long-term power savings justify conversion to newly built off-grid lamps. The development of global energy infrastructure involves expanding the use of renewable energy in combination with existing energy generators. The viability of solar energy in Romania is determined by weather conditions and solar radiation. The size of the photovoltaic system depends on the size of the load and the availability of sunlight in the winter months. Taking into account the expenses of the electricity bills in the commune of Margineni for the years 2005-2009, when the unconventional public lighting system was not implemented, and the expenses for the electricity between 2014-2018, when the street lighting from renewable sources was implemented and namely solar energy, it is observed that the expenses have decreased by about 40%.

Keywords: energy, solar potential, energetic efficiency.

D. MECHATRONICS & ROBOTICS

D.1. ROBO-PVAFM PROPER SOFTWARE PLATFORM FOR THE ASISTED RESEARCH OF THE KINEMATICS AND DYNAMICS OF INDUSTRIAL ROBOTS

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Abstract. The paper presents the assisted research with an original platform of the kinematic and dynamic behavior of industrial robots. The ROBO-PVAFM platform provides direct kinematics (FK) and inverse dynamics (ID) research for Articulated Arm, Scara, Cartesian, Double Portal robot structures. At the same time, the paper makes a detailed analysis of the current state of the art specifying the shortcomings of other assisted research platforms such as RoboAnalyser, RobotStudio, WorkSpace LT, FS Studio, SimRobot, ODE (Open Dynamic Engine), RoKiSim and ROS (Robot Operating System). The paper presents the vectorial matrix mathematical models that were the basis for the development of LabVIEW programs (37 subVIs) that are part of the ROBO-PVAFM platform. There is also a multi-objective optimization application that ensures the choice of the sequence of phases of movement of all joints in order to minimize the variation of speeds, accelerations, forces and moments, in order to obtain an optimal behavior from a dynamic point of view. The platform can also be used for other types of robots because, based on the graph associated with the structure, it can be adapted to multirob applications. The future work will be to include in the platform the Inverse Kinematics (IK) with the complex proper method with Sigmoid Bipolar Hyperbolic Tangent Neural Network with Time Delay and Recurrent Links (SBHTNN-TDRL) with Pseudo Inverse Jacobian Matrix Method (PIJMM) and Direct Dynamics (DD).

Keywords: robot structures, vectorial matrix models, Hyperbolic Tangent Neural Network.

D.2. NON-LINEAR FRICTION-TYPE BEHAVIORS IN LIQUID CRYSTALS IN A MULTIFRACTAL PARADIGM OF MOTION

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Abstract. In the case of liquid crystals, fractal analysis is usually mainly focused on their intrinsic (structural) properties, and less focused on their dynamic (functional) properties. In the present paper, a new model, based on a multifractal structural-functional synergy, for describing liquid crystals dynamics is proposed. Then, the liquid crystal entities dynamics will be explicated in the framework of the Scale Relativity Theory through continuous and non-differentiable curves (multifractal curves), described by using Schrödinger's theory and hydrodynamic theory. Examining the hidden symmetry of friction tensor at different scale resolutions, in the Madelung framework, synchronization modes among the liquid crystals entities are found through SL(2R) transformations groups. As such, at various scale resolutions, Riemannian manifolds with hyperbolic metrics, generated by means of direction parallel transport (in the Levi-Civita sense) can be defined. Different non-stationary friction characteristics can thus be highlighted at various scale resolutions using harmonic mappings

from the ordinary space to the hyperbolic one. Of these, the cellular and channel – type ones become fundamental.

Keywords: fractal analysis, liquid crystal entities dynamics, non-stationary friction characteristics.

D.3. ANALYSIS OF THE PROCESS PARAMETERS ON THE DEFORMABILITY OF AA-1050 IN THE CASE OF LONGITUDINAL STRETCH FORMING

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Abstract. Complex large shapes parts are used in the aviation, automotive, naval, and even architectural industries. Processing this type of part can be made by using indicated industrial processes, such as the stretch forming process (SFP). The SFP implies stretching and bending a metal sheet into a specific shape; this shape is given by a die. To be able to perform this action the parts are deformed in two directions, meaning that the nature of the process is biaxial. The stretching of the material usually takes place in the horizontal direction while in the vertical direction the die pushes the material into its shape. Thus, the process can be resumed to the stretching pressure, die speed, die stroke, material plastic deformation behaviour and after, the spring-back effect. The interdependence of these input process parameters must result in a precise shape with relatively tight tolerances while avoiding material failure. Due to the severe plastic deformation (SPD) that occurs with this type of process the deformability of the material, more precise, its elongation at break capability, must be high. This experimental paper aims to analyse the deformability of an aluminium alloy when longitudinal stretch forming is applied. The response surface methodology was implemented for this experimental paper and a 20-run experimental plan resulted in processing 0.5 mm thick aluminium alloy 1050 blanks, using a 150 (mm) steel die. The process parameters values range from 0 to 20 (bar) for the stretching pressure, 0.03 to 2 (mm/s) for the die speed and 30 to 50 (mm) for the die stroke. The parts shape was measured using a 3D image measuring system, resulting in the part radius and part height. The data was statistically analysed using the ANOVA method for model significance, resulting in the process mathematical models and interdependence graphs for process parameters and part radius and part height. In addition, a coefficient of deformation was calculated, and it offers a means of comparison between parts obtain in different conditions. The results indicate that the process is significant to a high degree, therefore the mathematical connections are considered valid and reliable for predicting subsequent shapes.

Keywords: stretch-formingm, stretching pressure, die speed and stroke, aluminium alloy, model significance, mathematical models.

D.4. STUDY ON THE NEW ROBOTIC TECHNOLOGY USED IN THE FOOD, PHARMACEUTICAL AND COSMETICS INDUSTRIES

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Abstract. Food safety issues are becoming more and more important as consumption levels have risen and the requirements of relevant laws and regulations for food production processes are becoming increasingly stringent. These include requirements for the use of food grade lubrication in food production equipment. The types of robots, commonly found on typical food production lines, include processing robots, sorting robots, packing robots, and palletizing robots. In order to meet the requirements of the primary sector, HM ("Hygienic Machine") robotics was developed. In the case of robots designed by "hygienic design", they are equipped with NSF H1 certified lubricants on all axes, including power supply systems. The maintenance intervals are the same as for standard robots. "One of the world's leading suppliers of food grade lubricants, Klüber Lubrication has developed food grade grease Klüberfood NH1 94-51 for robot gearboxes. This enhances the durability and excellent wear resistance of the gearboxes, while taking into account food safety and production efficiency. Hygienic Oil (HO) robots also offer potential applications outside of food processing and packaging, for example, in the processing of dried or crushed products such as chocolate or pastries.

Keywords: Hygienic Oil (HO) robots I food safety I Hygienic Machine (HM) I food production equipment I.

D.5. INTODUCTION OF INNOVATIVE LUBRICATION SOLUTIONS FOR GEARBOXES OF INDUSTRIAL ROBOTS IN THE AUTOMOTIVE INDUSTRY

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Abstract. Industrial robots have a more compact structure, higher load-bearing capacity and higher precision requirements than traditional machines. However, they are also a challenge for lubricants. Robots are widely used in the automotive industry for processes such as welding, assembling, gluing, painting and handling. In the case of robots in the automotive industry, proper lubrication not only reduces friction and wear between contact partners, but also contributes to the reliability and durability of gearboxes. This means, for example, extending the oil change cycle, thus reducing the costs and labor associated with changing the oil. At the same time, the lubricant must have a stable performance at high and low temperatures and, in addition, a high level of compatibility of the materials with the seals to prevent leakage during long-term use. This paper examines the increase in the life of robots in the use of high-performance lubricants of modern industry.

Keywords: robots in the automotive industry, high quality lubricants, reduction of friction and wear.

D.6. ANALYSIS OF A PRESSURE COMPENSATED FLOW CONTROL CONTROL VALVE USING "GUI" SYSTEM

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Abstract. Pressure compensated flow control valves are used mainly in the case of variabile loads at the hidraulic motors and at the same tine, the speed must not change. A Matlab Graphical User Interface is presented in this paper. A GUI (graphical user interface) is a system of interactive visual components for computer software. A GUI displays objects that convey information and represent actions that can be taken by the user. The objects change color, size, or visibility when the user interacts with them. A GUI is considered to be more user-friendly than a text-based command-line interface, such as MS-DOS, or the shell of Unix-like operating systems. This GUI îs dedicated to the study of a two ways pressure compensated flow control valve. Some important aspecte are analysed using the GUI designed by the authors of this paper.

Keywords: pressure compensated, flow control, I variabile loads, hidraulic motors, I GUI.

D.7. RESEARCHES ON THE DYNAMIC BEHAVIOUR OF CNC MACHINE TOOLS WHILE MACHINING THROUGH INTERPOLATION

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Abstract. The CNC machine tools are frequently used for machining injection moulds, parts for aeronautic industry etc. containing flat or tridimensional surfaces that are to be obtained through interpolation. For machining such surfaces 2, 3, 4 or even 5 numerically controlled axes of the CNC machine structure are taking part simultaneously. In practical applications, for exploiting the respective machine tool, the technology designer actually has no element at his disposal from the CNC machine tool concerning its capability to achieve the admissible error of the surface obtained through interpolation. Starting from the necessity mentioned above, the work is analyzing the design and functional factors that influence the path error during machining through interpolation. For this purpose the structure of the feed kinematical linkages will be presented, as well as the transient duties (acceleration/deceleration) and the experiments for obtaining a circle through interpolation on a CNC milling machine under various conditions of the transient duty. The linear and exponential duties have also been analyzed in terms of how these affect the contour error during machining. At the same time, the extent of participation to the transient duty of each element of the feed kinematical linkage has been settled. The analysis and optimization of the transient duty of a feed kinematic linkage is performed by following up a good stability of the axis. All these aspects have been experimented on a milling machine model CPFH 500. Based on the modification of the parameters of the "machine data" (modifying the acceleration/deceleration) the process of axis optimization is performed. The trial results have been measured by means of a Renishaw laser interferometer in the speed mode. Based on the modification of the linear accelerations and decelerations at the same time with providing the stability of the two feed kinematical linkages X and Y that take part to interpolation, interpolations of a circle have been done. The values of the roundness deviations of the circle obtained through milling have been determined on a CNC coordinate measuring machine.

Keywords: carbon amounts, finite element model, residual stress distribution.

D.8. INNOVATIVE SOLUTION TO INCREASE THE POSITIONING ACCURACY OF CNC MACHINE TOOLS

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Abstract. The accuracy of a CNC machine tool is one of the most important parameters that make the geometry and dimensions of the work pieces comply with the tolerance limits specified through the designer's technical drawing. When a machine tool is handed over to the customer it is compliant in terms of the accuracy limits specified in the documentation but, after a time interval of usage, because of the wear of the components in relative motion and machine exploitation conditions. This work suggests an innovating method of testing the accuracy of a CNC machine tool by using the "calliper", with a view to enhancing the positioning accuracy of the feed kinematic linkages. After designing and manufacturing this device, the measurement of the target points on the coordinate measuring machine is necessary, so that this device becomes a "calliper". For inspecting the machine tool, the "calliper" is located on the machine table, being measured at the target points by means of the probe with the tactile shooter that belongs to the machine. The measurement results are stored and compared to the results of the measurements performed through the coordinate measuring machine. In function of the two measurements the related corrections of the errors will be done in the software of machine tool numerical control.

Keywords: positioning accuracy, CNC machine tools, feed kinematic linkage, "calliper", machine tool errors.

D.9. THE CONNECTION BETWEEN MECHATRONICS AND IOT: ADVANTAGES AND THREATS

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Abstract. The residual stresses are generally induced in mechanical components by the manufacturing processes or by different mechanical loadings leading to material deforming, as well as by heating and chemical. The technological operations based on material deformation generate different types of residual stresses that can be beneficial or harmful, critical or insignificant. For example, milling usually induces two types of residual stress: thermal and mechanical. Thermal induced stress occurs as a consequence of the excessive heat developed during machining. Chemical composition of the material, inhomogeneity of the material, low thermal conductivity, intensive flank wear, can affect the distribution of residual stress in the surface layer. The aim of our research is to explore the link between the residual stress distribution generated in surface layers by machining and the materials carbon content. Experiments revealed that an increase of residual stress value in the tensile zone (546 MPa) is connected with a high value of carbon percentage for up to 0.9 % from the surface layer, while the decrease of residual stress value from approximately 550 to 300 MPa corresponded to a level 0.6 % of carbon. A theoretical investigation based on a finite element model (FEM) was also carried out. Six types of materials containing various amounts of carbon (from 0.4 % C up to 0.96 % C) but with constant content for the other alloying elements were used in the simulations. The cutting parameters were kept constant in order to assess the influence of carbon presence over residual stress. The FEM simulation also revealed a correlation between the materials carbon percentage and the distribution of the residual stresses in its surface layer. A useful geoinformatics utility is presented in this research study for project management of associated infrastructures in green sustainable

construction designs; the optimum operation of Health Centres and the protection of Public Health.

Keywords: carbon amounts, finite element model, residual stress distribution.

D.10. THE INFLUENCE OF THE THERMAL REGIME ON THE GUIDEWAYS OF THE MAIN DRIVE OF A GANTRY TYPE CNC MACHINE

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Abstract. CNC Gantry type Machine Tools with great distance between slides (gantry milling machines, plasma and laser gantry cutting machines, vertical lathe machines, etc) are used extensively in the manufacturing of large and long components. Same important examples of where such CNC Machine Tools can be imploied: machining of molds for the mold and cast parts industry, machining of large and complex parts from forged or cast monolithic blocks for the aerospace industry. Since the price per part, its directly affected by the speed of machining and because of the ever-increasing complexity of large parts, CNC Machine Tools with great distance between slides, have seen an increase in demand. Because this type of Machine Tool it is used to machine large parts at high speeds, significant heat will be produce at the cutting tool level and transmitted thru the tool holder to the spindle / main drive system and thru the spindle case to guideways. Heat its also generated when using a ball screw actuation for the main drive because of the friction forces at the ball screw level. The spindle / main drive motor can also add to the heat produces during machining. Due to material expansion, the heat generated during the milling process can influence the precision of the Machine Tool. In this paper, finite element analysis (FEA) was used to analyze the temperature distribution and the deformation of the guideways of a Gantry type CNC Machine Tool. A 3D CAD model was imported in to ANSYS Workbench for finite element analysis (FEA). Firstly, the whole CNC Machine Tool will need to be meshed, the mesh quality will directly influence the thermal analysis, grater the quality of the mesh the better results will be generated. For base referencing a static analysis, which calculates the stresses, displacements, strains, and forces was preformed, after that, a thermal analysis was performed by adding the heat loads the thermal analysis will show the temperature distribution and the deformation of the guideways. The results of the studies performed will provide the machine tool builder with important information regarding the points that need to be address in order to help in improving thermal compensation.

Keywords: kinematic feed chain, FEA, thermal analysis, deformation, CNC Machine Tool.

D.11. THE DYNAMIC BEHAVIOUR OF PARALLEL CONTROLLED KINEMATICAL FEED CHAINS OF A CNC MACHINE

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Abstract. The ability of CNC machine with kinematic feed chains with high distance between the slides to operate at high speeds while maintain stiffness and has become a significant problem due to the ever increasing demand for high precision and high speed machining of large parts. Due to logistic requirements and structural improvements large parts that were made previously from separate parts are now made from monolithic blocks. Such large structural elements are used in the aerospace and power generation industries. To meet this requirement a double and parallel actuation of the mobile element (the mechanical

coupling between the two kinematical feed chains) by means of two parallel kinematical feed chains and two corresponding control systems, it is usually used, this allows for increased rigidity and speed. A wary important aspect in this case it is the ability of the two kinematical feed chains and there corresponding control systems to follow the same trajectory accurately, thus maintain the correct position of perpendicularity of the mobile element during its movement along the slides. This achieves both the precision requirement and the speed requirement. In order, to control the movement of the mobile element within the parallel kinematical feed chains it is necessary to create a control scheme that it is capable of achieving the synchronization of simultaneous movements of the two ends of the mobile element. This maintains the correct perpendicular position of the movement on the guides, regardless of the torque disturbances or the differences between the dynamic behaviour of the control loops of each kinematical feed chain, taken separately. In this study, we will present a modern drive and control system for actuating the mobile element (traverses, portals, etc.) of CNC machine with kinematic feed chains with high distance between the slides. This paper has the dual objective of reducing the synchronization error of the two feed chains thus improving precision but also checking if the improved response time of a semi-open loop control system it is worth the loss in precision. To better, demonstrate the mathematical model's capability but also the efficiency of the proposed control system a gantry-type platform will be used as an illustrative example.

Keywords: kinematic feed chain, synchronization error, machine tools, control loop, response time.

D.12. MINIMIZING THE ERRORS OF SURFACE MACHINING THROUGH INTERPOLATION ON NUMERICAL CONTROL MACHINE TOOLS

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Abstract. The main theme refers to the increase of the machining accuracy through minimizing the path error while machining through circular, or other kind of interpolation on numerical control milling, boring and milling grinding or turning machines. Currently the process of path error minimization while machining on numerical control machine tools is explored at a low extent because of the absence of the dependence relations between the path error and the parameters of the transient duty of each kinematical axis taking part to the interpolation of the work piece contour. This work is also establishing and analyzing the relations of dependence between the path error and the response time of the kinematical axes involved in machining through linear and circular interpolation. The theoretical results are verified experimentally through performance of several machining operations through circular interpolation where the response times of the kinematical axes taking part to interpolation as well as the speed of moving on the contour are modified.

Keywords: contour, error, interpolation, response time, machine tools.

D.13. THE REMOTE CONTROL SYSTEM OF A CONVEYOR BELT

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Abstract. In this paper was presented a remote control system of a conveyor belt. The experimental stand was made in the laboratory of Machines and electric drives from the "Vasile Alecsandri" University of Bacau. It is constituted of a transmitter circuit and a

receiver circuit. An NRF24L01 shield and an Arduino Uno development board were used for each circuit. The transmitter circuit also contains a potentiometer required to generate the PWM signal which is transmitted remotely via radio waves on the 2.4 GHz frequency. The receiver circuit also contains the H-bridge bridge that supplies the motor with a variable voltage depending on the PWM signal received from the transmitter. The H-bridge is powered by a 12 V DC voltage source. A LCD 1600 I2c display is connected to the Arduino development board of the receiver circuit, which display the value of the fill factor of the signal transmitted remotely by the transmitter circuit. For remote control of the electric drive system, two programs were created in the Arduino IDE programming environment. Following the experimental determinations on the laboratory stand it was found that the control signal from the transmitter is received by the receiving circuit with a very high precision and for a distance of 20 m. The remote control system of a conveyor belt can be applied and in an industrial environment.

Keywords: conveyor belt, transmitter circuit, receiver circuit.

D.14. DESIGN OF A NEW ENGINE FOR VEHICLES WITH PNEUMATIC DRIVE

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Abstract. In recent years, research into the development of means of driving vehicles that do not use fossil fuels has intensified. In order, to reduce the CO_2 emission, several car manufacturers have committed to stop producing cars with diesel and gasoline engines starting with year 2040. In this paper, the authors present a vehicle that consists of a new constructive solution, an engine with pneumatic drive. The engine consists of two pneumatically operated pistons. The translational movement of the pneumatic piston rods is converted into a rotational motion by means of a mechanism based on toothed belts.

Keywords: pneumatic vehicle, pneumatic motor.

E. ECONOMIC ENGINEERING

E.1. HUMAN CAPITAL DEVELOPMENT AND EMPLOYMENT GROWTH IN NIGERIA

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Abstract. This study investigated the effect of human capital development on employment growth in Nigeria using annual time series data from 1981 to 2018. Evidence from ARDL estimation showed that the human capital development variables have statistically significant influence on employment growth both in the short-run and in the long-run. Although life expectancy had mixed short-run effects on employment. In both cases, the effects of human capital development appear to be stronger in the long-run. The TY-VAR Granger causality test supported causality from education expenditure to employment but not vice versa. Bidirectional causality was found between life expectancy and employment growth. This implied that better quality of life improved productivity in Nigerian workers and employment.

Keywords: short run, long run, TY-VAR Granger causality, bidirectional causality.

E.2. FROM TRADITIONAL APPROACH OF PROJECT MANAGEMENT TO AGILE PROJECT MANAGEMENT

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Abstract. This paper aims to present the changes in approach that have taken place in recent years in the theory and practice of project management, from the traditional approach to the Agile approach. The traditional approach to project management is linear, where all the phases of a process occur in sequence. In this approach the process of planning and execution and the expected results are communicated by the client at the beginning of the project. In the case of the agile project management the planning process is more summary but implies customer collaboration, and flexibility. The project team develops a step by step solution in very short cycles. The size of the project can be considered the major factor in deciding which methodology to use. For large projects it is more appropriate to use the classic methods of project management, especially if we know from the beginning exactly the requirements of the client and the allocated budget. If the requirements aren't exactly clear, an agile approach might be the best solution.

Keywords: plastic project management; agile management.

E.3. CIRCULAR ECONOMY IN THE EUROPEAN CONTEXT

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Abstract. This paper aims to present the changes in approach that have taken place in recent years concerning to the concept of Circular Economy especially in the UE. The concept of Circular Economy aims to replace the old approach of the traditional (linear) economic model in which goods are manufactured from raw materials, sold, used, and then incinerated or discarded as waste. The main problem that arises with this production approach is the inefficiently usage of the available resources. The process of transforming the linear model into a circular one involves reconsidering unsustainable aspects in order to eliminate waste as best as possible. In this context the natural resources are minimally used during production, while the old, used products are reused to the maximum. In this conditions, the faster transition to the truly circular economy has become a priority of the EU's development strategy. Principles such as reducing energy and resource use, waste prevention, protection of human health, promotion of consumer benefits, regenerating natural systems must become the norm in the EU market.

Keywords: Traditional (linear) economic model; Circular Economy; European Union.

E.4. COMPARATIVE STUDY CONCERNING THE CIRCULAR ECONOMY IN EUROPE

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Abstract. The Circular Economy is a concept developed during the time starting from the observation of the processes from the nature. There is no waste in the natural environment, everything is reintroduced into a new life cycle. Taking on different forms over time, the circular economy was established as a basic principle of European policies in 2015. According to the decision of the European Union the transition to a circular economy is essential in order to ensure a sustainable development, a smart use of natural resources and to prevent dramatic changes of the climate on earth. In order to evaluate the progress to a circular economy of each country, ten general indicators with different sub-indicators have been established by the European Commission. They take in consideration a wide range of aspects starting from the use of the raw materials until the recycling rate of the waste. The paper makes a comparative research of the state of implementation of the circular economy in Europe, using these indicators and also an analysis of the new business model essential for a sustainable development of the economy. The present paper was generated by the European project MULTITRACES, ID: 2019-1-RO01-KA203-063870.

Keywords: Circular Economy; implementation indicator|

E.5. DOMINO EFFECT OF THE PANDEMIC ON EUROPEAN AND ROMANIAN INDUSTRY. A GLIMPSE OF THE HOSPITALITY INDUSTRY

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Abstract. Last two years pandemic crisis determined not only medical and health effects but also had a big impact on almost all social and economic aspects of peoples life worldwide. In the same time it needed a tremendous effort from states and international organisms to cope with the unforeseen challenges still developing. European Union had put together specific mechanisms and measures for both the European states as well as for the European enterprises. The European states given their national prerogatives added some important aids for the most hited economic sectors. Although the European context promised a good outcome for most of the Romanian economy, the optimistic views of the politicians were soon to be demolished by the rough reality. Our approach aims at determining and measuring the domino effects of the pandemic and of the countermeasures by investigating the economic, politic, and industrial context, the measures and their empowerment and the impact of all of the above on the hospitality industry by presenting the main results of the study.

Keywords: Economy; domino effect; pandemic; hospitality industry.

E.6. THE EFFECTS OF AIR TRANSPORT AND ENERGY INNOVATION ON THE ENVIRONMENT

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Abstract. The novel objective of this study is to explore the impact that energy innovation exerts on FDI and its effects on the environmental degradation process in EU-5 during the period 1990-2015. Also, our proposed model analyses validate an N-shaped EKC between carbon emissions and economic growth. We hypothesis that renewable energy use helps to minorate carbon emissions in the selected panel. In other words, we aim to confirm that economic growth presents a nonlinear connection with carbon emissions. We also determine that energy innovation, via technical effect.

Keywords: Energy innovation; TLGH; FDI; FMOLS; Cointegration.

E.7. EFFICIENCY AND EFFECTIVENESS OF RELATIONSHIP MENTORING-PERFORMANCE IN THE ORGANIZATION

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Abstract. Within organizations there are a number of variables that play a very important role such as: mentoring, job performance, motivation, job satisfaction, etc., these being perceived as critical predictors of organizational performance. Thus, it is assumed that people with outstanding work performance will contribute to the achievement of organizational objectives, bringing added value to the company.The purpose of this paper is to analyze both theoretically and practically, what is the contribution of mentoring to the balance and development of human resources within a organization from Bacău. In this context, mentoring is a relevant tool for achieving this goal, and the results of studies confirming its usefulness.

Keywords: management, change, teams, technology, vision.

E.8. ANALYSIS OF ORGANIZATIONAL CHANGE IN A BANKING ORGANIZATION

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Abstract. The vision of change leads to the emergence of the element of novelty, with the meaning of giving up the old mechanisms, which have been found to be ineffective or which are not resistant or no longer meet the new requirements of the market and the assimilation of new ones, inspired by other business models. In this project we will analyze the management of a significant change that has taken place within Transilvania Bank recently, how the management of the banking institution and other employees reacted to this change, and also observe how the resistance to change was managed. which were the major factors that determined this change and whether the change helped the bank to achieve its proposed objectives.

Keywords: management, change, teams, technology, vision.

E.9. ENDEAVOURING SUSTAINABILITY IN HEALTHCARE FACILITIES: A CASE STUDY OF WASTE MANAGEMENT

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Abstract. The waste generated by healthcare facilities represents one of the most urgent and impacting environmental problems of the healthcare sector, with relevant effects on the

planet and human health. The approach to waste management, and to Sustainable Healthcare in general, varies sharply not only according to the country but also to the hospital. From that perspective, design can play a fundamental role, due to its ability to deal with open, complex problems within multi-stakeholder systems such as the healthcare ones. The present study aims to address the problem of waste management in hospital environments through a Systemic Design approach. The methodology applied is based on the study of material flows (resources consumed and waste produced) and the interaction dynamics between the users (patients, caregivers, nurses, physicians, and operators) involved in the case study of a General Paediatric Unit. The analysis of the interaction between actions and material flows is essential in order to understand the complex dynamics within the Unit system and to face them in a systemic way, thus addressing the waste problem from several perspectives. The findings show that a systemic approach to waste management can improve the overall management of Unit activities, with particular attention to the therapy and meal delivery and the consequent disposal of the waste produced. The strategies developed also consider the importance of multi-user communication to foster sustainable behaviours and empower users to enhance the sustainability of the whole system.

Keywords: Sustainable Healthcare; Systemic Design; waste management.

E.10. SPATIAL PERCEPTION SIMILARITY PATTERNS OF WATER RELATED PROCESSES IN THE CONTEXT OF FOREST MANAGEMENT SUSTAINABILITY IN GREECE

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Abstract. The importance of the water and forests relationship has long been established. However, in order to be able to include water related processes and functions in forest management sustainability assessments these need to be referenced at suitable spatial scales; a scientific quest, which is still on-going. This paper presents the spatial similarity patterns of forest water processes that were identified with reference to specific spatial landscape system entities. Each landscape spatial entity is characterized by a certain pattern of ecosystems and physiography based on two major defining variables, the geologic substrate and land form, grouped in five categories, and the climate represented by four altitudinal zones. For the forests and forest lands of Greece, 19 spatial landscape system entities were identified and mapped with a minimum mapping unit of 1- 5 km^2. Relevant forest water processes and functions reflected through 13 specific indicators were identified and evaluated in terms of their importance for forest management sustainability assessment and monitoring for each landscape system spatial entity by 74 top forest managers, members of the National Forest Governance Council, who filled in a specifically designed questionnaire. These water related processes and functions included water for household use, groundwater and spring water, water for agricultural crops, water for biomass production (grass or woody plants), irrigation infrastructure, water for industrial use, water for hydroelectric energy, fish production (commercial, recreation), conservation of water quality, conservation of water landscape values (aesthetic and functional), conservation of water related biodiversity, erosion control and flood control. Perception similarity patterns of the water indicators with respect to each landscape system spatial scale were identified and analyzed by using multidimensional scaling. The evaluation results of the forest water related processes can be used by the policy makers and the forest resource managers for sustainable forest management assessments and monitoring.

Keywords: Multidimensional scaling, forest landscape spatial scale, water indicators, forest governance.

E.11. COMBINING HAZARDOUS WASTE RECYCLING AND GREEN ENERGY PRODUCTION - AN EXAMPLE FROM HUNGARY

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Abstract. Most countries still use linear methods in their waste management systems, which refers to reducing (Reduce), recycling (Recycle), or preventing the generation of waste by reusing products (Reuse). The basic economic concept, the circular economy, which is becoming more and more widespread today, rests on these basic pillars. The concept was born in response to the linear economic approach that prevailed until the beginning of the 20th century, which favors production based on the use of new resources and then the disposal of products after their useful lives. The two goals I wish to achieve through this paper is on the one hand to support that, in an appropriate continent, through scaling up and optimization, the required annual consumption can almost entirely be produced in this way. On the other hand presenting in respect of the two fields provided for my calculations that by eliminating nearly 1.300 tonnes of CO2 issue, thousands of euros in savings and income generation can be achieved annually. I obtained the final results with the help of the "Photovoltaic Geographical Information System", in short: PVGIS, where the expected production and performance indicators for the given area can be developed to the smallest detail. In light of the PVGIS data, the energy generation can be calculated as 1207,44 kWh / year. As a result, can optimally provide an energy generation over 2.000.000 kWh / year, depending on the technology used.

Keywords: Hazardous waste; Recycling; CO_2; PVGIS; Energy generation.

F. CHEMICAL & FOOD ENGINEERING

F.1. THE COMBINED EFFECT OF HIGH-PRESSURE PROCESSING AND THERMAL TREATMENT ON THE PROPERTIES OF FETEASCA REGALA WHITE WINE

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Abstract. This work aimed to investigate the influence of high-pressure treatment on the physicochemical and sensory attributes of Feteasca regala white wine during 12 months of storage. The wine used in the research was a dry Feteasca regala from Vincon Vrancea. HPP was performed with 300, 450, and 600 MPa for 5 and 10 min at room temperature (20°C). A combined treatment of HPP and temperature was applied using the same pressure and time regimes at 45°C. Untreated wine and wine treated with 50 mg SO2/L and 100 mg SO2/L served as control samples. Samples were dark stored in brown glass bottles of 30 mL each under refrigerated conditions for up to one year. The antioxidant activity (DPPH), total phenolic content (TPC), colour of wine, and enzymatic activity – polyphenol oxidase (PPO) and peroxidase (POD) content – were determined immediately after the high-pressure treatment, and then after six and 12 months. Also, after one year, the control and high-pressure treated Riesling wine samples were subjected to sensory analysis performed by a panel composed of trained personnel from Vincon Vrancea. The panellists evaluated the wine clarity, colour, taste (components harmony, acidity and sweetness), and aroma (the smell and the bouquet of the wine). The high-pressure treated wine showed a decrease in enzyme activity compared to control samples demonstrating the influence of HPP and extending the shelf life of wine. Overall, the high-pressure treated wine showed better sensory properties compared to control samples, the best results being obtained for the wine treated with 450 and 600 MPa, for 10 min at 45°C. HPP combined with temperature proved to contribute to SO2 reduction in white wine.

Keywords: antioxidant activity, enzymatic activity, high-pressure, Fetească regală, sensory analysis, white wine, wine aroma.

F.2. VALORISATION OF SPENT GRAIN FROM MALT WHISKY IN THE WAFERS FORMULATION

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Abstract. In recent years, the sustainable use of organic waste and agri-food by-products has become one of the main principles of the circular economy and one of the most important challenges of food engineering. There are numerous researches initiatives aimed at harnessing renewable resources resulting from food production. In addition, waste and by-products from the food industry are a good source of protein, minerals, fatty acids, fibre and bioactive compounds that can prevent nutrition diseases and increase the physical and mental well-being of consumers. Wafer sheets are the main wafer products used worldwide as the basis for obtaining wafer bars or wafer fingers, being filled with different creams and possibly dressed in chocolate. Spent grain is a by-product of the beer industry or resulting from the process of obtaining whiskey, it is generated in large quantities throughout the year,

at a low purchase price, which is an advantage. Traditionally, spent grain is used for animal feed, but due to its valuable chemical composition (rich in proteins and fibres) it is desired to capitalize on it to obtain fortified food products. The wafers were obtained by baking in special forms a fluid dough prepared from various flours (chickpeas, millet), spent grain, water, salt, leavening agents, and other materials used for flavour and taste. The realization of the product provides for the qualitative and quantitative reception of raw and auxiliary materials, dosing and preparation of raw and auxiliary materials, mixing components with the obtaining of the fluid dough, filtering the dough for the separation of any possible clumps, mold casting, electric oven baking, cooling and packaging the finished product. The products obtained were evaluated from the point of view of sensory analysis, technological processing, and were compared with the data from the specialized literature.

Keywords: by-product, valorisation| spent grain, wafers.

F.3. STUDIES ON BREWING WITH BUCKWHEAT AND BUCKWHEAT MALT

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Abstract. The main raw materials in the process of obtaining beer, currently used for malting are barley or wheat. The many advantages of using these cereals for brewing are well known, one of which is the high starch/protein ratio. The global trend is to replace barley malt or wheat malt with other unconventional raw materials, such as rice in Asia, maize in America, millet and sorghum in Africa. This is due to the consumers' desire to add new qualities to the finished product or to demand of functional beer, and, on the other hand, for beer producers, to improve the brewing process, to reduce the cost of production or to develop of gluten-free brewing. The use of buckwheat as adjuvant in brewing has long been known. Recently, research has been intensified on the use of this pseudocereal and in malted form to obtain a new variety of beer. Also, in recent years, research studies on the use of buckwheat in the manufacture of gluten-free beers have intensified due to the increase in the number of people suffering from celiac disease. Obtaining 100% buckwheat malt beer was a real challenge for the specialists in the field. The first stage in the production of buckwheat beer that has been optimized is brewing. For example, buckwheat malt wort had low fermentability values and high viscosity levels compared to barley malt wort. The paper presents the use of buckwheat and buckwheat malt in the production of beer on a laboratory scale. For the finished product beer, the following physicochemical analyzes were performed according to standard procedures: original extract (% m / m), alcohol content (% v / v, % m/m), density (g/cm^3), turbidity, turbidity S25/S0, turbidity S90/S0), pH, colour, bitter value. The beer samples were also analyzed from a sensory point of view using the standard Romanian method. The obtained results show that buckwheat can be used successfully in the production of beer in malted form, but also unmalted, for the last option it is recommended to use enzymatic preparations to facilitate the mashing and filtration of beer wort.

Keywords: gluten-free beer, unconventional raw material, pseudocereals.

F.4. SELECTION OF CRITERIA APPLICABLE IN THE COST-BENEFIT ANALYSIS OF FOOD WASTE RECOVERY ALTERNATIVES

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Abstract. Food waste loss is, without a doubt a serious problem nowadays. This arises, both in terms of food production and processing, but also in terms of retail and consumption. Each of us contributes to food waste by buying food, which eventually ends up being discarded, either because it is spoiled, or because it is beyond its expiration date. Moreover, the very high standards of consumers who want to buy only fruits and vegetables that look as close to perfection as possible, contribute to food waste and these are just some of the reasons why the amount of food thrown do not seem to fall. EUROSTAT estimates that 1.3 billion tons of food are dumped every year. Thus, not only valuable resources are wasted, but also money. According to the Council of the European Union, the food waste loss and food waste have cost the worldwide economy 840 billion euros. The purpose of this paper is to identify the most viable economic and environmental criteria required in the application of Cost-Benefit Analysis (CBA) to assess the economic and environmental sustainability of food waste management scenarios. Two management scenarios will be considered, for which, economic and environmental criteria will be analyzed: (i) recovery of food waste as compost used as soil amendments; (ii) combined processing of food waste for obtaining both compost and energy. A number of principles are used to highlight the set of economic and environmental criteria, which reflect how to build a problem. Thus, the result of this study will be to build a panel of viable and applicable economic and environmental criteria for assessing the sustainability of alternatives to food waste recovery and for incorporating sustainable development criteria into organic food waste management strategies. This will help environmental decision makers to identify the optimal strategy for food waste recovery. These criteria will provide a solid database and will facilitate the best decisions as a result of the application of the CBA and the results obtained for food waste management scenarios.

Keywords: food waste, recovery, economic and environmental sustainability.

F.5. INVESTIGATION REGARDIND CYTOTOXIC AND GENOTOXIC EFECTS ON DIFFERENT EXTRACTS OF *ORIGANUM VULGARE* USING *ALLIUM CEPA* ASSAY

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Abstract. In recent years, the biological properties of medicinal plants present an increasing attention in order to clarify and evaluate their therapeutic potential, also to identify the major compounds and possible synergisms. *Origanum vulgare L.* (oregano) is one of the most well-known medicinal plants used, since ancient times, for therapeutic purposes and has been the subject of numerous studies concerning it chemical composition and various healing properties (digestive, expectorant, antiseptic, antispasmodic, etc). Biological activity of oregano species is due to the flavonoids and phenolic acids (rosmarinic acid, caffeic acid, apigenin, luteolin, quercetin, and their derivatives). Numerous researches present the bioactivity of oregano methanolic extracts and essential oils, but traditionally, the preparation of medicinal plants for therapeutical applications is mainly represented by aqueous extracts (infusion, decoction), hydroethanolic extracts being also used. The

antioxidant and antibacterial activities of some oregano extracts were reported, but the cytotoxic and genotoxic effects of this plant using Allium cepa test have not been well investigated so far. The *Allium cepa* test represents an important model in vivo where the roots grow in direct contact with the substances of interest (plants extracts) and has been used by many researchers mainly to evaluate the genotoxic potential of medicinal plants. Therefore, in order to ensure the safety of *Origanum vulgare L*. for therapeutic uses, the present study was conducted to investigate the potential cytotoxic and genotoxic effects of aqueous and hydroethanolic oregano extracts on the cells of *Allium cepa.* The ratio plant material: extractant used for extraction were 1: 10. Four different extractions using water or hydroethanolic mixture were carried out. A spectrophotometric evaluation of samples was performed using Shimadzu Spectrophotometer UV-1280. Also, the total phenolic content (TPC) present in the samples was evaluated by Folin-Ciocalteu method at λ = 750 nm. Microscopic cytotoxic and genotoxic effects of oregano extracts were evaluated using *Allium cepa*-test. For this, onion bulbs were purchased from a local market, chosen about the same size and the outer scales of the bulbs were carefully removed. A serie of 15 onion bulbs was placed in tap water for 24 hours. The next day, series of 3 bulbs were exposed to the four oregano extracts as such, without any dilution, for another 24 hours in the dark at room temperature. As a control, a serie of 3 bulbs was placed in water. For the evaluation of possible chromosomal aberration, root-tips were cut and subjected to specific treatment for this type of evaluation: fixed in ethanol: glacial acetic acid (3: 1, v/v), then hydrolyzed in 1 N HCl at 60 °C for 5 minutes after which they were washed in distilled water. Preliminary results of microscopic evaluation of root-tips of *Allium cepa* indicated that the tested extracts of *Origanum vulgare* did not affect the cell division process, as cells were observed in all phases of mitotic division. Along with normal cells, some cells with chromosomal aberrations were also highlighted. The different stages of mitotic division and various types of chromosomal aberrations were observed in the *Allium cepa* assay with tested extracts of *Origanum vulgare*. The frequency of cells with chromosomal aberrations is higher in the case of samples treated with hydroalcoholic extracts, compared to the control sample.

Keywords: oregano, extract, cytotoxicity, genotoxicity, *Allium cepa* assay.

F.6. NEW ASSORTMENTS LACTOSE-FREE ICE CREAM-A MINIREVIEW

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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/ year) among people of all ages, and global consumption is on the rise because of its delicious, wholesome, and nutritious properties. This product, which is widely consumed, offers an advantage on the market of products for special nutrition, because it has a high nutritional value, its composition can be easily changed and is a food enjoyed by people of all ages. Standard ice cream is generally defined as a multiphasic frozen stable emulsion, containing approximately 50% air, 30% ice, 15% non-fat solids and 5% fat (by volume). The main components of conventional ice cream are: sugars, fat, non-fatty dairy solids and additives, specifically stabilizers. Currently, the dairy industry is exploring new ways to redesign existing products by adding healthy ingredients, free of additives, obtained through gentle processing, and having a clean label. Though conventional ice cream is made by using dairy milk, over the last years, dairy-free milk such as soy, almond, coconut, sesame, oat milk, etc. has become more common. These milk substitutes provide plant proteins and lipids in ice cream, by incorporating the nutritional values and health-promoting effects of plant compounds into ice cream. The use of milk substitutes also leads to the production of novel lactose-free products, which could be attractive and practical for consumers. Fat reduction in dairy products remains a challenge for the industry. Fat reduction affects the quality of dairy products, including light ice cream, such as deficiency in the flavour profile, poor texture, and lower quality. As health-conscious

consumers' demand for light and non-fat ice cream is increasing, the quality of light ice cream products should not be compromised. Thus, the quality and type of vegetable milk and bioactive compounds employed in making ice cream have the main role in the final product's properties. The search for new ingredients and creating new assortments of dairy free functional ice cream is important since consumers demand new flavours, healthier options, and lactose free ice cream products that can render "mouthwatering appeal". This paper presents a mini-review about a different assortments lactose free ice cream studied by researchers.

Keywords: lactose-free products| healthy ingredients| bioactive compounds| new assortments.

F.7. AGRO-INDUSTRIAL POTENTIAL OF CANNABIS SATIVA L. CULTIVATION IN THE REPUBLIC OF MOLDOVA

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Abstract. Cannabis commonly known as hemp is an annual herbaceous, anemophilous plant. Cannabis sativa L. species were domesticated and widespread cultivated not only in Asia but also in Canada, the United States, Europe and Africa. The EU is the largest hemp market in the world, followed by Canada, France, the Netherlands, Lithuania and Romania being the main production centers. Cannabis sativa L. or industrial hemp is considered to be one of the most profitable crops. Hemp has been grown by Moldovans since ancient times and was used for food, shelter, clothing and animal feed. The Republic of Moldova has favorable climacteric conditions for growing hemp, but its cultivation is a difficult one because of the local legislative restrictions, which hinder farmers to grow this precious crop. This leads to stagnation in the agro-industrial sector and producers miss opportunities for development in this domain. According to the profile Associations, hemp can ensure a profit of about 7-10 thousand euros per hectare, depending on the purpose of use. At the same time, it is a crop with increased resistance to drought, which can revitalize the development of such sectors as livestock, textile production, processing and drug industry, especially the food production sector. The functional properties of hemp seeds are due not only to its high nutritional value, which provides important beneficial characteristics for human health but also to the presence of various bioactive compounds, including unique phenolic compounds with antioxidant, anti-inflammatory and neuroprotective actions. Nowadays, hemp-based products are imported to the Republic of Moldova in large volumes and at a high price. Considering that the annual hemp crop could cover about 10% of state revenue, the Ministry of Agriculture and Food Industry is developing a legislative framework for the legalization of technical hemp in order to replace imported products with the local ones, thus forming a value chain in the national production of hemp for the food industry

Keywords: hemp cultivation| profit| agro-industrial potential| food production sector.

F.8. APPLICATIONS IN THE ENZYMATIC COUPLING OF MAGNESIUM FERRITE, $MGFE_2O_4$, AMINO FUNCTIONALIZED

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Abstract. The need for the presence of the amino functional group on the surface of ferrites to allow their use in enzymatic applications was the basis for this study. The ferrite used in this direction was of the magnesium ferrite type, $MgFe_2O_4$, which was synthesized by the co-precipitation method in aqueous solution. The determination of amino functional efficiency was verified by FTIR and UV-VIS spectroscopy. Following the studies, the amino groups on the surface of the magnesium ferrite were successfully identified.

Keywords: enzymatic applications, magnesium ferrite, spectroscopy

F.9. ACETIC ACID BACTERIA DETECTION IN WINES BY REAL-TIME PCR

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Abstract. Acetic acid bacteria (AAB) are considered one of the most common wine spoilage microorganisms. They are ubiquitous, well adapted to high level of sugars and ethanol, and can be a threat to wine-making process. Their ability of wine spoilage by acetification of ethanol is well described. Besides, they seem to affect wine quality by influencing must composition and affecting the growth of yeast and lactic acid bacteria during fermentation. In spite of their ubiquitous presence and their role in wine spoilage, wine associated AAB are still difficult to cultivate on laboratory media, which highlights the importance of alternative methods of detection of these bacteria. The goal of this work was development and testing of a fast and reliable Real Time Polymerase Chain Reaction (RT-PCR)-based method for easy detection of AAB in wine. We designed two primer sets for RT-PCR for detection of AAB and compared the results obtained using these primers with those obtained using a commercial kit. Specific primers were designed based on the DNA sequences available in the GeneBank. Total DNA from five wines of different origins: Pinot-Noir (Taraclia), Merlot (Taraclia), Merlot (Nisporeni), Malbec (Romanesti), Cabernet-Sauvignon (Taraclia) was isolated and analyzed both using a commercial kit for AAB screening and home-designed primers for detection of *Acetobacter aceti* and *Acetobacter pasterurianus* using SYBRGreen I as a dye. The results obtained with the commercial kit and home designed primers were compared. The results obtained using home designed primers showed good correlation with the results, obtained with the commercial screening kit. Moreover, the home-designed primer sets allowed to differentiate between two *Acetobacter species – A. aceti and A. pasterurianus*. So, the tested primer sets can be used for detection of Acetobacter species in wine. Due to the difficulties of cultivation of wine associated AAB on laboratory media, methods of AAB species detection in wine by RT-PCR can be a good alternative to the traditional culture-based methods of AAB diagnostics in wine. Acknowledgments: This

work was funded by the State Project 20.80009.5107.09 “Improving of food quality and safety through biotechnology and food engineering”, running at Technical University of Moldova.

Keywords: Acetic acid bacteria; DNA; real-time PCR; primers; detection kit

F.10. TECHNOLOGY DEVELOPMENT OF AMARANTH BASED PROTEIN BEVERAGE

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Abstract. The development of the modern food market is accompanied by a search for new renewable raw materials of a protein origin. Vegetable protein beverages are becoming increasingly popular as a source of essential amino acids for consumers with individual lactose and/or casein intolerance, vegans and people with physiological preferences for vegetable protein consumption. Generally, drinks based on plant protein are nutritionally inferior to cow's milk due to amino acid limitations. However, amaranth presents a unique product with a high biological and nutritional value, which total protein content is almost 20%, the ratio of essential amino acids is closed to the "ideal protein" and protein digestibility is up to 80%. It was established that pure amaranth-based milk cannot be recommended for protein beverage production, as it is heterogeneous, unstable and has an unpleasant aftertaste. Despite this, amaranth seeds can successfully enrich the nutritional composition of other plant-based milk such as soymilk. Based on the organoleptic characteristics, the recommended proportions between soy and amaranth are 80...20% and 60...40%, the ratio of raw materials to water being 1:4. Such a product has a mild and pleasant taste and its physicochemical characteristics are stable for 6 days at 4 ± 2℃. Thus, using amaranth seeds for drinks production may be the best option to ensure an overall balance of essential amino acids in vegetable protein beverages. Acknowledgment: The research was funded by State Project 20.80009.5107.09 “Improving of food quality and safety through biotechnology and food engineering”, running at the Technical University of Moldova.

Keywords: essential amino acids, high protein digestibility, plant-based milk, vegan product

F.11. RHEOLOGICAL CHARACTERIZATION OF HONEYS IN NEGATIVE TEMPERATURES

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Abstract. Honey is a complex food, the oldest sweet substance used by the humankind, used as medicine and as a food source too. The Codex Alimentarius and EU Directive 100/2001, defines honey as the natural substance produced by Apis melifera bees from nectar or secretions of some plants, after which the bees is transforming and combining with different substances. The chemical composition of honey consists in sugars (approx. 80%), water (15-20%), proteins (0.1 – 0.4%), ash (approx. 0.2%), and small quantities of amino acids, phenolics compounds, aroma compounds etc. Honey rheology is influenced mainly by the chemical composition of the samples and temperature. Honey exhibits a Newtonian behavior, the viscosity of honey is not influenced by the shear rate applied. Normally, the honey exhibits a liquid-like behaviour (G”>>G’), but at negative temperature the viscoelastical behavior of honey changes as G’>G’’. In our study we evaluate the rheological

behavior of five honey samples (acacia, tilia, sunflower, rape and thyme) in the negative region from -15°C to -40°C in order to determine the glass transition temperature. The viscoelastical behavior of the honey in the negative region was analysed in the scientific literature and there was observed an increase of G' (elastic modulus) and G" (viscous modulus); the temperature at which the viscous component dominates the elastic component is called the glass transition temperature. The intersection of the both moduli was influenced by the chemical composition of the samples which depends on the botanical origin. After the intersection, there was observed a high dominant elastic behavior, the glassy state is characterized by the reduction of physicochemical reactions, at low temperatures the reaction movements are decreasing resulting in solid characteristics of the material. The glass transition temperatures of the honeys ranged from -19°C to -32 °C. The elastic modulus increased from 10 3 to 10 9 Pa.

Keywords: honey, rheology, glass transition temperature.

F.12. RAPESEED OILCAKE: A POTENTIAL SOURCE FOR THE PRODUCTION OF BIODEGRADABLE MEMBRANES

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Abstract. Oil cakes are the by-products obtained after the extraction of oil from seeds. They can be used in both animal and human diet because contain high amounts of proteins and polysaccharides. Currently are underutilized, mainly as feeds, compost, biofuel, substrate for the production of enzymes, antibiotics and biosurfactants and in the recovery of bioactive compounds for the production of new value-added products. The work is focused on the posibility to use these valuable materials for the formulation of biodegradable membranes.
Rapeseed oilcakes (RSOC) obtained after cold extraction of the oil was grounded and sieved, to be below 180 µm. The membranes were developed using the wet casting method. A common matrix of alginate and glycerin was added into 100 ml of ultrapure water. The basic material was analyzed regarding the chemical composition. The safety of the RSOC was proved by mineral content, ELISA and water activity analysis. Along the control sample were obtained five membranes ranging the proportion of oilcake (0.10-0.50g). The analysis done on the membranes were thickness, solubility, color and moisture. The chemical composition of the RSOC used was: 13% lipids, 24% carbohydrates, 26% proteins, moisture and 6% ash. The absence of heavy metals (Pb, Hg and Cd) and mycotoxins was observed in the base material. Furthermore, the safety of the sample was also demonstrated by the water activity index, which was 0.4. Given the fact that all samples have the same matrix, the membranes properties were influenced by the amount of RSOC added. The addition of rapeseed oilcake caused an increase in lightness and b*(yellowness) values of the membranes. The membranes showed good water activity (< 0.35). The thickness of the membranes increased with the addition of RSOC, thus the membranes with the biggest addition showed the highest thickness. The solubility in water is excellent, the time necessary for the dissolution increase with the amount of RSOC added. The results suggest that the membranes with RSOC addition have potential to be used as food packaging due to the safety of the material and its high nutritional content.
Acknowledgements. This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-3863, within PNCDI III.

Keywords: by-products, rapeseed oilcake, biodegradable films, valorization

F.13. VALORIZATION OF SUNFLOWER HULLS IN THE PRODUCTION OF BIODEGRADABLE PACKAGING FOR MEAT PRODUCTS

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Abstract. The work focuses on the capitalization of sunflower hulls in the production of biodegradable packaging for the food industry. Hulls resulted from the bakery and pastry industries or by their consumption can be used for the production of tray materials for sliced meat products. Moreover, covering membranes with antimicrobial and antioxidant extract from seed husk were made. The hulls were ground and sorted with a sieving system in 11 fractions (2.5mm, 2mm, 1mm, 710µm, 630µm, 500µm, 300µm, 250µm, 200µm, 180µm and 125µm). These fractions were combined in different proportions using as binder a mixture of flour and water. On the dry materials were performed mechanical tests such as hardness, tensile strenght, elongation at break and fracturability. Mineral composition determined using the ICP-MS atomic emission spectrometer, water activity, microbiological tests and ELISA method were used to highlight the safety of the raw sunflower hulls. In the basic materials the limits for heavy metals are not exceeded, mycotoxins are not present. Moreover, the peroxide value is zero and the water activity 0.34. The coating membranes using to cover the formed trays had common matrix of 0.75g alginate, 0.75 agar and 0.50g glycerol. In this mixture were added 2 ml of different polyphenols extracts (between 68.68 and 85.12 mg GAE/g) and ultrapure water until 150 ml. All the components were stirred at 90˚C for 30 minutes. The extracts were made by ultrasound treatment at various amplitudes (99, 60, 50 and 40), times (10 to 90 minutes) and pulsations (0 or 10 seconds). On the membranes were performed the following determinations: water transfer rate, water vapor permeability, thickness and mechanical test. Films containing the extract with the highest polyphenols values had the lowest water vapor permeability, water transfer rate, water activity values and the highest tensile strength and elongation at break values.
Acknowledgments: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-3863, within PNCDI III.

Keywords: sunflower hulls, trays, biodegradable membranes, polyphenols extracts

F.14. PRODUCTION OF BIOCHAR AND ITS USE AS AN AMENDMENT FOR ACIDIC SOILS

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Abstract. Very strongly alkaline biochar (pH of 9.89±0.01) was obtained by slow pyrolysis of vine pruning residues, using carbon dioxide as a sweeping gas and oxidizing agent. The influence of biochar on the physicochemical properties of a strongly acidic soil (pH of 5.40±0.02) and on the growth of tomato plants was assessed. A greenhouse experiment was conducted for two months, applying the following treatments: biochar (at a volumetric ratio between soil and biochar of 80/20), foliar fertilizer, and biochar with foliar fertilizer. Biochar

had a beneficial effect on the growth performances of tomato plants. The height, number of leaves, and collar diameter of plants grown in biochar-amended soil without foliar fertilizer treatment were up to 50% higher than those of plants grown in soil without treatments (control) and with other treatments. This favourable effect of biochar on plant growth performances is due to changes in the physicochemical properties of the soil. The values of electrical conductivity, pH, soluble potassium, phosphorus, and ammonium nitrogen concentrations, as well as of available potassium, phosphorus, and sodium concentrations of biochar- amended soil were higher than those of non-amended soil. In addition, biochar reduced soil bulk density by 50%, improving plant root development, water and nutrient uptake. Accordingly, the production of biochar from vine pruning residues and its use as a soil amendment can have significant agronomic, environmental, and economic benefits.

Keywords: biochar, pyrolysis, soil quality, tomato growth, vine pruning residue.

F.15. PHYSICO-CHEMICAL PROPERTIES OF PECTIN FROM GRAPE POMACE AS AFFECTED BY ULTRASOUND EXTRACTION TECHNIQUE

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Abstract. Pectin is the third group of complex polysaccharides which constitute a part of higher plant wall characterized by relatively extractability using different type of acids (mineral or organic) or chelators and a high content of galacturonic acid. Pectin is found in the middle lamella of the cell wall (CW), with a gradual reduction from the primary CW to the plasma membrane. The structure and firmness of the plant CW depend on the mechanical properties, orientation and link between cellulose and pectic substances. Although, some pectin molecules are linked to xyloglucan chains of the CW. Pectin accomplishes two different functions, as a thickening element on the CW and as a „cementing" component in the middle lamella of plant CW. Pectin is extracted from fruits, vegetables and their processing by-products. Presently, the main sources of commercially pectin are citrus peels and apple pomace which are suitable for specific applications in food industry [4]. Besides, the main sources of pectin, other agricultural food by-products such as cocoa pod husks, tomato waste, potato pulp, grape pomace etc. The ultrasound-assisted extraction (UAE) of pectin from Fetească Neagră (FN) grape pomace was modeled utilizing the Box-Behnken design with three parameters as follows: amplitude (20, 60 and 100%), extraction time (20, 40 and 60 min) and pH (1, 2 and 3). The responses of the design were extraction yield, galacturonic acid (GalA) content and degree of esterification (DE) of pectin. The response surface methodology (RSM) plots were used for the analysis of the influence of the independent variables on the pectin characteristics (extraction yield, GalA and DE). According to the results of the ANOVA and RSM plots present, that all the applied independent variables highly influenced the pectin yield. Extraction yield had a range between 3.26% (amplitude of 20, pH 3 for 40 min) and 10.16% (amplitude of 100, pH 2 for 60 min) for FN pectin. The similar tendency was observed for GalA content and DE. The physico-chemical properties of pectin extracted by UAE from FN grape pomace denoted a promising field of different applications of this fiber in food industry.
Acknowledgements: This work was funded by Ministry of Research, Innovation and Digitalization within Program 1-Development of National Research and Development System, Subprogram 1.2-Institutional Performance-RDI Excellence Funding Projects, under contract no. 10PFE/2021.

Keywords: ultrasound, extraction, grape pomace, pectin yield, galacturonic acid

F.16. THE INFLUENCE OF THE EXTRACTION CONDITIONS ON THE ACTIVE COMPONENTS FROM BY-PRODUCTS OF WALNUT (*JUGLANS REGIA L.*)

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Abstract. *Juglans regia* L. (Juglandaceae), commonly known as walnut, is an important walnut tree, cultivated for its medicinal and nutritional value in central and southern Europe, Asia, the United States of America, South America. Knowing that the outer shell of the nut and its inner septum represent 40-50% and 3-5% of the mass of the fruit, considerable quantities of by-products and biowastes are obtained annually from the processing of walnuts. Although the main nutritional importance of walnuts is attributed to its kernel, it has been shown that the other different parts such as leaves, roots, green husk, shells, skin, septum, etc. are rich sources of nutraceutical components, including dietary fiber, phenolics and many other useful compounds that possess a broad spectrum of pharmacological activities including anti-oxidant, anti-microbial, anti-allergic, antitumor, cytotoxic, bactericidal, insecticidal, immunomodulatory activities, etc. Thus, various parts of walnut are used in popular folklore medicine for the treatment of fever, liver disease, inflammation of the mouth and throat, etc. The main objective of the present study was to obtain the hydroalcoholic extracts from the powdered ground shells and septum with ethanol-water (70/30, v/v) with a solid-liquid ratio of 1:10 (m/v) using two modern extraction methods: microwave irradiation and ultra-sonication. The obtained hydroethanolic extracts composition were analyzed by high-performance thin-layer chromatography (HPTLC). The microwave irradiation made it possible to obtain extracts with a higher yield of both the powdered ground shells and septum, in a shorter time. The phytochemical profile of the analyzed extracts shows that walnut septum is a more valuable source of biologically active compounds (especially polyphenols) that can be used in the food and pharmaceutical industry.

Keywords: walnut, by-products, extraction, high-performance thin-layer chromatography.

F.17. THE STRUCTURE OF FISH COMMUNITIES IN TROTUS RIVER, SECTION CAIUTI - SLOBOZIA

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Abstract. Jet ejectors are used in refrigeration, air conditioning and heat recovery applications, such as that resulting from solar energy and waste heat from various industrial processes. A jet ejector is designed to transfer kinetic energy from one medium, which moves at a higher speed, to another. An area with low pressure is created inside the ejector, which will take fluid from another inlet, making a heat transfer between them, so that later they are mixed and sent back to the thermal network. A jet ejector is a small but very efficient device that works with a pump. If we talk about water as a working agent, then it is very widespread and cheap, it can also work with steam or various other fluids. The principle of operation of the ejector is based on the Bernoulli principle, if the speed of movement of any fluid is increased, then around it will always form an area with low pressure, obtaining the discharge.

The discharge nozzle has a much smaller diameter than the rest of the unit, even a small narrowing will significantly accelerate the incoming water flow. Then the water enters the mixing chamber, which will create a reduced pressure, for then to be forwarded. Water must not enter the unit from a direct source, but through a pump, in order to provide constant kinetic energy to the liquid mass to be lifted. Using a jet ejector together with a pump will save a large amount of electricity, as the station will not operate at the limit. This paper aims at a SolidWorks simulation of the process inside the jet ejector, in order to optimize its geometric parameters, analyzing the variation of the flow parameters of the working fluid inside it.

Keywords: structure of fish communities, biodiversity, Trotus River basin-section Caiuti - Slobozia

F.18. HOLISTIC APPROACH TO RHEOLOGICAL PROPERTIES OF WHEAT FLOUR DOUGH WITH ROSEHIP POWDER ADDITION

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Abstract. The effect of the rosehip powder (Rp) addition (1.0, 2.5 and 5.0 %) on the rheological properties of dough obtained from white wheat flour 550 type was investigated. For that, a holistic approach consisting of a three-phase system was used: farinograph analysis (first phase) to find out the water absorption of the flour and the kneading properties of the dough, extensograph analysis (second phase) to measure the stretching properties of the dough, and amylograph analysis (third phase) to determine the gelatinization properties of the starch contained in the flour. While water absorption (WA) increased and the degree of softening (DS) decreased with the addition of Rp, the dough development time (DT) and dough stability (S) increased at the beginning and then was reduced for additions higher than 2.5 % Rp. The resistance to extension of the dough reached the maximum limit of the extensograph with Rp additions of 2,5 % and higher. The differences were significant ($p < 0.05$). The results indicated that a proper dough and a bread with a higher volume and good porosity and elasticity are obtained with Rp additions lower than 2.5 %.

Keywords: wheat flour, rosehip powder, dough rheology, dough stability, farinograph, extensograph, amylograph.

F.19. SYNTHESIS OF NEW CLAY-BASED ADSORBENTS INCORPORATED WITH SILVER IONS

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Abstract. Among the wide variety of water pollutants, natural bacterial pathogens, organic dyes and its derivatives are particularly dangerous for biodiversity and human health. In recent years, bacterial resistance to antibiotics has increased and a lot of infectious diseases have emerged as a direct effect of antibiotic resistance. Although gold, zinc and copper nanoparticles have shown high bioactivity, silver nanoparticles are the most promising. Silver ions released from unstable silver nanoparticles are responsible for the excellent biocidal action. Naturally occurring bacteria do not develop resistance to silver. This is why a special interest has been dedicated to Ag nanoparticles. To this end, we have developed a low-cost mechanism to synthesize three promising materials with silver coating and clay core. These newly synthesized materials were named: KSF-Ag^0, BN-Ag^0 and KSF-$Ag_{coloidal60}$. The antimicrobial behavior of the nanoparticles contained in each material were evaluated by diffusivity and inhibition tests of the area against strains of *Gram ISO SS* bacteria isolated from sewage sludge and Gram negative bacterial strains E.*coli. ATCC 25922*. The assay is a semi-quantitative method in which the chemically modified materials has been brought into direct contact with a bacterial slurry spread on Muller-Hinton agar plates. After 24 hours of incubation at 37 ° C, the inhibition zone and the diffusion zone of the materials with silver ions were observed and analyzed. Bactericidal and bacteriostatic testing was based on the Kirby-Bauer model. In addition to the antibactericidal and antibacteriostatic activity of the synthesized materials, their catalytic activity was also tested. For this purpose, the Malachite Green dye used in aquaculture was used as the target pollutant.

Keywords: clay, adsorbents, bacterium, antibacterial activity, catalytic activity.

F.20. THE EFFECT OF CYCLIC OLIGOSACCHARIDES ON THE STABILITY OF INDIGENOUS WINES

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Abstract. In winemaking, there are often various accidents and defects. These accidents can come from raw materials and / or during the fermentation process. In Oenology are considered accidents / defects those precipitations that are present in the stage of bottling, storage, aging. To prevent these undesirable phenomena, winemakers use various clarifiers to stabilize the biopolymeric compounds of wine. The most common are the aluminosilicate type due to its high swelling capacity. The present paper presents the effect of a cationic clay on a series of local wines. In order to make the protein stability and organoleptic qualities of the wines more efficient, B-cyclodextrin solutions of different concentrations were also used. This compound consisting of cyclic oligosaccharides with 7 glucose units is known in the food industry as an additive with no adverse effects on the consumer. This food additive is very effective for the long-term storage of easily degradable biochemical substances in wine (polyphenols, tannins, vitamins, minerals) in the presence of external factors (temperature, pH). After several tests with the two types of sorbents (montmorillonite and B-cyclodextrin)

in local wines, it was found that the effects of cyclodextrin in wine are compromising, both organoleptically and biochemically.

Keywords: temperature, protein stability, polyphenols, β-cylodextins, aditive.

F.21. THE INFLUENCE OF ULTRASONICATION ON THE PHYSICO-CHEMICAL PARAMETERS OF DIFFERENT VARIETIES OF WINE

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Abstract. Ultrasonication is a non-thermal processing method, widely used in the food industry due to its easy application, but also significant effects on the product. One way to improve winemaking is by adopting energy-saving technologies, such as ultrasound, which can improve the sustainability of quality wine production. The International Wine Organization (OIV) approved in 2019 the use of ultrasonic technology for the treatment of crushed grapes to increase the level of extraction of chemical compounds. Recently, several studies have reported that the use of ultrasound in winemaking can prevent the degradation of polyphenolic compounds, can have positive effects on the protein stability of white wines and also beneficially influence the aging processes of wines. At the same time, sonication gives wines an intensification of the color, flavor, and taste of the red wine by extracting valuable ingredients from grape seeds and skin, such as polyphenolic substances, but also accelerating its maturation. Sonicated wine (energy intake in liquid) gives a more uniform degree of dispersion to the components, which improves the taste and quality. This study aims to evaluate the quality of four varieties of wines obtained from grapes of Vrancea area: *Feteasca albă* (FA), *Tămâioasă Românească* (TR), *Carbernet Sauvignon* (CS) and *Muscat de Hamburg* (MH) in terms of physico-chemical properties. The grape samples were processed in the laboratory respecting the technology of white and red winemaking, respectively. Afterwards the samples were ultrasonication 10 and 30 minutes in order to extraction of polyphenolic compounds. The untreated and treated samples were subjected to the alcoholic fermentation process and then, their general physico-chemical parameters (density, sugar content, total acidity, pH, conductivity, redox potential, dissolved oxygen) were evaluated. The results showed that the ultrasonic samples had a lower fermentation rate due to the inactivation of the yeasts, and the red wines have a more intense color than the control samples, results also related by physico-chemical parameters tested. Therefore, ultrasound, with its abilities to increase efficiency and reduce the time required for various processing operations, promises a progressive future for wine industry.

Keywords: alcoholic fermentation, maceration, ultrasonic treatments, wine

F.22. THE INFLUENCE OF EGGSHELLS MACERATED INTO A CLASSICAL WHITE BREAD

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Abstract. The present study focuses on hen eggshell - derived compounds that are considered renewable resources with high potential for food sector. The recovery of waste from the food industry contributes to the sustainable development of the environment. This paper treats the

effect of addition of unconventional materials as eggshell (ES) derived products for improving the quality of bread. The main goal of this study is to demonstrate the feasibility of eggshells macerated (ESM) that contains a high assimilable calcium source (i.e. calcium citrate) as a supplement in white bread formulation. The influence of different percentage of ESM (i.e. 2.5 %, 5.0 %, 7.5 %, 10.0 %, wt/wt) into a classical white bread recipe to some physico-chemical, textural, nutritional, microbiological properties and also to sensory quality of fresh bread is compared. Other than the enrichment of bread in calcium easily assimilated in citrate form, the final products with 5 and 7.5 % ESM does not crumble, had a superior taste and aroma. These products had resolved the increasing the shelf life of bread by inhibiting the development of molds a real problem encountered in the bakery industry. We consider the final products as innovative products obtained instantly at laboratory level, but easy to raise on an industrial scale.

Keywords: renewable resources, eggshell, bread, calcium, bakery industry.

F.23. VALORIZATION OF AGRO-ALIMENTARY WASTES, AS POSSIBLE MATERIALS, IN ENVIRONMENTAL DEPOLLUTION

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Abstract. There are many studies in which biopolymers, such as starch, chitosan, cellulose and lignin are used to solubilize persisting hydrocarbons. The exploitation of green materials gained much more attention from various fields of science. In plants, the most representative biomaterial are cellulose and starch. The sources of these bio-polymers are green materials, insects or agro-industrial wastes. Agro-industrial wastes are present in high proportion under the form of biodegradable types of wastes which can be the result of different activities: horticulture, viticulture, crops, and wastes from livestock (manure) and other industrial activities. There is a growing interest in the recycling of biomasses of agro-industrial origin through extraction, reuse and upgrading. Wastes from agro-industries can be used in biotechnologies processes such as the production of value-added compounds and substrates for microbial isolation. The limitations of persistent organic pollutants (POPs) destruction are due to higher molecular weight, low water solubility and low availability. Polycyclic aromatic hydrocarbons (PAHs), in particular naphthalene, anthracene, and pyrene are known to be strongly absorbed to soil particles. The main sources of PAHs are incomplete combustion, digenetic processing of organic matter, to a smaller extent forest fires and in connection with oil pollution. There are various remediation methods which have been employed in the removal of environmental pollutants such as chemical, thermal and biological treatments. The aims of our researches were to synthesize corn starch derivatives by alkylation reaction using ether (propylene oxide) or ester (succinic anhydride) alkyl agents in order to fulfil two main objectives: firstly to increase the aqueous solubility of modified starch and secondly to allow benzo[a]pyrene (BaP) solubilisation permitting therefore its retention in polysaccharide based materials. Indeed, BaP, a high molecular weight polycyclic aromatic hydrocarbon, is a toxic, carcinogenic and mutagenic compound which tends to persist in the environment because of its very low water solubility and its tendency to be strongly absorbed on soil organic matter. Such chemical modifications of starches have been used to introduce new properties permitting their use as potential surfactant agent for enhancing BaP bioavailability for microorganisms, such as fungi. These researches extend starches applications as renewable for soil rehabilitation.

Keywords: agro-industrial wastes, polycyclic aromatic hydrocarbon, starch, chemical modification.

F.24. RAW MATERIALS FOR POULTRY FEED

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Abstract. Poultry production has experienced significant growth in recent years. Among the many technical issues that arise to support the development of the sector, that of food is particularly significant. Indeed, food represents the main part of the production cost (60 to 65%). The transition to an ecological diet due to greater difficulty in achieving a balanced diet and less availability of certain raw materials rich in protein could further increase this food cost. In addition, this regulatory imperative risks accentuating the sector's dependence on soybean meal, which is mainly imported. Thus, research programs are providing the first answers to this major technical challenge. A food is a substance which must provide the animal with the energy and elements necessary to keep it alive and therefore cover maintenance needs. For animals rearing, the food must also provide enough nutrients to meet production needs (eggs or meat). In the present research, we have shown the importance of nutrition of the broilers. Following the studies performed, we propose an optimized and own variant for their nutrition. Research results help to update needs with regard to genetic progress and by integrating the improvement of knowledge in the precision of determination of these needs (use of new technologies or definition of new "nutrients" by example).

Keywords: poultry feed, nutrition of the broilers.

F.25. POSSIBILITIES OF RETAINING TOXIC METALS IN CHICKEN MANURE, USING CHITOSAN CLAY HYBRID MATERIAL

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Abstract. Chicken manure is a waste from raising chickens and used in agriculture. It is considered a very good fertilizer. In Bacău County there is a great development for the food industry, regarding the growth and marketing of chicken meat. For this paper I collected and analyzed samples from 15 poultry farms belonging to Agricola Bacău. In a quantitative analysis of his chicken manure we found very good indicators that recommend chicken manure as a very good fertilizer. Thus the average amount of nitrogen had the value of 31g. But after thorough analysis, small amounts and toxic elements were found like: As, Cd, Pb. In this paper we have studied the possibility of removing these toxic substances using a

material prepared in our organic-inorganic laboratory. It is about a hybrid clay material with Chitosan. It was prepared by interposing chitosan in cationic clay of the montmorillonite type. Clays are materials that can easily contain toxic substances. Due to the existence of inter lamellar ions, an ion exchange takes place between the metal contained between the lamellae and the toxic metal. Thus the clays act as a sponge for these toxic substances. Chitosan is an organic substance with good properties of retaining heavy metal elements due to its good properties of binding them by chelation and complexation. In this study, chicken samples collected from the halls Agricola Bacău were put in contact with different quantities of Chitosan hybrid clay materials. At 1 gram of chicken manure were added 0,00; 0,1; 0,5; 1,00; 1,50; 2,00; 2,50 grams of hybrid material. Distilled water was added to the solid materials and worked in a dynamic mode at 300 rot/min, at a temperature of 20 Celsius degrees, 5 days, 8 hours/day. The results obtained were promising resulting in a decrease in the concentrations of toxic elements to 98.72%

Keywords: chicken, montmorillonite, chitosan.

F.26. CHARACTERIZATION OF ALUMINUM PILLARED CLAYS FOR AMMONIA ADSORPTION IN COAXIAL MAGNETIC FLUIDIZED BED

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Abstract. In order to improve the adsorption capacity of ammonia gas from air on modified clay, in this study is use processes intensification like coaxial magnetic fluidized bed with various particles structure. An adsorbent that could separate the ammonia from mixed gases is prepared and characterized before adsorption tests, this adsorbent chosen is aluminum pillared clay particles. The characterization techniques were Energy Dispersive X-ray analysis associated with SEM, thermo-gravimetric analyses with TG and DTA curves determination, BET method for pore structures and surface area determination and X-Ray Diffraction for basal spacing determination. Process intensification offer an opportunity to design and operate fluidized beds in new configuration of particles. The mixed beds consist of adsorbent particles in this case an aluminum pillared clay particles and steel particles. After the characterization analysis the material AP-12.5-400 is selected by economic reasons, as adsorbent with pore volume 0.163 cm3/g, surface area 146.3 m2/g and basal spacing 1,79 nm. The studies of adsorption kinetics were carried out using three configurations type of beds. In practice the fluidization velocity is chosen to expand the bed and to expose at maximum the particles for ammonia adsorption but careful to avoid bed bubbling. For an effective comparison between adsorption capacity of the particles in fluidized bed, coaxial magnetic pseudo-homogenous bed and coaxial magnetic multi-bed. Ammonia adsorption capacity of the pillared clay beds in these three configurations was calculated in the saturation conditions $C_f/C_i = 0.95$. The highest efficiency was recorded for particles in coaxial magnetic multi-bed reaches 46.77 % at the end of tests with 100 % adsorption efficiency after about 622 seconds at the adsorption beginning. Ammonia adsorption in coaxial magnetic multi-bed was the most efficient technique, all the particles have a quasi-homogeneous structure and the gas bubble breaks out of the magnetic layer taking part in the mass transfer.

Keywords: aluminum pillared clay, ammonia gas, coaxial magnetic field, multi-bed, adsorption capacity.

F.27. THE OBTAINING PROCESS OF XERES WINES

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Abstract. This paper aims to obtain Xeres wines, special wines, characterized by taste, aroma, color, specific physico-chemical indices. These wines are not obtained at this time in our country, although many attempts and tests were made. Our vineyards that are based on white grape varieties which accumulate large amounts of sugar when they mature and overcook (Feteasca alba, Aligote, etc.) are suitable for obtaining such wines, so there is the possibility of producing them. But classical technology is unmanageable, takes a long time, while modern ones are too complex and big thermal or electrical energy consumers. The aim was to find a middle way for the production of Xeres wine. Xeres wines are dessert wines, oxidative type, with a high alcohol content. Romania being a country with a tradition in wine preparation, pleads for the construction of sections specialized in obtaining Xeres type wines. To obtain Xeres wines it is recommended to use young, white wines a low residual sugar content below 0,2% and p*H* = 3,2-3,5. In order to favor the development of film yeasts, the wine must have an alcohol content below 15-16 % alcoholic volumes and a sufficient amount of nitrogenous substances necessary for the yeast nutrition process. The results obtained for Xeres wine are: 20 % vol.alcohol, 0,4% sugar, 5% dry extract, 6% acidity, 150 mg/l aldehydes.

Keywords: alcohol, amount of nitrogenous, acidity, aldehydes.

F.28.STUDY ON THE USE OF VEGETABLE JUICES TO IMPROVE BREAD QUALITY

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Abstract. Bread is part of everyone's diet found in every meal. Made from wheat flour, yeast, salt and water, bread has a wide variety of types due to the ancillary ingredients used for making it. Usually, this diversity is realized by replacing wheat flour with other types of flour, such as rye flour, potato flour or flakes, oat flour or flakes. One can also add flax seeds, sunflower seeds, sesame seeds, caraway seeds, etc. Replacing the water with other liquids is not practiced, maybe only with milk in bakery specialties. In order to make our dish, we thought to replace the liquid ingredient, water, with vegetable juice. These juices have besides carbohydrates, minerals and vitamins, substances that can dye the vegetables once they are fully grown. We decided upon using red, yellow-orange and green aș they are some of the most common colours in vegetables. Thus, we chose the following vegetables to provide the colours: beetroot, carrot and spinach. Using a juicer we made the liquids that replaced the water in making the bread dough. Several bread samples were made by gradually replacing the water with vegetable juice, starting from 20% to 50%. These obtained products were subjected to organoleptic and physicochemical analysis and were completed with scorecards. Among the drawn conclusions are the following: vegetable juice improves the appearance and colour of bread and gives flavour. From a physicochemical point of view, bread with vegetable juice has the acidity close to the value of semi-white bread of 4.6 - 4.8 degrees acidity; the porosity is fine with the value of 66 % – 71%. The humidity of the core is higher than white bread, being 46.5 - 47%. Packed in paper packaging and stored at 20˚C, it maintains its freshness for about three days. Because this bread looks good and tastes even

better we recommend it for festivities, for remarkable sandwiches and appetizers. It can also be consumed by children who will surely find it tasty and delightful. Bread is the king of the table and all else is merely the court that surrounds the king.' Louis Bromfield

Keywords: vegetable juices, organoleptic properties, physicochemical properties

F.29. THE TECHNOLOGICAL PROCESS OF MAKING ACHLORIDE BREAD

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Abstract. The paper presents the technological process of making achloride bread, which begins with the presentation of the raw materials used. Have chosen this topic in terms of documenting the production of chlorinated bread, because bread is a valuable product that should not be missing from the human diet and is rich in nutrients, and can be consumed by children, young people, adults. Bread has valuable physicochemical and gustatory properties that underlie the nutritional value and quality of consumer products. Dietary bakery products are now playing an important role, and this can be explained by the interests of ordinary consumers to eat healthy and especially those suffering from various ailments. The main characteristics of the raw material have been studied , of the auxiliary material, of the materials and packaging, as well as of the finished product, the analysis of the technological factors that influence the production and the quality of the finished product, the technology of obtaining the bread chloride, the chemistry of the technological processes. Salt in food has the property of giving taste, but also of changing the texture of the bread, for example a bread with salt will be slightly thicker and denser than one without salt. The salt-free dough worsens the technological properties and ferments intensely, so that the yeasts consume too much sugar, and through the products it creates a reduced volume, forms a flattened and pale crust. Without salt in bakery products, gluten is destroyed more quickly. This will make the holes in the bread no longer appear or will be rare. Unsalted bread is recommended for a hyposodic diet and is beneficial as a treatment for heart and kidney problems.

Keywords: wheat flour, acloride, dough, bread, gluten

F.30. STUDIES ON CLIMATE ASPECTS IN THE AREA OF TWO ECOSYSTEMS WITH AGRICULTURAL POTENTIAL

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Abstract. Climate factors are a major concern in the context of increasing demand for agricultural products. The evolution of temperatures and precipitation in recent years is an alarm signal for farmers. This study aims to analyze the evolution of climate data over a period of about 50 years on the following parameters: pressure, precipitations, sunshine, minimum temperature, cloud cover, medium temperature, soil temperature and minimum temperature. For a more precise analysis, the following indices were studied: the De Martone aridity index, the Lang rain index, the Fournier index and the Angot precipitation index.

Following the analysis of these data, it was found that both the air temperature and the soil temperature show an increasing trend. Also, the minimum and maximum temperature show an upward trend. The number of sunny days increases while the cloudiness becomes lower and lower during the analyzed period. According to the Lang rainfall index, for most of the years analyzed, the climatic conditions are specific to the warm temperate climate and the humid temperate climate. The Angot precipitation index shows a high risk of soil erosion for the months of June and July for the entire analyzed period. In conclusion, the analyzed meteorological data show a trend of increasing temperatures and periods of drought

Keywords: climate factors, precipitation, temperatures, drought, soil, agriculture.

F.31. POSSIBILITIES OF USING NATURAL MATERIALS FOR WATER DEPOLLUTION

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Abstract. This paper presents practical research on the possibility of using natural materials, in particular bentonite clays such as montmorillonite and sawdust to make filters capable of depolluting water containing organic pollutants such as dyes. The clay comes from the Chioarului Valley deposit and the sawdust is a waste resulting from the cutting and / or processing of dry trees in the area of Vînători Park, Neamț. Locally produced pottery has been used to filter water for hundreds of years. Ceramic filters are usually made of clay mixed with a material such as sawdust or cereal husks. For a good depollution, colloidal silver was added. Colloidal silver is an antibacterial that helps inactivate pathogens, while preventing the growth of bacteria in the filter itself. Natural substances have been used for more than 2,000 years in India, Africa, and China, and certainly elsewhere, to remove turbidity from drinking water and to turn muddy water into clear water. The mixing of these substances has the effect of coagulating the particles that disturb the water, which can then be easily removed, for example by filtration. Figure 1 shows a filter having a filter material made of montmorillonite clay of the bentonite type which we treated with colloidal silver. With this installation we were able to make a good drinking water that complied with European purity standards.

Keywords: Bentonite, montmorillonite, colloidal silver, water purification.

F.32. STUDY OF DEPOLLUTION POSSIBILITIES USING BIOMATERIALS AS CLAY-STARCH

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Abstract. The use of hybrids materials, with specials properties, develop a highest interest for industries due to the retentions of pollutants by clays in complexion with polysaccharides as starch. As is know this organophyls clays augment the capacity of the ability to remove

pollutants, as organic compounds, especially aromatic pollutants such as dyes and agrochemical substances. Starch is a polysaccharide obtained from corn, wheat, rice or potato. It is one of the most important polysaccharide used in preparation of biomaterials. Starch and its derivatives represent an ecologically source for the preparation of adsorbents with low costs which can be useful for removing pollutants from water. This biopolymer is an interesting alternative for bio-adsorbents materials due to its special characteristics (abundant, renewable and biodegradable resource) and its properties, such as highest stability and reactivity. Successively, montmorillonite type clays, are recognized as materials with highest properties for retaining pollutants. On the strength of its possibilities to ionic exchange, cationic clays can easily retain ionic pollutants. In this study, in order to realize hybrid material, it was prepared in the first step cationic starch. Secondly, it was contacted with montmorillonite using aqueous solutions. The contact was realize for 3 days in static regime at 35° C. To recover the hybrid material, it was submitted to centrifugation. To verify if the obtained material has efficiency was submitted to the reaction with acid 2,4-diclorofenoxiacetic, which is an herbicide soluble in water. It was realized synthetic solutions with different concentrations of the pollutant, in order to contact different quantities of hybrid material obtained in laboratory. The most important result was obtained from materials that present exchange capacity around 205 meq/100 g adsorbent material. Adsorbent capacity of those bio-composites of anionic pollutants was compared with adsorbed capacity of clays without starch in composition. The most exchange capacities was around 38 meq/100 g adsorbent. The conclusion is that the adsorption of the pollutant in the presence of bio-material, is due to the electrostatic interactions between carboxylate anionic groups of herbicide and ammonium group, with cation character, present on the surface on material or in the interleaved space of clays.

Keywords: clay, starch, bio-material, herbicide, electrostatic interactions.

F. 33. STUDIES ON USING CLAY-CELLULOSE COMPOSITES IN THE PROCESS OF WATER POLLUTION

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Abstract. The aim is to use the retention properties of some less expensive and widely available natural materials in water decontamination processes. The performance and efficiency of the adsorption or retention techniques of toxic pollutants depend mainly on the nature of the material that is used, its costs, its abundance we can find it in nature and the possibility of its regeneration. The first part of the study was dedicated to the process of modifying the structure of bentonite with cellulose to improve its properties in the wastewater treatment. Several types of hybrid materials with different clay/cellulose ratios have been created. Their effectiveness has been tested using Decis (an insecticide) as a pollutant. Clays have a very good property of retaining ionic pollutants. This is mainly due to their ionic exchange capacity. Cationic exchange capacity (CEC) is a measure of a clay's ability to exchange its cations. It depends on both the permanent and the variable charge. CEC measures the concentration in cations "non fixed" in the diffuse double layer and depends on the total charge. CEC depends on pH, and is generally given for neutral pH (7). CEC is measured in milliequivalent (meq) per 100g of calcined clay at pH 7. Polysaccharides

are the most abundant organic polymers on Earth. Tons of cellulose, starch and other biopolymers are widley produced by photosynthesis every year, and the annual use is very high in form of wood, paper, textiles or plastic.Among other, cellulose has a very important propriety: to retain pollutants. Hybrid clay-cellulose materials were prepared in the laboratory using polyethylene glycol as a binder. The process was carried out in a dynamic regime, with agitation of 600 rpm, at a temperature of 400C, for 8 hours. The hybrid material was then filtered. The effectiveness of the prepared materials was studied regarding the ability to retaint the insecticide. The best materials were determined. The results has confirmed that use of hybrid materials made from natural raw materials in the process of water pollution can be very interesting both scientifically and economically.

Keywords: clay, cellulose, hybrid materials, insecticide, water pollution

F. 34. INTERDISCIPLINARITY MODERN FORM OF ORGANIZING TEACHING ACTIVITIES IN THE FIELD OF FOOD PRODUCTS

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Abstract. This paper aims to evaluate the interdisciplinary didactic sequence with practical experiments based on teamwork, based learning, problem solving to build solid knowledge about food. The teaching sequence was developed using practical activities with alternative materials and equipment commonly used in food laboratories. It aims to address this topic of healthy eating, but also how new knowledge about nutrition can be passed on to students in an interdisciplinary way. The objectives of the research are to use appropriate strategies and methods to objectively determine the level of readiness of students, to adapt or develop new ones, to record, monitor and compare the results obtained by students in the experimental and control groups, the initial assessment test and the final assessment, analysis of the relationship between the results recorded and interdisciplinary learning with the help of experiment and the factors that stimulate or slow down this type of learning, quantifying and measuring students' progress. The experimental group consists of 19 students aged between 16 and 17, most of them from rural areas. The control group consists of 22 students of the 10th grade, aged between 16 and 17, most of them from rural areas. Students became more interested and motivated to learn, through interdisciplinarity in approaching the subject of food, because they better understood the close relationship between the knowledge they gained at school in various disciplines and their needs in everyday life.

Keywords: interdisciplinarity, food products, healthy food.

F.35. INFLUENCE OF BUCKWHEAT FLOUR ON QUALITY OF WHITE WHEAT BREAD

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Abstract. Buckwheat flour is considered an important nutritious source of protein (high lysine content), polyphenols compounds with high antioxidant activity, dietary fibers, vitamins, minerals. Buckwheat flour in combination with other flours and used in bakery provide multiple health benefits (constipation, reducing cholesterol, obesity, reducing hypertension, cancer prevention, maintaining the optimal level of glycemic index). Whole buckwheat flour was added (0 to 12.5 %) in white wheat flour in order to obtain different blends of flour. The sensory and physico-chemical properties of white bread with different buckwheat flour additions were studied. White wheat flour has a low mineral content, so with the addition of buckwheat flour, the ash content has increased from 1.76% (control sample) to 2.46% (bread with 12.5% buckwheat flour). As the addition of buckwheat flour increases, the electrical conductivity of the bread crumbs increases from 826 mS/cm (control sample) to 1089 mS/cm (bread with 12.5% buckwheat flour). Also, the increasing of buckwheat flour addition lead to decreasing of redox-r*H*, due to increasing of polyphenols compounds content with high antioxidant activity from 144 mV (control sample) to 111 mV (bread with 12.5% buckwheat flour). The elasticity and porosity of bread crumb had decreased with buckwheat flour additions. The buckwheat flour addition had influenced positively the quality of white bread. 10 % buckwheat flour addition showed better sensory, nutritional and functional properties.

Keywords: buckwheat flour, white wheat bread, sensory analysis, physico-chemical properties.

F.36. CATALASE ACTIVITY OF POLLUTED SPONTANEOUS FLORA

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Abstract. In plants, catalase breaks down H_2O_2 into water and oxygen. H_2O_2 is generated during photorespiratory oxidation, mitochondrial electron transport, or β-oxidation of fatty acids. The evidence indicates that catalase plays an important role in plant protection, aging and senescence. H_2O_2 is a reactive oxygen species that induces changes in redox systems at the cellular level. H_2O_2 is a reactive oxygen species that induces changes in redox systems at the cellular level. Recent studies show that, reactive oxygen species, including H_2O_2, are considered toxic compounds. Thus, H_2O_2 acts as a signal molecule. It is often considered that concentration is a key factor in determining H_2O_2 action. The present study analyzed catalase activity in spontaneous flora. The samples were collected from 3 pollution representative areas of the city of Bacau. The determinations were carried out according to the method described by Wang (2010) and were performed in triplicate. Plants under stressful conditions tend to respond in order to survive these conditions homeostatically. Hydrogen peroxide is a primary metabolite produced excessively in green plants when stressed. The results showed that there is a significant increase in catalase activity in plants in polluted areas (3.92) compared to unpolluted areas (1.86). This shows that hydrogen peroxide is produced in plants in polluted areas and therefore increases the expression of catalase activity. In conclusion, catalase is an important antioxidant enzyme which plays a key as a defense mechanism.

Keywords: catalase, spontaneous flora, polluted area.

F.37. THE THERMAL EFFECT OF MICROWAVES ON FOOD

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Abstract. Microwaves are electromagnetic energy, such as radio waves, and hold some of the spectrum of electromagnetic power or force. They are very short waves (hence the name) that propagate at the speed of light. Today, microwaves are used in long distance telephony, television programs, internet, satellites, etc. But for many people, microwaves are just a term related to the immediate preparation or heating of food. Heating food in the microwave causes a loss of vital energy between 60-90% and at the same time the microwave accelerates the structural disintegration of food. Microwaves can create cancer-causing agents in milk and cereals. Microwaves change the basic food composition and cause digestive disorders. Microwaves change the chemical composition of food and thus reduce the body's ability to protect against cancer. Heating food in a microwave oven increases the number of cancer cells in the blood. The microwave breaks down nutrients from raw, cooked or frozen vegetables, even if they are exposed for a short time, forming free radicals. Heated food in the microwave leads to the general destruction of peripheral tissues and the gradual destruction of the digestive systems, producing in time intestinal cancerous tumors. Heated food in the microwave decreases the human body's ability to use B-complex vitamins, vitamin C, vitamin E and essential minerals.

Keywords: microwaves, vitamin, food

F.38. SOFT PRETREATMENT AND ENZYMATIC HYDROLYSIS OF SPRUCE SAWDUST TO ENHANCE PRODUCTION OF BIOETHANOL

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Abstract. In the perspective of environmental sustainability, in recent years the production of biofuels from lignocellulosic biomass has gained widespread attention. Production of energy from renewable resources such as lignocellulosic materials is a promising approach to reducing the negative environmental impact of fossil fuels. Annually, the forestry sector generates huge amounts of residues (sawdust, bark, branches, etc.) that can be used to produce cellulosic bioethanol and other value-added products. In this study, the samples of spruce sawdust which were purchased from a sawmill, were sieved in order to obtain different granularities. Then, the lignin was removed from the samples by pretreating them with acid and dilute hydroxide in different conditions (extraction time, temperature and solid to liquid ratio). After the pretreatment step, two types of enzymes (Celluclast 1.5L and Carezyme) were used for the hydrolysis of spruce sawdust. SEM analysis was used to study and highlight modifications in sample structure following the pretreatment and enzymatic hydrolysis steps. The total polyphenols content was determined using Folin-Ciocalteu analysis method. The identification and quantification of individual polyphenols, organic acids and individual carbohydrates from the pretreatment and hydrolysis step was carried out using a high performance liquid chromatograph (HPLC).

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Keywords: lignocellulosic biomass, soft pretreatment, enzymatic hydrolysis, bioethanol.

F.39. DEVELOPMENT OF FAST DISSOLVING BIOACTIVE FILMS WITH B-GLUCAN FROM SPENT BREWER'S YEAST AND BILBERRY JUICE

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Abstract. In a context where it is increasingly difficult to synthesize new molecules for drug development, the use of natural products have a major contribution to pharmacotherapy, particularly to the chronic disease management such as diabetes. The present study incorporated bilberry juice (Vaccinium myrtillus) in β-glucan films as an alternative to the synthetic drugs due to a plenty of phytochemicals which allows to have medicinal value. Naturally occured polysaccharides of β-D-glucose, β-glucans was extracted from spent brewer's yeast following an alkaline-acid process. This polysaccharide is known to stimulate the innate imunmunity and together with anthocyanin-rich bilberry can be employed for its anti-diabetic properties as food supplements. Films were produced by casting using β-glucan and bilberry juice in different proportions. Glycerin was added as plasticizer as 25% (w/w) of the total dry mass. To ensure a fast dissolution, sodium alginate and soybean oil were used as water soluble polymer and surfactant respectivelly. Water vapor transmission rate (WVTR), water vapor permeability tests (WVP), dissolution time and water activity were studied to determine the best film in relation to the water barrier efficiency and fast dissolution time. The amount of β-glucan and bilberry juice ensure the recommended daily intake and the films obtained can be a part of an equilibrated diet for diabetes.

Keywords: β-glucan, bilberry juice, bioactive films, diabetes, food supplements.

F.40. REDUCTION OF CO_2 EMISSION BY USING OF NEW MATERIALS OBTAINED FROM POWER PLANT ASH

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Abstract. The characteristics of geopolymeric materials made from ash and sodium hydroxide solutions/pellets treated hydrothermally at different temperatures are investigated in this work. Due to the vast range of properties of fly ash, the qualities of geopolymer material may vary depending on the type of fly ash used to manufacture it, necessitating experimental research for each type of ash. The obtained materials can be utilized to substitute cement, leaving a low carbon footprint. Fly ash was supplied by Iasi, Romania thermal power plant. Alkali solution was made with analytical-grade sodium hydroxide pellets. The concentration of alkali was changed from 2 to 6 M, while the ash powder to alkali solution ratio was kept constant at 2:1. 5 g ash and 5 ml alkali solution of various molarities were combined in an autoclave. This autoclave was heated in an oven at various temperatures. SEM, EDAX, FTIR, and XRD were used to characterize the geopolymer

samples. The primary structural block of geopolymeric assembly is a polymeric structure of Si–O–Al formed during the geopolymerization process. Main conclusion are: p*H* range in 13–14 is the most suitable for the formation of the geopolymers with good mechanical strength. Alkali concentration in the range of 2–6 M has an important role in the formation of new mate FTIR research revealed that higher peak intensity was recorded for highly concentrated alkali solution, which can be concluded in terms of characterization of synthetized materials; The FTIR peak of the 6M sample behaved differently than that of other synthetized materials, indicating a higher quantity of geopolymer gel formation during the initial stage of the reaction; XRD spectra revealed that in alkali concentration solutions, the intensity of crystalline phases was increased; XRD was used to identify known geopolymer/zeolite phases such as sodalite, faujasite, and Na-Y; When the 6M solution was employed, SEM analysis revealed destroyed ash particles due to geopolymer reaction. The percentage of geopolymer increases with curing time at the temperature of 65^0C. Because of the higher degree of geopolymerization, there is more soluble silica present. The quantity of quartz and mullite somewhat declines at longer reaction times. Geopolymer is a better alternative for cement replacement and environmental protection by immobilizing heavy metals from wastewater and soil, etc. According to the research, geopolymers are "Ecomaterials" with lower strength in the first period, but its strengths are improved in time, and can approaches the value over conventional cement after 28 days; These materials are obtained without calcination, resulting in reduced CO_2 emissions during production.
Acknowledgements: This work was supported by POC/163/1/3/Innovative Technology Project, project number 399/390075/17.11.2021, Cod SMIS 2014: 120951.

Keywords: CO_2 reduction| fly ash, cement replacement, alkali activation

F.41. MODELING AND OPTIMIZATION OF PHARMACEUTICALS BIOSORPTION FROM AQUEOUS MATRICES BY *SACCHAROMYCES PASTORIANUS* RESIDUAL BIOMASS/CALCIUM ALGINATE COMPOSITE BEADS IN A BATCH SYSTEM

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Abstract. The global increase in water pollution with persistent organic pollutants such as pharmaceuticals has led to more attention paid to combating this problem. Given the potentially harmful effects on human health and ecosystems, pharmaceuticals are one of the most toxic and problematic classes of compounds. It is already known that biosorption can be a potential alternative to conventional treatments for pharmaceuticals removing from aqueous matrices, if a viable biosorbent can be found. In this study, the modeling and optimization of biosorption process of Ethacridine Lactate (EL) removal by *Saccharomyces pastorianus* /calcium alginate composite matrix was investigated in a batch system. Biosorbent synthesis was performed by immobilization of *Saccharomyces pastorianus* residual biomass in calcium alginate beads. *Saccharomyces Pastorianus* – calcium alginate system was characterized by scanning electron microscopy (SEM), and Fourier-transform infrared spectroscopy (FTIR). Beads size and point of zero charge were also determined. Lab-scale biosorption experiments were performed in a batch system. Beads of the *Saccharomyces Pastorianus* – calcium alginate system showed a spherical–elliptical morphology, diameter of 3,226 ± 0,0294 mm, point of zero charge 6.9 and texture stability during storage at 4^0C. Process parameters like pH of initial solution, biosorbent dose and initial EL concentration were optimized to obtain high removal efficiency. The biosorbent exhibited the removal efficiency over 85 % at 23°C, at the initial p*H* value of 4.0 and

biosorbent dose of 1 g/L for all EL initial concentrations tested. The Freundlich, Langmuir, Hill, Sips, Temkin, Redlich-Perterson adsorption models were tested for the mathematical description of the biosorption equilibrium and isotherm constants were evaluated. Equilibrium data (q_{eq_exp} = 8.9095 ÷ 27.6645 mg/g) fitted very well to the Freundlich model (q eq_pred = 9.5639 ÷ 28.1490 mg/g) in the studied concentration (20 ÷ 60 mg/L) range. The pseudo-first order, pseudo-second order, Elovich kinetic models were also applied to the experimental data. The results indicated that the EL biosorption process followed the pseudo-second order rate expression and adsorption rate constants decreased with increasing concentration. For EL removal from aqueous solution, *Saccharomyces pastorianus* residual biomass/calcium alginate composite beads were found to be a good biosorbent due to the removal efficiency, low cost and eco-friendly.
Acknowledgments: This research was funded by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P2-2.1-PED-2019-1063, within PNCDI III.

Keywords: *Saccharomyces pastorianus* residual biomass, natural polymer, biosorbents, Ethacridine Lactate, biosorption process, modelling, optimization

F.42. CONGO RED DYE ADSORPTION FROM AQUEOUS SOLUTION TO MAGNESIUM HYDROXIDE ADSORBENT

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Abstract. The use of magnesium hydroxide ($Mg(OH)_2$) as an effective adsorbent for dye removal from aqueous solution is discussed in this work. Congo red (CR), an anionic dye, was utilized as a dye molecule model, often chosen in adsorption studies. The $Mg(OH)_2$ was prepared by chemical precipitation from magnesium nitrate and magnesium sulphate 0.1 M solutions and potassium hydroxide with concentration of 0.5, 1, 1.5 and 2M. The solid characterized by X-ray diffraction, IR spectroscopy and was well crystallized. Structural transformations of adsorbent function of potassium hydroxide molarity are monitored using powder X-ray diffraction and infrared spectroscopy. The adsorption experiments were carried out in a batch system, at 293 K. The effects of different parameters on adsorption such as adsorbent dosage, contact time, concentration of dye on the efficiency of CR adsorption onto $Mg(OH)_2$ were investigated. Maximum adsorption efficiency was found 98.23%, for a solution of 5 mg/L and adsorbent dosage of 3 mg/L. The adsorption kinetics fit the pseudo-second order kinetic model. Different types of adsorption isotherm models were evaluated and it was found that Langmuir isotherm fits well. Magnesium hydroxide has the highest adsorptive capacity and might be used as a low-cost option for removing refractory dyes from industrial effluent.

Keywords: Congo Red, adsorption, magnesium hydroxide, kinetic analysis.

F.43. TOWARD THE EFFICIENT ELIMINATION OF A TOXIC ORGANIC COMPOUND FROM AQUEOUS SUSPENSION UNDER SOLAR LIGHT IRRADIATION

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Abstract. Textile industries are nowadays recognized among the most polluting industrial activities in terms of volume of generated effluents and complexity of pollution. These effluents are today well-known to present large amounts of organic and inorganic toxic compounds. Among them, they are the synthetic dyes. These water pollutants received an increased attention because of their resistance to conventional effluent treatments because of the complexity of their chemical structure. In this context, today there is a real necessity to develop new effective processes to treat textile dyes effluents before their discharge to the aquatic environment in order to protect the water resources. Advanced oxidation processes are an established green technology for the water and wastewater purification applications. Among these technics, heterogeneous photocatalysis has gained a considerable interest in recent years because of its efficiency and versatility. In this study, we propose a zinc oxide (ZnO) photocatalyst prepared by co-precipitation and its successful utilisation for the photo-oxidation of basic blue 41 textile dye under solar light irradiation conditions. The structural, optical and morphological measurements of the prepared samples were investigated in detail by X-ray diffraction, FTIR analysis and Scanning Electron Microscopy (SEM). The photocatalytic activity of the synthesized samples was evaluated under batch mode using solar irradiation conditions. According to the collected experimental information, the degradation of the target molecule was effective after a contact time of 150 min. at a solution pH of 7. The increase of the initial dye concentration declined the photo-degradation of the target compound and the highest elimination efficiency was found at 10 mg/L. Furthermore, it has been observed that the enhancement of the catalyst content leads to a significant rise in the removal of this organic molecule. Therefore, these results provide new relevant data on the degradation of basic blue 41 dye under solar irradiation conditions confirming the potential use of the prepared catalyst for future applications in the area of textile effluent treatment.

Keywords: water pollutants, dyes, basic blue 41, heterogeneous photocatalysis, zinc oxide.

F.44. TECHNOLOGICAL ASPECTS CONCERNING THE VALORIZATION OF WHEAT BRAN IN CEREAL PROBIOTIC BEVERAGE PRODUCTION

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Abstract. This work aims to investigate the posibility to valorisation of nutritional and functional potential of wheat bran to obtain beverages with probiotic potential. For this purpose, wheat bran scalded mashes were subjected to lactic fermentation using different amounts of starter lactic acid bacteria (LAB) from Brouwland, Belgium, in the range of values 0.5 % w/w and 2.0 % w/w. The wheat bran scalded mashes were obtained from fine wheat (Triticum aestivum, var. common) bran, debranned millet (Panicum miliaceum L.) flour, Pilsner barley malt and or not CaraAmber barley malt (malts from Weyermann Specialty Malting, Germany) with 1:9 of the ratio cereal ingredients: water. The lactic acid fermented mashes were subjected to a lautering operation, the separate liquid fraction actually representing the probiotic beverage based on wheat bran. Basic physical-chemical, microbiological and senzorial characteristics of mashes and beverages were analyzed (pH, total and volatile acidity, extract, dynamic viscosity, yield, colony-forming units per milliliter, turbidity, colour, taste, flavour). Obtained experimental data indicate that an inoculum of LAB of 1.25 % w/w and 1.50 % w/w is recommended for the generation of probiotic beverages, for both variants of mashing, with or without CaraAmber barley malt. For these technological variants a balance was found between total acidity and volatile acidity. If in addition, the dynamic viscosity is also taken into account, then an inoculum of LAB of 1.50 % w/w is technologically preferred, confirmed by the sensory analysis. Also, the sensory potential of the studied beverages is positively influenced by the addition of CaraAmber barley malt. In conclusion, it was found that the technological processing of the proposed cereal-type ingredients matrix can be an interesting alternative to diversify cereal-based food products and a good way to improve the nutritional, functional and sensory quality of this food category.

Keywords: cereals, wheat bran, beverage, probiotic, lactic fermentation.

G. INDUSTRIAL POWER ENGINEERING & COMPUTER SCIENCE

G.1. CORRELATIONS BETWEEN STRUCTURAL, MORPHOLOGICAL AND OPTICAL PROPERTIES OF ZNO THIN FILMS OBTAINED BY THERMALLY OXIDIZED METALLIC ZINC FILMS

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Abstract. Among the other oxides in thin films, zinc oxide (ZnO) thin films are very important due to their application as an active semiconductor compound in transparent electronic devices. ZnO thin films are used as transparent conducting electrodes and buffer layers in solar cell technology, as a material in sensor technology, ultrasonic oscillators and transducers, optical waveguides and other important applications. ZnO properties are determined mainly by the non-stoichiometry of the films resulting from the presence of oxygen vacancies and interstitial zinc atoms. A few methods are preferred to obtain ZnO thin films: chemical vapor deposition, electro-deposition, the sol-gel technique, metal-organic chemical vapor deposition, spray pyrolysis, r.f. magnetron sputtering, pulsed laser deposition etc. In this paper, ZnO thin films were prepared by thermal oxidation of vacuum evaporated zinc films. Structural, morphological and opticall properties of as obtained ZnO films were investigated.

Keywords: Thin films, zinc oxide, thermal oxidation, vacuum evaporated.

G.2. EFFICIENCY OF THE TEACHING LEARNING PROCESS BASED ON VIRTUAL REALITY TECHNOLOGIES

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Abstract. The article present the study on the efficiency of the learning process using VR equipment. The study will identify the equipment, technologies and implementation methods needed to implement a teaching IT system. The computer system will be used in the communication between the equipment and the graphics engine. Using the Unreal Engine, the information is processed by the server and distributed over the network to synchronize the equipment. The synchronization of information is done on the server, which allows users to be present in the same place in the virtual environment.

Keywords: vr education, unreal engine, teaching, learning, software application.

G.3. USER INTERFACE FOR INTELLIGENT MEASUREMENTS OF A VIRTUAL INSTRUMENT TO CHARACTERISE THE ELECTRIC CAPACITY OF SBT FILM AND FOR FASTER APPLICATION DEVELOPMENT AND INCREASED PRODUCTIVITY

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Abstract. This article shows an alternative and a combinatorial way of making measurements in the laboratory, using a Labview, an experimental environment based on virtual instruments. One of its characteristics is an easier way to use a graphical interface (UI) for a lab experiment. Users can quickly come up with valid experimental findings and conclusions using contemporary computer-controlled instruments. It takes little time to come up with practical solutions to measurement and control problems. The aim of this virtual instrument is to define the ferroelectric properties of a SBT deposited film (SrBi2Ta2O9) which works as a ferroelectric material, used to achieve variable capacity.

Keywords: UI user interface (UI), intelligent measurement system, arc discharge, nanomaterial, Virtual Instruments.

G.4. SMART HOME SYSTEM BASED ON IOT DEVICES

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Abstract. IoT technology is the basis of economic and social evolution, which is why it justifies the interest of people in technology as many human activities. The Internet of Things involves sensors, software, and other technologies that interconnect and transfer data over the Internet with other devices. The smart home system is based on IoT devices such as monitoring the various functions in a home, connecting them to a cloud platform, and communicating data to the user via the Internet. In this project, the market requirements for such a solution were established, and subsequently, an attempt was made to solve them. Therefore, there were processes for assembling and programming IoT devices with different functionalities, the cloud infrastructure was created using resources provided by Amazon Web Services, and finally, a web application developed in JavaScript, HTML, and CSS was created. Finally, the solution was analyzed in terms of performance and compliance with the identified requirements, but also terms of costs generated.

Keywords: IoT, self-monitoring, analysis and reporting technology, cloud computing.

G.5. DEVELOPMENT OF A HYBRID BAR AND RESTAURANT SERVICE MANAGEMENT APPLICATION FOR POST COVID-19 ERA

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Abstract. COVID-19 has created many changes in the way we work and live. Pandemic impact and implications for the future are still unclear due to the scope and scale of the outbreak. In the wake of the pandemic and lockdown, many businesses and individuals shifted to remote working, online collaboration, and digitalization. Establishing a digital presence with digital commerce capabilities during the pandemic and in the post covid-19 new normal is therefore essential. Food is a necessary commodity, and the use of pubs and restaurants has increased significantly during the last decade. Due to the critical need for food and technological advancements, the conventional ordering method has proven inefficient and ineffective in service management. This study presents a novel hybrid system for bar and restaurant service management integrated with cycle stock inventory method based on content management system (CMS) using Rapid Application Development (RAD) model and Reuse-Oriented Development (ROD) technique, and the designed system is implemented as a mobile application. A bar and restaurant service management application integrated with inventory management will provide an improved, reliable, and automated system through the use of technology in daily operations, as well as help maintain government controls on the social distance to minimize the virus's spread from person to person, thereby enhancing the fight against COVID-19.

Keywords: content management system, reuse-oriented development, rapid application development, cycle stock inventory.

G.6. LONGITUDINAL DIFFERENTIAL PROTECTION OF THREE-END HIGH VOLTAGE LINES

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Abstract. Renewable energy sources are usually connected to an existing outlet line, usually called a T-connection. One of the peculiarities of this type of connection is that, if a differential line function (87L) is activated, the protection relays at the three ends must be able to communicate quickly with each other. The installation of a differential protection is mandatory in the case of short lines. The physical means by which information is transmitted is, in principle, indifferent. However, at the functional level, it is no longer enough for one end to receive information from the other. Each end must receive data from the other two and ensure that the fault is in the protected area and not outside it. The protected area consists of the two T-connected lines, excluding the bars to which the three ends are connected. The problems raised by achieving protection for these situations are: The need for digital terminals at each end. They must measure the current at that end and quickly communicate it to the other two the existence of a fast communication route between the three ends, usually a fiber optic cable The accuracy class of the current transformers should be 5P20 or even 5P60, the last digit indicating the saturation coefficient of the magnetic circuit for the protective winding used operating times for a fault in the protected area must be short, up to 30 ms. The paper presents an example of the design of such an installation for the situation

of connecting a 20 MW photovoltaic plant to an existing 110 kV short line. In this case, the existing 110 kV line is an overhead line, and the T-branch is a cable line. The communication path was chosen by the optical fiber mounted on the guard wire at the overhead line and by a buried cable for the underground branch.

Keywords: differential protection, power network, fibre optic technology.

G.7. HEAT RECOVERY SOLUTIONS WITH HEAT PUMPS

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Abstract. Power transformers are devices without moving parts that changes electrical parameters of energy received. In a substation there are, commonly, one or two interconnection transformers. Power transformers with forced cooling of oil can be sources of heat for heating and domestic hot water, both inside station buildings and the ones beyond. The heat generated by electrical losses in iron and windings is taken by cooling oil that can get in operation, currently, at 45-60 0 C. Given the low level of oil heat, using heat exchangers to recover heat can not get an agent heated to a high temperature. But, the use of a heat pump permits. In addition, maintaining the oil at a low temperature by using of the heat pump has the advantage of increasing the life of the transformer insulation. Such a solution is proposed in this paper. A scheme of heat recovery and thermal model of the transformer and of compression heat pumps and absorption are presented. A study is conducted on a transformer of 250 MVA, 400/110kV, in operation at a substation and the numerical results are shown. The proposed solution heat recovery of cooling oil of power transformers with compression heat pump and absorption heat pump allows obtaining: hot water for heating and domestic hot water, in the cold season cold water for cooling of air conditioning and domestic hot water, in the warm season.

Keywords: heat pump, power transformer, substation.

G.8. E-ALERT PLATFORM FOR REAL-TIME MONITORING

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Abstract. eALERT platform is a complex system for accurate monitoring in the Chisinau city of the real-time environmental factors through the modern ICT technologies and any type of sensors, with storage, processing, and analysis of big data, as well as instant warning in the case of dangerous natural and anthropogenic hazards. Earlier, a software application was used in connection with the UAV-based measuring station for computational modeling of environmental factors, which facilitates the analysis and interpretation of the monitoring results, with provided results on pollutants detection, real-time data recording, and Atomic Force Microscopy (AFM) samples analysis for particulate matter PM 10 and PM 2.5 . There are 3 stages of the eALERT platform development. Firstly, creation of the sensor network in the monitoring locations Centru, Telecentru, Botanica, Rascani and Buiucani of the Chisinau city. Then follows the design and development of the ICT infrastructure for communication, storage, and processing of environmental monitoring data, followed by the

implementation of service and training of beneficiaries. Monitoring data are transmitted from sensors in the real time through an independent wireless network LoRaWAN to be stored and processed on a dedicated eALERT platform server. The secure online system allows remotely access and even control the monitoring process, as well as to store and process a large stream of acquired data. The communication infrastructure contains an application for sending SMS messages to a list of subscribers, as well as the data access interface for users outside the network. Therefore, from the current qualitative warning of the city population in the short and medium terms by announcing the alert codes, we advance to a modern real-time warning system depending on the manifestation in a specific moment of time of the dangerous natural and anthropogenic hazards.

Keywords: eALERT platform, wireless network, sensors, real-time monitoring, environmental data processing.

G.9. SPEED CONTROL OF INDUCTION MOTOR USING ARDUINO MEGA 2560 DEVELOPMENT BOARD

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Abstract. This paper presents an application made with the Arduino Mega 2560 development board for adjusting the speed of three-phase asynchronous motors. Speed control of the induction motor is a topical research topic. The programming of the Arduino Mega 2560 board was done in the LabVIEW 2017 programming environment. An important advantage of using the Arduino Mega 2560 development board is the extremely low cost of the equipment compared to the use of the Compact RIO 9074 data acquisition board. The realization of this work ensures the validation of a new method of regulating the speed of the induction motors that can be applied in electric drive systems in industry.

Keywords: induction motor, Arduino mega 2560, speed control.

G.10. HYBRIDIZATION CONCEPT FOR HORIZONTAL AXIS WIND/TIDAL SYSTEMS APPLICABLE TO REAL-TIME EMULATION METHODS

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Abstract. One of the main research challenges of replacing conventional conversion energy systems with renewables energies sources is to develop advanced concepts to hybridize, control and optimize different energy resources to deliver reliable energy with minimum cost. Reviewing previous studies on hybrid offshore wind-tidal power systems, including the impact of energy storage systems on power generation efficiency, concludes that the hybridization of wind/tidal resource could be an important issue contributing for reliable

autonomous electrical networks development. Thus, in this paper we propose design structures concerning a HILS (Hardware in the Loop Simulation) system for a hybrid wind-tidal low power generation units using Doubly Fed Induction Generator (DFIG). The wind profile is generated via a specific program that allow to introduce the 'time acceleration method' reducing time computation. The wind and tidal torque/power characteristics are also modeled and simulated for real-time emulation purposes. This study is conducted using different hybrid wind-tidal turbine numerical models developed in MATLAB/ Simulink environment.

Keywords: wind turbine, tidal turbine, hybrid system, real time emulation.

G.11. METHODS TO FILL IN MISSING VALUES USED IN IOT

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Abstract. With the increase in the number of IoT devices, the volume of data sent to the Cloud by them has also increased. Due to technical reasons that may include sensor failures, loss of connection, etc., these data have missing values that can affect the information content. In this paper, the authors present a comparative analysis of the main methods that can be used in the IoT field to complete the missing values. Thus, the performance of the main methods of filling in the missing univariable and multivariate values on a set of data transmitted to the Cloud was studied.

Keywordsmissing values, IoT, cloud computing.

G.12. PREDICTION OF BLDC ENGINE DEFECTS WITHIN UAVS

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Abstract. In recent years, UAVs are increasingly used in various fields due to their untapped potential. Thus, research that includes UAVs has increased due to the fact that they are able to replace humans. Accidents that include UAVs have increased with the growth in their number. In this paper, the authors propose a method that can classify the defects of BLDC electric motors in the composition of UAVs, using machine learning techniques. The accuracy of the model is 98%.

Keywords: fault prediction, fault classification, BLDC motors, UAV.

G.13. CYBER SECURITY OF VIRTUAL PLC SYSTEMS BUILT ON THE RASPBERRY PI PLATFORM

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Abstract. In the last period, there has been a sharp increase in cyberattacks on industrial systems and especially on PLC based control systems. This paper examines the cyber security issues of PLCs in general and in particular for virtual PLCs implemented with OpenPLC on the Rasberry Pi 4 platform. In this paper, the cyber security assessment was performed, identifying the following types of vulnerabilities: vulnerability of the Raspberry PI operating system, vulnerability of the PLC program, respectively of the file with hardware configuration, vulnerabilities given communication protocols and data traffic on the ports used and last but not least the GPIO pin configuration vulnerabilities. A solution based on SNORT 3 is proposed to prevent attacks, in which new rules have been introduced. It can automatically report and block traffic if it detects anomalies or possible cyberattacks. As a hot backup solution, another virtual PLC identical to the analyzed one is proposed, implemented on the same Raspberry Pi platform, which can be activated in case the first PLC is affected.

Keywords: OpenPLC, Rasberry Pi, cyber security, vulnerabilities.

G.14. OPTIMIZING THE REHABILITATION TRAINING VR SYSTEMS FOR PEAK HUMAN PERFORMANCE

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Abstract. The design of rehabilitation technologies based on VR are not very recent research topics. However, there are some discrepancies due to an incomplete understanding of the cognitive tasks required of the client. The novel contributions of this methodology for VR-based rehabilitation is the integration of taxonomy-based classifications, such as Bloom's cognitive domain taxonomy and Harrow's psychomotor domain taxonomy to model cognitive tasks to model operator cognitive workload. CTA delivers a process to isolate the discrete mental processes executed by the operators of the system. This article describes a CTA methodology which integrates cognitive and psychomotor classifications to estimate cognitive task capability. This new methodology has been validated for programming a control-room supervising task, by establishing its capacity to differentiate between complexity tasks. In previous domains, a framework like this possibly will be useful for system everywhere unobservable human action acting a significant role, but currently, only high and low workload was discriminated. Proving that the individual ranks of the taxonomies can be discarded to discriminate the cognitive workload experienced could approach further validity. Feedback in simulated virtual reality environments must be carefully coordinated to elicit realistic responses from customers. Guaranteeing that VR systems operate efficiently and safely needs models of client workload to offer a framework for VR system optimization. The experiments performed provides an approach for creating and validating models for basic human actions implied. The preprocessing steps for the client response records involved temporally aligning the facts with the simulation,

removing noise, confirming that the data fit within well-known physiological limits, and adapting data by a baseline correction. Prior to acting, it was important for the simulation that each participant was instructed in the scenario and the simulation tasks. To make training easier, a slide deck was developed. For the tactile feedback was achieved to the clients by a custom vibrotactile wrist- stripe, composed of a mini pulsing disc motor, an Arduino Mini, a minui solderable breadboard, the 3D printed case, and a perspired bracelet. It was used Arduino for plasticity of hardware and code customization. The final model was made for each performance measure involved pupil response data and evaluation response data. Baseline correction was used to enable comparison between clients and has been revealed to correct for random oscillations in pupil records. Objective metrics can determine workload and performance directly through precision and/or time, and indirectly, by way of the biosensors designed for neurophysiological data interrelated with load. Subjective metrics run through participant feedback to quantify workload perceptions.

Keywords: neurophysiological data, model operator cognitive workload, cognitive domain taxonomy, psychomotor domain taxonomy.

G.15. USE OF SRF TO DETERMINE THE TIME OF OCCURRENCE OF A FAULT AND THE TYPE OF FAULT IN GAS-INSULATED SWITCHGEAR (GISL)

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Abstract. During the manufacturing process and during operation, small defects may occur in gas-insulated circuit-breakers, which may lead to their failure, with undesirable effects. These defects that lead to distortion of the internal electromagnetic field of the switch, will strengthen the local electric field and will produce partial electric discharges. The method used to determine the severity of the defect is to measure the partial discharges and to determine a pattern (model) that determines the appropriate moment of intervention on the equipment and what maintenance operation must be performed. There are two categories of methods used to determine the patterns of partial discharges, namely: traditional methods and modern methods. Traditional machine learning methods include: support vector machine and random forest. Traditional methods of recognizing shapes are limited by the manual extraction of features or are extremely sensitive to the quantity and quality of data sets. Modern methods include: factorized search space and deep neural networks.

Keywords: GIS, Gas Isulated Switchgear, Form Recognition System, machine learning, deep neural networks.

G.16. SPECIAL CASES IN THE TRANSPORT PROBLEM. FORBIDDEN ROUTES

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Abstract. There are several special cases in solving transport problems: degeneration in the transport problem, unbalanced transport problem and forbidden or blocked routes. If

for some reason a route (image) is forbidden, then it is necessary that (image). In order for this restriction not to impede the application of the algorithm, a high transport cost for that route is required from the outset: (image). If the route appears to be blocked after the last iteration, then the cost (image) changes and the algorithm resume from the current point. If (image) or (image) have values greater than the value given by (image) then the route cannot be avoided: (image) or (image).

Keywords: optimization, transport problem, forbidden routes.

G.17. SOLUTIONS FOR AUDIO GUIDE APPLICATIONS IN MUSEUMS

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Abstract. The rapid development of information technology has led to the opportunity to create modern audio guide systems in museums. These systems can be developed as smartphone applications or can be implemented on the basis of hardware devices offered to visitors (audio headphones, possibly with video camera). Audio guide systems have the ability to select the language in which the information about the exhibits will be provided from the moment they enter the museum. Video camera guidance systems have the ability to recognize exhibits or an RFID/QR tag and provide that audio information in the set language. In the case of smartphone applications, they can be downloaded to the phone or they can access an application from the server. The application will contain a map of the museum with certain points of interest corresponding to the exhibits. In order to view the position on the map of the visitor it is necessary to know its location. Being inside the building, the location can be done with wifi beacons or with bluetooth beacons, because the GPS system cannot be used. The positioning of the beacons is done according to some specific algorithms, so that the position of the visitor is provided accurately on the floor where he is. The person's position will be specified on the map, thus being able to identify nearby exhibits. When you approach an exhibit, it will automatically start playing audio information about it in the set language.

Keywords: WiFi beacons, bluetooth beacons, location, smartphones, audio guide.

G.18. MOBILE FORENSICS ON ANDROID AND IOS DEVICES BASED ON SPECIFIC TOOLS

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Abstract. This study aims to point out some key-elements regarding the use of Tableau forensic bridges and duplicators in order to acquire forensic data on presumed criminal devices. The study will furthermore describe some steps that should be taken in order to re-compose the information and to make it useful for investigators. As greater storage and amounts of data are at present key challenges for examiners and investigator, the tools such as Tableau T8u Forensic USB 3.0 Bridge and Tableau T35u USB 3.0 Forensic IDE/SATA Bridge provide great support and productivity. This paper will describe some practical aspects in the implementation of forensics examination operations.

Keywords: digital forensics, investigation, tableau bridges.

G.19. CHOOSING THE RIGHT DATA STRUCTURE: A GUIDE BY STUDY CASES

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Abstract. The choice of appropriate data structures is the most important decision we have to make in formulating a computer solution to a problem. To adequately choose the needed data structures we had to analyze the problem to determine the basic operations that must be supported, to quantify the resource constraints for each operation and finally, as a result of the above processes to select the best data structure that fits requirements. To help in this process we've created a guide based on study cases to make it easier for computer science students to choose the right type of data structure. Even the guide is non-exhaustive related to data structures it is a valuable tool in the learning process of algorithms as proved by analyzing the results of its use.

Keywords: Algorithms, Teaching, Data structures.

G.20. DETECTION OF MIMICO-GESTURAL MOVEMENTS USING TECHNIQUES SPECIFIC TO ARTIFICIAL INTELLIGENCE

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Abstract. The goal of research is to develop learning methods that promote automatic analysis and interpretation of human and mimic-gestural movement using oriented perspectives and use information extracted from image/s, videos, depth/s, data type mocap, audios and inertial sensor/s. In this way, deep neural models are used for classification best used is supervised and semi-supervised characteristics learning, also the temporal dependencies are modeled and we show the effectiveness om a set fundamental set of tasks, which includes detections, classifications, estimation of parameters. and user verification. An introduction to identifying and classifying human actions and gestures based on deep multi-scale and multimodal learning from visual cues (such as video data, depth and mocap). A training strategy that exploits, firstly, the careful initialization of the individual modalities and, secondly, the gradual fusion that involves the random elimination of separate channels (called ModDrop) to learn the correlations between modalities, preserving over time the uniqueness of each modality. specific. representation. In addition, the ModDrop training technique proposed to ensure the robustness of the classifier for missing signals on one or more channel/s implied to reproduce sum of predictions from any available number of certain modes. In this project, data is reproduced utilizing movement sensors built into the mobile device.

Keywords: learning methods, develop, automatic analysis, human, mimic-gestural, artificial intelligence.

G.21. EARLY DETECTION OF FAULTS IN COMPLEX INTERNET OF THINGS SYSTEMS

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Abstract. Remote monitoring and control systems via the Internet have become increasingly complex and monitor a large number of parameters. With such complex systems it is difficult to detect anomalies that can signal malfunctions. The paper presents a system for early detection of defective states based on a neural network with adaptive prediction (using an ADALINE neural model) implemented on a programmable logic matrix. Based on the observation that a system has a deterministic behavior, its evolution being described by a continuous function with slow variation in time, the neural network monitors the evolution of these functions of evolution of the system generating, through the error function, the appearance of inconsistencies, could indicate a malfunction of the system. The number of monitored parameters is at the choice of the designer but, in general, the efficiency of the early detection of errors depends on the judicious choice of these parameters.

Keywords: Internet of things, monitoring and control system, neural network, programmable logic matrix, malfunction detection.

G.22. GSM OF THINGS FOR EMERGENCIES

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Abstract. The evolution of Internet of Things systems has led to the recent development of sophisticated surveillance and control technologies. There are breakdowns such as: power outage, Internet outage, etc. which may lead to the failure of such a system. This paper presents a solution to such a situation. The solution is based on a GSM system that warns of the occurrence of a fault and allows orders to be sent for the correct behavior of such a system in the event of a fault. If the Internet does not work, the GSM network is used alternately for warning and control. The solution presented in the paper is based on a battery-powered SIM800l module and an Arduino UNO module that can handle text messages and voice messages with which you can send alerts or receive commands.

Keywords: GSM of things, Internet of things, monitoring and control system, GSM module, Arduino UNO module.

G.23. ENERGY PRODUCTION OF A SOLAR ELECTRIC VEHICLE CHARGING SYSTEM

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Abstract. This is a fact that the number of electrical vehicles are increasing continuously. For example, in Hungary at the end of 2021 the number of cars with green license plates were 42633 (in Hungary the electric cars and plug in hybrid cars had green license plat). This number mean a 57% annual increasing. In Romania this increasing was harder, where in 2021 the annual increasing was 118%. This situation determines an increasing of demand for electric vehicle charging station too. One of the biggest advantage of the electric car is that the CO2 emission is zero. The best situation is when the electric energy used for electric vehicle charging are coming from green energy source too. From this reason at Óbuda University was built a solar electric vehicle charger system with storage capacity. The system contains three parts: Solar, energy storage and the charger parts. The energy used for electric vehicle charging should coming from solar system, power supply network, and from batteries. The total energy produced by solar system from middle of April 2021 is 9,76MWh, for electric vehicle charging was used 125kWh energy. The rest of energy was fed in power supply network, and for charging of the batteries. In figure 1 is presented the monthly energy production of the solar system for 2021 and for 2022. The total energy production for 2021 was 7,56MWh, and for 2022 it is 2,2MWh. Another novelty of the system is that for storages was used second life Nissan Leaf lithium ion batteries, which give the possibility to storage the produced green energy.

Keywords: electric vehicle, solar panel, electric vehicle charger, Nissan Leaf, lithium ion batteries.

G.24. MAINTENANCE MANAGEMENT SYSTEM FOR POWER STATION ELECTRICAL EQUIPMENT

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Abstract. The periodic measurements in order to establish maintenance programs for power transformers involve consistent material and human resources. This article proposes an online monitoring system of the main parameters of the transformer to establish a predictive maintenance program, which would allow an optimal operation of the equipment over a long period of time, with minimal resources.

Keywords: monitoring, maintenance, Labview.

G.25. THE ENERGY AND ECONOMIC IMPACT OF NZEB COMPLIANCE MEASURES ON THE CONSTRUCTION OF COMMERCIAL BUILDINGS

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Abstract. The building with near-zero energy consumption, nZEB, is defined (according to EPBD and Law 372/2005, republished on September 23, 2020, with subsequent amendments and completions) as a building with very high energy performance, characterized by very low energy consumption, almost equal to zero. The energy consumption is covered by renewable energy produced on-site or nearby, in a proportion of at least 30% (ratio established in Romania, following the provisions Articles 4 and 5 of Directive 2010/31 / EU). In the new methodology for calculating the energy performance of buildings MC001 (which is currently being approved), the specific requirements for nZEB buildings are set according to the building category and the climate zone. The maximum permissible values for primary energy consumption expressed in kWh / m^2 per year and for CO^2 emissions expressed in kg / m^2 * year are specified. The paper aims to highlight the measures necessary to be taken for a hypermarket building to comply with the requirements of nZEB from Romanian legislation. Thus, we start from the existing project of a hypermarket building located in Romanian climate zone IV. The building is made of ISOPAN sandwich panels with 10 cm embedded polyurethane foam. It also has carpentry with insulating glass made of three sheets of glass, curtain walls with a thermal barrier with low-e double glazing, prefabricated concrete panel base with thermal insulation 10 cm embedded polystyrene and a self-supporting corrugated sheet metal roof, with 20 cm basalt wool insulation and PVC waterproofing. The indoor microclimate is ensured with the help of air handling units for the sales space, gas boilers and air conditioners units for the office area. A BMS system is provided at the level of the entire building. The lighting is with LEDs, and a self-consumption photovoltaic system is mounted on the roof. Nonetheless, several additional measures are proposed that lead to a reduction in energy consumption for heating and cooling of approximately 12.2%. According to the values obtained for the economic calculation considering six evolution scenarios of the annual rate of increase of energy cost and the annual rate of euro depreciation, the recovery time is less than the life of the construction. Thus, the measures required for compliance for nZEB non-residential buildings regarding the value of the corrected minimum strengths are technically and economically efficient.

Keywords: nZEB, energy efficiency, primary energy consumption, non-residential building.

G.26. SOME CONSIDERATIONS ABOUT THE USE OF HYDROGEN AS AN ENERGY VECTOR

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Abstract. The preoccupations about hydrogen use for energy purposes are not new. Still, they have become more pronounced in recent times as concerns about climate change become more apparent and energy insecurity has intensified. Depending on its end use, to fulfill its mission as an energy vector, depending on its end use, hydrogen must go through the following steps: production, transport, storage, distribution, and conversion. Each phrase is faced with several technological and economic challenges for researchers and engineers that try to meet all the criteria of energy efficiency and security, reduction of carbon dioxide

emissions and cost. Hydrogen can be a long-term solution for increasing the security of energy supply and slowing down global warming only if two requirements are concomitantly met. Firstly, the hydrogen will be produced using renewable energy (or non-renewable technologies that include the recovery of carbon dioxide). Secondly, governments, researchers, and the business community, including the oil industry, will have to work synergistically to overcome all technological and cost barriers faced at all stages. In this context, the paper analyzes the opportunity of a cogeneration plant using fuel cells based on existing technology.

Keywords: hydrogen, fuel cells, cogeneration plant.

G.27. RESEARCH ON THE RECOGNITION AND EVALUATION OF HUMAN ACTIVITY BY PROCESSING VIDEO FLOWS

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Abstract. People regularly perform various simple and complicated tasks in their daily life, such as walking, running, cleaning, and playing. Action in Human Action Recognition (HAR) is an entity that can be observed using either the human eye or detection technology. Recognition of human activity (HAR) is one of the most important and challenging issues in computer vision. HAR is a challenge because of the complex posture of human interaction with many people. Multi-mode sensors could be used to overcome some of these challenges. Such sensors could include an RGB-D camera, infrared sensors, thermal cameras, etc. Recognition of video-based actions is an emerging and challenging method of research in this era, especially for identifying and recognizing actions in a video sequence. Deep learning is a dominant and widely used technique for learning high-discriminatory characteristics and developing end-to-end systems in video-based and behavioral recognition actions. A 3D convolution method can be performed by convolving the 3D kernel into several stacked frames. The 3D convolution method has a high cost. Training time will be longer in the absence of supported hardware, such as GPUs. Spatio-temporal problems are addressed through the use of recurrent neural networks (RNNs), where LSTM is specifically designed for long-term video sequences to learn and process the temporal characteristics of HAR in surveillance systems.

Keywords: HAR, machine learning, LSTM, RGB-D, RNN, video, camera.

G.28. PBTE PARTICLES OBTAINING AND CONTROL

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Abstract. Many researches on nanostructures are based on the fact that the properties of nanoscale materials can differ greatly from those of the bulk material on a larger scale. As the material dimension decreases, at first the properties remain unchanged, then non-essential changes occur, and when the dimension of the material is below 100 nm, significant changes in the material properties occur. A IV B VI compounds advantageously differ from other semiconductors due to their refractive index value - the basic parameter of the photonic crystals used in optoelectronic devices fabrication. The solvatothermal method is one of the simplest and most widespread methods of nanocrystals obtaining. In the case of PbTe nanoparticles obtaining, this method includes the following steps: a) the solution containing

the surfactant (the reactant containing lead and the one containing tellurium) is prepared; b) a stabilizing agent, for example hydrazine hydrate, is added to the solution; the given solution is maintained at 140÷200 o C for 10÷40 h, to obtain the reaction product containing PbTe nanoparticles. Propylene glycol, ethylene glycol or ethanol may be used as solvent. The stabilizer is polyvinylpyrrolidone with a molar mass of 2000 atomic units and polypropylene glycol with a molar mass of 6000 atomic units. A base, for example NaOH, can be added to facilitate the nanoparticles formation in the solution and $N_2H_4 \times H_2O$ as a reducing agent is used. The obtained samples represent a polydisperse system composed of nanoparticles of different sizes, polymer and the resulting reaction products. The separation of the particles according to the size criterion is done by using the method of selective precipitation, which consists in centrifugation. The dimensions of the nanoparticles can be changed by varying the parameters of the reaction, for example the variation of the molar concentration of surfactants. A major advantage of this method is that the solvent dissolves in water. The verification of the quality, composition and morphology of the obtained nanomaterials was carried out by using МИИ -4 microscope, by the IR spectroscopy and by the X-ray diffraction method. The results of this research showed that PbTe nanocrystals are pure, without other phases, with a cubic structure (a = 0.646 nm). From the obtained diffractograms, by using the Scherrer equation, the average dimensions of the PbTe nanoparticles were estimated

Keywords: PbTe nanocrystals, solvatothermal method, nanocrystals obtaining.

G.29. ACCURACY-VALIDITY AND RELIABILITY OF SMARTPHONE ROM GONIOMETRIC APPLICATION

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Abstract. Previous research investigations have demonstrated that the universal goniometers had a high degree of reliability by regard of several joints, and are attested as the most used tools in daily clinical practice and research. Assessment of ROM (Range Of Motion) is one of the principle components of a clinical evaluation, as it assists the appreciation of joints and/or muscles limitations, applied as a standard (normal values) for the valuation of the achieves of rehabilitation processes, as well as possible vulnerabilities of injuries, mainly in ergonomic research. However, the degree of ROM requirements to be unprejudiced and reliable, as clients may be assessed and re-evaluated by multidisciplinary therapists equips and at distinctive times during the course of the rehabilitation interventions. Due for its very well recognized trustworthiness, the universal mechanical or electronic goniometers are counted the gold-standard and is the most usually in use assessment method in clinical field for the reason that it is non-invasive, economical and uncomplicated. Pondering the experimental procedures engaged in this study, joints angular sizes obtained with a mechanical classic goniometer were excellently correlated with those obtained using the free ROM © goniometric app (v.1.4) for my smartphone Samsung Galaxy S5. The experimental procedures engaged-which were conducted to examine the reliability of manipulating the smartphone like a clinical device: (I) different joints, (II) different adverse health conditions, (III) different goniometric applications and (IV) different devices-angular measurements acquired using a universal classic goniometer were highly correlated with those achieved using the ROM ® goniometric application, and this accuracy is stable regardless of the level of experience of the evaluators. A possible explanation is regardless of non-necessity of the anatomic reference point-positions knowledge for using a normal goniometer. Therefore, young clinicians may have a preference for this novel smart apps technology, especially those who have not as much of experience in joint angle measurements.

Keywords: goniometry, smartphone apps, validity, reliability, ergonomic.

G.30. ADAPTATION, RELIABILITY AND VALIDITY TESTING OF A ROMANIAN VERSION OF THE RAPID-ENTIRE-BODY-ASSESSMENT (REBA)

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Abstract. Focal reasoning of the present research paper was to culturally adapt and evaluate reliability and validity of REBA, developed originally by Sue Hignett and Lynn McAtamney from Nottingham City Hospital in 2000. As the authors say in the original publication: it is a tool for postural analysis in medical activity, specially designed to be sensitive to the type of unpredictable jobs found in healthcare. But the scores were defined by 3 ergonomists, coding 144 combinations of positions. Therefore, it analyzes and evaluates a certain working position (an instant), which must be classified in one of the 144 predefined methods. It is self-reported, brief, but it is appreciated that it isn't very easy to calculate final score. Thus, I construct a more facile and very similar application, using Excel. However, another strong argument is that surveys should not just be translated, because the consistency and validity of the questionnaires could be affected through cultural differences, for preserving its psychometric assets. Test-retest evaluation were performed in terms of relative reliability and internal consistency. Romanian version of REBA (total score) indicated very good test-retest reliability result (ICC = 0.93) and internal consistency (α Cronbach = 0.96). The correlations Spearman's meant for total score, activity and severity parameters were above 0.53. Moreover, the questionnaires had demonstrated satisfactory psychometric properties regard of reliability and validity and responsiveness, tested in ergonomics laboratory field. The form was a successful educational instrument for COVID isolation period. In conclusion, the present Romanian version of REBA is a reliable and valid instrument for the Entire-Body Assessment, in clinical settings, for practice and/or research, in occupational medicine, for ergonomists and physical and occupational therapists.

Keywords: ergonomics, REBA, Excel app, test-retest reliability, internal consistency.

G.31. ADAPTATION, RELIABILITY AND VALIDITY TESTING OF A ROMANIAN VERSION OF RAPID-UPPER-LIMB-ASSESSMENT (RULA)

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Abstract. Focal reasoning of the present research paper was to adjust and appraise reliability and validity of Romanian version of RULA. The most habitually accredited client-related instrument for Work-Related Upper Limb Diseases (WRULDs) risks is RULA, developed originally by McAtamney & Corlett from University of Nottingham in 1993 (Institute of Ocupational Ergonomy). It has been expended in clinical studies too, mainly as it is self-reported, brief, but it is appreciated that it isn't very easy to score. Thus, I construct a more facile and very similar application, using Excel. However, another strong argument is that surveys should not just be translated, because the consistency and validity of the questionnaires could be affected through cultural differences, for preserving its psychometric assets. Test-retest evaluation were performed in terms of relative reliability and internal consistency. Romanian version of RULA (total score) indicated excellent test-retest reliability (ICC = 0.98) and internal consistency (α C ronbach = 0.95). The correlations Spearman's meant for total score, activity and severity parameters were above 0.55. Moreover, the questionnaires had demonstrated satisfactory psychometric properties regard of reliability and validity and responsiveness. The form it was a very good educational

instrument, too. In conclusion, the present Romanian version of RULA is a reliable and valid instrument for the assessment of Upper-Limb Assessment, in clinical settings, for practice and/or research, in occupational medicine, for ergonomists and physical and occupational therapists.

Keywords: ergonomics, RULA, Excel app, test-retest reliability, internal consistency.

G.32. COMPARISON AND EFFECTIVENESS OF SANDIA FREQUENCY SHIFT AND SLIP MODE SHIFT FREQUENCY ACTIVE METHODS FOR ISLANDING DETECTION IN SINGLE-PHASE GRID-CONNECTED PHOTOVOLTAIC SYSTEMS

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Abstract. This paper gives a global comparison for the effects of two most important active anti-islanding detection methods which are the slip mode shift frequency (SMS) and Sandia frequency shift (SFS). The comparison is proved in detail through the simulation of the proposed single-phase photovoltaic (PV) system in the Matlab/Simulink. The obtained results show that islanding operation can be successfully detected and prevented using the studied active methods with adequate values for grid power and local load quality factor. In addition, adequate parameters of each method lead to minimize the non-detection zone (NDZ) and avoid the failure of the studied methods.

Keywords: active methods, boost converter, islanding, inverter, photovoltaic (PV), Sandia frequency shift (SFS), slip mode frequency shift (SMS).

G.33. RESEARCH ON ALGORITHMS FOR RECOGNIZING THE FEELINGS OF RESPONDENTS TO THE QUESTIONNAIRE

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Abstract. Sentiment analysis is a subset of natural language processing research. If we have a categorical weight based on a dictionary with a low score, then in the analysis of feelings no change was made, using deep learning. Preprocessed texts are formatted as a vectorization of words with unique numbers for pre-training word embedding patterns. The Word2Vec array with the most likely word is applied to the embedding layer as a weighted array to fit the DL models. Natural language processing (NLP) is the interaction between computers and human natural language. In natural language systems, textual instances are often represented as vectors in a characteristic space. For example, if space has only four characteristics (f1, f2, f3, and f4) and each of these characteristics is binary, that is, it can have values of 0 or 1, then an instance for which f1 is 0, f2 is 1, f3 is 1 and f4 is 0, can be represented by the vector. Training and testing courts are converted into such feature vectors, which are in turn processed by the machine learning system. A word can be associated with more emotions, in

which case it will have more entries in the affected lexicon. However, for a number of terms, there is great agreement among evaluators as to whether they are positive, neutral, or negative.) Similarly, some words express emotions as part of their meaning (and are thus associated with emotion). and some words are only associated with emotions. For example, anger and rage denote anger (and are associated with anger), while neglect, fighting, and betrayal do not denote anger, but are associated with anger.

Keywords: Sentiment analysis, NLP| machine learning, DL, vectors, Word2Vec.

G.34. USE OF GREEN ENERGY IN THE DOMAIN OF RAILWAY TRACTION

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Abstract. This paper aims to introduce the concept of energy in the Romanian railway vehicles. Thus, the possibility of using energy, namely photovoltaic energy, was for the Desiro SR 20 D vehicle, manufactured by Siemens between the years 2000 and 2007.

Keywords: energy, railway, photovoltaics

Cu sprijinul Consiliului Județean Bacău.
”Conținutul acestui material nu reprezintă în mod obligatoriu poziția oficială
a Consiliului Județean Bacău”.

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