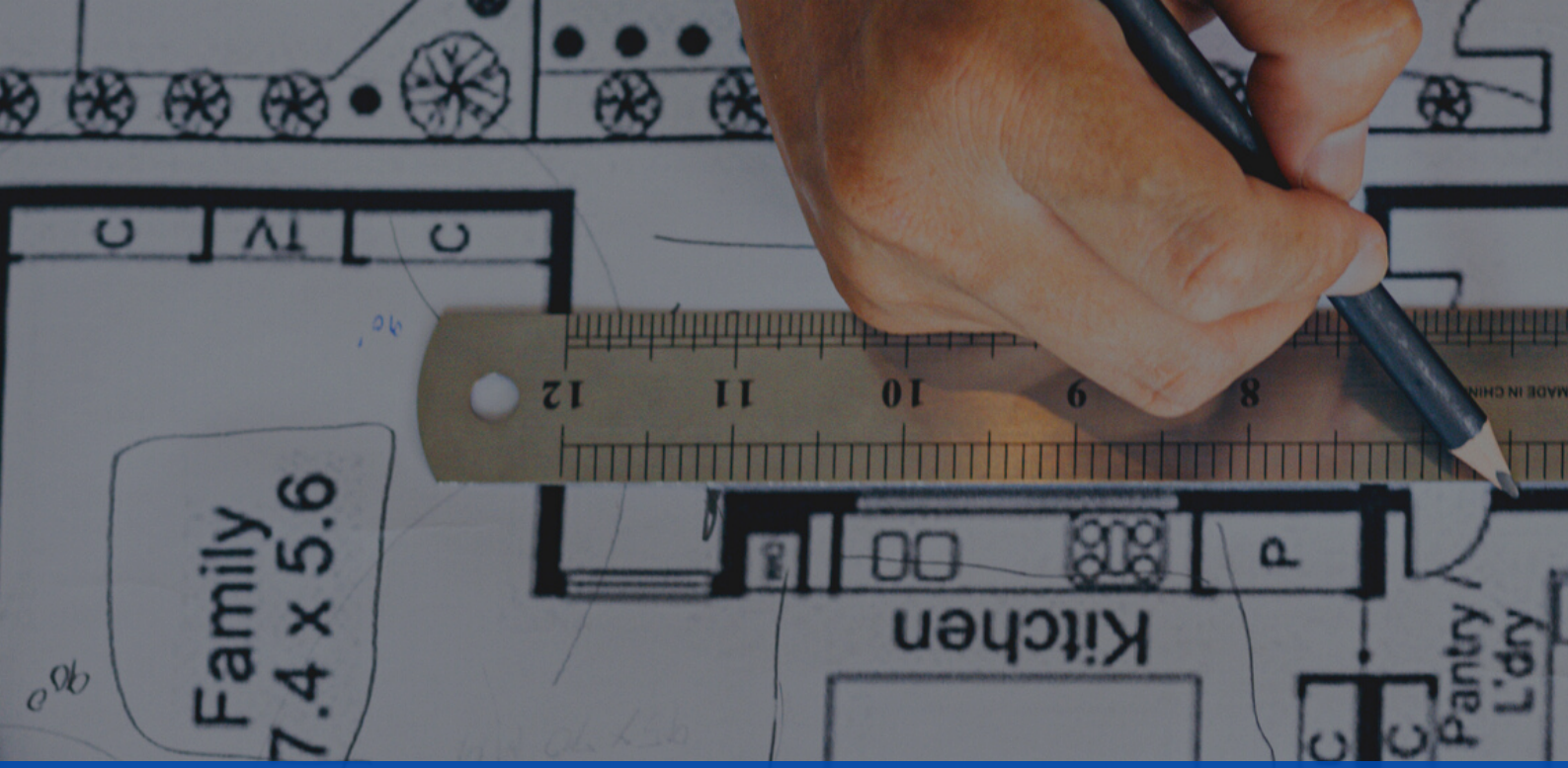

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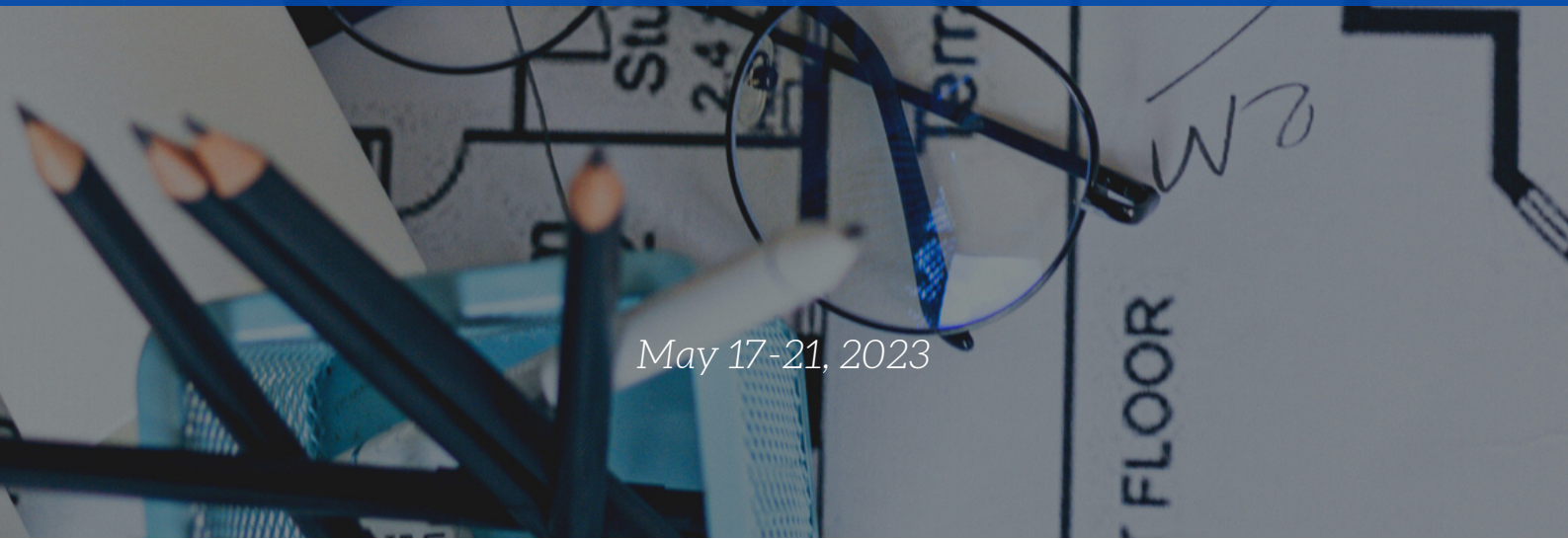
9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCES

BOOK OF ABSTRACTS



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MAY 17 TO 21, 2023 IN SARAJEVO, BOSNIA AND HERZEGOVINA

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On behalf of the organizing committee, we are pleased to announce that the ***9th*** *International Conference on Engineering and Natural Sciences* ***(ICENS 2023)*** *held from* ***May 17 to 21, 2023 in Sarajevo, Bosnia and Herzegovina****, Turkey. ICENS provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Engineering and Natural Sciences issues. The conference seeks to contribute to presenting novel research results in all aspects of Engineering and Natural Sciences. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Engineering and Natural Sciences. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in all areas of Engineering and Natural Sciences. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. The scientific program will focus on current advances in the research, production and use of Engineering and Natural Sciences with particular focus on their role in maintaining academic level in Engineering and Applied Sciences and elevating the science level. The conference's goal will to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in clinical trials and scientific experiments.*

Best regards,
Prof. Dr.Özer ÇINAR

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ICENS 9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
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COMPARISON OF DEEP CONVOLUTIONAL NEURAL NETWORKS IN BRAIN TUMOR CLASSIFICATION USING MAGNETIC RESONANCE IMAGING SCANS

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Abstract:

Brain tumor is the growth of abnormal cells in the brain that can lead to cancer, sometimes fatal, or seriously affecting quality of life. Early diagnosis of tumor significantly increases the chances of successful treatment. Traditional diagnosis of brain tumor by radiologists is made by examining a series of images produced by magnetic resonance imaging (MRI). Many automatic computer aided detection (CAD) systems have been developed to help radiologists achieve their goals of accurately classifying the MRI image. In this study, the performances of four deep transfer learning models were analyzed using Python programme to diagnose brain tumor types (glioma tumor, meningioma tumor, no tumor (normal) and pituitary tumor) using magnetic resonance imaging (MRI) scans. Brain Tumor MRI scan dataset used includes 926 glioma tumor, 937 meningioma tumor, 500 no tumor (normal) and 901 pituitary tumor images. The dataset was divided into 80%-20% (train - test), classified by deep convolutional neural networks based on data augmentation and transfer learning models. Classification performances of DenseNet169, InceptionV3, MobileNet and VGG16 models were compared using parameter values for 30 epochs, shear range = 0.1, batch size = 16, and zoom range = 0.1. According to the simulation results obtained from all models, an average classification accuracy of over 97.70% was obtained from each model. The average classification accuracy of InceptionV3 model (98.72%) was higher than DenseNet169 (98.15%), MobileNet (98.29%) and VGG16 (97.72%). In this context, the classification performance of InceptionV3 model was determined as 99.86% for no tumor (normal), 99.57% for pituitary tumor, 99.29% for glioma tumor, and 98.72% for meningioma tumor types.

Keywords: Brain Tumor, MRI Scans, Deep Transfer Learning, Densenet169, Inceptionv3, Mobilenet, VGG16 Models

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ICENS 9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
May 17-21 2023 Sarajevo (Hybrid Event)

THE EFFECT OF TOPICAL METFORMIN USE ON KERATIN 17 IN DIABETIC WOUND HEALING

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Abstract:

Upon wound formation, which is defined as a disruption of skin integrity for any reason, dermal fibroblasts, keratinocytes, and various inflammatory cells contribute in programmed cooperation to the not strictly separated but regularly functioning phases of the wound healing process. Keratin17, which is not normally expressed in the interfollicular epidermis, is accepted as a rapidly induced inflammatory marker in keratinocytes in the suprabasal layers of the epidermis after injury. There are many complications caused by hyperglycemia, which is the most serious clinical picture seen in diabetes, which occurs due to absolute or relative insufficiency of insulin secretion and/or action. Late/inadequate wound healing, which is one of these complications, is a serious problem for diabetic patients. Metformin, a pharmacological agent frequently used in the oral treatment of type 2 diabetes, has been proven to have anti-inflammatory effects as well as known antihyperglycemic effects. However, there are very few available studies showing that it provides this effect not only with oral use but also with topical use. We aimed to evaluate the effects of topically applying metformin on wound healing. For this purpose, we applied topical metformin (3mM) on a wound model created in healthy and diabetic rats. We examined the mRNA level of keratin17 by qRT-PCR and the amount of protein by IHC in biopsy samples taken on days 0, 3, 7, and 14. As a result, we showed that keratin17 acted as an inflammatory marker under the influence of diabetes, whereas keratin17 expression did not change in diabetic rats. With metformin treatment, it was observed that wound healing was induced, especially in the inflammation and proliferation stages, and thus the wound healing process progressed more healthily in terms of skin integrity. These results show that keratin17 plays important physiological roles during wound repair as well as being an inflammatory marker.

Keywords: Diabetes Mellitus, Wound Healing, Metformin, Keratin 17

*

ICENS 9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
May 17-21 2023 Sarajevo (Hybrid Event)

PREDICTION OF WELDED BIMROCK STRENGTH USING ARTIFICIAL NEURAL NETWORK AND REGRESSION ANALYSES

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Abstract:

Blocky pyroclastic rocks and agglomerates are typical welded bimrocks because of composing blocks embedded in a fine-grained matrix material. It is very difficult and even sometimes impossible to obtain laboratory specimens from bimrocks in accordance with the standards and/or suggested methods. Therefore, in recent years, researchers have generated predictive models for the estimation of the strength of such complex and heterogeneous rock masses. In this study, explanatory variables (predictors) controlling the strength of bimrocks outcropped in Konya city center were determined at first to predict their uniaxial compressive strength (UCS) through predictive models. For this purpose, properties such as dry unit weight(γ), volumetric block proportion (VBP), fragmentation fractal dimension (DF), roughness fractal dimension (DR), and the number of blocks (BN) of 47 core specimens extracted from bimrock were determined. Simple regression analyses were performed to reveal the relationships between these properties and the UCS. Then, artificial neural network (ANN) which is one of the soft computing techniques, and multivariate linear regression (MLR) analyses were conducted using the most effective properties on the UCS as independent variables. The performances of the predictive models generated from both techniques were compared with each other based on the coefficient of determination (R2) metric for both the training and testing phases. The results show that the predictive models proposed in this study can be used for strength predictions of bimrocks observed in Konya and its vicinity, which have similar characteristics.

Keywords: Bimrock, Fractal Dimension, Predictive Models, Artificial Neural Network

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ICENS 9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
May 17-21 2023 Sarajevo (Hybrid Event)

INVESTIGATION OF THE THERMAL PERFORMANCE OF A GROUND COUPLED CARBONATED SOFT DRINK COOLING SYSTEM WITH AN UNDERGROUND THERMAL ENERGY STORAGE TANK

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Abstract:

The demand for cooling systems that are energy efficient and environmentally friendly has been increasing in recent years. This study investigates the thermal performance of a ground coupled carbonated soft drink cooling system with an underground thermal energy storage tank. The system is composed of three main components: a chiller unit, a thermal energy storage (TES) tank, and a syrup room to be cooled. An analytical model was developed to determine the thermal performance parameters of the system using Duhamel's superposition and dimensionless correlations to solve the transient heat transfer problem around the TES tank. The analytical model includes energy expressions for the main components as well as a solution to the heat transfer problem surrounding the TES tank. The hourly temperature variation of water in the TES tank and other performance parameters, such as Coefficient of Performance (COP), are calculated. To do this, a simulation model was developed using MATLAB software. The study investigated the effect of various system parameters such as the size of the underground thermal energy storage tank, soil type, and Carnot efficiency on the thermal performance of the system. The findings reveal that granite is the most efficient type of soil for the cooling process. The results indicate that the ground coupled carbonated soft drink cooling system with an underground thermal energy storage tank is a feasible and energy-efficient solution for providing cooling for carbonated soft drinks.

Keywords: Duhamel's Superposition; Energy; Energy Storage; Ground Coupled Chiller; Syrup Room; Tes

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May 17-21 2023 Sarajevo (Hybrid Event)

COMPARISONS AMONG COMPUTATIONAL TOOLS FOR THE SIMULATION OF MIXED-MODE CRACK PROPAGATION

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Abstract:

Failure of engineering structures that may lead to catastrophic outcomes has always been a matter of common interest. One of these failure mechanisms is related to the fracture mechanics phenomenon that may be accompanied with fatigue loading. In most of the engineering problems which include cracked structures, determination of the crack growth direction is essential. These problems can become even more complicated if a complex structure is subjected to mixed-mode fatigue loading. Computational methodologies have become critical for this type of analysis. One of the well-known tools used for computational studies, finite element methods, was shown to be effective for the solution of fracture problems with fatigue loading. A mixed-mode fatigue crack growth simulation requires a growth law, determination of the direction for crack propagation, accurate calculation of fracture parameters such as the stress intensity factors and an automatic remeshing technique. Various programs are available to the users for the simulation of crack propagation phenomenon. However, many of these programs have limitations associated with element types used in the analysis, complexity of the geometries that can be handled or total number for degrees of freedom used in corresponding finite element models. These limitations are discussed in detail. A recent methodology that was developed to eliminate all these drawbacks is summarized. Advantages of the current procedure over other available tools are apparent as shown in this study. Work-in-progress and possible future applications of the new methodology are also given.

Keywords: Computational Fracture, Mixed-Mode Fatigue Crack Growth, Crack Propagation Tools

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May 17-21 2023 Sarajevo (Hybrid Event)

INFLUENCE OF DRY SLIDING TEST TEMPERATURE ON WEAR PROPERTIES OF THE PA 12 COMPOSITES

Burcin Ozbay Kisasoz[a]*, Ibrahim Tutuk[a], Ebubekir Koc[a], Sencer Sureyya Karabeyoglu[b], Alptekin Kisasoz[c]

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Abstract:

The Selective Laser Sintering (SLS) method is a promising method for the production of polymer-based composites. Polyamide is one of the most used matrix materials in polymer matrix composites. Also, ceramic additives are generally used as reinforcement materials. Especially, usage of the ceramic additives improves the mechanical properties and wear resistance of the polyamide. In this study, PA 12 matrix composites were produced with ceramic particulate additives. In order to examine the effect of ceramic additives on wear properties, dry sliding wear tests were carried out at room temperature and 80 °C, respectively. Worn surfaces were examined by light metal microscopy (LMM), scanning electron microscopy (SEM) and surface roughness analysis. It was observed that the ceramic reinforcement significantly improves the wear properties of PA 12.

Keywords: PA 12 Composite, Dry Sliding Wear, Ceramic Additives, High Temperature

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ICENS 9TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
May 17-21 2023 Sarajevo (Hybrid Event)

A PRELIMINARY STUDY ON POTENTIODYNAMIC POLARISATION BEHAVIOUR OF UNS S32760 DUPLEX STAINLESS STEEL

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Abstract:

Duplex stainless steels (DSSs) possess higher mechanical properties and corrosion resistance owing to dual-phase microstructure. DSSs have an approximately equal amount of ferrite and austenite phases. The ferrite phase provides mechanical strength and resistance to pitting corrosion, while the austenite phase provides ductility and general corrosion resistance. The desired ferrite and austenite phase balance can be achieved by the solution treatment applied above 1000 °C. Application of solution treatment at high temperatures or long periods at proper treatment temperature causes an excessive increase in ferrite ratio. An increase in ferrite content causes brittleness in the structure and a decrease in general corrosion resistance. In this study, the influence of solution treatment duration on the corrosion properties of the UNS S32760 duplex stainless steel is investigated. Solution treatments are applied at 1050 °C for 30 minutes, 60 minutes and 90 minutes. Then corrosion resistance and pitting potential of the samples are investigated by potentiodynamic polarization resistance and critical pitting potential tests, respectively. It is revealed that the solution treatment process is critical for the corrosion properties of the UNS S32760 duplex stainless steel alloy.

Keywords: Duplex Stainless Steels, Solution Treatment, Corrosion, Pitting Resistance

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May 17-21 2023 Sarajevo (Hybrid Event)

LAND COVER AND LAND USE CLASSIFICATION OF PATCH-BASED DENOISED SAR IMAGES

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Abstract:

Land cover and land use information contributes to the research of important environmental issues such as the change of forest areas on the earth over the years, the determination of the increase and decrease in the amount of water, the detection of irregularities on the earth, the determination of damage after natural disasters. Synthetic Aperture Radar (SAR) systems, which can provide images in all weather conditions without being affected by changes in weather events, are preferred for obtaining images. Classification of SAR images is crucial to the analysis of these images. Developing technology allows the recording and interpretation of many high-dimensional SAR images. Since SAR images represent large areas, the objects in the image take up a very small area. The study includes the use of a patch-based approach to classifying these areas. In addition, speckle noise may occur in SAR images due to scattering. In the proposed study, Sparsity-Driven Despeckling (SDD) filter was applied to remove speckle noise. Filtered and unfiltered SAR images were classified with the deep learning algorithm, and comparative results of the classification performance of the SDD filter were obtained. Experimental results have proven that the SDD filter significantly impacts classification performance.

Keywords: Synthetic Aperture Radar (SAR); Remote Sensing; Deep Learning; Land Classification; Image Processing; Despeckling

**This study is supported by Scientific Research Projects Coordination Unit of Karabuk University*

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May 17-21 2023 Sarajevo (Hybrid Event)

INFLUENCE OF MICROSTRUCTURE PROPERTIES ON POTENTIODYNAMIC POLARISATION BEHAVIOUR OF AGED DUPLEX STAINLESS STEEL

Mehmet Mogoltay Ural[a]*, Alptekin Kisasoz[b], Burcin Ozbay Kisasoz[c]

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Abstract:

Duplex stainless steels (DSSs) contain an equal amount of ferrite and austenite phases in the microstructure. The ferrite phase provides mechanical strength and resistance to pitting corrosion, while the austenite phase provides ductility and general corrosion resistance. The DSSs are used in various fields such as petrochemical industries, marine applications and the nuclear industry due to the combined properties of ferrite and austenite phases. Although these superior properties, the precipitation of the secondary phases like sigma, carbides and nitrides may deteriorate the mechanical properties and corrosion resistance. The sigma phase precipitates between the 600 °C and 1000 °C temperature range owing to the higher amounts of chromium and molybdenum. In this study, the influence of thermal conditions on the microstructure and corrosion properties of the AISI 2507 DSS is investigated. For this purpose, two different thermal cycles are applied at 600 °C. As a result of these cycles, the microstructure and corrosion properties of the samples are studied. Optical microscopy (OM) and scanning electron microscopy (SEM) examinations are applied in order to reveal microstructural properties. Moreover, corrosion properties are investigated by potentiodynamic polarization tests. It is observed that increasing the sigma phase ratio deteriorates the corrosion properties.

Keywords: Duplex Stainless Steels, Thermal Cycle, Sigma Phase, Corrosion

*

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MOLECULAR DOCKING OF NATURAL OCCURRING MEROTERPENOIDS WITH THE SARS-COV-2 MAIN PROTEASE

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*

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Abstract:

Meroterpenoids are naturally occurring products which possess mixed biosynthetic origin partially derived from terpenoids. Cytokinins, phenylpropanoids carrying isoprenoid side chains and certain alkaloids such as vinca alkaloids can be classified as an example. To date, many meroterpenoids were isolated and structurally elucidated. In spite of the fact that its well-known genetic and molecular features of SAR-CoV-2, there are still no therapeutic knockout treatments.

The present study deals with the molecular docking of natural occurring meroterpenoids with Covid-19 main protease protein. Structure/function relationships were also assessed.

Viral main protease enzyme was downloaded by RCSB PDB (Protein Data Bank) with the file extension of "pdb". ChemDraw was used for drawing the 2D structures of merotepenoids. Their 3D figures were turned by OpenBabel algorithms. An AutoDock 4.2 was used for molecular docking assay.

Docking results showed that meroterpenoids might be key modulator of SARS-CoV-2 main protease enzyme and used for preventing pulmonary fibrosis.

Keywords: SARS-Cov-2, Main Protease Enzyme, Merotepenoids, Molecular Docking

*

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FERMENTATION OF GREEN SMOOTHIE BY PROBIOTIC BACTERIA: BIOACTIVE, MICROBIOLOGICAL AND PHYSICOCHEMICAL PROPERTIES

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Abstract:

This study aimed to develop green smoothie-based probiotic drink formulation with spinach, parsley, kiwi, green apple and apple juice. Two commercial lactic acid bacteria (LAB), namely Bifidobacterium animalis ssp lactis B94 and Lactobacillus rhamnosus GG were employed to investigate the effects on the phenolic compounds, antioxidant capacities and physicochemical properties of the green smoothie during 7 days of storage at 4 oC. The physicochemical characterization of the formulations with better performance regarding the maintenance of probiotic counts was carried out. The pH, titration acidity, ash, dry matter, brix, density and color values of all samples were determined. After the period of storage for 7 days, results showed that both green smoothies were favorable matrices for LAB growth and the colony counts remained between 6,26 - 9,45 log CFU/mL after fermentation. Total phenolics and flavonoids in green smoothies were increased after fermentation period. The total phenolic contents of the samples were varied between 139,84 and 146,29 gallic acid equivalent in mg.L−1. Correspondingly, antioxidant capacities based on DPPH and ABTS methods were improved significantly and positively ($p \leq 0.05$) especially in the first day of the storage. Consequently, the green smoothie can be considered an appropriate vehicle for the incorporation of probiotics and fibers, whereas, the probiotic bacteria remain at a satisfactory level throughout storage.

Keywords: Antioxidant Capacity, Functional Beverage, Microbial Viability, Probiotics, Smoothie

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May 17-21 2023 Sarajevo (Hybrid Event)

IN SILICO ANALYSES OF USUAL AND UNUSUAL TRITERPENOID-BASED PAK1 INHIBITORS DERIVED FROM NATURAL SOURCES

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Abstract:

Triterpenoids are accessible in many higher plants as well as marine creatures. To date, more than 20.000 naturally occurring triterpenoids have been identified from distinctive natural sources. They have exhibited many varied bioactivities, including anti-HIF1 activation, cardioprotection, anti-inflammation, chemopreventive, anti-cancer and antidiabetic. A p-21-activating kinase PAK1 is a critical signaling molecule involved in a myriad of biochemical pathways and pathogenesis.

Triterpenoids were selected as ligand molecules and their chemical structures were drawn using ChemDraw 16.0 and saved in the file format of .sdf. Then, converted to the .pdb file format using the Open Babel: The OpenSource Chemistry Toolbox. Molecular docking simulation was performed through AutoDock 4.2. an automated docking tool. 3D structure of catalytic domain of PAK1 (PDB Code :1F3M) was downloaded from protein data bank. Discovery Studio Visualizer 4.5 software was used for removing sugar and undesired heteroatoms. Grid box size and x, y, and z axes were arranged to get maximum interaction.

Overall findings of our in silico study revealed that usual and unusual triterpenoids may be strategic molecules to inhibit the PAK1 enzyme. Moreover, the compounds tested should be also investigated in vitro and in vivo test models in an attempt to show their potency.

Keywords: Triterpenoids, PAK1, Molecular Docking, In Silico

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EDIBLE FILMS AND COATING AS CARRIER FOR PROBIOTICS AND THEIR POTENTIAL APPLICATIONS

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Abstract:

Edible coatings and films are an alternative innovative packaging system characterized by being more environmentally and customer friendly than traditional food preservation systems. Retaining probiotic cells in edible films or coatings is a positive approach that can overcome the limitations associated with the use of bioactive compounds in food products. The global probiotic market has been growing steadily in recent years, guided by the growing consumer demand for healthy eating and wellness. This has led food industries to develop new food products containing probiotics, and researchers to study certain properties of probiotics and their effects on human health. Recognition of the various health benefits associated with probiotic intake is recognized and well documented worldwide. However, due to the low stability of probiotics in food processing steps, food matrices and the gastrointestinal tract, encapsulation with edible films and coating materials is of high importance. The development of such new and functional edible packaging may also lead to new functional foods. This study will focus on the application of probiotics in edible biopolymeric matrices for the development of active edible films and coatings, as well as the innovative techniques used to obtain such packaging.

Keywords: Functional Foods, Active Packaging, Probiotics, Edible Films And Coatings

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EXOGENOUSLY APPLIED POLYPHENOLS, A NEW PERSPECTIVE TO MITIGATE ABIOTIC STRESS DAMAGE IN CROPS

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Abstract:

Abiotic stress factors such as salinity, drought, and heavy metal pollution limit agricultural production by causing loss of plant growth, product quality, and yield. Recent studies in the agricultural field have turned to sustainable approaches that will increase tolerance to environmental changes in plants and alleviate stress-induced damage. Plant polyphenols contain many bioactive molecules with chemical diversity that play a role in the metabolic processes of plants. It is also known that the synthesis and accumulation of phenolic compounds in plants increase as a stress response. In addition, polyphenols are involved in the defense system with their antioxidant activities and metal-chelating properties. Therefore, the use of polyphenols in stress tolerance studies is one of the promising ideas. However, the majority of previous studies have generally been limited to animal tissues and health-promoting effects. We summarized the stress tolerance, antioxidant activity, and photosynthetic capacity data obtained by exogenous treatments of plant-derived polyphenols to crop plants.The compilation of the results revealed that phenolic compounds alleviate growth retardation in plants under abiotic stress such as temperature, salinity, and heavy metal pollution. Again, polyphenol applications prevent oxidative damage and increase endurance against environmental conditions by activating the antioxidant system including SOD, POX, and CAT enzymes. In particular, flavonoid treatments support the increase in biomass by protecting photosynthetic reactions in thylakoid membranes. As a result, the use of natural phenolic compounds to increase plant tolerance to abiotic stresses has the potential to improve agricultural production.

Keywords: Abiotic Stress, Agriculture, Antioxidant System, Crop, Flavonoids, Polyphenols

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ANALYSIS OF Y-BALANCE TEST DATA USED IN SPORTS SCIENCES WITH MACHINE LEARNING METHODS

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Abstract:

The Y-Balance Test (YBT) is commonly used to measure athletes' balance and functional mobility. However, it is crucial to perform the test correctly to obtain accurate results. For precise measurement of YBT data, a separate measurement should be conducted for each individual, and the test grid and equipment must be set up correctly. Clear instructions and a standardized protocol must be followed to avoid misleading results, which can lead to incorrect information being used to design training programs to improve the performance of athletes and reduce injury risks. To address this challenge, a study was conducted using supervised learning methods to explore YBT data. We perform preprocessing steps and compare different performances of machine learning models in predicting YBT data. The study predicted YBT values, which require individual measurements, using different machine learning methods based on determining features such as age, gender, and training age. The experimental results demonstrated that the predicted YBT values could aid in designing training programs to enhance the performance of athletes and reduce injury risks. Overall, the study findings highlight the importance of accurate YBT data measurement and the potential of machine learning methods in predicting YBT values based on an individual's specific features. This approach can provide valuable insights to coaches, trainers, and healthcare professionals to create tailored training programs to improve athletes' balance and mobility while minimizing injury risks.

Keywords: Y-Balance Test (Ybt), Machine Learning, Regression, Sport

**This study is supported by Scientific Research Projects Coordination Unit of Karabuk University.*

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FIRE RISK ASSESSMENT IN HIGH RISE BUILDINGS WITH COMBUSTIBLE ALUMINUM COMPOSITE PANELS

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Abstract:

This paper aims at presenting a novel model of the Aluminium Composite Panels (ACPs) cladding system. The main objective of this work is to find the air gap and the suitable and economical number of fire barriers between the external wall of the high-rise buildings and the ACPs used for cladding.

For this purpose, a simulated fire experiment was conducted using Grasshopper and Galapagos software. The integrated novel model of ACPs proposed changes in the material used, like wet and hot insulations using special latest products like Fenomastic hygiene emulsion paint.

The input parameters used to investigate the validity of the proposed numerical model are the initial fire temperature, the facade material elements, the facade elements' properties, the elements' fire resistance, and the time.

As a result, the optimal value for the air gap is 111 mm. Furthermore, using four barriers in the air cavity plays a major role in neutralizing and limiting the fire spread to the external facades, minimizing the risk, and reducing harmful effects to the inhabitants of the high-rise buildings.

These findings and results will contribute to improving and enhancing the behaviour of the fire flame in high-rise buildings, in addition, to eliminating the fire risk for the habitant's life in the high levels of tall buildings and conserving the environmental periphery including neighbouring buildings, human beings, vehicles, and all other equipment and materials.

Keywords: Aluminium Composite Panels (Acps), CAVITY BARRIERS, AIR GAP, GALAPAGOS

**THIS STUDY IS A PART OF PHD DESERTATION*

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THE DIMENSIONS OF NETWORK EQUIPMENT OF MOBILE COMMUNICATION SYSTEMS THAT CAN BE USED ON SHIPS AND THE IMPORTANCE OF THE ELECTROMAGNETIC FIELD VALUES THEY DISPENSED FOR MARINE COMPANIES

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Abstract:

IT is the fastest growing and changing sector today. The developments in this sector are still continuing at a great pace. There are two basic elements of the ICT sector as communication and content. Today, there are great changes and developments especially in communication infrastructures. Wireless systems with different features and frequencies are used in communication infrastructures. Some of the maritime communication systems are for inter-ship/land communication, others are for intra-ship communication. In recent years, developments in the ICT sector have brought about a great change and diversification in the communication devices used both inside the ship and between the ship/land. The vast majority of these systems are wireless technologies. Wireless devices operate at different powers and frequencies. All wireless systems generate electromagnetic fields (radiation). The antenna dimensions of these devices and the electromagnetic field intensities they emit vary according to the frequency values used. These values are also of great importance for the health of seafarers working and living on ships. Because the volume and electromagnetic field values of the radio devices that can be used in mobile communication on ships of different sizes should be limited. In addition, the electromagnetic field intensities emitted by these must not exceed international values in terms of human health. This issue is also extremely important for maritime companies. Because shipping companies are primarily responsible for the health of seafarers working on their ships. In addition, new communication systems have different communication capabilities. Especially in recent years, the data communication feature of these devices has been developing gradually. These features both offer new opportunities for ships and ship companies in terms of communication and bring additional responsibilities.

Keywords: Ship Companies, Maritime Industry, Information Systems

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ANALYSIS OF MULTI-LEVEL PARABOLIC LEAF SPRING SYSTEMS DESIGNED BY USING DIFFERENT MATERIALS

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Abstract:

The deformations that may occur on multi-level parabolic leaf spring systems due to the external effects such as vibration and force should be analyzed before the system designed. In this work, ANSYS based modal and deformation analyzes have been carried out for 10-7 parabolic leaf spring systems designed by using the Stainless Steel, Titanium Alloy and Aluminum Alloy materials. From the deformation analyzes realized under the force values of 1000 N, 3000 N and 5000 N, it was observed that the maximum total deformation values were obtained for Aluminum Alloy material and the relevant deformations were obtained as 2.7620 e-5 m, 8.2861 e-5 m and 1.3810 e-4 m, respectively. In order to analyze the effects of the different materials on the resonance frequencies, the modal analyzes were also realized under the 5000 N force value. The modal analyzes results represent that the resonance frequency value intervals were emerged as [141.3 Hz-515.14 Hz] for Stainless Steel material, [128.66 Hz-471.47 Hz] for Titanium Alloy material and [142.89 Hz-522.97 Hz] for Aluminum Alloy material.

Keywords: Leaf Spring System, Total Deformation Analysis, Modal Analysis

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IMPROVEMENT OF STICK-SLIP NOISE IN CHASSIS SHOCK ABSORBERS

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Abstract:

In this study, a test method is applied to detect stick-slip noise in the shock absorber, and a numerical comparison of different noise levels is made. It has been determined on which road types the shock absorber makes the stick-slip noise and a test signal suitable for this road type has been generated. This generated road signal was run on the servo-hydraulic test machine and the vibration levels of the shock absorber from the chassis connection point were recorded with a data acquisition device. Then, these collected data were analyzed by creating time vs amplitude and frequency vs amplitude graphs, and the stick-slip noise could be seen in graphics. After detecting the stick-slip noise by numerically studies have been carried out to reduce the sound by changing the combination of oil seal and seal oil.

Keywords: Stick-Slip Noise, Friction Induced Vibration, Shock Absorber, NVH Testing

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STRUCTURAL, PHYSICAL AND THERMAL PROPERTIES OF PLA FILMS PLASTICIZED WITH NATURAL OIL OBTAINED FROM LIQUIDAMBAR ORIENTALIS

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Abstract:

Polylactic acid (PLA) is the most extensively used commercial biodegradable polyester having great application potential regarding its superior structural features and physical properties such as good transparency, mechanical durability and easy processing like other commodity thermoplastics. PLA is produced by condensation polymerization of lactic acid that can be obtained from fermentation of various renewable polysaccharides like corn, rice starch, and sugar beet. Recently, commercial applications of PLA, as an alternative green material instead of polyethylene (PE), polypropylene (PP) and polystyrene (PS), have greatly increased in many areas such as (i) food packaging or disposable cutlery due to good barrier properties, (ii) medical technology, (iii) filament for 3D printing, (iv) automotive plastics, (v) production of disposable clothes, personal hygiene products, and industrial wipes. On the other hand, PLA possesses some structural and physical weaknesses such as low thermal stability, slow crystallization rate, low melt strength, and brittleness. Therefore, a considerable research effort, including PLA compounding with different polymers, plasticizers, additives, and fillers, has emerged to expand its applications. In this study, plasticization effects of bio-based natural oil on the physical properties of PLA films were investigated. Natural oil obtained from liquidambar orientalis was introduced to PLA (as 10, 20, and 30 phr) by melt blending and solution mixing methods. Effect of oil amount on the glass transition temperature, melt and cold crystallization behaviors, and degree of crystallinity values of samples were determined by thermal analysis conducted in a differential scanning calorimetry (DSC). Solid state viscoelastic properties of PLA films were also characterized with dynamic mechanical analysis (DMA) tests.

Keywords: PLA, Bio-Based Plasticizer, Crystallization

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APPROACHES DEVELOPED TO SOLVE FRACTIONAL DIFFERENTIAL EQUATIONS

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Abstract:

Fractional calculus is not a new topic, in reality it has almost the same history as that of classical calculus. In this paper, new approaches are developed to solve a class of nonlinear fractional differential initial value problems with fractional derivative defined in Caputo sense. Two numerical methods have been presented, Fractional Adams-Bashforth-Moulton Method (FABMM) and Fractional Differential Transformation Method (FDTM) compared with Adomian Decomposition Method (ADM), used for very specific type of problems. The methods are used on two different nonlinear fractional differential equations of the form, , with and without exact solution for the same initial condition . We present new results that deal with the Adomian Decomposition Method (ADM), suitable to handle fractional calculus applications. The results are obtained with comparisons made between FDTM, FABMM and the exact solutions at each integration point, given, both graphically and tabularly, for different fractional orders , constant step-size and small time interval . Our work, with using symbolic software packages as Wolfram Mathematica 12.1, can be considered as an alternative to existing techniques, and will have wide applications in science and engineering fields.

y(0)=0. We present new results that deal with the Adomian Decomposition Method (ADM), suitable to handle fractional calculus applications. The results are obtained with comparisons made between FDTM, FABMM and the exact solutions at each integration point, given, both graphically and tabularly, for different fractional orders from 0 to 1, constant step-size h=0.01 and small time interval. Our work, with using symbolic software packages as Wolfram Mathematica , can be considered as an alternative to existing techniques, and will have wide applications in science and engineering fields.

Keywords: Keywords: Fractional Differential Problem, Adominal Decomposition Method, Fractional Adams-Bashforth-Moulton Method, Fractional

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INVESTIGATION OF LITHIUM CONTENT OF BORON TAILINGS

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Abstract:

Lithium, the metal of the future, has an unbalanced global distribution and is at risk of supply disruptions in many countries. According to the Geological Survey Institution of the US, lithium consumption jumped from 20 thousand tons to 93 thousand tons from 2010 to 2021. According to the latest data, usage of lithium in battery fieldhas increased from 23% to 74%. It is called the most important energy metal of the 21st century not only for batteries but also for nuclear fusion. Mineral resources and lithium in brine are economic resources and have been exploited one after another. Due to the depletion of lithium ore and the high cost of solvents used for separate from salt lake brine, interest in the lithium-containing clay is growing. Also, the increasing environmental awareness has a made itself felt in the mining sector, and the issue that disposed of the damage caused by the wastes generated as a result of mining activities is also at the forefront.

Lithium is an alkaline element and does not occur freely in nature. It is usually found as ionic compounds. Lithium-containing clay deposits can be broadly classified as Jadarite type and Hectorite type deposits. Hectorite deposits have a wide distribution. It is known that , lithium in smectite clays occurs in hectorite. This study aims to characterization the boron clays obtained from the boron waste dams of Balikesir region and to examine the lithium content. As a result of the tests performed on clay samples taken from six different points, the highest Li content was determined as 1823 ppm Li. According to the sieve analysis, the d80 grain size of this sample was 1600 µm,even so the d80 grain size was determined as 3.91 µm according to the analysis made with the Horiba brand grain size analysis device. In XRD studies, it is seen that this sample contains a major amount of Saponite, Calcite, Colemanite. However, as a result of the detailed characterization for clay mineralogy, the presence of hectorite, saponite and montmorillonite minerals from the smectite group clay minerals were determined.

Keywords: Boron, Lithium, Characterization Of Boron Tailings, Clay Mineralogy

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REVISED STRATIGRAPHY OF JURASSIC SEDIMENTS FROM KOSRELIK AND KOSRELIKKIZIGI AREAS (N ANKARA)

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Abstract:

Transgressive and widespread sediments of the Jurassic Period and various geological units from north Ankara provide paleontological and sedimentologic data to interpret the past geological history. In the study, we made a proper stratigraphical revision for the Jura sediments from the Kosrelik and Kosrelikkizigi areas in northern Ankara. For the revised stratigraphy, the obtained field and laboratory work results and the literature information were used. A Total of 47 samples were collected from the Jurassic-aged units. Two stratigraphical sections were measured. In the area, the Bayirkoy Formation, more than 600 meters in thickness and early Jurassic in age comprise the following members from the bottom to top: Corakliktepe, Kosrelik, Hacikavagi, Beytepe and Turnacesme members. It starts with transgressive basal conglomerates and continues with arkosic quartzitic sandstones, rhythmic marl and mudstone sediments and ends with sandstones. Foraminiferal findings support the Jurassic age. Lithological and faunal contents of the Jurassic sediments show open marine deeper paleoenvironment.

Keywords: Jurassic, Kosrelik, Kosrelik Kizigi, Paleoenvironment, Stratigraphy

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BENTHIC FORAMINIFERAL FOSSILS: INDICATORS AND TRACERS OF CLIMATE CHANGE

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Abstract:

Climate change is one of the most pressing environmental issues of our time, and its effects on the Earth's ecosystems are of great concern to scientists and policymakers alike. Benthic foraminiferal fossils are increasingly recognized as important tools for studying the impact of climate change on the marine environment. As sessile organisms, benthic foraminifera are highly sensitive to changes in their environment, and their fossilized remains provide a record of past environmental conditions. In this study, we review the current state of knowledge regarding the use of benthic foraminiferal fossils as indicators and tracers of climate change. We discuss the various factors that affect the abundance and diversity of benthic foraminiferal communities, including changes in water temperature, salinity, and oxygen levels. We also examine the role of benthic foraminiferal fossils in reconstructing past sea level changes, ocean circulation patterns, and sedimentary environments. Fossilized foraminifera have been used as important indicators of environmental change in the Paleogene and Neogene periods. Alveolinids, such as Alveolinella quoyi and Alveolinella hanai, are indicative of warm, shallow water environments, while Nummulites, particularly the species Nummulites fichteli, are associated with high-energy, shallow water environments. Orbitolites, including Orbitolites complanatus and Orbitolites media, are commonly found in reef and lagoon settings and are also indicative of warm, shallow water environments. These fossilized foraminifera provide valuable information about past environmental conditions and can be used to better understand the impact of climate change on marine ecosystems. Finally, we highlight the potential of benthic foraminiferal fossils as tools for predicting future climate change impacts on marine ecosystems. Our study underscores the importance of benthic foraminiferal fossils in understanding the impact of climate change on the marine environment, and provides a foundation for further research in this field

Keywords: Benthic Foraminiferas, Climate Change, Fossils, Paleoecology

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COMPARISON OF TOTAL HARMONIC DISTORTION IN TWO-LEVEL AND CASCADED MULTILEVEL INVERTER

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Abstract:

Voltage source inverters are classified according to the number of levels that are present in the waveform of the output voltage as two-level and multilevel inverters. A multilevel inverter generates more than two levels in the output voltage waveform, while a conventional two-level inverter only generates two levels in the output voltage waveform. When comparing inverters with the same power ratings, multilevel inverters are increasingly being used due to their many advantages. The multilevel inverter is very effective since it can remove the low-order harmonics in the output waveform without affecting the high-order harmonics. Thus, the multilevel inverter's output voltage has less harmonic fluctuation compared to the two-level inverter. This study compares the performance of a two-level inverter with a five-level cascaded H-bridge multilevel inverter based on total harmonic distortion (THD) in the output waveform. While the two-level inverter employs the bipolar sinusoidal pulse width modulation (SPWM) technique, the five-level cascaded H-bridge multilevel inverter uses the phase disposition multicarrier pulse width modulation (PD-MCPWM) technique to get the optimal switching angles for harmonic reduction of the output waveform. The modeling and simulation of each model are carried out in Matlab/Simulink and the analysis results are presented. According to the simulation results, the five-level cascaded H-bridge multilevel inverter has a lower THD of the output voltage and current and provides improved power quality at the output when compared to the conventional two-level inverter.

Keywords: Total Harmonic Distortion, Harmonic Analysis, Two-Level Inverter, Multilevel Inverter, SPWM, PD-Mcpwm

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WIND TURBINE POWER ESTIMATION BASED ON ANFIS UNDER CHANGING AIR DENSITY AND WIND SPEED CONDITIONS

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Abstract:

Within the scope of the study, a mathematical model of a wind turbine with a power value of 600kW, which is in the power range used extensively today, was created in a simulation environment. An Adaptive Neuro-Fuzzy Inference system (ANFIS) model was also created in the same simulation environment. The training of ANFIS was made using the data of a real wind turbine, which provides similar power values with the mathematical model. Air density and wind speed and output power values of the wind turbine were used in the training of ANFIS. In the next step, wind speed and air density data of Nevsehir province were transferred to the simulation environment. Both the mathematical wind turbine model and the Fuzzy Inference System (FIS) model created as a result of ANFIS training were run on the same data set. Both generated models were run at the same time in the simulation environment and the power data produced were compared. It has been observed that the ANFIS model, which has achieved a great deal of success on non-linear systems, predicts the wind turbine output power value within the scope of the study more than 90% correctly. As a result of the obtained comparison, it has been observed that the farthest error value, at which the training with ANFIS is differentiated according to the mathematical model, is around 10%.

Keywords: Anfis, Wind Energy, Wind Turbine Model, Wind Turbine Power Estimation

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COMPARISON OF SUPPORT SYSTEMS USED IN UNDERGROUND MINING

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Abstract:

The consolidation process carried out in order to prevent the collapse of a hole opened in the mineral deposit is called support. During underground mining operations, underground galleries are opened due to works such as reaching the ore, determining the boundaries of the ore, and ore excavation. These galleries, which are opened for production and preparation in underground mines, must maintain their stability throughout the production process. For this purpose, temporary or long-term support systems are used. In recent years, with the development in equipment and materials, support systems with faster and simpler installation procedures such as rock bolts, steel mesh, shotcrete, and cemented rock fill have been used to manage more complex and more difficult underground excavations and control ground instability. These support systems are used in single or mixed form when the rock is weak or strong. In this study, a general evaluation of the advantages and disadvantages of underground support systems used in underground mining has been made.

Keywords: Underground Mining, Support Systems, Rock Bolts, Shotcrete, Steel Mesh

[*]Department of Scientific Research Projects of the University of Van Yuzuncu Yil, Van, Turkey, Project ID: FYL-2023-1064

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A GENERAL EVALUATION OF THE USAGE OF FLY ASH IN CONCRETE MIXTURES

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Abstract:

Concrete is a building material that uses cement, fine and coarse aggregates, water, and different chemical additives. In their mixtures, Portland cement (PC) or cement with additives is used as binding material. The release of a high amount of carbon dioxide (CO2) gas into the environment during cement production causes significant environmental problems. To reduce the damage caused by cement production to the environment, it is important for sustainability to replace cement with pozzolanic materials in concrete mixtures. The most important pozzolanic materials obtained from various industrial activities in our country are blast furnace slag, silica fume, and fly ash (UK). UKs are obtained from thermal power plants that produce electricity. UK is stored in dust catchers called electro filters or cyclones at the top of the chimney while burning very low-calorie coals, which are not generally used in industrial facilities, by grinding them into fine grain size and burning in the thermal power plant furnace. Although it does not show a binding feature on its own, it provides a significant advantage in terms of cost by being used to replace cement. This study is thought to make a general evaluation of the potential of the UK in our country and its use in concrete mixtures.

Keywords: Concrete, Fly Ash, Sustainability

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May 17-21 2023 Sarajevo (Hybrid Event)

FINDING THE INFLUENTIAL PARAMETERS ON DIFFERENT POPULATION-LEVEL OUTCOMES IN AGENT-BASED EPIDEMIC MODELS

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Abstract:

Agent-based simulation modeling is frequently used for decision-making under epidemic conditions, enabling public health experts to evaluate the effectiveness of potential intervention strategies. These include pharmaceutical (e.g., vaccination) and non-pharmaceutical (e.g., social distancing) interventions whose effects differ on population-level outcomes. In this study, we use linear regression and random forest models to assess the effectiveness of a set of medical and social distancing measures on three different population-level outcomes: attack rate, the peak day of the epidemic, and the maximum daily number of ascertained cases. These models also complement each other: while random forest models provide the importance of each intervention in predicting the selected population-level model outcomes, linear regression models show the direction of the effect of each intervention strategy. We use an open-source agent-based model, FluTE, for experimentation. Our results show that linear regression predicts the attack rate more accurately than random forest. However, random forest models are more accurate in predicting the peak day of the epidemic and the maximum daily number of ascertained cases. We also observe that the effectiveness of interventions depends on the outcome. For example, while the daily number of vaccines administered is a critical factor for the attack rate and the maximum daily number of ascertained cases, it is not significant for the peak day of the epidemic.

Keywords: Agent-Based Modeling, Epidemiology, Epidemic, Machine Learning, Public Health

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ANALYSIS OF THE COMBINED USAGE OF PLASTICIZER AND ACCELERATOR EFFECTS ON MICROSTRUCTURE FOR MORTAR

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Abstract:

During the production process of mortar many of additives can be used jointly to obtain efficient workability properties. In this situation strenght of mortar depends on the correct ratio of admixtures. This study focuses on analysing of mortar samples that have different doses of plasticizer and set accelerator admixture combinations. Various effects in the strenght and durability are investigated by experimental methods. Scanning electron microscope (SEM) images were obtained for observations. In the investigation unit weight, ultrasonic pulse velocity, comprehensive strenght, setting time tests and microstructure analysis tests were performed in three different dosage mixtures and the obtained data were evaluated. As a result of the tests carried out, the use of the admixtures in different dosages caused decreasement in physical properties of the concrete. Therefore, as a result the coexistence of additives must be sensitively controlled and the required dosage adjustments must be made in production.

Keywords: Plasticizer, Accelerator, SEM, Microstructure, Dosage

[*]This study is supported by Eskisehir Osmangazi University Scientific Research Projects Commission (ESOGU BAP) with the 2016-114

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ENHANCING THE FLAME RESISTANCE PROPERTIES OF KRAFT PAPERS USED AS ARCHIVE-STORAGE MATERIALS WITH SOME MCC/CMC-REINFORCED CHEMICALS

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Abstract:

As it is known, the low flame resistance is one of the negative characteristic features of Kraft papers which find a wide usage area. This feature needs to be improved especially in paper types that will be used for archival-storage and protection purposes. The aim of this study was to increase the flame resistance of Kraft-based paper materials (envelope, box, etc.) to be used for the purpose of storage-archive. In this study, MCC (microcrystalline cellulose) / CMC (carboxymethyl cellulose) reinforced lignin, tannin and borax were used. The immersion method was chosen for the application of chemicals. Limited oxygen index levels (LOI) and UL-94 flammability tests were performed on the treated papers to determine their burning characteristics and flame resistance properties. As a result of this study, it was seen that the chemicals applied to the kraft papers by immersion method improved the fire resistance properties and also positive results have been obtained especially with MCC/CMC reinforcement.

Keywords: Flame Resistance, Kraft Paper, Borax, Lignin, Tannin, MCC, Cmc

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INVESTIGATION OF THE ELECTROCHEMICAL BEHAVIOR OF A PILLAR[5]ARENE DERIVATIVE ON THE GLASSY CARBON ELECTRODE SURFACE

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Abstract:

Pillarenes are macrocyclic compounds composed of hydroquinone units linked by methylene bridges at para positions [1]. Although pillar[5]arene shows electrochemical activity related to the oxidation of hydroquinone units, the number of studies on its use in electrochemical sensors is very few [2].

Ascorbic acid (AA), known for its reducing properties, is easily oxidized to dehydroascorbic acid. It is a powerful antioxidant and fights against free radical-induced diseases. Excess ascorbic acid can irritate the stomach, and oxalic acid, one of its metabolites, causes problems in the kidneys. Sometimes, excess amounts of ascorbic acid can result in the inhibition of natural processes occurring in food and can cause a deterioration of taste/aroma [3-5]. Thus, the determination of ascorbic acid has become important.

In this study, the electrochemical behavior of a newly synthesized pillar[5]arene derivative on the glassy carbon (GC) electrode surface was investigated using the electrochemical method. The GC electrode surface was modified with gelatin/azido- pillar[5]arene to improve the conductivity on the electrode surface. Electrochemical experiments were carried out to determine the usability of the prepared electrode surface in the determination of ascorbic acid. Electrochemical experiments were carried out in different pH media at different scan rates to determine the optimum conditions. As a result, it was established in this study that azido-pillar[5]arene was sensitive to ascorbic acid at different pH and concentrations.

Keywords: Pillar[5]Arene, Electrochemical Method, Electrode Modification

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UTILIZATION OF PVC WASTES ON CONCRETE BICYCLE ROADS

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Abstract:

Polyvinyl-chlorine (PVC) is a material with a wide range of utilities such as construction, packaging, medical materials, and the automotive sector. Because these materials have much time to disappear in nature, it is vital to utilize PVC chip wastes. Concrete was applied on the roads of the Northern campus of Hittites University. PVC chips obtained from door and window manufacturing shops have been added to the concrete mix of concrete bicycle roads. PVC chips were utilized in the concrete by eliminating 0,5 mm aperture size. PVC chips have been added into the transit-mixer from the concrete plant to the construction site. PVC chips were used in the mixture of concrete in the ratio of 1-3 and 5 kg/m3. The largest aggregate size in the mixture is 22.4 mm. The addition of PVC chip to the concrete mix reduced the precipitation value of fresh concrete from 190 mm to 150 mm. The addition of PVC chip has slightly increased the air void ratio of the fresh concrete. Hardened concrete tests, compression resistance, tensile splitting strength, and modulus of elasticity were performed. PVC has been compared with the additive control concrete sample. 5 kg/m3 PVC chip, which was added to the mixture, has reduced pressure resistance by about 11%. It can be stated that the PVC chip contributes positively to the tensile splitting strength and elasticity module values of the concrete. Apart from these tests, firstly, modulus of elasticity tests was carried out on 15*30 cm cylinder samples. Then, compression resistance and tensile splitting strength tests were conducted on the same samples. In the modulus of elasticity test, variations in compression and tensile splittings strengths of examples exposed to repeated compression loads were examined. After the test of elasticity modulus, the compression resistance and tensile-splitting strengths of the samples have decreased. It has been concluded that very thin PVC chip wastes can be utilized in a concrete mix.

Keywords: PVC Wastes, Concrete, Concrete Roads,

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UTILIZATION OF PVC WASTES ON CONCRETE ROADS

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Abstract:

Polyvinyl-chlorine (PVC) is a material with a wide range of utilities such as construction, packaging, medical materials, and the automotive sector. Because these materials have much time to disappear in nature, it is vital to utilize PVC chip wastes. Concrete was applied on the roads of the Northern campus of Hittites University. PVC chips obtained from door and window manufacturing shops have been added to the concrete mix of concrete bicycle roads. PVC chips were utilized in the concrete by eliminating 0,5 mm aperture size. PVC chips have been added into the transit-mixer from the concrete plant to the construction site. PVC chips were used in the mixture of concrete in the ratio of 1-3 and 5 kg/m3. The largest aggregate size in the mixture is 22.4 mm. The addition of PVC chip to the concrete mix reduced the precipitation value of fresh concrete from 190 mm to 150 mm. The addition of PVC chip has slightly increased the air void ratio of the fresh concrete. Hardened concrete tests, compression resistance, tensile splitting strength, and modulus of elasticity were performed. PVC has been compared with the additive control concrete sample. 5 kg/m3 PVC chip, which was added to the mixture, has reduced pressure resistance by about 11%. It can be stated that the PVC chip contributes positively to the tensile splitting strength and elasticity module values of the concrete. Apart from these tests, firstly, modulus of elasticity tests was carried out on 15*30 cm cylinder samples. Then, compression resistance and tensile splitting strength tests were conducted on the same samples. In the modulus of elasticity test, variations in compression and tensile splittings strengths of examples exposed to repeated compression loads were examined. After the test of elasticity modulus, the compression resistance and tensile-splitting strengths of the samples have decreased. It has been concluded that very thin PVC chip wastes can be utilized in a concrete mix.

Keywords: PVC Wastes, Concrete, Concrete Roads,

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FOREST FIRE DETECTION USING UNMANNED AERIAL IMAGES AND DEEP LEARNING METHODS

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Abstract:

Forests are the most crucial oxygen source and have an essential role in the life of living things. Therefore, it is necessary to protect forests for ecological balance. However, forest fires disrupt the environmental balance and cause significant damage to forests. While forest fires are easy to put out when they first appear, it is quite difficult to extinguish when they spread over large areas. Recently, images obtained from unmanned aerial vehicles have facilitated the detection of forest fires by detecting fire and smoke in large areas. Deep learning algorithms provide faster and more accurate analysis of these images. This study uses the End to End Object Detection with Transformers (DETR) algorithm, a robust deep learning algorithm. Experimental studies show that the DETR algorithm has promising results in detecting forest fires.

Keywords: Deep Learning, Uav, Object Detection, Forest Fire

[*]This study is supported by the Scientific and Technological Research Council of Turkey (TUBITAK) with the BIDEB-2218 program.

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DETERMINING THE STRUCTURAL PERFORMANCE OF A HISTORIC WATER SUPPLY CHIMNEY

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Abstract:

This study covers the seismic performance evaluation of a chimney embedded of historical water supply structure built in 1583. In the study, the current state of the chimney was modeled and performance analyses were carried out based on the survey and soil properties of the examined chimney. In this context, first of all, seismic performance analyzes were carried out by considering soil loads, surcharge loads, and loads caused groundwater as static effects. Next, the structure loads and ground-induced earthquake effects were calculated and applied to the structure. Earthquake effects were divided into three groups based on the structure mass, soil and surcharge effects, and global ground relative displacement. As a result of the analyses, it has been determined that the chimney meets the axial strength conditions under static effects based on the conditions specified in the relevant regulations. As a result of the analysis, the structure provides the "Controlled Damage" performance level for the DD-3 earthquake level, but does not provide the "Controlled Damage" performance level for the DD-2 earthquake level. The presented study is expected to make a significant contribution to the literature in terms of presenting the methodology to be followed in determining the seismic performance of chimney structures.

Keywords: Historical Structure, Water Supply Chimney, Seismic Performance, Soil Study

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ANALYZING SEISMIC PERFORMANCE OF A TIMBER STRUCTURE: MODELING AND ANALYSIS CONSIDERATIONS

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Abstract:

Seismic performance analysis is a critical step in assessing the structural safety and stability of timber structures under earthquake loads. This study outlines the key steps and considerations for conducting a seismic performance analysis of a timber structure. The analysis was made using the three-dimensional finite element method. The analysis involves evaluating the structural response including displacement, acceleration, and stress, under seismic loads, and assessing the performance of the structure in terms of its ability to withstand such loads without excessive damage or collapse. The study highlights the importance of understanding the material properties of wood, modeling the structure accurately, selecting appropriate seismic loads, and using appropriate analysis methods. The findings from the seismic performance analysis can provide valuable insights for guiding the design and retrofit of timber structures, enhancing their seismic resilience and minimizing potential damage during earthquakes.

Keywords: Timber Structure, Seismic Performance Analysis,

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DETERMINATION OF MATERIAL CHARACTERISTICS AND SEISMIC PERFORMANCE ASSESSMENT OF MASONRY BUILDINGS WITH TIMBER AND REINFORCED CONCRETE SLAB

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Abstract:

The evaluation of the seismic performance of existing masonry buildings with timber and RC slabs is of critical importance for assessing their structural integrity and seismic resilience. In this study, an approach involving laboratory tests and linear performance analysis is employed to assess the behavior of an existing masonry building. The laboratory tests include cement content and X-ray diffraction (XRD) analyses, aimed at determining the material characteristics. Based on the laboratory test results, a linear performance analysis is performed using finite element analysis (FEA) to simulate the seismic behavior of the masonry building. The FEA model incorporates realistic material properties and geometric details of the masonry components, as well as the timber and reinforced concrete slabs. The seismic loading is applied in accordance with relevant design codes and spectra. The linear performance analysis provides insights into the behavior and performance of the masonry building under seismic loading, aiding in the assessment of its seismic vulnerability and identifying potential retrofitting strategies. In conclusion, the combined approach of laboratory tests and linear performance analysis provides a comprehensive assessment of the seismic behavior of existing masonry buildings. The findings of this study can be utilized for seismic performance analyses of such buildings.

Keywords: Masonry Structure, Seismic Performance Analysis, XRD Analysis, Material Characterization

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NONLINEAR FEA ANALYSIS FOR DETERMINATION OF THE SEISMIC PERFORMANCE OF RC BUILDINGS WITH FRAME AND SHEAR WALL SYSTEMS

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Abstract:

Nonlinear performance analysis through finite element analysis (FEA) is a crucial tool for evaluating the seismic performance of existing reinforced concrete buildings that consist of both frame and shear wall systems. In this study, a comprehensive nonlinear performance analysis is conducted to assess the seismic behavior of an existing RC building. The FEA model is developed based on the as-built drawings and specifications of the building, incorporating realistic material properties and geometric details. Nonlinear material models are utilized to accurately capture the behavior of RC elements under seismic loading, considering the effects of concrete cracking, steel yielding, and degradation of material properties. The seismic loading is applied in accordance with the relevant design codes and spectra. The performance of the building is evaluated in terms of various seismic response parameters, including inter-story drift, plastic hinge formation, and global structural behavior. The nonlinear performance analysis provides valuable insights into the structural behavior and performance of the building under different levels of seismic demand. The results of the analysis can be used to assess the seismic vulnerability of the existing RC building, identify potential weaknesses or deficiencies in the structural system, and develop appropriate retrofitting strategies. The findings can also contribute to the development of guidelines for seismic retrofitting of similar buildings, leading to improved seismic resilience and safety of structures in high seismic hazard regions. In conclusion, the nonlinear performance analysis through FEA is a powerful tool for evaluating the seismic behavior of existing RC buildings with frame and shear wall systems.

Keywords: RC Building, Seismic Performance Analysis, Nonlinear Analysis

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EVALUATING THE EFFECTIVENESS OF JACKETING AND CFRP STRENGTHENING FOR AN RC BUILDING THROUGH SEISMIC PERFORMANCE ANALYSIS

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Abstract:

Seismic performance analysis is a crucial step in evaluating the effectiveness of proposed strengthening techniques for enhancing the seismic resilience of structures. In this study, the effectiveness of jacketing and CFRP (carbon fiber reinforced polymer) strengthening technique is investigated through seismic performance analysis. The proposed technique involves a jacketing system and CFRP plates on a RC members. Finite element analysis (FEA) is employed to simulate the seismic response of the examined building after strengthening. The performance of the building is evaluated in terms of lateral displacement, inter-story drift, and base shear. The results of the seismic performance analysis indicate that the proposed strengthening technique effectively enhances the seismic resistance of the structure. Proposed retrofitting method results in a significant reduction in lateral displacement and inter-story drift, as well as an increase in the overall stiffness and strength of the structure. In conclusion, the findings of this study demonstrate the effectiveness of the proposed jacketing and CFRP strengthening technique in improving the seismic performance of structures. The results can serve as a valuable reference for engineers and researchers involved in seismic retrofitting of structures, contributing to the advancement of seismic strengthening strategies.

Keywords: RC Building, Seismic Performance Analysis, Retrofitting Proposal

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SEISMIC PERFORMANCE OF A MASONRY BUILDING THROUGH FINITE ELEMENT ANALYSIS AND KINEMATIC LIMIT ANALYSIS

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Abstract:

This study presents a comprehensive analysis of an existing masonry building using finite element analysis (FEA) and kinematic limit analysis. The building is located in a region prone to seismic activity. The FEA is performed to assess the structural behavior of the building under various loading conditions, including dead loads, live loads, and seismic loads. The masonry material properties, boundary conditions, and loading patterns are considered in the FEA model. The results from the FEA provide insights into the stress and deformation distribution within the building, identifying potential areas of concern. Furthermore, kinematic limit analysis is performed to assess the local collapse mechanism of the building under seismic loads. The kinematic limit analysis is based on the upper bound theorem of plasticity, which is used to determine the ultimate load-carrying capacity of the building. The critical collapse mechanism and the corresponding load-carrying capacity are identified through the kinematic limit analysis. The findings from this study can aid in the evaluation of the structural performance of the masonry building and provide valuable information for retrofitting or strengthening measures. The results can also contribute to the advancement of knowledge in the field of seismic analysis of masonry structures, and assist in the development of guidelines for the seismic assessment and retrofitting of historical masonry buildings.

Keywords: Masonry Structure, Seismic Performance Analysis, In Situ Test

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POTASSIUM AND STRESS RESPONSE IN PLANTS

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Abstract:

Potassium is an important macro element that plays a role in the growth and development physiology of plants. Potassium deficiency causes problems in yield, metabolism, growth and development, as well as a decrease in the resistance of plants to stress. Plants are exposed to many stress factors throughout their lives. These stress factors cause a decrease in yield and disruption of the sustainability of agricultural production. Potassium plays a critical role in resistance to stress factors such as cold, high temperature, disease, drought and salinity in agriculturally important plants. Within this stress response, potassium has duties in stomatal regulation, photosynthesis, transport, cell signaling processes. Therefore, with the developments in DNA technology (proteomics, metabolomics, transcriptomics) the knowledge about the role of potassium in the response and resistance to abiotic stress factors has increased.

Potassium deficiency can be seen in soils due to global climate change and anthropogenic activities, and new perspectives are needed in agricultural production designs and fertilization process, considering the rapid increase in the world population. Similarly, there is a need for a better understanding of the role of potassium in plants in resistance to biotic and abiotic stress factors and in resistant plant breeding studies.

In this study, knowledge about the effect of potassium element on the growth and development in plants and its role of stress response are summarized.

Keywords: Potassium, Abiotic Stress, Biotic Stress, Stress Response

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EVALUATION OF ENVIRONMENTAL IMPACTS OF A BODYBUILDING DIET WITH LIFE CYCLE ASSESSMENT APPROACH

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Abstract:

Bodybuilding, known as a universal sport, covers body shaping, body weight and nutrition. As it requires high amounts of energy and nutrient to ensure training and stay healthy, a bodybuilder must follow a strict diet containing high amount of protein. This study aims to evaluate the environmental impacts of a bodybuilding diet in the off-season with life cycle assessment (LCA) approach. Two different diets, regular bodybuilding diet and pesco- vegetarian diet as an alternative, were assessed according to carbon footprint (CF, kg CO2-eq/kg) and water footprint (WF, liters water/kg). Foods in the bodybuilder's nutrition program were included in the system boundary, while the supplements (e.g., protein powder, vitamins, etc.) were excluded. The results indicated that meat consumption in both diets had the biggest share in CF and WF. Replacing red meat and poultry meat with fish meat reduced the CF and WF as 58% and 38%, respectively. As a result, consuming different types of meat with equivalent protein value showed that it can be provided more sustainable nutrition by reducing the environmental burden in the bodybuilding diet.

Keywords: Bodybuilding Diet, Environmental Impact, Carbon Footprint, Water Footprint, Sustainable Nutrition, Sustainability.

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DEVELOPMENTS IN THE MECHANIZATION OF PEACH FARMING WITHIN THE SCOPE OF AGRICULTURE 4.0

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Abstract:

The peach, native to China has become a fruit that is widely produced in the world over time. Because of the importance of peach and nectarine species in human nutrition, being a preferred delicious product and having a high yield per unit area, they are among the most preferred products by producers. The most important peach and nectarine producing countries in the world are China, Italy, Greece, Spain, Turkey and the United States. According to the latest statistical data, approximately 24 million tons of peach and nectarine are produced in the world and have an economic value of approximately 4 billion US dollars. In recent years, peach farming has benefited from a variety of technological advances that, like all other fields, help growers increase productivity, reduce costs and support sustainability. The use of reduced and no-tillage techniques, cover crops, and organic and non-organic mulching techniques, which have gained importance in tillage and soil management recently, are also increasing rapidly. Today, as in every field, smart technologies have come to the fore in the agricultural field as well. With the developments based on Precision Agricultural Technologies and Agriculture 4.0; Many technologies such as the internet of things (IoT), drones, tractor-mounted or autonomous smart sprayers (with integrated pest and disease management techniques), site-specific agricultural applications, smart irrigation and spraying systems, robotic harvesting have begun to be applied in peach production. Post-harvest technologies (sorting, packaging and conservation) are developing day by day. All these technologies help growers optimize water use, protect crops from diseases and pests, increase productivity and profitability, and improve fruit quality. In this study, by making an examination of the technological developments mentioned above in the logic of digitalization in “Precision Agriculture” and “Agriculture 4.0”, current technological developments and technologies that are likely to be used in peach farming in the future are evaluated.

Keywords: Agricultural Mechanization, Smart Farming, Intelligent Agriculture, Peach Farming

[*]This study was carried out during the preliminary preparations of Ekim Keskinkilic's Master thesis.

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PERFORMANCE ANALYSIS COMPARISON FOR A GROUND SOURCE HEAT PUMP WITH AND WITHOUT USING SOLAR COLLECTORS

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Abstract:

Underground storage tanks are used to efficiently store thermal energy for domestic and commercial heating systems. This study compares two systems; The first consists of an underground storage tank, a heat pump, and a building to be heated. The second system consists of the same components with adding solar collectors (SC). An analytical model of each system is developed to find the performance parameters of the heating systems. The Coefficient of Performance COP, the temperature of the storage tank, and solar energy are part of the main performance parameters. Time-dependent water temperature in the tank is obtained by calculating the heat transfer from the storage tank to the surrounding earth hourly. A MATLAB program is prepared for computing all performance parameters of the heating systems. In the fifth year of operation, the comparison results showed adding the SC led to increasing the temperature of the tank by at least 10.2 ℃; it also showed an increase in the value of COP around 1.8. These findings were obtained for a tank volume of 400 m3, a Carnot efficiency of 40%, and a house in Gaziantep. As evidenced by a temperature increase and coefficient of Performance COP, the addition of solar collectors SC has a significant impact on the system.

Keywords: Seasonal Thermal Energy Storage Tank, Ground Source Heat Pump, Solar Energy, Comparison.

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THE COMPARATIVE PETIOLE ANATOMY OF SOME HEDYSARUM (FABACEAE) SPECIES IN TURKEY

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Abstract:

The present study was designed to evaluate the petiole anatomical characteristics of some Hedysarum species distributed in Turkey using light microscopy (LM) for their systematic and taxonomic importance for correct identification. Paraffine methods were performed to obtain anatomical sections of studied species. Some cross sections were taken by a razor blade and dyed with safranin. All the slides were observed by Leica DM 1000 light microscope. Measurements were made with Cameram 21 program and photos were taken with a Canon EOS 450D camera attached to the light microscope. In petiole transverse sections, the general shapes of the petiole was examined oval or triangular. The epidermis is composed of single layer and epidermal cells of both surfaces are rectangular to oval and have trichomes. Cortex parenchymatic cells which are located under the epidermis are orbicular shaped and are composed of 6–9 layers. The pith cells were only oval shaped in studied species. The results showed that petiole anatomy has important potential role to accurately identify and classify Hedysarum genus.

Keywords: Hedysarum, Multicaulia, Subacaulia, Sweetvetch, Petiole

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ASSESSING THE SUSTAINABILITY OF ELECTROCOAGULATION TREATMENT FOR TEXTILE WASTEWATER IN DYE PRODUCTION INDUSTRY AND ITS CIRCULAR ECONOMY POTENTIAL

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Abstract:

The rapid growth of the global dye production industry has resulted in a concerning rise in the impact of wastewater containing dyes, particularly in the textile industry. Treating textile industry wastewater is crucial for sustainability and circular economy objectives. The wastewater contains high concentrations of pollutants, including dyes and microplastics, which can have severe environmental consequences if released untreated into natural water sources. Implementing effective treatment methods, such as electrocoagulation, can successfully remove these pollutants and prevent environmental contamination. Additionally, applying circular economy principles to the treatment process enables the recovery of valuable resources like metals and dyes from the wastewater. This reduces waste generation and allows for the repurposing of materials, aligning with the circular economy concept. Therefore, proper treatment of textile industry wastewater is essential for sustainable and circular practices within the textile industry. The paper focuses on investigating the viability of employing the electrocoagulation (EC) process as a sustainable and circular solution for treating both paint production wastewater and textile wastewater. These types of wastewater are known to be highly polluted and pose significant environmental risks if left untreated. The study evaluates the performance of the EC process in terms of removing Chemical Oxygen Demand (COD) and microplastics (MP) using various electrode combinations (Fe-Fe, Al-Al, Fe-Al, Al-Fe, 2Fe-2Fe, 2Al-2Al, 2Al-2Fe, and 2Fe-2Al). The EC process employed a fixed distance of 1.8 cm between the electrodes, an electrolyte concentration (NaCl) of 2 g/500 mL, and a current of 4 A supplied to each reactor for 30 minutes. These specific parameters were carefully selected to optimize the removal of pollutants, especially COD and microplastics, from the wastewater. By controlling these parameters, the EC process demonstrates high removal efficiencies, making it a sustainable and effective treatment method for textile industry wastewater. The results indicate that the parallel monopolar 2Fe-2Al electrodes achieved the highest COD removal efficiency of 78.61% for textile wastewater, while the parallel monopolar 2Fe-2Fe and 2Fe-2Al anode and cathode pairs attained the highest MP removal efficiency of 95.69%.

Keywords: Wastewater From Textile Industry, Dye-Contaminated Wastewater, Sustainable Practices, Microplastic Pollution, Electrocoagulation

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THE EFFECT OF METERING PLATE AND OPERATION SPEEDS OF PNEUMATIC PRECISION PLANTERS ON PLANTING PERFORMANCE WITH PEA SEEDS

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Abstract:

Human nutrition has become an important problem because of the rapid increase in the world population in the last century. Developments of agricultural mechanization have an important role for solving this problem. Single seed planters' technology also makes significant contributions to have high yield from the unit area. Peas are an important vegetable protein source in human nutrition. Due to its high sphericity, the use of pneumatic precision planters in pea production is increasing day by day. With the recent developments in agricultural mechanization, it is seen that the operation speeds of tractors and agricultural machines have also increased in parallel. Current pneumatic precision planters work with the rotation of the metering discs, which have a certain number of holes, with a different transmission according to the machine-tractor forward speed. However, the current designs of these machines limit the speed of operation.

In this study, the planting performance of a pneumatic single seed planting unit was evaluated according to 2 different metering plate hole numbers (32 and 40) and 3 different operating speeds (6, 10, 12 km/h) with pea seeds. A planting unit simulator in the laboratory environment was used for the experiments. Opto-electronic seed spacing measurement system was used to measure seed spacing values. Results showed that Iqf (quality of feed index values) varied between 92.4% and 62.14%. In the evaluations, it was seen that the planting quality decreased with the increase in the forward speed. It was evaluated that the main reason for that decreasing was the peripheral velocity of the seed metering plate rather than the operation speed. In order to have good planting performance at high operation speeds with current metering plates, it is necessary to increase the number of holes on the plates and to limit the metering plate speed to 21-23 rpm for current metering plate type.

Keywords: Precision Planters, Metering Plate, Planting Performance

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A NEW FERMATEAN FUZZY WASPAS METHODOLOGY FOR THE LOCATION SELECTION PROBLEM

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Abstract:

Real-world decision-making problems contain a high level of uncertainty and hesitation that cannot be expressed with exact numbers. Fuzzy set theory has been developed to analytically express uncertainty and incorporate individual decision-making behavior into the evaluation process. Fuzzy sets have frequently been used in multiple criteria decision-making problems due to their flexibility and capability in expressing hesitation regarding conflicting objectives.

As the complexity and the uncertainty increases in the decision-making problems, more effective extensions to fuzzy sets have been proposed in the literature. The most important feature in these extensions is the representation of hesitation degrees in addition to membership functions. By introducing the degrees of membership, non-membership and hesitation, fermatean fuzzy sets provide flexibility in handling uncertainty.

In this study, we propose a new extension to the WASPAS method that incorporates fermatean fuzzy operations to account for ambiguity and hesitation in decision making. We present a real-world case study that determines the optimal location for a new beverage facility in the food industry. The WASPAS method, with its mathematical infrastructure, can rank the best results based on decision makers' evaluations. The most appropriate alternative was rationally selected using the Fermatean fuzzy WASPAS method, which provides flexibility to decision makers for evaluation. As a result, it has been demonstrated to be an effective method for dealing with complex decision-making problems.

Keywords: Fermatean Fuzzy Sets, Waspas, Uncertainty, Mcdm, Location Selection Problem

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EFFECT OF AIR-ENTRAINING ADMIXTURE USAGE RATE ON DYNAMIC YIELD STRESS AND VISCOSITY IN PORTLAND CEMENT SYSTEMS CONTAINING UREA

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Abstract:

Air-entraining admixtures added to cementitious systems in order to increase freeze-thaw resistance also affect the fresh state properties of the mixture. In this study, the effect of the use of air-entraining admixtures on the rheological properties of urea-containing Portland cement systems was investigated. For this purpose, 3 different paste mixtures were prepared by adding 0.15% and 0.30% air-entraining admixtures to the control mixture containing 3% urea instead of cement. The dynamic yield stress and viscosity values of the prepared mixtures were determined in accordance with the Herschel Bulkley model. It was determined that the dynamic yield stress values of the paste mixtures increased and the viscosity values decreased with the use of air-entraining admixtures. It was understood that this behavior became more evident with the increase in the use of admixtures.

Keywords: Viscosity, Flowability, Loop Test, Thixotropy, Air Entraining Admixture

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EFFECT OF BORON WASTE ON MECHANICAL AND DURABILITY PROPERTIES OF CONCRETE

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Abstract:

It was emphasized that 8% of the CO2 emission that causes global warming occurs during cement production. In addition, the consumption of natural resources used in cement production increases due to the increase in cement demand with the widespread use of concrete. In this context, studies on alternative binders continue in order to reduce cement production and consumption. Today, besides the use of mineral additives such as blast furnace slag, fly ash and silica fume as binders in concrete mixtures, studies on the disposal and sustainability of other industrial wastes are continuing. One of the wastes generated in the industry is formed in boron plants. It is important to evaluate boron wastes especially in Turkey, which has significant boron reserves in the world. Studies on the use of boron wastes in concrete mixtures have recently become widespread. It was reported that boron wastes used in concrete generally show positive performance in terms of strength and durability of concrete. In this study, a comprehensive literature search was conducted on the effect of boron waste use on the mechanical and durability properties of cementitious systems. In this context, the effect of boron wastes on early and advanced age strength performance, freeze-thaw and high temperature resistance of cementitious systems was investigated and discussed.

Keywords: Boron Waste, Cementitious Systems, Sustainability, Strength, Durability Performance

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