3th International Congress of Engineering and Natural Sciences Studies

Abstracts Booklet

Hikmet Y. Çoğun
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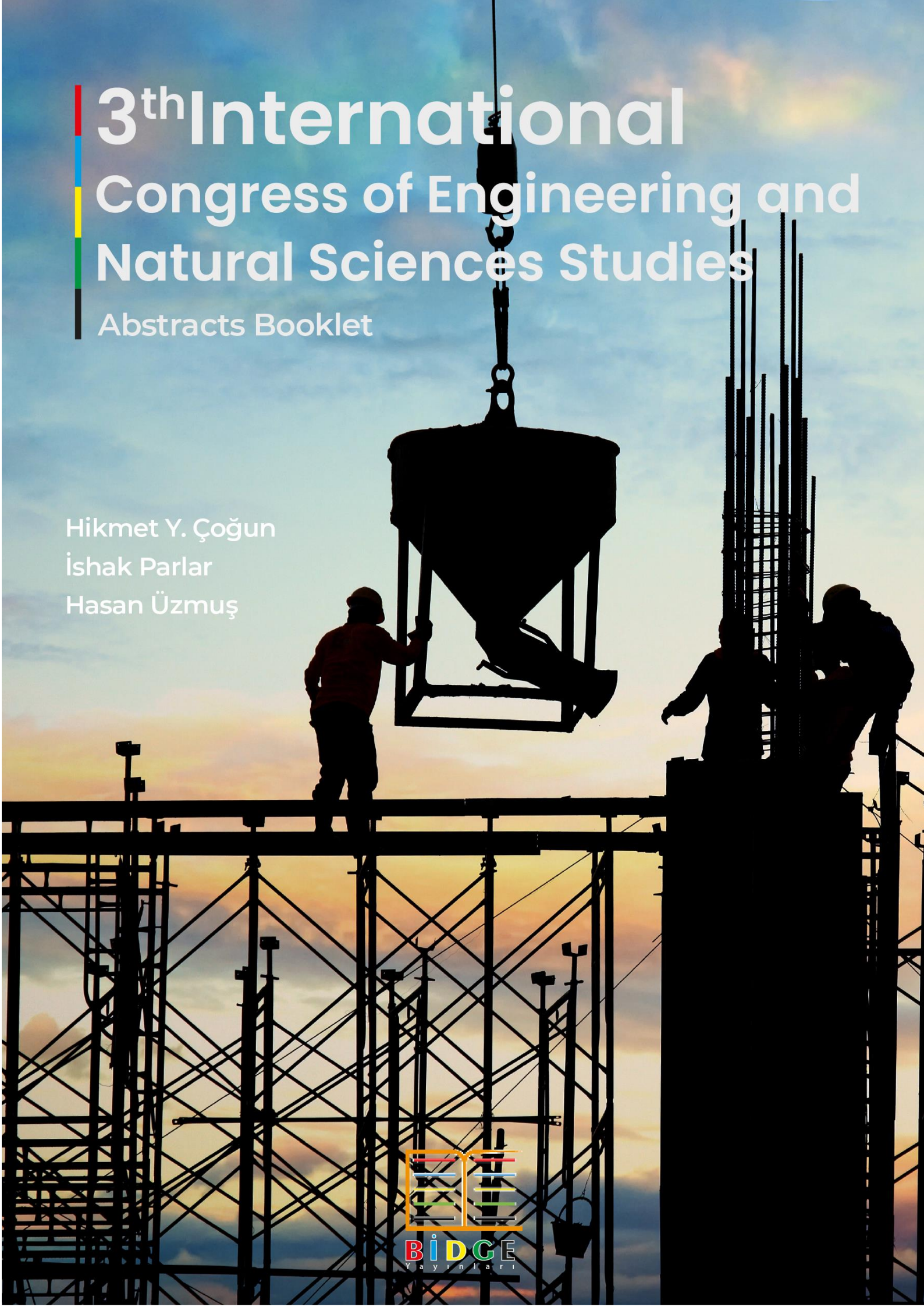
Hasan Üzmuş



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ABSTRACTS

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ISBN: 978-625-6488-02-1

Recreate ST-0087 aka Temperature Controlled Seat Life Cycle Test in Ansys

Bilal BAYIR[1]
Alper KARAGÖZ[2]

Abstract

For car seats heater mat is an important component especially for winter seasons. It is important to have a homogeneous and comfy temperature distribution on car seat. Physics behind heater mat is direct conversion of electrical energy to heat energy via joule heating. There are two heat transfer mechanism, conduction and convection. Purpose of this work is recreate of ST-0087 aka temperature controlled seat life cycle for back cover test conditions and inspect the temperature distribution at two different time periods on backrest of the seat in thermal-electric module of Ansys 2023 R1. The analysis conducted as transient and steady state. Heater mat model created by Solidworks according to 2D drawing of heater mat. The boundary conditions are defined according to the test conditions. Material properties given by Gentherm heater mat's datasheet. Outside of Ansys results, there are governing equations of joule heating and conduction heat transfer to examine how material properties effect the heating of car seat. We can see that resistance of the wire, current passes through wire and thermal conductivity of seat cover is important material properties for temperature distribution of seat. In the result of analysis average temperature is higher at low potential side than high potential side. This outcome cannot be seen in the test results.

Keywords: Heater Mat, Joule Heating, Conduction, Ansys, Heat Transfer

[1] R&D Manager, Magna Otomotiv San.ve Tic. A.Ş. , Orcid: 0000-0001-6636-9204
[2] R&D Intern, Magna Otomotiv San.ve Tic. A.Ş, Orcid: 0009-0008-4133-2534

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Micromechanical Evaluation of the Plasma Assisted Hard Facing Metal Matrix Composite Coatings

Esad KAYA[1]

Abstract

In this study, the surface of the steel material was modified with direct plasma welding energy heat input In this study, the surface of the steel material was modified with direct plasma welding energy heat input by using different metallic powder mixtures. The study aimed to improve the microstructural and mechanical properties of the surface. Fe and W-containing powder, lean heat input, and untreated samples were selected as a control group. Optical microstructure, microhardness, and micro indentation analyses of the samples were performed. The microstructural and mechanical properties of the produced metal matrix composite coatings were determined. The coatings' microstructure analysis and microhardness were determined with the analysis. A higher microhardness profile was observed in plasma-modified coatings. The Fe and W content composite coating exhibits deeper hardenability compared to lean heat input and as received substrate. In addition, with the micro indentation test, the penetration depth, micro-indentation hardness, and indentation modulus were calculated depending on the p-h curve. Superior mechanical properties were obtained for all plasma-modified coatings. The highest penetration depth was calculated as the received substrate, meaning the lowest strength. Maximum indentation modulus was calculated in FeW content coatings. The lean plasma heat input has been determined to improve the microstructure with the rapidly solidified microstructure. It has been observed that the FeW-containing plasma coatings exhibit superior mechanical properties compared to lean plasma heat input and received substrate samples.

Keywords: Hard facing, Cladding, Mechanical Properties, Composite Coating, Hardness

[1] Esad Kaya, Eskişehir Osmangazi University, Mechanical Engineering Department, Orcıd: 0000-0002-7332-6154

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Investigation of EPP's Effect on Car Seat Head Restraints Energy Absorption Using Ansys Mechanical

Bilal BAYIR[1]
Elif GÜRGİT[2]

Abstract

Automobile manufacturers have to modify seat and headrest designs to meet evolving homologation requirements, ensuring passenger safety and compliance with updated mobility standards. These changes aim to combine factors such as safety, ergonomics and comfort. Especially in car seats, the headrests used should not only enhance passengers' safety in the event of accidents but also provide comfort and support from an ergonomic perspective. The primary purpose of headrests is to protect the head and neck areas from impacts during accidents. Therefore, headrests should comply with the static evaluation diagram determined by organizations such as the Insurance Institute for Highway Safety (IIHS) and the Highway Loss Data Institute (HLDI). The performance and structural integrity of the headrest should meet the criteria set by the ECE R-17 standard. To achieve this performance and structural integrity, headrests are composed of various components with high impact-absorbing properties. One of these components commonly used in traditional headrest designs is the Expanded Polypropylene (EPP) subpart. This research aims to investigate the displacement and durability effects of using EPP in car seat headrests. For this purpose, the static loading test specified in the ECE R17 standard (5.6.3) and customer-specific requirements (5.9) was simulated using the ANSYS 2020 R2 software package program and compared with real test data. To better observe the impact of the EPP material, the same headrest design without EPP was also simulated in the static loading test. The simulations were conducted considering the actual test criteria and initial conditions. The force applied to the headrest, according to the ECE R17 standard, is determined with reference to the H-point of the seated passenger. The properties of each material present in the headrests were obtained from data sheets specific to each component to ensure matching between simulation and test data. The analysis results aim to contribute to a better understanding of the strength and energy absorption effect of the EPP subpart.

Keywords: Seat headrest; ECE R17; Linear loading; Ansys; H-point

[1] R&D Manager, Magna Otomotiv San.ve Tic. A.Ş. , Orcid: 0000-0001-6636-9204
[2] R&D Intern, Magna Otomotiv San.ve Tic. A.Ş, Orcid: 0009-0005-8319-7893

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Improvement and Optimization of Composite Materials For Ballistic Armor

Mehmet Orhan ŞENASLAN
İlyas İSTİF

Abstract

Laminated composite materials are widely used in various industries, including aerospace. These materials are preferred because of their exceptional properties such as high modulus of elasticity and high strength, as well as their ability to be customized for specific applications. These properties and customizability of composite materials make composite materials prominent in the choice of armor materials, especially for ballistic protection. This study investigates the impact dynamics of layered composite materials with different surface types and the impact strength of the composite material. Accurate prediction of impact dynamics can be realized through various models that include the motion of the impacting object and target as well as the forces developed at the interface. For this purpose, models of the composite material with the same layer, material and orientation in different geometric structures were developed in ANSYS/ACP and the composite armors designed using the Explicit Dynamics interface in ANSYS were subjected to the same impact load. The thickness, properties, layers and external factor were kept the same to observe the effect of geometry change. The stress state near the impact zone is quite complex and requires detailed analysis. Significant experimental data have been published to characterize the important features of impact damage. In the light of these data, the forces released during impact for the designed armors were investigated and compared. The energy absorption of composite armor of different designed geometries on a projectile with the same energy and velocity is compared. It was observed that the effect of geometry differentiation on the kinetic energy of the projectile, in other words, it provides a higher resistance in terms of impact absorption. The variation of the forces occurring at the moment of impact with different geometries was analyzed.

Keywords: Ballistic, Composite, Optimization

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Improvement and Optimization of Composite Materials For Ballistic Armor

Ahmet YILDIZ[1]
Tarık YEŞİLOVA[2]
Furkan DEĞİRMENCİOĞLU[3]

Abstract

In this study, the structural analysis and shape optimization of a C-type press body, which is frequently used in robotic production lines, were investigated. Considering the number of ribs in the C type press body, finite element analyzes were carried out under different rib numbers and displacements and stress values were calculated. In addition, how the chamfer structure in the lateral parts of the body affects the structural analysis in different dimensions has been examined by finite element analysis. According to the results of the comparison, it has been observed that the triple rib structure and the 5 and 7 rib structure have little effect on the displacements, and the chamfer structure has more critical importance in reducing the displacement, and the optimum chamfer size has been selected according to the analysis results. Thus, important results for design engineers for C type presses are presented in this work.

Keywords: C type press body, shape optimization, finite element analysis

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[2] Sanver Engineering & Automation System, 106. Sk. No:57/A, 16140 Minareliçavuş Osb/Nilüfer/Bursa
[3] Sanver Engineering & Automation System, 106. Sk. No:57/A, 16140 Minareliçavuş Osb/Nilüfer/Bursa

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Investigation of the Effect of Process and Design Parameters on the Mechanical Properties of PETG Materials Produced by Fused Deposition Modeling

Cem GÜDÜR[1]
Türker TÜRKOĞLU[2]
İlker EREN[3]

Abstract

Rapid prototyping methods are becoming increasingly popular in areas where traditional manufacturing methods are insufficient. Additive manufacturing methods stand out in terms of fast production advantage and the manufacturability of complex structures. Additive manufacturing technology offers many innovative applications in the automotive, aerospace and biomedical fields. In this study, PETG (Polyethylene Terephthalate Glycol)materials were successfully fabricated by FDM (Fused Deposition Modeling) method, which is a low-cost and practical method, under different design and manufacturing parameters. In addition, TPMS (Triply Periodic Minimal Surfaces) lattice structures were designed as design parameters. The lattice designs used were determined as gyroid, lidinoid and schwarz. By using these cage structures, it is also aimed to reduce the weight of the specimens. These structures with different mathematical formulations are preferred due to their high absorption and strength properties. The production parameters that remained constant for all samples were layer height (0.2 mm), nozzle diameter (0.4 mm, filament diameter (1.75 mm), bed temperature (70 °C) and no support structures. Printing temperature and printing speed were selected as variable production parameters. The production parameters were decided as three levels, 230-240-250 °C for printing temperature and 40-50-60 mm/s for printing speed. As a result of the tensile test, the results were evaluated comparatively. The results showed that the maximum strength of the specimens produced by the FDM method under different process parameters was obtained from the specimen manufactured in schwarz lattice design, 250 °C printing temperature and 40 mm/s printing speed.

Keywords: Additive Manufacturing, Fused Deposition Modeling, Triply Periodic Minimal Surfaces, PETG

[1] Postgraduate Researcher, Balikesir University, Department of Mechanical Engineering, Orcid: 0000-0002-6836-7656
[2] Assistant Professor, Balikesir University, Department of Mechanical Engineering, Orcid: 0000-0002-0499-9363
[3] Assistant Professor, Balikesir University, Department of Mechanical Engineering, Orcid: 0000-0003-4326-0294

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Evaluation of models for the estimation of global solar radiation: Ankara province of Turkey case

Galip KALTAKKIRAN[1]

Abstract

Solar energy, which is one of the clean and renewable energy sources, has been among the crucial alternative energy sources in the world and has recently started to reach the point it deserves in our country with notable incentives. In applications related to solar energy, solar radiation data for the relevant region is needed. These data can be obtained by measurement or can be estimated with the derived solar radiation models. In this context, many researchers have developed model equations to predict the daily global solar radiation. In this study, the usability of the models developed for the estimation of the daily global solar radiation values on the horizontal plane for the Ankara province of Turkey is examined with various statistical test methods. The daily global solar radiation values of the Turkish State Meteorological Service for the period of 2007-2021 are compared with the results of the models derived from various parameters such as average temperature, sunshine duration, day length and daily extraterrestrial radiation value. In addition, the performances of the models derived for the estimation of the daily global radiation value are investigated using the mean bias error (MBE) and the root mean square error (RMSE) statistical comparison methods. The models that give the best daily global solar radiation estimation for Ankara province are determined according to RMSE values.

Keywords: Daily global solar radiation, Empirical models, Meteorological data, Ankara province

[1] Dr., Ardahan University, Electrical-Electronics Engineering, Orcid: 0000-0003-2502-0078

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Modeling of Temperature Dependent Anisotropic Elastic Behavior of Polymers Produced by Fused Deposition Modeling (FDM) Method

Kubilay ÖNGİDER [1]
Alperen ACAR [2]

Abstract

Additive manufacturing is based on virtually slicing the data of the final part geometry and then manufacturing these slices or layers on top of each other. The production with layers creates anisotropy and porosity arising from the nature of the method. In addition, it is well known that the mechanical behavior of plastics is highly temperature dependent. Through this necessity, this work aims to develop a model that can predict the effect of these conditions on the elasticity modulus of the material. The storage modulus is the modulus associated with the elastic deformation of the material. A similar definition can be made for the modulus of elasticity. Although the measurement methods are different, the fact that both are associated with elastic strain recalls the idea that there may be a correlation between them. Richeton et al. have previously developed the work of Mahieux and Reifsnider and presented a model that can predict the storage modulus for polymers at different temperatures and strain rates. To describe the anisotropy behavior, a variant model was obtained by using the generalized Hooke's law to extend this uniaxial model to a multiaxial anisotropic state. However, the layer thickness is also an important parameter and has a great influence on the porosity behavior. For this reason, this parameter should also be included in the model to define the porosity behavior. For this purpose, Spriggs' porosity model was added to the developed model. In the synthesis of these three models, a model is proposed that can predict the anisotropic stiffness matrix, which should be used in structural analysis to be applied to parts produced by Fused Deposition Modeling, for varying temperature values and layer thickness values. It has been observed that there is a positive relationship between the model and the experimental results.

Keywords: Additive Manufacturing, Anisotropy, Porosity, Temperature, Storage Modulus

[1] Y.L. Öğrencisi, Yıldız Teknik Üniversitesi, Makine Mühendisliği Bölümü, Orcid: 0009-0002-6656-8021
[2] Dr. Öğr. Üy., Yıldız Teknik Üniversitesi, Makine Mühendisliği Bölümü, Orcid: 0000-0001-5462-9910

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Structural Design and Optimization of Bearingless Helicopter Tail Rotor System

Mert Mustafa TEKİN[1]
Vahit MERMERTAŞ[2]

Abstract

In this study, it is concentrated on to eliminate flap, lead and pitch bearings that are used in articulated, semi-articulated and hingeless rotor systems in helicopter tail rotors. This can be accomplished by eliminating all bearings and hinges from the rotor hub system and allocating the rotor blade into two main primary structures which are flexbeam and torque tube. Elimination of bearings and links is possible with proper rotor blade design and optimization process. The exclusion of hinges and bearings from conventional rotor system will result in less parts to maintain, lower manufacturing costs, reduced parasite drag, less fuel consumption and a lighter tail rotor system in overall. The flexbeam and torque tube is optimized using a three-stage optimization procedure that comprises free size optimization, sizing optimization, and shuffling optimization. Free size optimization endeavours to create multiple ply design options based on load path and establish the most constructive ply sizing among the options. Through sizing optimization, the thickness of each ply is improved with accuracy, building upon the outcomes obtained from free size optimization. Shuffling optimization is the final stage that involves incorporating design and manufacturing constraints, for example symmetry, balance, and the maximum number of successive plies. After optimization, weight reduction of 72.43% for detail parts and 23.08% for the complete tail rotor system is successfully achieved.

Keywords: Helicopter Rotor Systems, Bearingless Rotor, Composite Optimization, Structural Design, Weight Reduction

[1] Master's Degree Student, Istanbul Technical University, Department of Mechanical Engineering,
[2] Prof. Dr., Istanbul Technical University, Department of Mechanical Engineering, mermertas@itu.edu.tr, ORCID: 0000-0001-9441-1502

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Tensile Strength Analysis of Various Bonded Single Lap Metal/ Composite Plates

Filiz KARABUDAK[1]
Ali SADIK[2]
Hamid ZAMANLOU[3]

Abstract

With the development of technology, bonding; the use of adhesive in load-bearing structures has an important role in aviation, aerospace, automotive, wood and plastic industries due to its properties such as time and cost savings, high corrosion and fatigue resistance, cracking retardation, excellent damping. The need to use different materials together has also improved the joining techniques and versatility. Adhesive bonding has a huge impact on making engineered systems lighter, stronger and more economical. Adhesive bonding has many advantages over mechanical bonding. These include the ability to combine different thicknesses and types of materials, create connections with even load distribution, and also act as a seal. In the literature, in the studies carried out to determine the mechanical properties of adhesive joints; Although there are studies examining the effects of the adhesive thickness applied between the plates, the overlap length of the plates, the thickness of the plates and the selected adhesive type on the mechanical properties of the adhesive joint, there are very few studies examining the mechanical properties of the lap joints obtained using plates made of different materials.

In this study; stress and damage analysis of bonded, pin and pin-bonded single lap AZ91/AZ91, AZ91-KF and KF-KF metal/composite joint plates under tensile loads were investigated. The plates prepared in the dimensions of 100-25-3 mm were adhered in various connection ways using acrylic adhesive (Acrytron 1E1) and M5X15 pin. Standard deviation values were determined by testing at least three samples from each connection plate group subjected to the tensile test. Stress and damage analysis values were compared and evaluated. In conclusion; It was determined that the maximum tensile stress and maximum tensile elongation were observed in the pin-bonded specimens, and the highest tensile stress value occurred in the AZ91-KF pin-bonded specimens and the maximum elongation value in the KF-KF pin-bonded specimens. When the tensile strength and elongation of the connections in different bonding shapes are taken into account, it is seen that they take values in the Adhesive<Pined<Pined-Adhesive order.

Keywords: AZ91, tensile strength, carbon fiber, composite, Metal bonding, Pin-Bond

[1] Gümüşhane Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Makine Bölümü
[2] Gümüşhane Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Makine Bölümü,
[3] Atatürk Üniversitesi, Mühendislik Fakültesi, Makine Bölümü

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Tensile Tests of Laser Welded Third Generation High-Strength Automotive Steels

Hafize Çelik[1]

Abstract

It is crucial to determine the mechanical properties of third generation high strength automotive steels joined by laser welding. In this study, an advanced generation dual-phase steel quality, which is mainly used by the automotive sector and whose demand is met by imports in our country, and third generation steel grades with different strengths and thicknesses were combined with the butt-welding method using a fiber laser system. The mechanical properties of the test samples taken from the welded area in the welded samples were examined and the results obtained were interpreted. Tensile tests measurements were performed, and the results have been investigated.

Keywords: Laser welding, dual phase steels, third generation steels, mechanical properties, tensile strength

[1] Yüksek Makine Mühendisi, Tofaş Türk Otomobil Fabrikası A.Ş., ArGe Merkezi, Orcid: 0000-0001-7572-073X

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Comparative Investigation of Sas Turbulence Model Performance For Some External Flow Conditions

Erhan FIRAT[1]
Mehmet SEYHAN[2]
Mustafa SARIOĞLU[3]

Abstract

The numerical study aims to reveal the performance of the SAS (Scale-Adaptive Simulation) turbulence model in predicting some aerodynamic and flow characteristics in comparison with both the SST k-ω turbulence model and experimental data. For this purpose, the steady and unsteady flows around two different airfoils (SD7003 and NACA0018) and the unsteady flow around a circular cylinder are modeled in three-dimensions, and the data obtained using these turbulence models for four different cases are compared with experimental data. The simulations of turbulent external flow at different Reynolds numbers show that the SAS turbulence model approximates the experimental data with an acceptable deviation. It is found that the SAS turbulence model can predict the turbulence values of the aerodynamic coefficients better than SST k-ω under unsteady flow conditions. It has been demonstrated that solver settings are critical to accurately model the physics of flow. In particular, it was stated that care should be taken to include equations modeling the laminar-turbulence transition in the solution.

Keywords: Flow simulation, External flow, SAS, Airfoil, Circular cylinder

[1]Dr. Öğr. Üyesi, Munzur Üni., Makine Müh. Bölümü; ORCID: 0000-0003-2800-6714
[2]Dr. Öğr. Üyesi, Karadeniz Teknik Üni., Makine Müh. Bölümü; ORCID: 0000-0002-5927-9128
[3]Doç. Dr., Karadeniz Teknik Üni., Makine Müh. Bölümü; ORCID: 0000-0002-4295-7607

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Solution of the Frame Effect Problem on Backlit Fascia Ambient Lighting

Serkan ALTINTAŞ[1]

Abstract

Ambient lighting provides both direct and indirect illumination of the passenger compartment by setting the light intensity and colors desired by the customer. It makes the car's interior more attractive and affects consumer quality perceptions. As an upward trend, we can now see ambient lighting anywhere in the vehicle with different applications of technology. One of these frequently used technologies is the backlighting technology with In-Mold Forming (IMF) Film. Thanks to this technology, we can apply different pattern structures by adding a thin foil on the outer lens of the fascia so we can switch between different modes as daytime and nighttime. During the product development of such a complex part, some problems related to the lighting performance are encountered and these issues can negatively affect customer satisfaction. In this paper, it is explained that the causes of homogeneity defects in the night mode of the ambient lighting panel placed on the instrument panel of a premium segment vehicle are investigated and how the problem is solved step by step.

Keywords: Ambient Lighting, Backlighting, Instrument Panel, In-Mold Forming (IMF), Fascia

[1] TOFAŞ Türk Otomobil Fabrikası A.Ş., İstanbul Cad. No: 574, 16110, Türkiye Corresponding Author: Serkan ALTINTAŞ

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Alternative Material Usage on Body in White

Sunay ÖZTÜRK[1]

Abstract

The automotive industry is actively seeking ways to enhance vehicle efficiency and sustainability through Body-in-White (BIW) structures. Traditionally, steel has been the go-to material due to its strength and cost-effectiveness. However, there is a growing interest in exploring alternative materials that offer significant advantages.

One such material is aluminum, which is approximately one-third the weight of steel while maintaining comparable strength. Magnesium is another material under consideration for BIWs. It is even lighter than aluminum, with a density that is roughly two-thirds that of aluminum. Carbon fiber reinforced polymers (CFRP) are also being explored as alternative materials for BIWs. CFRP is a strong and lightweight material that is already used in industries such as aerospace and sporting goods. Furthermore, there is a growing interest in natural fiber composites for BIWs. In this paper, to enhance vehicle efficiency and sustainability, the usage of Aluminum, magnesium, CFRP, and natural fiber composites have been compared in terms of weight reduction, strength, and environmental sustainability.

Keywords: sustainability, Body-in-White (BIW) structures, steel, alternative materials, aluminum, weight reduction, fuel efficiency, magnesium, cost, carbon fiber reinforced polymers (CFRP)

[1] Makine Mühendisi, Tofaş Türk Otomobil Fabrikası A.Ş., ArGe Merkezi, Orcid: 0009-0003-3759-4770

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Investigation of Mechanical Properties of Interlayer Hybrid Composite Pipes by Finite Element Analysis

Mehmet Çağrı TÜZEMEN[1]

Abstract

Composite materials are highly preferred in areas such as automotive, marine, sports equipment, aviation, and space industry, thanks to their low weight and high strength. As the usage areas of composite materials increase, the needs are diversified. In this case, hybrid composites in which different fibers are used together come to the fore. Hybrid composites in which different fibers are used in different layers within the composite are called interlayer hybrid composites. In this study, the behavior of interlayer hybrid composite pipes under tensile load was investigated. Unidirectional (UD) glass fiber and UD carbon fiber were used together for hybridization. A total of ten models were designed, two of which are glass fiber epoxy and carbon fiber epoxy plain composites, and eight of them are interlayer hybrid composites formed in various stacking sequences. Plain glass fiber epoxy and plain carbon fiber epoxy models are reference designs created for comparison with interlayer hybrid composites. The models are designed to have eight layers. When modeling interlayer hybrid composites, four layers of glass fiber and four layers of carbon fiber are used. Mesh optimization has been made on the designs. Thus, both the skewness quality of the mesh is increased and the independence of the results from the mesh was ensured. Tsai-Wu failure criterion was used in the finite element analysis. Fixed support from one end and tensile force from the other end were applied to the models. It was concluded that the use of glass fiber in the outer layers of interlayer hybrid composites increased the strength.

Keywords: Mechanical properties, interlayer hybrid composites, glass fiber, carbon fiber, finite element analysis.

[1] Assist. Prof. Dr., Nevşehir Hacı Bektaş Veli University, Metallurgical and Materials Engineering, Orcid: 0000-0002-1746-2864

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Production of New Sandwich-Type Composite Panels For Lightweight Luggage Board

Harun BAŞKAN[1]
Erdinç DOĞANCI[2]
Didem Elif YAŞA[3]

Abstract

In the luggage compartment (interior) of passenger cars, the part covering the spare tire is called the Luggage Board. In some vehicles, this part has different opening angles with a stepped design and may have two or three stages, while in others it is located as a single piece. The prepared sandwich panel was heated with the help of a heat oven and made ready for forming. During forming, the visible surface fabrics were fed with pre-tension in the press in the same way. So there is no further transaction. The heated sandwich panel was pressed and formed with a single operation and fabric joining (lamination) of the visible surfaces was carried out at the same time. During the press pressure, the trimming operation of the part was completed with the help of the cutting blades on the mold. That is, all of the traditional sequential operations are combined into a single operation. In addition, on-vehicle benchmark studies were also carried out. At this stage, different brand/model vehicles were examined separately, material structures and production methods were investigated. In the on-vehicle examinations, two- and three-part products were determined according to different brands and models. In a vehicle model, it has been determined that five different Plastic Honeycomb geometries are used and the ones other than the honeycomb forming the main chest are positioned by folding over the other peripheral parts. It is known that the large number of parts increases the product production time and costs. In addition, on-vehicle benchmark studies were also carried out. With the innovative material structure and process we have developed, our product is both lower cost and lighter. Within the scope of the project, a very different sandwich structure was created apart from the existing products and both weight and financial advantages were provided. Due to the materials used, the target of 30% weight reduction on the product has been achieved. Since the inner structure is based on PP material, the lamination of aesthetic fabrics is completed with the forming process under the press. Trimming is also done in this process and the process time is much less. The product produced by the current method is the polyurethane (PUR) molding process. What we have developed is a forming-based process.

Keywords: Composite, forming, PP, sandwich panel.

[1] Business Dev. and R&D Manager, Farform Automotive Industry and Trade. Inc.
[2] Doç.Dr, Kocaeli University, Department of Chemistry and Chemical Processing Tech., Orcid: 0000-0003-2490-0671
[3] R&D Assistant Specialist, Farform Automotive Industry and Trade. Inc.

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The effect of climate change on natural species in rangelands: Determination of Habitat Requirements and Phenological Periods of Agropyron cristatum (L.) Gaertn. subsp. pectinatum (M.Bieb) Tzvelev, Artemisia scoparia Waldst. & Kit., Bassia scoparia (L.) A.J.Scott

Kevser KARAGÖZ SEZER[1]
Mehtap ÖZTEKİN[2]
Necati ŞİMŞEKLİ[3]
Oğuz DEMİRKIRAN[4]

Abstract

As an indicator of climate change, biodiversity and the shift of climate belts (as belt-shaped climate zones) are emphasized. In this study, three species present in natural vegetation: Agropyron cristatum (L.), Gaertn. subsp. Artemisia scoparia Waldst. & Kit. and Bassia scoparia (L.) A.J. Scott. were selected. Selected species have been monitored in Konya Karapınar General Directorate of Combating Desertification and Erosion Protection Area for four years. The detected features are associated with changing climatic conditions. Flower-maturity-seed periods of each species were monitored throughout the study period. The crown volumes of individual populations of the species were calculated in the examined periods, the climate demands of each period were determined and their responses to changing conditions were recorded. Agropyron cristatum ssp. pectinatum taxon was determined to be one of the plants that gave the most sensitive response to the changes in the examined climate parameters. its highest population was also detected in the area in 2019. The fluctuations in the population of Agropyron in an area and the crown volume, amount and size of the individuals of the population in the vegetation can be considered as an indicator of the variability in the climatic components of that region. In this sense, it has been concluded that it can be used as an indicator or control plant. In general, arid plants can survive in arid conditions, but improvements are seen with the increase in precipitation. Artemisia, on the other hand, can only exist in arid conditions, unlike other arid plants. Thus, it was concluded that it was better adapted to arid conditions. In all phenological periods, when Bassia received a lot of precipitation, its vegetative part remained green for a long time, but its development was adversely affected. In arid conditions, its population in the area also increased. It has been observed that Bassia blooms after receiving at least (45 mm) rainfall in the area and after the ongoing 35-40 days of dryness. The plants selected and monitored as material in this study were recorded for the first time their phenological periods, lengths, phenological period processes and the climatic conditions of the process.

Keywords: Agropyron cristatum ssp. pectinatum, Artemisia scoparia, Bassia scoparia, climate change, phenology.

[1] phd, Republic Of Türkiye Ministry Of Agriculture And Forestry Field Crops Central Research Institute
[2] National Botanical Garden of Türkiye, ORC-ID:0000-0001-9755-5499
[3] Drought and Desertification Research Institute
[4] Soil Fertilizer and Water Resources Central Research Institute

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Effects of Information Resources of Cattle Breeders of Giresun Province on Dairy Cattle Nutrition

Kemal ZIRTLAN[1]
Hulusi AKÇAY[2]

Abstract

In this study, it is aimed to evaluate the information sources of cattle breeders in Giresun in terms of their effects on dairy cattle nutrition. The material of the study consisted of questionnaires made with 99 cattle breeding farms in Giresun province, which was determined by the sampling method. To examine the behavior and decision processes of the producers, graphs were obtained with the Non-Linear Canonical Correlation (OVERALS) analysis.

From a socio-economic point of view, 58.59% of them are in the 35-60 age range, 85.86% are male, 36.37% are primary school graduates, 62.63% are at middle income level, 90.91% are organized and 80.81% of them did not attend any course on animal husbandry. 64.65% of the farmss indicated straw as indispensable feed for livestock production. 43.43% of the farms stated that they give the same amount of feed to their animals regardless of their yield. At the same time, 80.81% of the enterprises reported that they made their own feeding programs. It was determined that they obtained their information resources from TV (81.82%) and internet (72.73%).

As a conclusion, in Giresun province, due to the low milk yield of the farms, it has been understood that the breeders generally turn to individual marketing after processing the milk they obtain. Considering the situation of the breeders participating in the research benefiting from information sources, it is seen that when deciding to implement any innovation, it is mostly cheap, and they think that they will increase their income. It has been understood that they can reach the information they need most easily from the internet and television channels, and it has been understood that agricultural publications and books are not used enough. When evaluated in general, it can be said that the information resources of the small scaled farms are insufficient.

Keywords: Giresun province, dairy cattle, information sources, animal nutrition

[1] Zir.Yük.Müh, Aydın Adnan Menderes Üniversitesi, Zootekni Bölümü, Orcıd: 0000-0001-5600-0614
[2] Dr.Öğr.Üyesi, Aydın Adnan Menderes Üniversitesi, Zootekni Bölümü, Orcıd: 0000-0001-9759-1035

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New Trend in the Future : Natural Colored Cotton

Selma KAYA[1]
Hacer KOCATÜRK[2]

Abstract

Cotton is the most used textile product and a substantial oil crop plant all around the World. Cotton with its versatile utilization fields, has strategic importance in agriculture, manufacture, and trade in Turkey and World. In terms of being natural raw material and water, heat, and moisture retention features, cotton has been favorable to human nature and health throughout time. Recently, there is a tendency to environment-friendly and organic textile production because of global warming and shifting consumer demands. However, the production of an organic crop is not only about the usage of organic raw material in the textile sector because the organic structure deteriorates during the finishing process. Integration of natural colored cotton fiber to textile production enables more natural and ecofriendly output. Water consumption in the finishing process decreases considerably with the implementation of naturally colored fiber in cotton yarn production and also there will be no need to use chemical dyes. All over the World, the diversity and the numbers of naturally colored cotton varieties are limited and they have lower values than white cotton varieties in terms of yield, gin efficiency, and fiber quality. Colored cotton can't take its place in production fields due to mentioned deficiencies. Various breeding approaches integrated with biotechnological methods must be implemented to breed colored cotton varieties that can be competitive in the market in terms of yield, gin efficiency, and fiber quality.

Keywords: cotton**,** naturally colored fiber, gin efficiency, fiber quality, yield

[1] Dr, Adana Doğu Akdeniz Tarımsal Araştırma Enstitüsü, selma_selka@hotmail
[2] Adana Doğu Akdeniz Tarımsal Araştırma Enstitüsü, hacerk01@hotmail.com.

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A Preliminary Study on the Effect of Temperature and Exposure Time on the Success of the Extraction Method Used in the Detection of Microplastics in Organic Samples

Aykut YOZUKMAZ[1]

Abstract

The particles smaller than 5 mm with plastic origin in ecosystem are called "*Microplastics*" (MP's). Recent studies have proved that these pollutants are the most important pollutant group especially in the marine ecosystem. Thus, the qualitative and quantitative identification of these pollutants in samples from the natural environment is of great importance. Different methods are used to refine MP's in samples taken from different compartments of the aquatic ecosystem. In this study, the most commonly used extraction method for the detection of MP's was compared in terms of the success of the filtration by changing the temperature and exposure times. Tissues of Sea bream (*Sparus aurata*), Mediterranean mussel (*Mytillus galloprovincialis*) and freshwater mussel (*Unio crassus*) were removed by changing the temperature and exposure time for the using 10% Potassium hydroxide (KOH) solution. Samples were filtered through Whatmann GF/F (47 mm Ø, 0.7 µ) filters with a vacuum pump and compared in terms of filtration success. The highest success rate of 97.8% was observed in the method with 72 h at 40 °C in the incubator. In the experiment, which was in an oven at 60° C for 24 h, while all the mussel tissues were removed, residues from the gill and skin samples of the fish were found. Condensation was detected in the samples of the experiment whose conditions were 2 weeks exposure time at room temperature in the mechanical shaker. Although the samples were diluted with distilled water (1:1 ratio), the filtration process proceeded rather slowly and then came to a standstill. Sample filtration success was the lowest with 27.2%. It was revealed that even in the most successful method, cooling of the samples caused a condensation. For this reason, it was concluded that it would be more procedural to complete the process quickly and work with fewer samples.

Keywords: Sea bream (*Sparus aurata*), Mediterranean mussel (*Mytillus galloprovincialis*), freshwater mussel (*Unio crassus*), Microplastics, KOH.

[1] Aykut YOZUKMAZ, PhD. Muğla Sıtkı Koçman University Faculty of Fisheries, 0000-0003-2575-3044

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The Effects Of Different Sowing Methods on Some Soil Parameters in Wheat-Second Crop Soybean Rotation

Sait AYKANAT[1]
Mehmet Emin BİLGİLİ[2]
Hatun BARUT[3]

Abstract

This research was carried out to determine the effects of different sowing methods on some physical properties and soil compaction of wheat + second crop soybean rotation in Çukurova conditions in 2015-2016 production period. As sowing methods in both crops; "Flat sowing", "ridge sowing" and "wide ridge sowing" methods were examined. In order to determine some physical properties (moisture-volume weight and porosity) of the experimental soil, undisturbed soil samples were taken at two different depths (0-15 and 15-30 cm) after both crop harvests. After the wheat harvest, in terms of soil moisture, the "year" factor at 0-15 cm depth was statistically significant at the 5% significance level, while it was not significant at 15-30 cm depth. Soil moisture at a depth of 0-15 cm in the first year was 19.77% in group (b), while in the second year it was in group 22.74% (a). After the second crop soybean harvest, the "year" factor at 0-15 cm depth and different sowing methods at 15-30 cm depth were found to be different in terms of soil moisture. After the first year soybean harvest, soil moisture at 0-15 cm depth was 22.39% (a) and 21.22% (b) in the second year. In terms of sowing methods after soybean harvest, the highest soil moisture; While it was 29.82% (a) in the ridge sowing method, the lowest soil moisture was found in the "wide ridge sowing" method with 24.80%. In terms of volume weight, the interaction of "year", "sowing method" and "sowing method*year" at a depth of 15-30 cm after wheat harvest was found to be statistically significant. Volume weight values at 15-30 cm depth; it was found to be 1.43 g/cm3 (b) in the first year and 1.57 g/cm3 (a) in the second year. The highest volume weight value; It was determined as 1.53 g/cm3 (a) in the "flat sowing" method. In the interaction of "sowing method*year", the highest volume weight value; It was obtained from the second year of the "ridge sowing" method with 1.64 g/cm3. The "year" factor was found to be significant at a depth of 15-30 cm after the second crop soybean harvest. First year volume weight value; 1.51 g/cm3 (b); In the second year, this value was determined as 1.54 g/cm3 (a). While there are statistically significant differences in both depths after wheat harvest in terms of porosity; The interaction of "year", "sowing method" and "sowing method*year" after soybean harvest was not found significant. Porosity value at 0-15 cm depth after the first year wheat harvest; While it was 51.16%, this value was determined as 48.68% in the second year. At a depth of 15-30 cm, it was found to be 46.84% in the first year and 41.53% in the second year. As a result; As the soil depth increased, the moisture and bulk weight values of the soil increased, while the porosity values decreased. A digital penetrometer device was used to measure soil compaction in different sowing methods. The penetration resistance of the soil was measured at 5 cm intervals at a depth of 0-30 cm. After the wheat harvest, the penetration resistances were below 2 MPa along 0-30 cm in the "ridge sowing" methods, while the penetration values were above the 2 MPa threshold in the "flat sowing" after 22 cm depth. After the second crop soybean harvest, soil compaction values were found to be above 2 MPa after 18, 26 and 28 cm depth, respectively, in "flat sowing", "wide ridge sowing" and "ridge sowing" methods.

Keywords: Adana, rotation, bulk weight, porosity, penetration resistance

[1] Dr., Eastern Mediterranean Agricultural Research Institute, Agronomy Department, 0000-0002-5690-408X
[2] Doç. Dr., Eastern Mediterranean Agricultural Research Institute, Department of Agricultural Mechanization, 0000-0002-4191-0540
[3] Doç. Dr., Eastern Mediterranean Agricultural Research Institute, Department of Soil and Water Resources, 0000-0003-2482-6715

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The Effect of Chitosan Used in the Coating of Quail Eggs on Egg Weight Loss and Albumen pH

Gözde KILINÇ[1]
Fadime SEYREKOĞLU[2]

Abstract

In this study, the effects of chitosan used in the coating of Japanese quail (*Coturnix coturnix japonica*) eggs on egg weight loss and albumen pH were determined. In the study, 3 different groups (K, Kit-1, Kit-2) were formed with a total of 45 fresh (daily) eggs that were homogeneous in terms of weight (P>0.05). Eggs were coated with two different concentrations (0.125%, 0.250%) of chitosan material, which were prepared with acetic acid. Moreover, no coating material was used in the control group. Eggs were stored in quail egg viols at room temperature for 3 weeks. As a result of weekly weighing, weekly and overall egg weight losses were calculated as %. Albumen pH was determined at the end of the experiment. There was no significant difference between the groups in terms of weight loss of eggs during the 3 different storage periods and albumin pH at the end of the experiment (P>0.05). However, the lowest egg weight loss in all weeks (1st, 2nd and 3rd weeks) and albumen pH were observed in the Kit-2 group. (P>0.05). Furthermore, there was a significant difference between the groups in terms of overall (general; 1-3 weeks) weight loss of eggs (P<0.05). When the overall weight loss was evaluated, it was determined that the egg weight loss was lower (P<0.05) when using the coating material prepared with 0.250% chitosan. In conclusion, the data obtained from this study showed that the coating material prepared with low concentrations (0.125%, 0.250%) of chitosan did not affect the weekly weight loss and albumen pH. Therefore, it is thought that it would be useful to investigate coating materials prepared with different organic solvents at higher concentrations.

Keywords: Egg Coating, Chitosan, Quail, Weight Loss, Albumen pH

[1]Asst. Prof. Dr., Amasya University, Suluova Vocational School, Department of Food Processing, Orcid: 0000-0002-8667-3390

[2]Asst. Prof. Dr., Amasya University, Suluova Vocational School, Department of Food Processing, Orcid: 0000-0001-9787-4115

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Ankara Province Poultry Consumption and Consumer Preferences

Abdurrahman Emre DÖNMEZ[1]
İskender YILDIRIM[2]

Abstract

This study is a survey study prepared to determine the white meat consumption and consumption trends of consumers living in Ankara. The study examined the tastes, preferences and habits of consumers that have an impact on their purchasing and consumption of white meat. In the survey study the research, 30 questions grouped on various subjects were directed to 399 people in total. Some prerequisites for the participants to whom the survey applied were determined before the fieldwork. First of all, it was required that the person who will answer the questionnaire has been residing in Ankara for at least one year. Then, the conditions were sought for the person to consume poultry meat, to be over 18 years old and to have a fixed monthly income. Finally, care was taken to administer the survey to only one person from the household. After the survey form is prepared, it was checked by experts and competent people in the field in terms of response time, intelligibility of questions and question order. The purposive sampling method was used in the research. It is understood from the research results that consumers consume more chicken meat as their income levels increase. The increase in income level does not increase the consumption of red meat, unlike chicken meat. Especially as the income level increases, the interest in piece chicken meat increases. One of the biggest reasons for this is that there are many companies selling chicken and their products in Ankara province and its districts.

Keywords: Ankara, poultry meat, consumption level, consumer behaviour

[1] Agricultural Engineer, Zootechnical Department, Orcid: 0009-0001-1845-3257
[2] Prof Dr., Selçuk University, Zootechnical Department, Orcid: 0000-0002-1818-2856

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Sensor Technology and Application in The Bee Colony Swarm Prevention And Disease Alert System

Engin KILIÇ
Muhammed Fatih ADIGÜZEL
Çetin BOZDEMIR
Mehmet BOZDEMIR
Eyüp Ömer Özyiğit

Abstract

If there is more than one queen in a bee colony, it means that the colony has a tendency to swarm. The bee swarming situation causes a decrease in the number of bees in the hive and decreases in the production of bee products throughout the season. In order to prevent these negative situations, it is necessary to follow the swarming process of the bee. When the bee colony enters the swarming process, significant changes occur in the values of temperature, humidity and sound frequency parameters in the hive. Detection of significant changes in these parameters can be done with sensors to be integrated into the hive, and when the values taken from the sensors are processed into meaningful data by computer, the swarming process can be followed. This follow-up may be delayed in some cases, although it is very rare. It is also possible to monitor the swarming process of the bee by determining the number of queen bees. By integrating a camera into the hive, the number of queens in the image can be determined by comparing the images taken with the images of the queens previously introduced to the computer. Since it is known that the queen is constantly wandering around the hive, the number of queens will not be determined continuously with the camera. For this reason, the detection of the number of queen bees with the camera; It is used as a factor that will help to cover the problems in the follow-up of the bee swarming process with sensors. In addition, increasing humidity and temperature rates due to the unusual air change due to global warming cause the reproduction and reproduction of microorganisms and cause disease in the colony by infecting bees. Bacterial, fungal, viral and protozoal diseases are frequently seen in honey bees due to the negative effects of environmental conditions. As it can be understood, undesirable temperature and humidity changes in the hive play an important role in the formation and reproduction of diseases. In the researches, the temperature and humidity value ranges inside the hive that the bee needs to survive in a healthy way have been determined. As soon as these determined ranges are exceeded, precautions will be taken by warning the beekeeper. As a result, if the sensors placed in the hive and the data taken from the camera are processed and interpreted on the computer and transferred to the beekeeper, it will be beneficial to monitor the swarming process of the bees moment by moment, to prevent swarming by taking the necessary precautions early, and to provide early warning for the prevention of diseases that show a positive correlation with the temperature and humidity changes in the hive. Since beekeeping is an agricultural activity that requires knowledge, experience and continuous monitoring, the use of the above-mentioned technological system has become essential. In this article, the importance of technology in the beekeeping sector, the importance of meaningful data obtained by using sensors, integrated cameras and computer software in order to overcome the difficulties experienced in the follow-up of the bee swarming process and the prevention of bee diseases are discussed.

Keywords: beekeeping, bee swarm prevention, technology, sensor, camera, programming

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Sandbar Shark (*Carcharhinus plumbeus*) Observations at Boncuk Bay in 2022, Gökova, Türkiye

Bengi ATAY[1]
Harun GÜÇLÜSOY[2]

Abstract

The sandbar shark is classified as an enangered species by the International Union for Conservation of Nature's Red List, and its population is declining. Boncuk Bay is one of the most critical nursery areas for sandbar sharks in the Mediterranean Sea, and it is protected as a Special Environmental Protection Area. Furthermore, it is one of the six "No Fishing Areas" in the Gulf of Gökova. Since the mid-2000s, monitoring studies have been carried out in the area irregularly. Since 2013, the Mediterranean Conservation Society has been monitoring the area, and from 2021, it commenced conducting real-time camera observation studies of sandbar sharks. This study was carried out in Boncuk Bay between 1 January 2022 and 31 August 2022 to examine the sandbar sharks presence is related with water temperature and season. For this purpose, the images were gathered for an average of 14 hours per day using two underwater real-time monitoring cameras that derive their energy from solar panels. The cameras have been placed underwater on the shore where the sharks pass. During this period, sandbar sharks were encountered 6,424 times. The temperature range in which the sandbar shark was observed was 17,0 - 29,1oC. In this study, the factors affecting the shark incidence were analyzed using the logit model. It was found that the probability of occurrence at temperatures above 20 °C was higher than at temperatures below 20 °C. The highest frequency of encounter was in spring (April and May) before 1 p.m., while the lowest frequency was in winter (Jan-Feb). This project was supported by the ELP (The Endangered Landscapes Programme).
Keywords: Sandbar shark, *Carcharhinus plumbeus*, Gökova SEPA, Boncuk Bay, Real-time Monitoring

[1] Dokuz Eylül University, The Graduate School of Natural and Applied Sceinces, Buca, 35390, İzmir, 0009-0009-6185- Project monitoring assistant, Mediterranean Conservation Society

2 Assoc. Prof. Dr., Dokuz Eylül University, Institute of Marine Sciences and Technology, İncirali, 35380, İzmir, 0000-0002-4147-2587, harun.guclusoy@deu.edu.tr

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Effect of Conservative Tillage on Soil Properties in Apple Orchard

Muammer YALÇIN

Abstract

Keywords:

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Evaluation of Biocontrol Potential of Beneficial Nematodes against Pear Lace Bug, Stephanitis pyri (F.) (Heteroptera: Tingidae)

Ebubekir YÜKSEL[1]

Abstract

Pear lace bug, *Stephanitis pyri* (F.) (Heteroptera: Tingidae), is one of the serious pests of orchards such as apples and pears in the Mediterranean countries. Many growers tend to apply organophosphate insecticides (Malathion and dimethoate) repeatedly to suppress the *S. pyri* populations. However, intensive use of organophosphate insecticides may lead to serious issues such as the development of resistance in pest populations and adverse health effects on humans as well as pollution of the environment. Therefore, developing new and effective control strategies against *S. pyri* is of crucial importance. Entomopathogenic nematodes (EPNs) (*Steinernema* spp. and *Heterorhabditis* spp.) and their bacterial symbionts (*Xenorhabdus* spp. and *Photorhabdus* spp.) are lethal parasites of insect pests and emerging approach to controlling many economically important pests. In this study, the pathogenicity of two native EPN species (*Steinernema feltiae* DDKY-11 and *Heterorhabditis bacteriophora* AVB-15) was assessed against the adults of *S. pyri* under laboratory conditions (at 25±1 ◦C, 60±5% relative humidity). Infective juveniles (IJs) of EPNs were inoculated to Petri dishes (Ø 9-cm) at 0 (Control), 100, and 200 IJs concentrations/ml water. The mortality of the adults was recorded on the first, second, and third days after treatment (DAT). In general, mortalities were higher at 200 IJs/ml concentration. The results revealed that *S. feltiae* caused higher mortalities than *H. bacteriophora* at 200 IJs/ml concentration 3 DAT and induced mortalities over 60%. The results indicate that tested EPNs have a good potential in the control of *S. pyri*.

Keywords: Beneficial nematodes, sustainable control, orchard, pest

[1] Dr. Öğr. Üyesi, Erciyes Üniversitesi, Bitki Koruma Bölümü, Orcıd: 0000-0002-6982-5874

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Biotechnical Control with Pheromone against Mediterranean Pine Engraver Beetle (Orthotomicus erosus) (Wollaston) (Coleoptera: Scolytidae) for pine trees Balcalı Campus in Çukurova University

Mirac YAYLA[1]
Dogancan KAHYA[2]

Abstract

Mediterranean Pine Engraver Beetle (*Orthotomicus erosus*) (Wollaston) is a destructive pest and cause important damages on *Pinus* species. This pest cause damage on *Pinus brutia* and *Pinus halepensis* in foresting areas of Çukurova University (Balcalı /Adana campus) in 2008. Alternative methods should be used to suppress this pest. Biotechnical control is one of the most effective control method used commonly against pests. Control with applied the pheromone traps against *O. erosus* ,which larvae were caused the death of trees with damaging in the cambium, is known as an alternative control method and this study was carried out to determine the efficacy of biotechnical control method against this pest in Balcalı /Adana (Cukurova University Campus) in 2015. This study showed that we can use the bio-technical control method with pheromone was both more effective and supported biological control methods against to *O. erosus*. According to the results of this study, prepared 55 pheromone traps were hung up on trees located various in Balcalı campus before the flight of these insects. Pheromone traps were checked as periodically in every 15 days. The result showed that 451.296 adult insects felled into the traps with this control method. Consequently, biotechnical control was found effective and can be used against this pest.

Keywords: *Orthotomicus erosus*, biotechnical control, pheromone, Balcalı, Adana

[1] Dr., Biological Control Research Institute, Entomlogy, Orcid: 0000-0003-4492-120X
[2] Dr. Öğr. Üyesi, Eskişehir Osmangazi Üniversitesi Ziraat Fakültesi, Bitki Koruma, Orcid: 0000-0002-8996-3393

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Effects of Na-Humate and Ca-Humate Application on Cold Hardiness of Wheat and Corn

Vedat BEDİRHANOĞLU[1]
Metin TURAN[2]
Adem GÜNEŞ[3]
Müdahir ÖZGÜL[4]

Abstract

This experiment was conducted under field conditions to determine the effects of Na and Ca-humate application on cold hardiness of wheat and corn plants. The study was organized with respect to completely randomized experimental design with two plants (Wheat, Corn), three fertilizer application (Control, Ca-Humate, Na-Humate), five application dose (0, 1, 3, 9, 12 kg/ha) and three replication. The findings of the study indicated that there was significant effect of Na and Ca-humate application on cold hardiness and some field parameter of wheat and cold plants were determined. The highest values for yield parameters in wheat and cold were obtained from 9 kg ha^{-1} Ca ve Na-humate application doses. The rate of cold hardiness was found to be highest levels in Na-humate and Ca-humate applications doses. The rate of cold hardiness in Na-humate applications in wheat respectively decreased at 0 °C 34.31%, at -5 °C 28.82%, at -10 °C 28.03%, at -15 °C 23.53%, at -20 °C 24.27%. The rate of cold hardiness in Ca-humate applications in wheat respectively decreased at 0 °C 33.17%, at -5 °C 27.46%, at -10 °C 27.65%, at -15 °C 28.12%, at -20 °C 27.61%. The rate of cold hardiness in Na- humate applications in corn respectively decreased at 0 °C 26.33%, at -5 °C 30.63%, at -10 °C 22.48%, at -15 °C 17.06%, at -20 °C 13.22%. The rate of cold hardiness in Ca-humate applications in corn respectively decreased at 0 °C 23.93%, at -5 °C 26.64%, at -10 °C 25.11%, at -15 °C 14.18%, at -20 °C 9.6%.

Keywords: Na-humate, Ca-humate, wheat, corn, cold damage

[1] Dr, Vedat BEDİRHANOĞLUInternational Agricultural Research and Training Center, Orcid: 0000-0003-4642-715X

[2] Prof. Dr, Yeditepe University, Agricultural Trade and Management, Orcid: 0000-0002-4849-7680
[3] Doç. Dr, Erciyes University, Soil Science And Plant Nutrition, Orcid: 0000-0003-0411-6134
[4] Prof. Dr, Atatürk University, Soil Science And Plant Nutrition, Orcid :0000-0002-5855-0086

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Improvement of Field Capacity and Persistent Wilting Point of Sandy Loam Soil Treated with Hazelnut Husk Compost

Caner YERLI[1]

Abstract

In this study, it was aimed to investigate the field capacity and permanent wilting point, which show the basic hydraulic properties of the soil and are important soil moisture constants, by applying hazelnut husk compost at different rates to a sandy loam soil with low water holding capacity. For this purpose, hazelnut husk compost was applied to the soil at the rates of 0% (control) and 1%, 2%, 3%, 4% and 5% on a dry weight basis, and the soil and hazelnut husk compost mixtures were left to incubate for two months. After incubation, soil organic matter contents and field capacity and permanent wilting point values were determined in soil samples. The results showed that depending on increasing organic matter content of the soil with increasing hazelnut husk compost rates, field capacity of hazelnut husk compost at 1%, 2%, 3%, 4% and 5% ratios increased by 22.2%, 39.1%, 58.5%, 75.3% and 97.1%, respectively, compared to the control application and permanent wilting point increased by 30.1%, 42.0%, 60.8%, 83.2% and 117.1%, respectively. In addition, positive linear relationships of organic matter with the field capacity and permanent wilting point were determined in this study. As a result, considering the effect of hazelnut husk compost to improve the hydraulic properties of sandy loam soil and the applicability of hazelnut husk compost to agricultural soils as an environmental waste management model, it is suggested that hazelnut husk compost should be used as a waste material that increases the field capacity and permanent wilting point of the soil in agricultural soils and that more comprehensive studies should be carried out on this subject.

Keywords: Field capacity, hazelnut husk compost, persistent wilting point, sandy loam soil, soil hydraulic properties, soil organic matter

[1] Dr., Department of Biosystem Engineering, Faculty of Agriculture, Van Yuzuncu Yil University, Van, Turkey, 0000-0002-8601-8791

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A Plot-Based Land Evaluation Study for Land Management; Seyrek-Kesik Case Study

Nejat ÖZDEN[1]

Abstract

This study was carried out on an area of 4700 hectares of agricultural lands covering Seyrek and Kesik Regions of İzmir, Menemen Province. The aim of the study was to determine the suitability classes of the land use types at the parcel level. To this end, a 1/5000 scale map with parcel-level digital area information was used as the base map, and the ILSEN computer model was used to determine potential land use groups and agricultural land use suitability classes. Soil survey and mapping studies were carried out primarily in the region, and the soils distributed in the floodplain and basin physiography within the valley were placed in the Entisol order, and two sub-rows, two large groups, and four sub-groups were defined. By integrating the physical and chemical land characteristics of the map units determined from the soil map and the soil fertility index model values, the suitability classes of the land use types were determined through comparing each land use type with the mapping units. A total of 19 different types of land use were evaluated, including 5 horticultural crops, 6 field crops, and 8 vegetable crops, in terms of soil and climate requirements and defined for the mentioned classes. Thus, a map was created using GIS to show the distribution of potential use groups at the parcel level within the study area. Although no area could be defined as excellent quality agricultural land considering the suitability classes of the soils of the research area for agricultural use, it has been found that 87% of the area is composed of very good quality agricultural lands, while the remaining 13% is composed of problematic agricultural lands.

Keywords: Land evaluation, soil survey and mapping, ILSEN, GIS, Menemen

[1] Dr., International Agricultural Research and Training Center, Plant Nutrition and Soil Department, Orcid: 0000-0002-5508-8877

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Zucchini Yellow Mosaic Virus (ZYMV) and Its Symptoms in Cucurbitaceae

Nur ÜLGER[1]
Sıdıka GÖNÜL[1]
Büşra ÜLGER[2]

Abstract

Viruses are among the most abundant pathogens that exert a detrimental effect on agricultural products both nationally and worldwide. Plant viral infections affect fruit quality and plant health, causing significant yield losses in production. Poor fruit quality and yield losses can significantly impact the profitability of overall production. The zucchini yellow mosaic virus (ZYMV) is one of the most prevalent viruses affecting cucurbits with a broad host range. Viral hosts in the Cucurbitaceae family include squash (*Cucubitaceae pepo*), cucumber (*Cucumis sativus*), melon (*Cucumis melo*), and watermelon (*Citrullus lanatus*). ZYMV, a potyvirus in the family Potyviridae, can be transmitted mechanically and via its vector aphids, which serve as vectors, inducing fruit deformities, discoloration, mosaic-like spots on leaves, and overall stunted plant growth. Serological methods such as RT-PCR and ELISA tests are utilized in diagnostic research to identify the ZYMV virus. Chemical control is done against aphids which do not provide an effective solution for disease combat. Given the limited availability of chemical control options for ZYMV disease and other virus diseases, the significance of employing resistant varieties and implementing meticulous cultural practices to combat ZYMV has grown exponentially. Among the available methods, the use of resistant varieties is deemed the most effective. This review delves into the damages and control mechanisms that pertain to ZYMV infections in cucurbits.

Keywords: Virus, Cucurbitaceae, ZYMV, RT-PCR, DAS-ELISA

[1]Agricultural Engineer MSc., R&D Engineer, Nur, Ülger, Multi Tohum Tar. San. Tic. A.Ş., 0000000332228037
[1]Agricultural Engineer, R&D Engineer, Sıdıka, Gönül, Multi Tohum Tar. San. Tic. A.Ş., 0009000214703543
[1]MSc Student, Plant Biotechnology, R&D Engineer, Büşra, Ülger, Wageningen University, Multi Tohum Tar. San. Tic. A.Ş., 0009000777286640

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Farm Management Strategies And Structural Characteristics Of Small Ruminant In Debaga, Shaqlawa And Degala In Erbil Province-Iraq

Hewa Kareem FATTAH[1]
Ayşe Özge DEMIR[2]

Abstract

This study includes part of the outputs of a field study conducted in three districts of Erbil province in northern Iraq (Debaga, Shaqlawa and Degala) on the diversity of small ruminant and the functioning of farms where animals are raised. For this purpose, it is aimed to clarify the roles of the farm management strategy related to the current situation of small ruminant, to determine the status of animals, to determine the social and economic context of agricultural-pastoral systems in terms of sources of income and to determine the sheep feeding methods of enterprises. In this descriptive study, which was conducted between 15 March 2020 and 15 March 2021, the sample size included 160 small ruminant farms. The data collection phase was classified into four different sections and was conducted using a standardized questionnaire consisting of a total of 69 questions. First part; socio-demographic characteristics, second part; farm management strategy and its role in small ruminant farms, third part; characteristics of small ruminant, fourth part; animal production, childbirth, epidemics, animal loss and veterinary services. The data were analyzed with SPSS program, version 24 and chi-square and normal distribution was created for frequency tables. According to the findings of the study, small ruminants face various obstacles, such as difficult geographical conditions, lack of management strategy on farms and malnutrition. All these prohibitive factors have a negative impact on animal production in terms of quality and quantity. However, it is thought that these obstacles can be overcome gradually over time with the implementation of good strategic management.

Keywords: Erbil, Farm management, Goat, Sheep, Small ruminant

[1] Agronomist, Universty of Salahaddin, Erbil, Colage of Agricultural Engineering Science, Department of Animal Resources, Orcid: 0009-0003-6686-9286

[2] Asst. Prof. Dr., University of Van Yuzuncu Yıl, Faculty of Agriculture, Department of Animal Science, Orcid: 0000-0001-7203-4734

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Comparison of Blood Mineral Levels of Norduz Goats of Different Ages Fed on Pasture at The End Of The Lactation Period

Ayşe Özge DEMIR[1]
Suna AKKOL[2]

Abstract

In presented study, it was especially aimed to determine some makro and micro mineral levels in the blood of a total of 26 Norduz goats (at the end of 1st lactation (n=10), at the end of 2nd lactation (n=8), at the end of 3rd lactation (n=8)) fed in pasture at Van Yuzuncu Yil University Research and Application Farm (Van, Turkiye). For this purpose, blood samples were duly taken from goats that had completed the lactation period at the beginning of June. Some of macro mineral levels (potassium (K), magnesium (Mg), calcium (Ca), sodium (Na)) and some of micro mineral levels (cobalt (Co), copper (Cu), iron (Fe), nickel (Ni), manganese (Mn), selenium (Se), zinc (Zn), lead (Pb)) samples of sera obtained from blood samples collected from goats were determined by inductively coupled plasma optical emission spectrometry (ICP-OES). The results of the minerals obtained from this study were subjected to all statistical analysis using SPSS 24.0 version (IBM SPSS Inc, Chicago, USA) (SPSS, 2016). All statistically significant differences ($P<0.05$) were compared and ranked with Duncan's Multiple Range Test. Later, the relationships between minerals were revealed by Pearson Correlation Coefficient ($P\leq0.05$). In addition, in this study, the ranking of macro and micro minerals and the rates of some of these minerals (Ca / Mn, Mg, Zn; Cu / Fe, Zn; Fe / Mn, Zn; K / Mg, Na, Mn) were also presented.

Keywords: Norduz goat, blood mineral, ICP-OES, reference values

[1] Asst. Prof. Dr., University of Van Yuzuncu Yıl, Faculty of Agriculture, Department of Animal Science, Orcid: 0000-0001-7203-4734

[2] Assoc. Prof. Dr., University of Van Yuzuncu Yıl, Faculty of Agriculture, Department of Animal Science, Orcid: 0000-0001-5123-7516

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Technical Assessment of Constructed Wetlands in Province of Istanbul and Suggested Selection Techniques for the Future Locations of New Constructed Wetlands

Hasan Volkan ORAL[1]

Abstract

The purpose of this study is to assess the current state of constructed wetlands in Istanbul and offer technical recommendations for the procedures to be used in the choice of constructed wetlands to be constructed in the future. The study sites were chosen to be the Pasakoy and Omerli-constructed wetlands in the Anatolian Part of the Province of Istanbul, which were constructed approximately twenty years ago. The study design is based on Multi-Criteria Decision Making (MCDM) and Geographical Information Systems (GIS) for the selection of the appropriate sites in the future. These two techniques have been employed to integrate each other. Constructed wetlands are considered in the applications of nature-based solutions, which are commonly discussed under the sustainable water management approach in recent years. Meanwhile, constructed wetlands are not a novel idea, but in recent years they have begun to be evaluated together with natural-based solutions. Nature-based solutions provide tools to mitigate impacts of the impacts of climate change. Human settlements have been significantly impacted by climate change, and in recent years, megacities have begun to feel its effects. Istanbul has one of the highest population densities of any city in the world. The construction of new residences within the municipal limits has become a necessary consequence of uncontrolled population growth. The consumption of natural resources and the use of water are both rising as a result of this population growth. Additionally, both industrial and daily use has resulted in an increase in the generation of wastewater. This type of wastewater also includes the quantity of is discharged by agricultural use in suburban or rural areas. Although local governments' initiatives to construct advanced wastewater treatment facilities on both Istanbul's continents have gained steam recently, some of the constructed wetlands in Istanbul in the 2000s are currently inactive.

Keywords: Sustainable Water Management; Nature-based solutions; Constructed Wetlands; İstanbul

[1] Dr.Öğr.Üyesi, İstanbul Aydın Universitesi, İnşaat Mühendisliği (İngilizce), Orcid: 0000-0002-5743-1931

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Use of Epiphytic Diatoms to Assess The Ecologıcal Status of Derinçay Stream (Çorum, Türkiye)

Süleyman İPEK[1]
Faruk MARAŞLIOĞLU[2]

Abstract

The diversity and seasonal succession of epiphytic algae were studied at 6 station in Derinçay Stream, Çorum. To determine the epiphytic algae in Derinçay Stream, plant samples were taken periodically between August 2020 and July 2021. A total of 42 epiphytic taxa belonging to five orders from Bacillariophyta were identified in Derinçay Stream. Some species were recorded as dominance during most of the study period, such as *Nitzschia palea* (19%) and *Fragilaria tenera* (13%). *Navicula veneta* and *Ulnaria* ulna species were represented at subdominant level with an abundance of 10-11%. In the study area, the predominant presence of pollution-tolerant species in the stream shows that there is a pollution pressure in Derinçay Stream. The fact that 45% of the taxa in the area consist of tolerant species shows that the water quality in the area is not in good status. Again, the fact that sensitive species, which are indicators of clean waters, are represented in the area with only 28%, shows that the pollution pressure in the area is high. Trophic Diatom Index (TDI) values were calculated using epiphytic algae data in order to comment on the trophic state of the water in Derinçay Stream. Low values of the TDI index indicate low nutrient levels, while high index values indicate eutrophic conditions of the water. Accordingly, Derinçay Stream has a hypertrophic trophic structure corresponding to the "bad" water quality class with an average TDI of 79.8. The annual average TDI values determined according to the stations in the epiphytic flora in phytobenthos are close to each other except for the 1st and 2nd stations. According to the TDI results determined according to the stations, it was seen that the water quality conditions of the other stations were "weak" or "poor" except for the 1st station (medium water quality).

Keywords: Stream, epiphytic algae, seasonal variation, pollution

[1] Uzman, Hitit Üniversitesi, Biyoloji, Orcid: 0000-0003-3176-4751
[2] Doç. Dr., Hitit Üniversitesi, Biyoloji, Orcid: 0000-0002-7784-9243

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Phytoremediation of Organic and Inorganic Pollutants in Aquatic Ecosystems by Algae

Özlem YILMAZ[1]

Abstract

In recent years, industrialization, population growth and people's interest in technology have increased. Environmental pollution occurs as a result of many industries producing high-capacity products to meet current demand, depending on technological developments. With the addition of these new pollution levels on top of the existing pollution, it is becoming increasingly difficult for nature to renew itself. Aquatic ecosystems are the places most affected by pollution in our country as in almost all parts of the world. Human activities such as industrial and agricultural activities, thermal power plants, domestic wastes, and sea transportation cause water pollution. The discharge of these pollutants, which are formed as a result of human activities, to wetlands such as rivers, lakes and seas not only causes many physical, chemical and biological changes and pollution in the water, but also causes negative changes in the life cycle of aquatic organisms living in the relevant environment. Recently, the potential of algae in removing pollution has attracted attention and studies in this area are increasing. Phytoremediation is the removal of pollutants such as heavy metals in soil or water using plants or algae, or the elimination of their toxic effects. Phytoremediation method is preferred more as a cost-effective removal method, which is low in cost compared to chemical and physical removal techniques, does not have destructive and negative effects on the environment, is environmentally friendly and is considered efficient because it uses solar energy. In this context, recent studies on algae breeding capacities, which are frequently used in the reclamation of organic and inorganic wastewater and natural waters, have been compiled.

Keywords: Algae, phytoremediation, aquatic ecosystem, pollutant, removal

[1] Dr, ORCID: *0000-0002-5329-559X*

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Comparison of K-means and Fuzzy C-means Clustering Algorithms on Water Quality Parameters: Case Study of Ergene Basin for 17 Stations

Gülay ARSLAN ÇENE[1]
Coşkun PARİM[2]
Erhan ÇENE[3]

Abstract

Water quality parameters are important measures of the health and safety of water sources, which can be affected by various natural and human-induced factors. There are several parameters to assess water quality. The aim of this study is to group 17 water stations in the Ergene Basin, Turkiye by using k-means and fuzzy c-means clustering algorithms which are methods of unsupervised machine learning. For this reason, 15 water related variables from the period of 1985-2013 are used to group 17 water stations. Different number of clusters are inspected in both of the algorithms and the optimal number of clusters is found as 4. These clusters are named as high-quality water, slightly polluted water, polluted water, and highly polluted water. The selected water parameters are Biochemical oxygen demand (BOD5), Chloride (Cl-), Dissolved oxygen (DO), Escherichia coli (EC), Aluminum (Al), Ammonium–nitrogen (NH4-N), Nitrite–nitrogen (NO2-N), Nitrate–nitrogen (NO3-N), Orthophosphate (o-PO4), Potential of Hydrogen (pH), Photovoltaics (pV), Suspended Solid (SS), Temperature (T), Total Dissolved Solid (TDS), Turbidity (Turb).

The center of the clusters are used to identify the characteristics of stations. The first cluster has the lowest BOD5, Al, NO2-N, T average, and the highest DO average. The second cluster has the lowest Cl-, EC, NH4-N, o-PO4, pV, SS, TDS and Turb average, and the highest NO3-N, pH and T average. The third cluster has the lowest DO average, and has the highest Cl-, EC, Al, NH4-N, NO2-N, o-PO4 and TDS average. The fourth cluster has the lowest NO3-N and pH average, and has the highest BOD5, pV, SS and Turb average.

Both k-means and fuzzy c-means clustering gives similar results both among stations and years. Water quality for most of the stations in this basin improved after the year 2006 whereas water quality of few stations get worse after the year 1990.

Keywords: K-means clustering, Fuzzy c-means clustering, Water Quality, Ergene Basin, Machine Learning

[1] Research Assistant, Marmara University, Departmant of Environmental Engineering, Orcid: 0000-0003-1983-266X
[2] Research Assistant PhD., Yildiz Technical University, Departmant of Statistics, Orcid: 0000-0002-6412-1325
[3] Assistant Professor, Yildiz Technical University, Departmant of Statistics, Orcid: 0000-0001-5336-6004

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Katı Atık Kaynakta Ayırma İşleminin Sıfır Atık Çalışmaları Kapsamında Araştırılması: Üsküdar Üniversitesi Örneği

Tuğçe YILMAZ KARAN[1]
Ömer APAYDIN[2]

Abstract

The rapid increase in the world population caused the rapid consumption of limited natural resources and disrupted the natural balance. As a result, efficient management of waste gained importance. Waste management is important for human health and environment because improperly managed waste leads to environmental pollution. Therefore, proper collection, transportation, processing, and disposal of waste are essential. Waste management includes various methods such as recycling, reuse and waste reduction. Thanks to these methods, the impact of waste on natural resources can be reduced. Thus, the rapid increase in the world population has revealed the necessity of efficient waste management. However, the amount of solid waste continues to increase in the modern era and this is becoming a major environmental problem in urban areas. Problems are experienced due to the lack of existing regulations on solid waste management in cities and institutions in particular, lack of planning and organization, and lack of adequate financing. However, effective waste management will help protect human health, the environment and natural resources. Therefore, within the scope of "Zero Waste" the separation of solid waste at the source is an important issue. Some institutions and organizations have successfully addressed the solid waste problem and offered solutions in an exemplary manner. Üsküdar University is one of these examples. Üsküdar University is an institution sensitive to environmental and sustainability issues. Therefore, it attaches great importance to zero waste studies. The University carries out a series of practices in order to minimize waste generation, increase recycling rates, and dispose of waste without harming the nature, and it provided exemplary practices and successful solutions related to solid waste issues in almost every aspect of the university. Therefore, our study highlights the waste management and zero waste practices implemented by Üsküdar University between 2020 and 2022.

Keywords: Waste Management, Zero Waste, Sustainable Environment, Üsküdar University

[1] Yıldız Teknik Üniversitesi, Çevre Mühendisliği Bölümü, Orcid: 0000-0000-0027-0307
[2] Doç., Dr., Yıldız Teknik Üniversitesi, Çevre Mühendisliği Bölümü, Orcid: 0000-0002-7909-2862

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Evaluation of Patent Applications and Research in the Field of Solid Waste Management

Büşra TOKKAN[1]
Mehmet Sinan BİLGİLİ[2]

Abstract

With the increase in patent awareness, the number of patent applications has started to increase and a race has started to emerge both in our country and globally. This awareness give point of view about the patent requirements such as: novelty, inventive step and industial applicabilitiy to the academic researchers. They make new pathway to them for searching methodology and start to use the patent databases about their search area, but it is not enough for the novelty of any research. Patent databases have not included the last 18 months because some rules of the patent offices shows that it is not a appropriate to publish the application within this period. In fact, similar research methods are used when researching both patents and academic studies. Especially, keywords are same about the same topic, like in this study we use waste, waste management, solid waste management for both databases about patent and article. However, even though we used the same keywords, it was seen that the number of patents and articles were not the same. As a result of this situation, within the scope of this study, it is aimed to present a numerical comparison of patent applications and researches specific to solid waste management, and to present solution proposals regarding the difference, taking into account the relevant databases and the number of applications shared by institutions.

Keywords: Waste Management, Solid Waste Management, Patent, Research, Evaluation.

[1] Büşra Tokkan, Yıldız Teknik Üniversitesi, Çevre Mühendisliği Bölümü, Orchid: 0009-0007-0133-5709

[2] Prof. Dr. Mehmet Sinan Bilgili, Yıldız Teknik Üniversitesi, Çevre Mühendisliği Bölümü, Orchid: 0000-0002-5547-1841

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Biopolymer Production Potential from Pickle Brine Effluent through Microbial Processes

Merve Aşkın DEMİR[1]
Gülsüm Emel ZENGİN BALCI[2]

Abstract

Conventional plastics are produced from limited petroleum derivatives and cause serious environmental problems. Polyhydroxyalkanoate (PHA) biopolymers are important alternative to petroleum-based polymers since they are produced from renewable sources, biodegradable and have similar mechanical properties to conventional plastics (Mannina et al., 2020). However, PHA production cost is remarkably high compared to synthetic plastics and the use of high organic content waste streams and mixed microbial culture have been suggested as a promising alternative to reduce the PHA production cost (Duque et al., 2014). In this study, the possibility of using pickle brine effluents as an alternative source for PHA biopolymer production with mixed microbial culture (MMC) is evaluated. Laboratory scale sequencing batch reactor (SBR) was operated under dynamic feeding conditions with pickle brine effluents at a sludge retention time of 4 days and with two cycles per day. The pickle brine effluent had high organic and chloride content, an average of 19065 ±685 mg/L COD and 40000 ± 1150 mg/L Cl^-, respectively. Total Kjeldahl nitrogen, total phosphours concentrations and pH values were 445 ± 18 mg N/L, 32± 46 mg P/L and 2.95± 0.14, respectively. The organic acid content of the pickle brine effluent was 1036±288 mg/L of acetic acid, 8065±302 mg/L of lactic acid, 5680±550 mg/L of propionic acid and 487±155 mg/L of succinic acid. The average volatile solids concentrations in the SBR was measured as 4600± 520 mg MLVSS/L at steady state conditions. A significant PHA production with a range of 46% to 52% gCOD/gVSS was achieved with the enrichment of mixed microbial culture under high saline stress conditions. The results indicate that pickle brine effluent is a promising alternative for PHA biopolymer production.

Keywords: mixed microbial culture**,** pickle brine effluent**,** polyhydroxyalkanoate, salinity

[1] Env. Eng., Istanbul Technical University, Environmental Engineering Department, Orcid: 0009-0004-5233-7155
[2] Assoc. Prof., Istanbul Technical University, Environmental Engineering Department, Orcid: 0000-0002-6475-9062

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Evaluation of Antibacterial Activities of Biomolecules Obtained from Marine Bacteria

Ayse KAZAN[1]
Asli KACAR[2]
Burcu OMUZBUKEN[3]

Abstract

Marine-derived bioactive molecules have contained important biological properties, such as antibacterial, antibiofilm, antiviral, antioxidant, and antifungal activities. In the present study, the antibacterial activities of complex and pure extracts from a marine sediment bacteria (*Kocuria rosea* MW559735) were evaluated on marine biofilm-forming bacteria (*Vibrio lentus* FJ200648, *Alteromonas genoviensis* FJ040186, *Pseudoalteromonas agarivorans* FJ040187, *Exiguobacterium homiense* FJ200652). The inhibition concentrations of extracts were tested using the minimum inhibitory concentration (MIC) test. The most effective minimum inhibitory concentration results of both complex and pure extracts of *Kocuria rosea* were determined at 6.25 mg/ml against *Alteromonas genoviensis*. In addition to that, the chemical profiling analyses (total alkaloid, total phenolic and total flavonoid) of extracts were performed using spectrophotometric methods. Results obtained from chemical profiling analyses indicated that pure extract was rich in alkaloids (56.33 ± 0.54 mg equivalent Boldin/g extract). On the other hand, total phenolic and total flavonoid were not detected in the pure extract. The complex extract was found to contain total alkaloids 142.16 ± 10.38 mg equivalent Boldin/g extract, total phenolic 92.58 ± 22.52 mg equivalent Gallic acid/g extract, and total flavonoid 12.03 ± 0.57 mg equivalent Quercetin/g extract. It is suggested that advanced structural analysis of marine-derived biomolecules should be performed to show their biotechnological use potential. Through, the commercial use of bioactive biomolecules is increasing, and it is expected to play an important role in the development of marine-derived biotechnological products in the future.

Keywords: Antibacterial activity, Bioactive molecules, Chemical profiling, Marine bacteria, Marine biotechnology

[1] Dokuz Eylul University, The Graduate School of Natural and Applied Sciences, Biotechnology Department, Izmir, Türkiye
[2] Prof. Dr., Dokuz Eylul University, Institute of Marine Sciences and Technology, Izmir, Türkiye
[3] Dr., Dokuz Eylul University, Institute of Marine Sciences and Technology, Izmir, Türkiye

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Treatment of Acid Mine Lake Water by Dolomite and Activated Carbon Filtration

Hasan Göksel ÖZDİLEK
Ersin ORAK
İlhan BETTEMİR
Tugay AKTAŞ
Oğuz AJLAN
Alime TAŞ

Abstract

Acid Mine Lakes impacts negatively the environmental quality. The acidic mine lakes of various sizes, located in the Çan district of Çanakkale province, have been on the agenda locally and nationally for the last 30 years. In this study, the pH value of the acid mine lake water was brought to normal standard with dolomite and the metals in the water were removed with activated carbon. 4 kg of dolomite filter (calcium magnesium carbonate) brought the pH value of the water below 2.5 above the 7.5 , and then in the adsorption study of the activated carbon used (200 mL of water and five different amounts of activated carbon), the investigated elements (aluminum, copper, zinc, iron, cobalt, manganese, and nickel) removal was found to be at least 82.78% (for Mn) and the highest 99.99% (Fe). It was found that dolomite (average diameter 30 mm) did not form excessive mud due to its hardness. The required activated carbon dose was determined for the seven metals measured, and the cost of treatment the water of an acid mine lake (200 thousand m^3 in volume) planned to be fully operated in 2023 has also been calculated. The target was selected to be ecotoxicological limit values of heavy metals examined. After the work planned in 2023, other acid mine lakes located near the Etili Village and Keçiağılı Village of Çan District of Çanakkale Province (the largest has a water volume of 1 million m^3) treatment and the study will be investigated for treated water suitability for agricultural irrigation.

Keywords: Acid mine lake, dolomite filter, activated carbon, Çanakkale-Çan, water pollution

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Technical and Environmental Evaluation of Composite Materials Obtained From Textile Wastes

Mürvet MIHÇI[1]
Murat SOLAK[2]
Mert KILINÇEL[3]

Abstract

Rapidly growing industrialization to meet the needs of the increasing population in the world has led to an increase in the formation of hazardous/non-hazardous waste. In this process, concepts such as recycling, recovery and reuse are extremely important in terms of ensuring environmental sustainability. Many wastes generated during the production processes of industries have significant potential in terms of being recycled as raw materials, producing new products and providing added value. There are deficiencies in both the literature and practice at the point of obtaining composite materials for the reuse of wastes with different applications. Composite materials are defined as new materials obtained by combining at least two different materials in macro dimensions, and advanced materials in which the superior properties of this self-forming material take place in the new material. Due to the high strength and lightness of these materials, they can be used in many sectors (automotive, construction, sports equipment, etc.). Composite materials consist of various matrix and reinforcement elements. Thermoset resins (epoxy, vinyl ester and polyester) are commonly used in composite engineering applications. In the study, composite materials obtained by using different textile wastes and different resins, various properties of these materials such as mechanical, thermal and acoustic, Literature studies on the difficulties that may occur in the production of composite plates and the contribution of composite plates obtained from waste materials to environmental sustainability will be investigated.

Keywords: Composite, textile waste, thermoset resin

[1] Postgraduate Researcher, Duzce University, Graduate Institute Environmental Engineering Department, Orcid: 0000-0002-1849-9554

[2] Doctoral Lecturer, Düzce University, Faculty of Engineering, Department of Environmental Engineering, Orcid:0000-0003-1542-1599

[3] Doctoral Lecturer, Düzce University, Faculty of Engineering, Department of Mechanical Engineering, Orcid:0000-0001-7057-4390

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Recyclability of Packaging Waste: The Case of Pendik-Istanbul

Miraç Nur CİNER[1]
Mehmet Can SARIKAP[2]
Emine ELMASLAR ÖZBAŞ[3]
H. Kurtuluş ÖZCAN[4]
Sinan GÜNEYSU[5]
Atakan ÖNGEN[6]
Serdar AYDIN[7]

Abstract

With the recycling and recovery of packaging, our natural resources are protected, energy savings are achieved and thus the country's economy is contributed. With the recycling and recovery of packaging waste, not only does it contribute to the country's economy, but also the health of people and the environment. With the "Packaging Waste Control Regulation" published in the Official Gazette dated 26/06/2021 and numbered 31523, it is stated that it is essential to reduce the amount of waste to be disposed of by primarily reusing, recycling, recovering and/or using the packaging wastes as an energy source. Arrangement for collecting packaging wastes within a zero waste management system based on the provisions of the Zero Waste Regulation, taking material recycling as the primary basis for the recycling of packaging waste, not sending recyclable packaging waste to landfills, and not accepting recyclable packaging waste by landfill facilities. has been made. In this study, an evaluation of the recycling of packaging waste was made by using the data obtained from the Packaging Waste Separation Facility of Pendik Municipality, which has been operating since 2018. With the effect of the pandemic process in 2020, it was observed that there was a decrease in the amount of recycled packaging waste compared to 2018 and 2019.

Keywords: Packaging waste, Recycling, Solid waste, Solid waste management

[1] Res. Asst., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9920-928X
[2] Lec., Istanbul University-Cerrahpaşa, Project and Technology Office, Orcid: 0000-0002-5044-1184
[3] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0001-9065-6684
[4] Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9810-3985
[5] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-4875-101X
[6] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9043-7382
[7] Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-0626-5224

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GIS Analysis for Topographic Effects of Landfill: A Case Study of Istanbul-Odayeri Landfill

Hüseyin YURTSEVEN[1]
Mehmet Can SARIKAP[2]
Miraç Nur CİNER[3]
Emine ELMASLAR ÖZBAŞ[4]
H. Kurtuluş ÖZCAN[5]
Sinan GÜNEYSU[6]
Atakan ÖNGEN[7]
Serdar AYDIN[8]

Abstract

Solid waste is produced in large quantities around the world nowadays as a result of modern life. The appropriate disposal of waste is the ideal practice in waste management. Sanitary landfills are where most solid waste is deposited. The choice of the landfill location is the most important step in the waste storage process. Although choosing the least expensive and environmentally harmful sites is the main factor to take into account, over time, due to impacting the collection threshold in terms of volume, spatial expansion in solid waste storage areas may be required. The objective of this study was to use a Geographic Information System (GIS) to map the temporal changes in the Odayeri solid waste landfill region, which is inside the city limits of Istanbul. The Odayeri solid waste dump area was examined for geographical changes between 1996 and 2022 using orthophotos and a variety of satellite pictures from 1996, 2002, 2005, 2010, 2013, 2014, 2017, 2018, 2021, and 2022. Forest areas were included in the spatial expansion, therefore alterations there were assessed stand-by-stand. At this point, it was established that between 1996 and 2022, the Odayeri solid waste dump area increased in size from 30.66 ha to 216.33 ha. The removal of oak, beech, and stone pine stands encompassing 120.25 ha of productive forest regions was revealed to be the cause of this alteration. Furthermore, volumetric measurements were made of the topographic changes that took place in the Odayeri solid waste landfill's areas that reached the storage threshold. The National Aeronautics and Space Administration's (NASA) Shuttle Radar Topography Mission (SRTM) data from 2000 and DEM data created by the Turkish General Directorate of Mapping (GDM) using photogrammetric techniques from 2013 were both used in the volumetric determination of topographic changes stage. Assessments showed that the 123.54 ha area that was restricted for storage at the threshold experienced a maximum topographic change of 65 meters. Furthermore, analyses based on this information suggested a volumetric change of almost 24,400,000 m3. Throughout the investigation, graphics were used to display and discuss each finding. The Odayeri solid waste landfill area and the geographic and topographical changes that have taken place through time have been assessed within the context of the conducted study from an environmental, geological, and forest structural standpoint.

Keywords: Landfill, GIS, Odayeri

[1] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Surveying and Cadastre Department, Orcid: 0000-0003-2469-9365
[2] Lec., Istanbul University-Cerrahpaşa, Project and Technology Office, Orcid: 0000-0002-5044-1184
[3] Res. Asst., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9920-928X
[4] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0001-9065-6684
[5] Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9810-3985
[6] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-4875-101X
[7] Assoc. Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-9043-7382
[8] Prof. Dr., Istanbul University-Cerrahpaşa, Environmental Engineering Department, Orcid: 0000-0002-0626-5224

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Correspondence of Breaking Years with the El Nino and La Nina Years

Göknur Elif YARBAŞI KAYHANLAR[1]
Ali İhsan MARTI[2]

Abstract

The studies on climate parameters affected from meteorological events provide to have information about earth and its geographical regions. The Southern Oscillation (SO) including cold (La Nina) and warm (El Nino) phases is one of the most important oceanic-atmospheric event affecting the climate on earth. The recent studies proved that the climate changes display considerable effects on the components of the hydrologic cycle. In this context, understanding the mechanisms controlling the variability of SO will also help us to understand the systems controlling the climate changes. The large-scale oscillations (pressure fluctuations) due to atmospheric movements within the hydrologic cycle are the climate anomalies having periodical characters. Therefore, the effects of the climate changes and climate anomalies on the water resources should be studied, and their future conditions should be observed and investigated. The purpose of this study was to determine the relationships between Southern Oscillation and the precipitation data of Black Sea Region of Türkiye. In order to find out the relationships, the homogeneity analysis methods of Standard Normal Homogeneity Test, Pettitt Test, Buishand Test, Von Neumann Test and Run Test were applied on the precipitation data of the Black Sea Region. As a result, the correspondence between the breaking years obtained from the homogeneity analyses and the warm/cold phase years of SO was determined as 59%.

Keywords: Southern Oscillation, precipitation, hydrologic cycle, climate anomaly, climate change.

[1] Ph. D. Student, Konya Technical University, Department of Civil Engineering, Orcid: 0000-0002-7323-8912
[2] Assist. Prof. Dr., Konya Technical University, Department of Civil Engineering, Orcid: 0000-0003-3440-6052

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Comparison of PKWs with Same Weir Height

Burak ÇEŞMECİ[1]
Ali İhsan MARTİ[2]

Abstract
Spillways are significant engineering structures constructed from past to present to perform their important functions within the water structures. There are many studies about linear weirs (sharp edged, wide-flange) placed on open channels to measure the discharge. In this study, three different D type PKW models with P=20 cm height were used to investigate the piano key weirs (PKW), types of PKW and the geometric parameters used for PKW. In order to find out the effect of the change in P_K (the ratio of entrance key width to the exit key width, W_i/W_o) on the discharge efficiency, the weir height (P) and the weir length (L) were set constant. Hence, three different D type PKW models were designed with L=30 cm, P=20 cm and P_K= 1.00, 1.25 and 1.50 values on which experimental and numerical analyses were made. While the experimental models were built and tested in a rectangular open channel in the laboratory, the numerical models were formed and analyzed in ANSYS-Fluent commonly used for Computational Fluid Dynamics (CFD) problems. The results of numerical and experimental studies were examined and compared on Discharge (Q)–Weir Head (H) and Discharge Coefficient (C_d)–Dimensionless Weir Head (H/P) diagrams. As a result of the studies, it was observed that the increase in P_K value decreased the weir head which means a more efficient model was obtained.
Keywords: Spillway, CFD, ANSYS-Fluent, Open Channel, PKW.

[1] Lecturer, Isparta University of Applied Sciences, Department of Building Control , Orcid: 0000-0002-4470-0274

[2] Assist. Prof. Dr., Konya Technical University, Department of Civil Engineering, Orcid: 0000-0003-3440-6052

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Comparison of D-Type PKWs with P_K=1.00

Burak ÇEŞMECİ[1]
Ali İhsan MARTİ[2]

Abstract

Existing within hydraulic structures and having various characteristics, spillways are the important parts of the water structures. Instead of commonly used sharp-edged or wide-flange weirs, this study considered D Type Piano Key Weirs (PKW) that are new trend weirs constructed on rivers or open channels nowadays. Four different models with PK (Wi/Wo)= 1.00 value were formed in the study, where PK is the ratio of entrance key width (Wi) to the exit key width (Wo). For constant PK value, the effects of changing weir lengths (L) and heights (P) on the results were observed. Models were designed with same weir length but varying weir height, on the other hand the other set of models had the varying weir length but constant weir height. In order to determine the effects of designed models on the discharge efficiency, the different four PKW models were analyzed experimentally and numerically. While the experimental models were tested in a rectangular open channel in the laboratory, the numerical models were analyzed in ANSYS-Fluent software used for Computational Fluid Dynamics (CFD) problems. The numerical and experimental results were compared and evaluated using the diagrams of Discharge (Q)–Weir Head (H) and Discharge Coefficient (Cd)– Weir Head (H/P). Finally, it was determined that the increasing P and L values decreased the weir head that can provide big amount of discharges to be transferred more efficiently.

Keywords: Weir, Open Channel, CFD, Piano Key Weirs, ANSYS-Fluent

[1] Lecturer, Isparta University of Applied Sciences, Department of Building Control, Orcid: 0000-0002-4470-0274
[2] Assist. Prof. Dr., Konya Technical University, Department of Civil Engineering, Orcid: 0000-0003-3440-6052

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Dikdörtgensel Kolonların Davranışlarının Makine Öğrenmesi ile Tahminlenmesi

Emre MUMYAKMAZ
Onur TUNABOYU
Özgür YURDAKUL
Talha ORHAN

Abstract

Machine learning, which has become more and more popular with the development of technology, has also affected the studies in the field of civil engineering. In this context, it has been examined whether the predictions made by machine learning during the design phase could be an alternative to the column parameters calculated by traditional methods. Predictions were made with the data in the database of 520 rectangular reinforced concrete column test specimens. The maximum shear strength of rectangular columns, the drift ratio corresponding to the point where the maximum shear strength decreases by twenty percent after the point where it starts to decrease, and the test result failure type have been predicted by using prediction models which are created by using Regression, Random Forest (RF), and CatBoost machine learning algorithms. The performances of the prediction models were examined using the Root Mean Squared Error (RMSE), R-Squared, Adjusted-R-Squared and 10-Fold Cross Validation statistical methods. It been observed that the maximum shear strength 91,1%, the drift ratio corresponding to the point where the maximum shear strength decreases by twenty percent after the point where it starts to decrease 69.1% and the failure type predicted with 96% accuricies. Within the scope of the study, a user-friendly interface has also been developed so that end users could make predictions.

Keywords: Predictions with Machine Learning, Random Forest, CatBoost, Regression, Reinforced Column

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Investigation of Interface Friction of Loose Pumice Sand and Concrete with Direct Shear Test

İbrahim YİĞİT[1]

Abstract

In the design of geotechnical structures such as shallow foundations, deep foundations and retaining structures, it is essential to know the friction at their contact surface with the soil. For this reason, there are many laboratory studies in the literature examining the friction between various soil types and building materials such as wood, steel and concrete used in geotechnical structures. However, there is an inadequacy of the literature on the investigation of the friction between the pumice sand and the concrete interface. Nevertheless, in the design of geotechnical structures in settlements built on pumice soil sections such as Isparta, it is necessary to examine the friction between the pumice soil and concrete interface. Because of the large void ratio and the ability to crush easily under external loads, pumice sand's mechanical behavior may differ from other soil types. Factors affecting the friction between granular soils and building materials can be listed as confining pressure, surface roughness of the building material, granulometry of the soil, shape and fabric of the soil grains. The direct shear box test, in which some of these factors can be controlled, is widely used for laboratory investigation of interface friction. In this study, the friction between the loosely prepared pumice sand and the concrete interface was investigated using the direct shear box test with a square section of 60x60mm. The interface friction angle of pumice sand and concrete and the internal friction angle of the pumice sand were found to be 33° and 36° respectively.

Keywords: Direct shear test, loose pumice sand, concrete, interface friction, internal friction

[1] Dr., Isparta University of Applied Sciences, Civil Engineering Department, Orcid: 0000-0001-5485-9222

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Freeze-Thaw Effect on the Strength of Cohesive Soil

Nazlı Ece ÖZ[1]
Mehmet Şükrü ÖZÇOBAN[2]
Murat GÜLEN[3]

Abstract

Freeze-thaw due to temperature changes affects physical and mechanical properties of soils such as clay, silt and fine sand. The reduction in soil strength can cause damage on structures like roads, earth fill, dam, piles, foundation etc. Therefore it is of importance to determine strength changes due to freeze-thaw before design. In this study, laboratory work was carried out to investigate the cycle number and confining pressure impact on the strength of a cohesive soil subjected to freeze-thaw. A clay soil with low plasticity whose optimum water content and maximum dry unit weight were determined by standart compaction test was exposed to 0, 1, 5 and 10 freeze-thaw cycles at optimum water content. After every freeze-thaw cycle, unconfined compression test and triaxial compression test (UU) at various confining pressures were conducted to determine strength of soil. As a result a significant decrease in strength was observed while the number of freeze-thaw cycle increased. In addition, greater strength values were achieved as the confining pressure raised from 0 kPa to 400 kPa. Decrement rates of soil strength were obtained for both of the mentioned tests. While unconfined compression tests showed that the strength was varied between %39 and %61, it was varied between %29 and %63 in triaxial compression tests. It was observed that the confining pressure has a slight impact on strength whereas the cycle number has a significant effect.

Keywords: Freeze-thaw, cycle number, unconfined compression test, triaxial compression test, strength

[1] Civil Engineer, Yıldız Technical University, Faculty of Civil Engineering, 0009-0003-0391-8001
[2] Assoc. Prof., Yıldız Technical University, Faculty of Civil Engineering, ozcoban@yildiz.edu.tr, 0000-0003-3521-0633
[3] Res. Asst., Yıldız Technical University, Faculty of Civil Engineering, mgulen@yildiz.edu.tr, 0000-0003-4143-9266

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Increasing the Flexural Capacity of Aluminum Facade Cladding Systems

Ömer Faruk YELEK[1]
Ferit CAKIR[2]
Selcuk DOGRU[3]

Abstract

Keywords:

[1] M.Sc. Öğrencisi, Gebze Teknik Üniversitesi, İnşaat Mühendisliği Bölümü, Orcıd: -
[2] Prof. Dr., Gebze Teknik Üniversitesi, İnşaat Mühendisliği Bölümü, Orcıd: 0000-0002-9641-2004
[3] Dr. Erbay Alüminyum A.Ş., Ar-Ge Departmanı, Orcıd: 0000-0003-4901-4967

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Analytical Modeling of Flexural Dominant Reinforced Concrete Columns

Erkan BICICI[1]

Abstract

Modeling of reinforced concrete (RC) columns is a critical topic for evaluating performance of RC structures. There have been several attempts and modeling technique for the calculation of lateral displacement of RC columns under lateral and axial loading. In this study, four different methods are used to model and analyze a flexural dominant RC column. An open-source structural analysis software is utilized. The envelope of lateral load-displacement relationship is calculated for a previously tested RC specimen. Four different parameters are focused in the envelope relation; i) peak lateral strength, ii) corresponding displacement for peak strength, iii) stiffness of the column and iv) lateral strength at the end of the analysis. The calculated four parameters for different models are compared with the experimental results for positive and negative loading sides.

Keywords: reinforced concrete structures; reinforced concrete columns; flexural-dominant columns; OpenSees;

[1] Dr. Ögr. Üyesi, Artvin Çoruh Üniversitesi, Mimarlık Bölümü, Orcid: 0000-0003-0612-2845

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The Mechanical Behavior of Sand At a High Degree of Saturation

Safi Nashat Safi ALJALIL[1]
Murat Ergenekon SELÇUK[2]

Abstract

Soil behavior can be affected by many internal and external factors. As a result of these effects, the physical and engineering properties of the soil vary. For granular soils, the degree of saturation has a great influence as well as the grain size and grain shape properties. Since the high degree of saturation affects the behavior of soil grains unpredictably, it is considered one of the worst cases in geotechnical engineering in design and practice. The shear behavior also shows great changes according to the degree of saturation. As the soil approaches the full saturation degree, the bonds between the soil particles become stronger, while the bonds become weaker as they move away from the full saturation degree. In this study, the variation of shear strength depending on the degree of saturation was investigated. Well-graded fine sands were prepared in different degrees of saturation (dry, 85%, 90%, 95%, and fully saturated). Small-scale direct shear tests were applied to the prepared samples under 3 different normal stresses (50, 100, and 200 kPa). Peak and residual behavior were observed in all direct shear tests. Depending on the peak shear stresses obtained as a result of the experiments, internal friction angle and cohesion, which are the shear strength parameters, were determined from the Mohr-Coulomb failure envelope. As a result, the variation of the shear behavior of the fine sands depending on the saturation rate was presented with graphics, and the variation of the internal friction angle and cohesion according to the saturation rate was explained. In addition, while the relationship between the degree of saturation and particle arrangement is observed, the optimum time required to saturate the sand samples has been determined.

Keywords: partially saturated, behavioral change, shear strength, particle arrangement.

[1] Civil Engineer, Yildiz Technical University, Faculty of Civil Engineer, 0009-0006-9741-9589

[2] Assistant Professor, Yildiz Technical University, Faculty of Civil Engineer, 0000-0003-1890-7965

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Self-healing Performance of Geopolymers with Construction and Demolition Waste-based Precursors

Hüseyin ULUGÖL[1]
İsmail Özgür YAMAN[2]
Mustafa ŞAHMARAN[3]

Abstract

The aim of this study was to evaluate the self-healing performance of geopolymer composites developed with completely construction and demolition waste (CDW)-based materials. Also, granulated blast furnace slag (S) was replaced with CDW to determine the effect of additional calcium content on self -healing performance. Although sodium hydroxide was considered the main activator, however, sodium silicate and calcium hydroxide were added to the system to determine the effect of additional calcium and silicate species on self-healing performance. Some specimens were cracked with preloading and all specimens were left wetting-drying procedure. At the beginning of the study and constant days, water absorption rates and electrical impedance were measured. According to the results, the chemical content of the geopolymer directly affects self -healing performance. Slag replacement increases the stability of self-healing. The existence of both sodium hydroxide, sodium silicate and calcium hydroxide increases the rate of reactions and consumes species that were expected to take the role in the self-healing process. Although Na2CO3 is determined because of efflorescence, however continuing geopolymerization provides a more stable self-healing performance. According to this, the self - healing behavior of geopolymer composites is similar to the self-healing performance of Engineered Cementitious Composites.

Keywords: Geopolymer composite, self-healing, electrical impedance, water absorption

[1] Dr., Ankara Üniversitesi, İnşaat Mühendisliği, Orcıd: 0000-0002-0186-3145
[2] Prof. Dr., Orta Doğu Teknik Üniversitesi, İnşaat Mühendisliği, Orcıd: 0000-0001-6489-6852
[3] Prof. Dr., Hacettepe Üniversitesi, İnşaat Mühendisliği, Orcıd: 0000-0002-7549-096X

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The Effect of Micro Fiber Type and Fiber Combination on the Elastic Modulus of Hybrid Fiber Reinforced Self-Compacting Concrete

Mahmut BAŞSÜRÜCÜ[1]
Kâzım TÜRK[2]

Abstract

In the design of building elements, deformations in concrete under load effects were important for building safety. In this study, the effect of fiber combination and micro fiber type on the elastic modulus of hybrid fiber reinforced self-compacting concrete mixtures was investigated experimentally and statistically. For this purpose, a total of five self-compacting concrete mixtures containing fibers having different types (steel and synthetic), aspect ratios, and sizes (macro and micro) were designed. To determine the mechanical properties of all self-compacting concrete mixtures, the compressive, the splitting tensile, the flexural tensile strength and the elastic modulus tests were performed. Moreover, empirical equations were developed to estimate the elastic modulus values of hybrid fiber-reinforced self-compacting concrete mixtures, and graphs were drawn to guide designers in obtaining the most suitable micro fiber type and volume fraction. Finally, it can be said that a total of 1% binary hybrid steel fiber reinforcement in self-compacting concrete mixtures increased the elastic modulus more than single steel fiber reinforcement. In addition to all these, it was determined that the use of micro steel fiber together with macro steel fiber in hybrid fiber reinforced self-compacting concrete mixtures had a more positive effect on the elastic modulus values compared to micro PP fiber.

Keywords: Elastic modulus, Hybrid fiber reinforcement, Polypropylene fiber, Micro steel fiber, Macro steel fiber, Self-compacting concrete

[1] Dr. Öğr. Gör., Malatya Turgut Özal Üniversitesi, İnşaat Bölümü, Orcıd: 0000-0001-7465-5286
[2] Prof. Dr., İnönü Üniversitesi, İnşaat Mühendisliği Bölümü, Orcıd: 0000-0002-6314-9465

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Use of Environmentally Friendly Transportation Vehicles

Nuriye KABAKUŞ[1]
Merve EYÜBOĞLU[2]

Abstract

In recent years, environmental problems such as increasing population, decrease in natural resources, increase in waste production, natural disasters and air pollution have led to an increased interest in the concept of sustainability. Carbon dioxide emissions from transportation systems also increase these environmental problems. A sustainable transportation system should provide a safe, comfortable, economical and environmentally friendly transportation standard for societies. The way to create this standard is to improve transportation systems and prefer environmentally friendly transportation vehicles instead of traditional motor vehicles. Thus, the environment is protected from irreversible damage and a greener environment is left to future generations, contributing to their quality of life. In this context, countries need to develop policies to reduce transportation-related pollution and increase the number of environmentally friendly vehicles. In this study, the use of environmentally friendly vehicles in 15 selected European countries was examined. The number of electric vehicles and the use of bicycles criteria of countries as environmentally friendly vehicles are discussed. The country with the highest number of electric vehicles among European countries is France, while the country with the least number of electric vehicles is Finland. While the Netherlands takes the first place in bicycle use, Turkey is in the last place in bicycle usage. As a result, by making necessary inferences based on the data obtained, it has been suggested that encouraging policies to increase the use of environmentally friendly vehicles should be immediately added to the sustainable development goals by the countries.

Keywords: sustainability, environmentally friendly vehicles, number of electric vehicles, bicycle use

[1] Dr. Öğr. Üyesi, Atatürk Üniversitesi, Acil Yardım ve Afet Yönetimi Bölümü, Orcıd: 0000-0002-8479-6733
[2] Yüksek İnşaat Mühendisi, Atatürk Üniversitesi, İnşaat Mühendisliği Bölümü, Orcıd: 0000-0002-7008-3150

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Numerical Investigation of the Behavior of a Single Pile Subjected to Negative Skin Friction Due to Changes Infill Load and Waterlevel

Ikram Razzaq ALDHAYDAN[1]
Murat TONAROGLU[2]

Abstract

The effect of changing loads and groundwater level on single pile in two site (Iraq and Turkey) was studied using the finite element method by PLAXIS 3D software to investigate the phenomenon of negative skin friction (NSF), neutral plane (NP) and dragload of the deep single pile. The numerical model used has been verified. The soil in the Iraq site is clayey consisting of four layers with the use of a single pile of concrete with a diameter of 80 cm and a depth of 22 m, while the soil in the Turkey site is sandy clayley soil consisting of two layers with a single pile of concrete with a diameter of 1.2 m and a depth of 32 m. The change in filling loads affects the value of negative skin friction (NSF) and the location of the neutral plane (NP) of single pile, but this effect depends on the type of soil and groundwater level. Where it was found that the value of negative skin friction (NSF) in the soil of the Iraq site increased by 10% whith raise the neutral plane (NP) 35cm by changing the fill load from 1 to 2. While increasing the (NSF) in the Turkey site by 40%, with an increase in the (NP) by a very small magnitude. The maximum affect of fill load in the lower groundwater level that increases(NSF)to about 45%in Turkey site and 15%in Iraq site.

Keywords: Negative skin friction, dragload, PLAXIS 3D, Neutral plane, Single pile

[1] Civil Engineer, Yildiz Technical University, Faculty of Civil Engineering, 0009-0009-3947-4450

[2] Asst. Prof., Yildiz Technical University, Faculty of Civil Engineering, 0000-0002-6145-5493

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Acquising 3d Objects From 2d Images Using the Instant Neural Processing Model

Adem Alpaslan ALTUN
Zainab Mohammed Hasan SABER ALAZDAEE

Abstract

The paper you are referring to presents a NeRF-based framework for rendering photo-realistic immersive virtual scenes in virtual reality (VR). The framework is designed to enable users to freely move their heads to explore complex real-world scenes in VR. The authors evaluate the performance of the framework by benchmarking three different NeRF scenes at different scene complexities and resolutions.
The authors report that their framework can achieve a frame rate of 30 frames per second with a resolution of 1280x720 pixels per eye, using super-resolution techniques. They also discuss potential applications of their framework, such as in architecture, design, and entertainment.One of the main contributions of this paper is that it evaluates the performance and suitability of NeRF implementations for VR, which has been largely unexplored in the research community. The authors provide an open source implementation of their framework, which can be used by researchers and developers to further explore the combination of NeRF and VR.
Overall, this paper presents a promising framework for rendering photo-realistic immersive virtual scenes in VR using NeRF, and provides a valuable contribution to the research community by evaluating the performance and suitability of NeRF for VR applications.
This passage describes a new approach for reducing the cost of training and evaluating neural graphics primitives, which are parameterized by fully connected neural networks. The approach uses a versatile new input encoding that allows for the use of a smaller network without sacrificing quality. The smaller network is augmented by a multiresolution hash table of trainable feature vectors whose values are optimized through stochastic gradient descent.
The multiresolution structure of the hash table allows the network to disambiguate hash collisions, making for a simple architecture that is easy to parallelize on modern GPUs. The system is implemented using fully-fused CUDA kernels with a focus on minimizing wasted bandwidth and compute operations. This approach achieves a combined speedup of several orders of magnitude, enabling training of high-quality neural graphics primitives in a matter of seconds, and rendering in tens of milliseconds at a resolution of 1920x1080.Overall, this new approach represents a significant improvement over existing methods for training and evaluating neural graphics primitives, which can be costly in terms of both time and computational resources. By reducing these costs, the approach makes it possible to train and render high-quality neural graphics primitives more quickly and efficiently, which could have important implications for a wide range of applications in areas such as computer graphics, virtual reality, and gaming.

Keywords: Neural Radiance Field , Instant Neural Graphics Primitives , Immersive Experiences , Free-viewpoint Videos , Image Synthesis, Neural Networks, Encodings , Hashing, GPUs, Parallel Computation, Function Approximation

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Data Privacy in Big Data: Federed Learning

Büşra BÜYÜKTANIR[1]
Buket DOĞAN[2]

Abstract

With the advancement of technology, the place of internet-based devices in our lives has increased day by day. With these devices, more data has been produced and thus the concept of big data has entered our lives. The big data produced includes various information as well as personal information. The working performance of artificial intelligence technology used in internet-based devices is directly proportional to large and various data. However, at this point, it is of great importance to ensure the privacy of the personal data used. Due to data privacy, in some organizations, data is used where it is produced, but data sharing is not done. This situation both negatively affects the development of artificial intelligence applications and limits the new productions that will emerge by processing the data produced in this field. As a solution to all these problems, federated learning technology has been developed. Federated learning is an up-to-date technology that enables model training without sacrificing data privacy. In this study, the working architectures of the big data concept and federated learning technology are explained, the current studies in the literature are reviewed and their usage areas are summarized. It is thought that this study will contribute to researchers who will work on federated learning for big data, which is up-to-date and open to development.

Keywords: Federated Learning, Big Data, Data Privacy

[1] RA, Marmara University, Computer Engineering, Orcid: 0000-0003-2571-4029
[2] Assoc. Prof., Marmara University, Computer Engineering, Orcid: 0000-0003-1062-2439

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Usability Evaluation of Urbancode UDeploy Software Tool with the Cognitive Walkthrough

Halil TAHMAZ[1]
Pınar ONAY DURDU[2]

Abstract

Nowadays, the need for software tools is increasing each day with the widespread use of digitalization in all areas. The use of software support tools in software development processes is highly preferred. Ensuring usability, which is one of the software quality attributes, is important for these software support tools to contribute positively to software development processes. Within the scope of this study, one of the software deployment tools called Urbancode UDeploy tool was selected and its usability was evaluated by implementing the cognitive walkthrough method, which is one of the expert-based evaluation methods. Initially scenarios and tasks were developed to conduct the evaluation. These tasks included all the essential actions required to accomplish the task and were grouped under the following categories respectively as system access, deployment process, access to the content and help categories. Some usability problems were revealed while performing these tasks during the evaluation. Evaluation forms designed for the research were used during the evaluation. Five usability problems of the Udeploy software tool were identified, according to the results of the evaluation made with the Cognitive Walkthrough Method. Some of the frequently encountered usability problems can be listed as; some of the functions are not visible enough on the application interface, unnecessary parameters on the interface causing complexity, unclear function and menu labels. The severity levels of all identified problems were determined and presented in a table. Finally, the severity ratings were given to the determined usability problems and the usability level of the tool was evaluated as moderate. Recommendations regarding the identified problems were also provided to improve the interface design and general usability of the software deployment tool at the end of the research.

Keywords: usability, usability evaluation, cognitive walkthrough method, software deployment, software deployment tool

[1] Yüksek lisans Öğrencisi, Kocaeli Üniversitesi, Bilgisayar Mühendisliği, Orcid: 0009-0008-8932-463X
[2] Doç. Dr., Kocaeli Üniversitesi, Bilgisayar Mühendisliği, Orcid: 0000-0002-0439-1702

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Comparative Analysis of Supervised, Unsupervised, Semi-Supervised, and Reinforcement Learning Methods for Data Loss Prevention

Ahmet VURAL[1]
Barış ÇELİKTAŞ[2]

Abstract

Data Loss Prevention (DLP) is a security solution that prevents the loss of data, as well as the sharing, transfer, or use of sensitive data in an unsafe or inappropriate manner. DLP also helps us comply with regulations such as the General Data Protection Regulation (GDPR) and other regulatory requirements.
The primary goal of DLP is to prevent the leakage of sensitive data, thus helping data owners protect their reputation, reduce costs, and ensure business continuity. DLP is an application that uses a set of rules to prevent data leakage or to record events using pre-defined data classification policies. These labels are typically created and applied based on information identified by a program.
This study focuses on the use of supervised, unsupervised, semi-supervised, and reinforcement learning methods in DLP systems. The study aims to minimize data breaches and violations by processing and utilizing data through machine learning algorithms for data classification. The study evaluates the most suitable options based on the abilities of machine learning methods.
The findings of the study suggest that the comparative analysis of supervised learning methods is the most effective approach for DLP, while semi-supervised and reinforcement learning methods can be useful when there is limited labeled data. The study also includes the benefits of automatically creating DLP principles using machine learning algorithms. By automating manually prepared classifications, the system is expected to be more efficient and false positive values are expected to be minimized.
In summary, this study combines users' data processing standards or habits with machine learning to enable the use of these tags and data in DLP rules. Manual classification, which is done manually, can be automated with machine learning, allowing for better controls. When machine learning and DLP are used simultaneously, data classification will be done without errors, resulting in a decrease in the number of false positive alarms. The structure and content of files will be determined accurately according to users' habits, ensuring the accuracy and reliability of relevant rules. Users will be monitored through specific algorithms, which can report the most frequently used data in file content, and determine whether it is acceptable as a company risk. The company can make data protection policies more efficient and usable, reducing the risks of data loss and controlling personal data subject to regulations.

Keywords: Data Loss Prevention, Comparative Analysis of Supervised Learning, Unsupervised Learning, Semi-Supervised Learning, Reinforcement Learning

[1] Student, Işik University, Cyber Security,
[2] Cyber Security Program Coordinator, Işik University,

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Chaotically Initialized Aquila Optimizer

Gülnur YILDIZDAN[1]

Abstract

The Aquila Optimizer (AO) is a new swarm intelligence-based optimization algorithm, proposed in 2021, inspired by the hunting behavior of the Aquila, one of the most common raptors living in the Northern Hemisphere. As in many other metaheuristic algorithms, the initial population is randomly generated in this algorithm. Instead of typical random methods, chaotic maps can be used to find a better initialization path that will correctly distribute the solutions within the search space of the problem. In this study, the effect of starting AO using a chaotic map on performance was investigated. For this, AO was started using ten different chaotic maps (gaussian, tend, logistic, sinusoidal, circle, iterative, sine, piecewise, singer, and chebyshev), and the obtained AO versions were tested on CEC 2019 test functions. The obtained results were interpreted with the help of statistical methods. According to the results, it was determined that starting the population with other chaotic maps, except for singer and chebyshev chaotic maps, contributed to the performance of the standard algorithm. The most successful performance was obtained by using the chaotic map called tend. Accordingly, it can be said that the use of chaotic maps is a promising approach that contributes to the performance of AO and is promising for future studies.

Keywords: Aquila Optimizer, Chaotic maps, CEC2019 test functions, Global optimization, Metaheuristic algorithm.

[1] Dr., Selcuk University, Kulu Vocational School, Orcid: 0000-0001-6252-9012

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Detection of DDOS Behaviors with Artificial Intelligence

Kadir İlker BUDAK

Abstract

One of the methods used by attackers to disrupt online services is DDOS (Distrubuted Denial of Service) attacks. DDOS attacks are difficult to detect as they can mask themselves in live traffic.
A method has been applied using artificial intelligence algorithms to detect and prevent DDOS attacks.
Keywords: DOS, DDOS, Artifical Intelligence, AI algorithms, Botnet

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Software Defect Prediction with Machine Learning Algorithms

Özge ŞEN KAYA[1]
Sinem BOZKURT KESER[2]

Abstract

The software that is becoming widespread day by day and used in many systems; it is of great importance in terms of quality and no defect. The quality of the software and the absence of errors in the software are issues that both the developers of the software and the end users of the software attach importance to. Many studies have been carried out to ensure that the software is of high quality and does not contain defects. Some of these studies have focused on defect prediction in software with machine learning algorithms. In this study, it is aimed to predict the defects in the software with machine learning algorithms by using CM1, MC1, MC2, MW1, KC1, KC2, KC3, PC1, PC2, PC3, PC4, PC5, JM1 data sets in NASA PROMISE data repository. In this study, J48, Random Tree, LMT (Logistic Model Tree), OneR (One Rule), PART, Logitboost, Multilayer Perceptron and Simple Logistic algorithms were used. Due to the class imblance in the data sets, evaluation was made with F-Measure metric. F-Measures values of 0.85 in CM1 dataset and 0.70 in MC2 dataset and 0.73 in PC5 dataset and 0.74 in JM1 dataset and 0.73 in KC1 dataset with J48 algorithm were obtained. F-Measure value of 0.97 in MC1 dataset was obtained by Random Tree algorithm. F-Measure values of 0.80 in KC3 dataset and 0.96 in PC2 dataset and 0.88 in MW1 dataset were recorded in Simple Logistic algorithms. F-Measure values of 0.88 in PC4 dataset and 0.85 in PC3 dataset with PART algorithm were obtained. F-Measure value of 0,91 was recorded in PC1 dataset with Multilayer Perceptron algorithm. Finally, the best performance in MC1 dataset is 0.97 F-Measure value.

Keywords: Software defect prediction, classification, machine learning.

[1] Master Student, Eskisehir Osmangazi University, Computer Engineering, Orcid: 0000-0002-4713-7536
[2] PhD Lecturer, Eskisehir Osmangazi University, Computer Engineering, Orcid: 0000-0002-8013-6922

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A Comparative Analysis of API Security Testing Tools: Features, Capabilities, and Performance Evaluation

Onur ÇARKCIOĞLU[1]
Barış ÇELİKTAŞ[2]

Abstract

Application programming interfaces (APIs) are components that facilitate communication between other applications. APIs are an integral part of modern web applications and provide a means for applications to communicate and exchange data with each other. Web applications and the APIs they use are both attractive and easily accessible targets for malicious hackers. Therefore, it is paramount to ensure the security of this application and protect the integrity and confidentiality of data.

The purpose of this study was to examine which vulnerabilities exist in REST API-based solutions and how widespread they can be tested. It describes the different approaches to security testing, available tools for API security testing, vulnerabilities, and common API threats to achieve these goals.

API services have security tests for many tools that can be used. Some of these applications are open source projects that can be used for free, while others are commercial solutions offered by security-oriented companies. This study utilizes tools such as Postman, Burp Suite, OWASP ZAP, JSON Web Token Toolkit, and Security Code Scan to accomplish its objectives.

In summary, the purpose of this study is to examine and identify known API vulnerabilities and to find ways in which an existing API solution can be tested for these vulnerabilities. It offers a systematic tool selection approach that enables organizations to make informed decisions based on their specific needs and requirements. Automating the testing process is crucial for ensuring the system's safety during continuous development and maintenance.

Keywords: API Testing, Burp Suite, OWASP Zap, Postman, RESTful API

[1]Student, Işik University, Cyber Security
[2] Cyber Security Program Coordinator, Işik University

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Detection of Fire Sensitive Areas Using Remote Sensing Image

Semanur ÇÖKEKOĞLU [1]
Fatih Ahmet ŞENEL [2]

Abstract

Forest fires in Turkey have drastically increased in the past decade, caused by various factors such as human activities, natural causes, climate change, and forest management. These fires are regarded as the most perilous and destructive disasters, regardless of their origin. Since July 2021, Turkey has witnessed extensive fires in the Marmara, Aegean, and Mediterranean regions, lasting for several days. These forest fires inflict significant ecological, economic, and social damage. Recent studies emphasize the substantial impact of climate change on forest fires, independent of human influence. Climate changes not only affect natural events worldwide but also alter natural conditions in Turkey. Factors such as low air humidity, wind direction and speed, high temperatures, and drought rates contribute to the outbreak and escalation of fires, leading to considerable losses. Accurate analysis of these data is vital for predicting and preparing for forest fire outbreaks, enabling prompt response and efficient firefighting. Therefore, in this study, forest fires in the regions are added to the data set by calculating the values in various band ranges of the data obtained by various remote sensing methods of the satellite images obtained from the regions in the Marmara, Aegean and Mediterranean regions of the forest fires that occurred in July 2021 from Landsat-8 satellite images, and by creating different index values. By using the humidity, temperature, wind and calculated index values before and after the fires in the regions, the values are calculated with various artificial intelligence and deep learning algorithms in the data set created to prepare for or prevent the fires that may occur in the future, and the values of the fire-sensitive areas are calculated with more consistent and predictable results. We aimed to predict with deep learning methods.

Keywords: Forest Fire, Visibility Analysis, Fire Risk Map, Remote Sensing, GIS

[1] Araştırma Görevlisi, Hitit Üniversitesi, Bilgisayar Mühendisliği Bölümü, Orcıd: 0000-0003-2319-9270
[2] Dr. Öğr. Üyesi, Süleyman Demirel Üniversitesi, Bilgisayar Mühendisliği Bölümü, Orcıd: 0000-0003-1918-7277

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Captcha Security Vulnerabilities and Comparison of Cyber Attack Models

Funda DİNÇER [1]
Metin TURAN[2]

Abstract

The wideness of the internet network and the increase in internet-based applications containing personal data cause the incidence of cyber-attacks to increase day by day. Many techniques and methods have been developed to attack web applications. While applying the methods developed for attack, robot programs prepared by the attackers try to reduce the duration of the attack and increase the effectiveness of the attack. The application called Captcha, "Completely Automated Public Turing Test to tell Computers and Human Apart ", which is one of the measures taken against robot systems in web applications, is an application that tests whether the user is human or not. Captcha, also known as Human Interactive Proof, is designed in a way that a human can easily pass but cannot be solved by a robot. Although Captcha is a precaution against cyber-attacks, its design may also contain vulnerabilities that can be resolved by a hacker. In particular, text-based captcha schemes can be subject to successful attacks due to careless design and security breaches. Many studies have been carried out proving whether the captcha application is impassable. Especially with the help of image processing methods, they were able to solve the original text by taking advantage of the design weaknesses of captcha with examples of captcha screenshots. Apart from the design model of Captcha, there are also types of cyber-attacks that can be exposed. One of them, dictionary attack, is spyware that repeats the character model of captcha. Spy applications that simulate the characters used by the captcha may be able to exceed a captcha without being subjected to image processing. In the study, the findings of the dictionary attack carried out by a robot were evaluated and compared with the captcha solutions realized with the help of image processing.

Keywords: Cyber attack, captcha, cyber security, vulnerability, image

[1] Istanbul Ticaret University, Computer Engineering Department, Orcid: 0000-0002-1675-5673
2 Istanbul Ticaret University, Computer Engineering Department, Orcid: 0000-0002-1941-6693

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Enhancement of Fire Resistant Properties of Poly(phenylene sulfide)/Graphene Composites

Kübra TAŞ YÜREK[1]
Gökçe ÇALIŞ İSMETOĞLU[2]
Halil İbrahim ÜNAL[3]

Abstract

Thermoplastic materials are preferred for the fabrication of composite materials for their superior properties in the defence industry. Poly(phenylene sulfide), PPS is a semi-crystalline and high performance engineering thermoplastic substrate. It has high melting point 280-334 °C, glass transition temperature 85-93 °C. In the defence industry, PPS is used as its composites composed of carbon fiber (CF), glass fiber (GF) and carbon nanotube (CNT). In these composites CF/PPS composites are especially preferred due to its enhanced stiffness, roughness, abrasion, oxidation and thermal resistance, and low specific gravity. Due to environmental concerns raised in the Paris Green Deal Agreement, coating of environmental friendly fire resistant additives onto the PPS surfaces are important. To meet these requirements, graphene and zinc borate are suitable candidate and so many researches are reported. In this study, 50%CF containing PPS (50CF/PPS) plates are used as a matrix and coated with a graphene layer and some fire resistance, thermal and mechanical properties are first time investigated. Various methods are applied for the coatings of reduced-graphene oxide (r-GO) onto 50CF/PPS plates and the following results are obtained. Surface morphology of 50CF/PPS plates are determined by using scanning electron microscope. It was concluded that, after coating with r-GO and zinc borate, fire resistance of 50CF/PPS plates are slightly enhanced as targeted.

Keywords: Thermoplastic composites, carbon fiber, Poly(phenylene sulfide), fire resistant, graphene, zinc borate

[1] Yüksek Lisans Öğrencisi, Gazi Üniversitesi, Fen Bilimleri Enstitüsü,, Orcıd: 0009-0002-0365-5689,
[2] Araştırma Görevlisi, Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Orcıd: 0000-0002-3369-6193,
[3] Prof. Dr., Gazi Üniversitesi Kimya Bölümü, Orcıd: 0000-0003-2318-6242,

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Electrochemical Analysis of Vitamin B6 by Adsorptive Stripping Differential Pulse Voltammetry on a Boron Doped Diamond Electrode Modified with Glutardialdehyde-Nano Fe_2O_3

Berna KOÇAK[1]

Abstract

Pyridoxine hydrochloride (vitamin B6) is a vitamin with the chemical structure of 4,5-bis(hydroxymethyl)-2-methylpyridin-3-ol and plays an important role in the synthesis and degradation of amino acids (1,2) . In this study, boron doped diamond electrode modified with glutardialdehyde- nano Fe_2O_3 (GA_2-nano Fe_2O_3/BDDE) was used for the first time for voltammetric analysis of vitamin B6. The characterization of the electrode surface was carried out by SEM-EDS. The behavior of vitamin B6 on the modified electrode was performed using the cyclic voltammetry method. The electrochemical behavior of vitamin B6 on GA_2-nano Fe_2O_3/BDDE was observed to be an adsorption controlled. Adsorptive stripping differential pulse voltammetry (AdsDPV) was chosen in the electrochemical analysis of vitamin B6. The voltammetric behavior of vitamin B6 depending on the pH of the supporting electrolyte was determined by the AdsDPV method and the highest peak current was observed in the pH 7 Brintton Robinson buffer. The optimum deposition potential required for the AdsDPV was found to be 0 V and the deposition time was 5 s. In addition, working range, limit of detection (8.98×10^{-7}M) and limit of quantification (2.99×10^{-6} M) were determined in vitamin B6 analysis by AdSDPV method under optimum conditions. The applicability of the developed method was successfully carried out on commercial tablet sample.

Keywords: Pyridoxine hydrochloride, Boron doped diamond electrode, Voltammetry, Modified Electrode, Adsorptive Stripping Differential Pulse Voltammetry (AdSDPV)

[1] Dr, Munzur University, Vocational School of Tunceli, Chemistry and Chemical Process Technologies, 62000, Tunceli, Turkey, Orcid: 0000-0002-2398-1492,

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Synthesis, Antioxidant Activities And In Silico Studies Of New Benzoyl Hydrazides Derived From 4-Iodobenzohydrazide

Bedriye Seda KURŞUN AKTAR[1]

Abstract

The production of free radicals in our body is the basis of many diseases that cause the formation of diseases with a high risk of death, especially cancer. Finding a suitable drug for use in clinical treatment for diseases caused by free radicals requires both process and cost, as well as the use of antioxidants in order to prevent the danger of the disease caused by the diseases with a high risk of death. There are many antioxidant agents with certain limitations of use used in treatment. There is a need for new antioxidant agents that are more effective and have no toxic effect than these antioxidants, which have limited use.

Hydrazones, which are a special member of Schiff bases containing azomethine group, have an important place in drug design because they are very rich in biological activity. Hydrazones have many biological activities such as antioxidant, antiviral, analgesic, antiepileptic, anti-inflammatory, antimicrobial and anticancer. Therefore, 4-iodobenzohydrazide was chosen as starting material, was reacted with fluorinated aldehydes (2-F, 3-F, 4-F, 2-CF_3, 3-CF_3, 4-CF_3) for 8 hours in acetonitrile to obtaine iodinated hydrazone compounds in this study. Structural characterization of the synthesized iodinated hydrazone compounds was clarified by FT-IR, ^{1}H NMR and elemental analysis. Then, the antioxidant activity (ß-carotene linoleic acid, DPPH, ABTS, CUPRAC)properties were examined and the properties of being a drug were examined with the SwissADME program (H-bond acceptors, H-bond donor, TPSA, Lipinski, iLogP, GI absorption, BBB permeant) which is important in drug design.

Keywords: Hydrazone, Antioxidant Activity, SwissADME, Schiff bases, Free radicals.

[1] Assist. Prof. Dr., Malatya Turgut Özal University, Yeşilyurt Vocational School, Department of Hair Care and Beauty Services, Orcıd: 0000-0002-1492-3266

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Electrochemical and Surface Studies of 2-amino-4-metoksi-6-metil-1,3,5-triazin as a Mild Steel Corrosion İnhibitor in 0.5 M hydrochloric Acid Solution

Veysi ÖKTEN[1]
Reşit YILDIZ[2]

Abstract

Because of its cost effectiveness and high machinability, mild steel is mostly utilized in the oil and gas industry, such as storage tanks for petroleum products, pipelines for transporting petroleum and natural gas, and so on. The corrosion inhibitor produced by coating breaking is adsorbed on the metal surface and, through a physical or chemical process, prevents the electrochemical reaction of corrosion from continuing. Corrosion inhibitors are used to reduce or postpone the corrosion of metallic materials. 2-amino-4-metoksi-6-metil-1,3,5-triazin (AMT) was explored to prevent mild steel corrosion in 0.5 M HCl solution. The inhibitor's efficiency as an inhibitor was investigated utilizing electrochemical and surface techniques. Electrochemical impedance spectroscopy and linear polarization resistance testing produced polarization resistance values that were remarkably similar for inhibitor concentrations ranging from 0.5 to 10.0 mM. The possibility for zero charge in mild steel was computed, and the surface was revealed to be negatively charged. Using scanning electron and atomic force microscopes, we studied the inhibitory activity AMT on the steel surface. The Langmuir adsorption isotherm best matches the inhibitor's adsorption properties to the steel surface. The results of PD polarization revealed that as the concentration of AMT increased, the processes of metal dissolution and hydrogen evolution slowed down significantly.

Keywords: Organic corrosion inhibitor, Adsorption, Acid Solution, Quantum Chemical Calculations, Mild steel

[1]Expert Teacher, Mardin Artuklu University, Graduate Education Institute, Department of Chemistry,
[2]Assoc. Prof. Dr., Mardin Artuklu University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Orcıd: 0000-0001-5467-6821

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Investigation of the effect of 2-Amino-1, 3, 5-triazine-4, 6-dithiol on corrosion inhibition of mild steel in 0.5 HCl solutions

Selim ARSLANHAN[1]
Reşit YILDIZ[2]

Abstract

It is known that corrosion is fought in many industrial areas. Corrosion is an undesired phenomenon that occurs when metals or alloys interact with their environment and lose their effectiveness over time. Organic compounds, which are the most commercially available corrosion inhibitors, are one of the corrosion prevention strategies. To prevent acid corrosion, organic inhibitors are commonly used in industrial processes such as pickling, descaling, acidizing oil wells, and cleaning. The effect of 2-Amino-1,3,5-triazine-4,6-dithiol (2-ATD) on mild steel corrosion in 0.5 M HCI solution was investigated using linear polarization resistance (LPR), electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization (PP). The surface morphology of mild steel exposed to the acid solution for 120 hours was studied using scanning electron microscopy (SEM) and atomic force microscope (AFM) both in the presence of the inhibitor and the absence of it. In the presence of 2-ATD in 0.5 M HCl solution, it provided good inhibition for mild steel corrosion, and the efficiency of the inhibition increased with increasing inhibitor concentration. After 120 hours of exposure, a very little volume of H_2 is collected on the MS electrode in the inhibited solution. The Langmuir adsorption isotherm best matches the inhibitor's adsorption properties to the steel surface. Furthermore, thermodynamic variables associated with the experiment, such as Kads and $\Delta G^{\circ}ads$, were calculated and discussed.

Keywords: Adsorption, 2-ATD, Mild steel, Corrosion inhibitor, EIS

[1]Expert Teacher, Mardin Artuklu University, Graduate Education Institute, Department of Chemistry,
[2]Assoc. Prof. Dr., Mardin Artuklu University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Orcıd: 0000-0001-5467-6821

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Determination of in Vitro Drug Release Kinetic Parameters of Curcumin Loaded 2-Aminothiophenol Functionalized Mesoporous Organosilica Nanoparticles

Osman Tayyar ARLI[1]
Yaşar GÖK[2]
Halil Zeki GÖK[3]

Abstract

Pharmaceutical nanotechnology has made a significant breakthrough and paved the way for a vast field of study in which a wide variety of formulations have been developed. However, it has brought with it the necessity of defining the parameters of the newly developed formulations. Mesoporous drug carrier nanoparticles stand out with their easy accessibility, high biocompatibility and wide functionalization capabilities such as adjustable pore diameter, particle size and surface properties. Curcumin is being studied intensively with its anti-cancer properties. In order to increase the bioavailability of curcumin and to maintain its stability in various forms, the parameters of this new forms should be defined. In this study, drug release kinetics were determined by loading curcumin on a pH sensitive mesoporous organosilica nanoparticle (**MON-B**) functionalized with 2-aminothiophenol. In order to load curcumin into **MON-B**, it was stirred at 70°C for 48 hours in the dark. The encapsulation efficiency was calculated as 22%. In vitro drug release studies were performed at physiological pH 7.4, endosomal pH 5.5 and more acidic pH 5-4.5. Drug release percentages were obtained as 1%, 5% and 33%, respectively. The drug release kinetics were determined using the zero-order model, the first-order model, and the Higuchi model. The K_0 value of the zero-order model was 0.0802 and the R^2 value was 0.9760, the K_1 value of the first-order model was 0.0009 and R^2 value was 0.9755, and the K_H value of the Higuchi model was 1.2790 and R^2 value was 0.8816. These results showed that **MON-B** was able to deliver curcumin to the drug release environment in a controlled manner in accordance with the zero-order drug release model in a pH-sensitive manner, based on the strong bonding of the 2-aminothiophenol in its framework with curcumin.

Keywords: Cancer, Curcumin, Mesoporous Organosilica, Controlled Drug Release, Drug Release Kinetics

[1] Doctorand, Burdur Mehmet Akif Ersoy University, Department of Chemistry, Orcid: 0000-0001-7619-2668
[2] Prof.Dr., Burdur Mehmet Akif Ersoy University, Department of Chemistry, Orcid: 0000-0003-3134-7560
[3] Prof.Dr., Burdur Mehmet Akif Ersoy University, Department of Chemistry, Orcid: 0000-0001-7641-2683

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Synthesis, Characterization And Antioxidant Activity of Fluorescent Carbon Quantum Dots from Oleaster (Elaeagnus angustifolia L.) fruits

Yanar Najmalden Ghaibullah GHAIBULLAH[1]
Naciye ÖZDEMİR[2]
İdris SARGIN[3]

Abstract

Carbon quantum dots are biocompatible, water-soluble, photoluminescent nanomaterials with low toxicity. Luminescent carbon-based nanomaterials continue to be a source of inspiration for many researchers due to their superior biocompatibility as well as their tuneable optical properties. Since carbon quantum dots are easily functionalized nanoparticles, their biologically oriented applications are of interest. The extraordinary fluorescence properties of carbon quantum dots have made them a target, especially for bioimaging applications. Moreover, due to their low cytotoxicity and tuneable optical behaviour, the analytical, biosensor and biomedical applications of fluorescent carbon quantum dots are extensively investigated. Oleaster (*Elaeagnus angustifolia* L.) is a deciduous, shrubby plant with small reddish-brown fruits. It has a wide geographical distribution in subtropical regions of Asia, Europe, and some parts of North America. It is widely grown for its edible fruits in Central and Eastern Anatolia in Turkey. In this study, optimization of the synthesis parameters of carbon quantum dots from oleaster fruits using microwave radiation and their characterization and antioxidant activity were investigated. For the optimization of fluorescence properties of carbon quantum dots, solvent type, solvent/substance ratio, applied microwave energy level and contact time were studied. structural, morphological, fluorescence, surface chemical properties were characterized through fluorescence spectroscopy, UV-vis absorbance measurements, FT-IR, TEM and XRD analyses, Zeta Potential measurements, surface charge analysis and quantum yield analyses. Antioxidant activities of the synthesized carbon quantum dots were studied. Fluorescent emission carbon quantum dots synthesized from oleaster fruits by microwave radiation technique can be tested in bioimaging, optical sensor and photocatalyst applications.

Keywords: Carbon Quantum Dots, fluorescence, Antioxidant, oleaster, *Elaeagnus angustifolia*

[1] Selcuk University, Science Faculty, Department of Biochemistry, Orcid: 0009-0004-4264-7838
[2] Selcuk University, Science Faculty, Department of Biochemistry, Orcid: 0000-0002-7802-709X
[3] Doç. Dr., Selcuk University, Science Faculty, Department of Biochemistry, Orcid: 0000-0003-3785-9575

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Development of Hydrogel Release System Containing Citrus Sinensis Against Honeybee Mite

Ezgi Ece DOĞAN[1]
Mehlika PULAT[2]

Abstract

The aim of this presented work is to develop a hydrogel system for controlled releasing of acaricide. In accordance with this purpose, four different types of interpenetrating network (IPN) hydrogels based on sodium carboxymethyl cellulose (CMC) and poly (acrylic acid) (PAA) were prepared. The hydrogel structures were carried out by using ammonium persulfate/sodium metabisulfite [$(NH_4)_2S_2O_8/Na_2S_2O_5$] radical initiator pair and ethylene glycol dimethacrylate (EGDMA) / maleic acid (MA) crosslinkers. The characterization of semi and full-IPN type hydrogels was done by examining the hydrogel formation (HF) and swelling/degradation behaviors. In general, high HF values were obtained. The variation of swelling by time were followed both in water and acetone. It is seen that the swelling values rapidly increased first, then reached a constant value between 40% and 140% near 30 hours. CMC content of the hydrogel positively effects the swelling percentages. It is also observed that semi-IPN hydrogels swell much more than the full-IPN hydrogels. The swelling - temperature tests show us that the swelling values increased by temperatures. From the variation of swelling – pH values it is found that the basic mediums increased swelling values. According to the swelling /degradation results one of the semi-IPN hydrogel was chosen as a controlled acaricide release material. A certain amount of Citrus Sinensis (sweet orange) essential oil was loaded into this hydrogel against Varroa Destructor mite. The controlled release studies were measured by using UV-Spectrophotometer at 330 nm. It was determined that release profile reached a constant value around 48 hours.

Keywords: Hydrogel, sodium carboxymethyl cellulose, poly (acrylic acid), controlled release, Citrus Sinensis, Varroa Destructor

[1] Yüksek Lisans Öğrencisi, Gazi Üniversitesi, Kimya Bölümü, Orcid: 0000-0003-3729-3516
[2] Prof. Dr., Gazi Üniversitesi, Kimya Bölümü, Orcid: 0000-0001-5724-5250

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Synthesis and Characterization of Phenantrene-Imidazole Derivative Silane Compounds

Uğur TAŞDEMİR[1]
Ashhan YILMAZ OBALI[2]

Abstract

Phenantrene-imidazole derivatives are organic compounds consisting of a combination of phenanthrene and imidazole groups. Phenantrene-imidazole derivative ligands (phenantro[9,10-d]imidazole) exhibit various properties due to their chemical structures and can be used as antimicrobial, anticancer, antitumor drugs and catalyst. Imidazoles are heterocyclic compound and plays a role in many biological processes. In particular, it is involved in cellular signaling pathways by binding to G proteins and controls the activation of proteins. Imidazole can also bind to metal ions, controlling the activation and inactivation of metal ions in biological systems [1]. These compounds can control cellular signaling pathways by interacting with proteins in cells. In particular, they can control cell growth and division by inhibiting protein kinases. For this reason, they are also being investigated as a potential drug in the treatment of cancer. The combined use of phenanthrene-imidazole-derived ligands and silanes serve as intermediate reactants for the design of nanopartcile for further studies [2]. This is an interesting strategy in various biomedical applications such as cancer therapy and diagnosis. These materials act in different ways in killing and treating cancer cells. Phenantrene-imidazole derivative ligands help kill cancer cells by binding to certain target proteins on the surface of cancer cells [3]. In this study, synthesis of phenanthrene-imidazole silane derivative compound will be presented in accordance with the literature pathway. The structures of the synthesized substances were elucidated by various spectroscopic methods.

Keywords: Phenantrene-Imidazole, (phenantro[9,10-d]imidazole), Silane Compounds, Catalysis, Chemical Pharmaceutical Compounds.

[1] Yüksek Lisans Öğrencisi, Selçuk Üniversitesi, Nanoteknoloji ve İleri Malzemeler ABD
[2] Doç. Dr. , Department of Chemistry, Selcuk University, Konya 42075, Turkey

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Synthesis of Phenanthrene-Imidazole Bonded Dipodal Ligand and Copper (II) Complex and Characterization of their Structures

Metin YONCALIK[1]

Ashhan YILMAZ OBALI[2]

Abstract

Schiff bases are compounds formed as a result of the condensation reaction between aldehydes and ketones with primary amines **[1].** The widespread use of Schiff bases and metal complexes in various qualitative and quantitative determinations, enrichment of radioactive materials, in the pharmaceutical industry, paint industry and plastic industry, attracting great attention due to their biochemical activities, and the synthesis of many Schiff bases that can be used in liquid crystal technology in recent years has further increased the importance for studies on these substances. **[2].** Saloph-type Schiff bases are ONNO-type ligands. Increasing interest in the detailed investigation of Saloph-type Schiff-based metal complexes is linked to the wide range of applications of these compounds in the chemical industry. They are used as catalysts in the synthesis of amino acids, as photo- and electroluminescent materials, as precursors to create materials with special magnetic properties, etc. It should be paid attention that the properties of these complexes depend on the type of metal, ligand, bond structure, geometry **[3].** Phenanthrene is one of the compounds with stable aromatic ring systems. They attract attention because they have an ideal structure for conjugated systems with high resonance energy. Phenanthrenes constitute an important class of organic compounds commonly found in nature. There are many molecules with phenanthrene and imidazole structures that show natural and biological activity and have therapeutic properties **[4]**. Due to the planar structure of phenanthrene-imidazoles, they have the ability to enter between stacked base pairs of DNA, and with these properties, they are preferred in antitumor, anticancer and antimicrobial studies. In addition, compounds and metal complexes containing phenanthrene-imidazole group are known to have important catalytic properties. Phenanthrene-imidazole compounds are also used as fluorescence sensors because they have superior photophysical properties such as high extinction coefficient, ease of synthesis, stability and superior absorption and emission properties **[5]**. In this study, the Schiff base compound 'Saloph' was derivatized with the phenanthrene-imidazole group and the synthesis of the targeted dipodal molecule was completed. The Cu(II) complex compound of the dipodal ligand was then synthesized. The structures of the synthesized substances were elucidated by various spectroscopic methods.

Keywords: Schiff base, dipodal, saloph, phenanthrene-imidazole, phenantro[9,10-d]imidazole derivatives.

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Cedrus libani Polenlerinden Eksin Mikrokapsüllerin Hazırlanması ve Karakterizasyonu

Gülnur DUYSAK[1]
İdris SARGIN[2]

Abstract

Sporopollenin is a natural biomacromolecule found in the outer wall of spores and pollen. Exin, the outer pollen wall, is one of the most complex wall systems in higher plants. Exin capsules of sporopollenin are microcapsules extracted from the outer shells of plant spores and pollen grains. Sporopollenin exine microcapsules are a promising biological material for the encapsulation of drugs or bioactive agents due to their uniformity in size, non-toxicity, and chemically and thermally stable nature. This structural macromolecular material is the most flexible bio-based material among natural polymers due to its resistance to harsh acidic, alkaline, and thermal processes. Pollen exin microcapsules have the potential to be used in oral applications because their structure consists of sporopollenin, a polymer that is amphiphilic and highly stable to strong acids and bases. Sporopollenin is a renewable and abundant material because many plants reproduce by pollination, sporopollenin is easily obtained by simple chemical processes, sporopollenin grains can maintain their structural integrity in the extraction process, have a porous morphology and uniform size distribution, resistant to chemical and biological attack, thermally stable up to 470 °C and above, and more importantly, the pendant reactive hydroxyl groups allow for chemical modifications. *Cedrus* belongs to the Pinaceae family. Five species of Pinus grow naturally in our country. *Cedrus libani* are evergreen trees 10-20 m tall, with 2-3 or 5 needles coming out of the shoots. Pollens of *C. libani* are monad, heteropolar and bilaterally symmetrical. In the study, the extraction of sporopollenin-exin microcapsules using *C. libani* pollen, respectively, and the extracted sporopollenin-exine microcapsules were characterized by SEM, XRD, and FTIR. Exine microcapsules were successfully extracted with the method applied in the study without disrupting their structural integrity. *C. libani* exin microcapsules can be used in the microencapsulation of pharmaceuticals and food additives.

Keywords: Pollen, exin, sporopollenin, *Cedrus libani*, microcapsule

[1] Selcuk University, Science Faculty, Department of Biochemistry, Orcid: 0009-0004-9069-8525
[2] Selcuk University, Science Faculty, Department of Biochemistry, Orcid: 0000-0003-3785-9575

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On the Fisher Information of Logistic Distribution

Mehmet Emin TUTAY[1]

Abstract

In estimation theory, Fisher information is used to quantify how much information a random variable contains about a particular parameter of the underlying probability distribution. However, calculating the Fisher information may be quite challenging depending on the probability distribution under study. In certain circumstances, where Fisher information cannot be calculated directly, lower bounds for the Fisher information might be helpful. This study examines the Fisher information for the scale and location parameters of the logistic distribution. Analytical lower bounds for the Fisher information are derived for both cases. Numerical results are presented in order to assess how well the lower bounds performed.

Keywords: Logistic distribution, Fisher information, Characteristic function

[1]Asst. Prof. Dr. , Dicle University, Electrical and Electronics Engineering, Orcid: 0000-0002-1506-0028

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Operator Guided YOLOv8 Supported Fruit Picking Robotic System

Mucahid BARSTUGAN[1]
Enes KORKMAZ[2]

Abstract

Hygiene in the food industry has an important place in terms of human health. Efforts are being made to deliver the produced food to people untouched by human hands. In this study, the process of detecting the fruit moving on the conveyor belt with artificial intelligence and picking them with an industrial robot arm was carried out. During robotic picking system Inverter, HMI (Human Machine Interface), and PLC were used to control the conveyer belt and for communication between industrial products. Inverter was used to move the conveyer belt. PLC was used to receive/send data between robotic arm and Python. HMI was used for user interface. The artificial intelligence and the robotic automation system was communicated via Modbus TCP/IP communication method. The experimental study was applied on three different fruits: orange, apple, and pomegranate. A fruit detection model was trained on Google Colab with a custom dataset. YOLOv8 (You Only Look Once) method was used to detect these three fruits. The weights of YOLOv8 were trained with a manually created fruit set and a model was created that can distinguish three fruits with high accuracy. The mean average precision (mAP) value of the created custom fruit detection model was obtained as 0.97.

Keywords: Artificial intelligence, Fruit detection, Robotic arm, YOLOv8

[1] Asst. Prof. Dr., Konya Technical University, Electrical and Electronics Engineering, Orcıd: 0000-0001-9790-5890
[2] Undergraduate Student, Konya Technical University, Electrical and Electronics Engineering, Orcıd: 0009-0008-9195-8375

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Development of A Low-Budget Current Sensor For Measuring Low Current Using Microcontroller

Fatih BULUT[1]

Abstract

One of the important parameters in the development of electronic-based high-tech sensors is the measurement of low currents. In studies on material production, the usability of the produced material as a sensor is investigated by illuminating the electronic properties. In such studies, researchers need to examine the electrical properties of the materials they produce. At this stage, it is important for the reliability of the study to perform the tests using high precision equipment. However, the fact that this equipment's are always not available negatively affects the working speed of the researchers. Thanks to the simple circuit to be obtained with this study, researchers can have initial information about the electrical properties of the materials they produce. With the device produced within the scope of this study, it will be possible for researchers to obtain low cost and measure current in the range of 10nA-30uA. There are many methods that facilitate the widely used C and C++ based software today. By making use of these methods and supported by an electronic mechanism, this system will be useful for researchers. Researchers who continue their studies in low-current electronics, lab-on-chip, microfluidics, nanosensors, and similar fields will be able to make preliminary examinations of their studies by establishing this system. In this way, they will accelerate their studies and will be able to use their valuable time to improve their research. The V-tech nanoampermeter device used in testing the system is one of the ammeters preferred by researchers. The values shown by both systems at different current values were recorded and these values were given in a graph it was seen that the two devices gave compatible results with each other. It has been concluded that the device obtained by this study can be used in preliminary tests in a way.

Keywords: Low current detection, current sensor, Attiny85 microcontroller, DIY current sensor, programming

[1] Dr, Sinop University, Scientific and Technological Research Applications and Research Center, Orcid: 0000-0001-5335-2307

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Axicon Metalens Design with Gold Aperture-Based Nanoantennas

Büşra ERSOY[1]
Ekin ASLAN[2]
Erdem ASLAN[3]

Abstract

Phase-modulated metasurfaces are meta-structures in which each metasurface unit cell is designed Phase-modulated metasurfaces are meta-structures in which each metasurface unit cell is designed according to a certain phase distribution to provide phase control of the electromagnetic wave. The desired phase response properties of the metasurface vary with the substrate and interface layer material type, size, shape, and rotational mode of the metasurface unit. Metalenses are metasurfaces where circular phase distributions are formed on the interface where light encounters. In this context, in this study, eight metalens unit cells that provide phase manipulation in the full phase range are designed to create the superficial phase layout required for the axicon focusing function. The designed unit cells are aperture-based nanoantennas opened in gold film coated on a silicon nitride membrane in nanometric thicknesses. Simulations are carried out at an operation wavelength of 850 nm. A circular arrangement of the designed cells at equal radial distances is created. In this way, circular phase rings that provide full phase transition on the metalens interface are formed. Under the limitations of the technical infrastructure of the analyses, with this proposed plasmonic metalens design, five focal points are identified. Focusing parameters such as focal length, numerical aperture, depth of focus, focus spot width, and focus efficiency are determined theoretically for each focal point.

Keywords: Axicon focusing, plasmonic metalens, focusing performance, circular phase distribution, nanoapertures.

[1] Student, Kayseri University, Department of Electrical and Electronics Engineering, Orcid: 0000-0003-1383-3311
[2] Assoc. Prof, Kayseri University, Department of Electrical and Electronics Engineering, Orcid: 0000-0003-0933-7796
[3] Assoc. Prof, Erciyes University, Department of Electrical and Electronics Engineering, Orcid: 0000-0001-6829-9000
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Multifocal Metalens with Titanium Nitride Aperiodic Nanoapertures for Fiber Optical Wavelengths

Büşra ERSOY[1]
Ekin ASLAN[2]
Erdem ASLAN[3]

Abstract

Noble metals such as gold and silver used in plasmonic applications possess significant optical losses. Instead of these, alternative plasmonic materials such as doped silicon, doped germanium, and transition metal nitrides, whose plasma frequency can be controlled due to their low cost and tunable electron number, can be used. Titanium nitride, one of the transition metal nitrides, exhibits metallic properties with plasmonic behavior at visible and near-infrared wavelengths. In this context, eight types of aperture-based nanoantenna designs that provide resonative light transmission and form a full-phase transition are presented. A multifocal alternative plasmonic metalens design is proposed in which these nanoantennas form unit cells. The unit cells are constructed in aperiodic arrangement and circular rings, in such a way that they provide a full phase transition from the center of the metalens in the radial direction. The focusing behavior of the designed structure at 850 nm, which is one of the fiber optical wavelengths, is analyzed theoretically. Field distributions with multifocal points are presented in line with the theoretical analysis facilities. The focusing performance of this multifocal structure was determined by theoretical data such as focal spot width, numerical aperture, focal length, focal depth, and focusing efficiency.

Keywords: Multifocal metalens, alternative plasmonic, focusing performance, circular phase distribution, nanoapertures..

[1] Student, Kayseri University, Department of Electrical and Electronics Engineering, Orcid: 0000-0003-1383-3311
[2] Assoc. Prof, Kayseri University, Department of Electrical and Electronics Engineering, Orcid: 0000-0003-0933-7796
[3] Assoc. Prof, Erciyes University, Department of Electrical and Electronics Engineering, Orcid: 0000-0001-6829-9000
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A Low Pass Filter Design in Circular Acoustic Ducts

İsa KOÇ[1]
Özge YANAZ ÇINAR[2]
Gökhan ÇINAR[3]

Abstract

In this study, an analysis was carried out on a circular acoustic duct with sequential expansion and contraction chambers. This design is an example of low pass acoustic filters and can be used in many applications to reduce noise, filter out or isolate background sounds. Such applications play important roles in ventilations, jet engines, etc. In the last decades, many different approaches have been used to analyse such filters. For this particular and novel design, Mode Matching Technique was preferred in order to determine the reflection and transmission coefficients. Mode Matching Technique is a rigorous analytical method relying on the continuity relations of the field components at the interfaces of the relevant waveguide regions. These continuity relations can then be formulated to yield some systems of linear algebraic equations which can be solved applying certain numerical procedures. The accuracy of this analysis has been verified by comparing the results numerically with the results obtained from the simulations. Graphical results of these coefficients presented the acoustic low pass filter characteristics of this design where the cutoff for higher frequencies can be optimized with the help of the geometrical parameters. Besides, it is observed that Mode Matching analysis of this filter provides a significant time advantage compared to the simulation software.

Keywords: Multifocal metalens, alternative plasmonic, focusing performance, circular phase distribution, nanoapertures.

Keywords: Acoustic Filters, Mod Matching Technique, Expansion Chambers, Contraction Chambers, Acoustic Simulation Programs.

[1] PhD Student, Eskişehir Osmangazi University, Electrical and Electronics Engineering Dept., Orcıd: 0000-0001-8043-1828

[2] Assoc. Prof. Dr., Eskişehir Osmangazi University, Electrical and Electronics Engineering Dept., Orcıd: 0000-0001-5045-6397

[3] Prof. Dr., Eskişehir Osmangazi University, Electrical and Electronics Engineering Dept., Orcıd: 0000-0001-8304-6618

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Disinfection Using Far Uv-C Rays

Cihan YESILDAG[1]
Mehmet Ali EBEOGLU[2]

Abstract

The new type of coronavirus (Covid-19) epidemic that we have been experiencing since the beginning of 2020 has affected the whole world, and the methods given to the eradication of infectious diseases have increased even more. The New Type Coronavirus (Covid-19) epidemic, which has mutated in recent days, poses a significant problem because people spend most of their time indoors and because pathogens (viruses, bacteria and fungi) that cause many infectious diseases spread rapidly in indoor environments. Improvement of indoor air quality; It is also of great importance in terms of economic losses due to human health, job loss and medical treatments. It is of great importance that the UVC systems used while removing the said pathogens from the ambient air have a structure that will not harm human health. Traditional UVC production methods produce harmful rays for human health, cannot fully disinfect the air and consist of power systems that require a lot of energy. The use of remote UV-C forming LEDs, which have been used in recent years, is an effective new method that is preferred in improving indoor air quality and controlling infectious diseases by producing rays that will cause less harm to human health, inactivation of all pathogens carried to the indoor environment by air, in an efficient manner. It is a new method.
In this study, besides the effective design of new generation UV-C systems, LEDs radiating at different wavelengths and 222nm wavelength LEDs, reducing energy consumption and increasing disinfection performance, UV-C radiation areas and UV-C dose distributions were examined.
Keywords: Air disinfection, Far UV-C, UVC systems.

[1] Lecturer, Kutahya Dumlupinar University, Vocational Higher School Of Techiical Sciences, 0000-0001-9321-2122
[2] Prof.Dr., Kutahya Dumlupinar University, Faculty of Engineering, 130065

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Variation of Spatial Coherence Factor for Quantitative Differential Phase Contrast Microscopy

Nur Efşan KÖKSAL GÜLTEKİN[1]
Esra ŞENGÜN ERMEYDAN[2]
İlyas ÇANKAYA[3]

Abstract

Differential phase contrast (DPC) imaging is a label-free phase imaging (PI) method to recover phase information of weak phase objects under asymmetric half circle intensity measurements. Label free imaging prevents photo-toxicity and photo-bleaching in live biological objects. Another label-free PI method is quantitative phase imaging (QPI) where the optical path length (OPL) of light is measured as it passes through a sample. QPI methods quantify the phase shift induced by the sample using spatially coherent illumination such as phase-shifting interferometry or holography. One of the method to obtain phase quantitatively is to use DPC images and reconstruct the phase information by using weak object transfer function (WOTF) model. DPC provides two times better lateral resolution and robustness to speckle noise. In this study, the objective is to retrieve optical phase delay without the requirement of any complicated hardware and expensive optics. It is presented that theoretical analysis and simulation for DPC images and reconstructed quantitative phase images. The variation of spatial coherence factor in order to effectively increase the performance of phase recovery in traditional DPC imaging. Six differential phase contrast images (I_{DPC}) are obtained for varying spatial coherence factors (σ=1.5, σ=1.25, σ=1, σ=0.75, σ=0.5 and σ=0.25). It is seen that the spatial coherence factor is also highly effective in reconstructed phase images. The case $\sigma \ll 1$ corresponds to highly coherence condition, which produces more artifacts, and low contrast images due to scattering from out-of-plane objects. For $\sigma \geq 1$, the differential phase contrast images and reconstructed phase images ($\alpha=5x10^{-3}$) do not have any changes and do not increase the resolution since it's at the incoherent resolution limit. Therefore, high contrast phase imaging and high accuracy are achievable at the same time. The obtained reconstructed images show that $\sigma \geq 1$ is a more suitable choice in designing optical microscopes systems.

Keywords: Microscopy, differential phase contrast, label-free imaging, quantitative phase imaging, computational imaging.

[1]Research Assistant, Ankara Yıldırım Beyazıt University, Electrical and Electronics Engineering, Orcıd: 0000-0002-6046-8014

[2]Assistant Prof. Dr, Ankara Yıldırım Beyazıt University, Electrical and Electronics Engineering, Orcıd: 0000-0002-5953-4301

[3]Prof. Dr, Ankara Yıldırım Beyazıt University, Electrical and Electronics Engineering, Orcıd: 0000-0002-6072-3097

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Synthesis of B-zno Nanomaterials and Investigation of Their Structural Properties

Büşra AYTEN[1]
Nida KATI[2]
Ferhat UÇAR[3]

Abstract

Today, with the development of technology, interest in nano-sized advanced technological materials has increased considerably. The decrease in the size of the materials and the significant increase in their properties have made nanotechnology popular. Reducing the particle size of the material provides an increase in the surface area and at the same time, the electrical and optical properties of the material are improved. The popularity of metal oxide particles is constantly increasing thanks to the change in properties of the materials in nanosize. Zinc oxide is a metal oxide with a wide band gap of 3.4 eV and high mechanical, thermal and chemical stability. Zinc oxide has a high binding energy. The reason for the preference is that it has high conductivity when doped with suitable elements thanks to its electrical optoelectronic and piezoelectric properties, and besides, it is possible to use zinc oxide nanostructures in wide application areas due to its compatibility with liquid and organic solvents. In this study, ZnO nanomaterials with zinc oxide, which show unique and superior properties when it comes to nanoscales, were synthesized by adding 1%, 2%, 5% and 10% boric acid first and then 1%, 2%, 5% and 10% boric acid. When the XRD patterns of Boron doped ZnO nanomaterial synthesized by hydrothermal method at different additive concentrations were examined, no change was observed in the ZnO lattice structure. The density in the direction of (101) revealed that the produced material has a wurtzite hexagonal structure. The shift of the peaks to lower angles with the addition of boron is the result of the elongation of the lattice constants. The reason for this change was defined as the deterioration of the crystal quality of ZnO with the addition of Boron and the change in nucleation centers due to lattice defects.

Keywords: Zinc Oxide, Boron, Hydrothermal Method, Nanotechnology

[1] Fırat Üniversitesi, Metalurji ve Malzeme Mühendisliği Bölümü, Orcıd: 0009-0003-2885-8287
[2] Doç. Dr. Fırat Üniversitesi, Metalurji ve Malzeme Mühendisliği Bölümü, Orcıd: 0000-0001-7953-1258
[3] Dr. Fırat Üniversitesi, Yazılım Mühendisliği Bölümü, Orcıd: 0000-0001-9366-6124

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Antioxidant and Antibacterial Analysis of Leaf Extracts Produced By Ultrasonic Extraction Used in Active Packaging

Mehmet Berkecan ÇAKIR[1]
Ahmet Bahadır KOYUNCULAR[2]
Ayşe ÜNLÜ[3]
Murat ÖZDEMİR[4]
Merve MOCAN[5]

Abstract

Packaging films, commonly produced from petroleum-based polymers, are highly preferred for mechanical and hygienic protection of food from environmental factors. However, these materials cannot be mechanically recycled due to food contamination, and because they do not biodegrade, they constantly accumulate and cause environmental pollution. Polymers obtained from natural resources, offer advantages in terms of lower carbon footprint and biodegradability, however they also need to possess sufficient mechanical strength and cost-effectiveness. This study aims to reinforce the packaging films with food waste while reducing the cost of films. In addition, active packaging can be achieved by incorporating antioxidant and antibacterial properties into the films using natural extracts to increase the shelf life of food products. These materials also decompose into fertilizer when their use is complete, thus also contributing to organic recycling.

In this study, bio-based and biodegradable polymers were used to produce biocomposite packaging films using food waste and green solvents. The film formulation was enriched with leaf extracts obtained using the environmentally-friendly ultrasonic extraction method to extend the shelf life of the packaged food product. Leaf extracts were produced under different conditions (temperature, power, and time), and their total phenolic content was determined using the Folin-Ciocalteu method, while their total antioxidant capacity was determined using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity assay. Optimum production conditions were determined using the Box-Behnken method. Disk diffusion method was used for antibacterial analysis of the extracts and films. The study found that leave extracts exhibit high antioxidant and antibacterial properties, and biocomposite films made using these leaves have a high potential to increase the shelf life of food products.

Keywords: bio-based biodegradable films, active packaging, antioxidant, antibacterial, Folin-Ciocalteu method, 2,2-diphenyl-1-picrylhydrazyl radical scavenging activity assay.

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[1] MSc student, Gebze Technical University, Department of Materials Science and Engineering
[2] BSc student, Gebze Technical University, Department of Materials Science and Engineering
[3] Res Asst Dr, Gebze Technical University, Department of Chemistry
[4] Prof Dr, Gebze Technical University, Department of Chemical Engineering
[5] Asst Prof Dr , Gebze Technical University, Department of Materials Science and Engineering

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Polyethylene Welding with Solar Energy Using Fresnel Lens

Sema UÇAK[1]

Abstract

Today, because of the increasing population and rapid consumption, the importance of renewable energy sources is increasing day by day. There are many studies to take advantage of the sun's rays, which are abundant in nature. But the idea of using fresnel lenses to weld with solar energy has not been included in any other academic study before. Within the scope of this study, the sun rays were focused by using fresnel lenses, which are cheaper and lighter than optical lenses. Thanks to the high temperatures at the focal point formed, polyethylene materials were welded. During welding processes, the temperatures were measured under the welding centers. Then, in order to determine the characteristics of the welding process, samples were taken from the base material and welded parts.Hardness test and macro examinations were performed on the samples taken. As a result of the examinations and experiments, it has been determined that the values obtained are close to the main material. Since this study is the first study in this field, it has been an infrastructure study. In addition, in light of the results obtained from this study, which was carried out within the scope of a completely monologue order, as the next step, a study will be combined with software and robotic studies.

Keywords: Fresnel lens, polyethylene, solar welding, thermoplastic welding, Concentrated solar energy

[1]Yüksek Lisans, Gazi Üniversitesi, Metalurji ve malzeme mühendisliği, Orcıd: 0000-0002-0219-7244

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Optimization of Sintering Parameters and Post Sintering Characterisation in Mullite-Zircon Ceramics

Elif BAL[1]
Görkem YUMUŞAK[2]
Recep ARTIR[3]

Abstract

In this study, with the help of the known effect of Fe_2O_3, which is a sintering aid additive for sintering, it is possible to synthesize products at temperatures much lower than 1500°C, which is the known sintering temperature in the phase diagram of the mullite-zircon system. In addition to the phase and microstructure analysis of the produced products as a result of the addition of sintering aid additive (Fe_2O_3) and reaction sintering process, mechanical characterizations were performed. The sintering aid additive (Fe_2O_3) was mixed into the Mullite-Zircon structure by adding 1 wt.%, 2 wt.% and 3 wt.%. 1% by weight of PAN was used as the binder. This mixture was formed into pellets before sintering under the selected pressing force of 2500 psi. These pellets were sintered at 1500°C, 1450°C, and 1400°C sintering temperatures, respectively, with a sintering time of 5 hours for each temperature. As a result of these processes, the effect of sintering temperature and the effect of the amount of sintering aid additives were examined by using characterization methods. It was aimed to determine the optimum parameters for this material, considering the important properties of ceramics such as porosity, hardness, density, and microstructure of the product to be produced with these additives and parameters. X-Ray Diffraction analyses were performed, and the phases formed as a result of the reaction were determined. Microstructure analyses were made for sintering temperatures of 1500°C, 1450°C, and 1400°C using an optical microscope. The optimum sintering temperature for the parameters used in this study and the amount by weight of the sintering aid additive to be used were selected considering variable factors in this study, and it was aimed to find the product with the best properties and the lowest cost.

Keywords: Mullite, Zircon, Liquid Phase Sintering, Hematite

[1] Y. Lisans Öğrencisi, Marmara Üniversitesi, Metalurji ve Malzeme Mühendisliği, Orcıd: 0000-0002-7982-8964
[2] Dr. Öğr. Üyesi, Marmara Üniversitesi, Metalurji ve Malzeme Mühendisliği, Orcıd: 0000-0002-5047-4357
[3] Prof. Dr., Marmara Üniversitesi, Metalurji ve Malzeme Mühendisliği, Orcıd: 0000-0002-6914-9167

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Welding Behavior of Recycled Polymers in Automotive Industry

Kübilay ÖZTÜRK[1]
Cem İÇİER[2]

Abstract

Polymeric materials are widely used in automotive industry due to some reasons such as low weight, low cost, and resistance to corrosion. As opposed to advantages, these kinds of materials are not sustainable. So, they need to be used in a more sustainable way. To do this, recycling polymers is popular nowadays. Recycling of discarded polymers is a feasible strategy to enhance the environmental sustainability of the plastic sector when combined with attempts to improve the use and specification of recycled grades to substitute virgin plastic [1]. For this reason, the waste polymers are converted to recycled polymers. The method of recycling is the polymers are reheated and reshaped after mixed plastic waste is sorted and cleaned. Recycled polymers are getting intensively used in automobile parts. However, they need to be investigated detailed in terms of manufacturability and machinability. For example, a lot of parts are welded during car manufacturing. So, the welding behavior of recycled polymers needs to be known. In general, recycled polymers tend to have less consistent molecular weights compared to virgin polymers [2]. It can also affect the melting point. This might affect their welding behavior, as the lower melting temperatures can result in weaker bonds and the inconsistent molecular weights can lead to uneven distribution of the melted material.

Additionally, recycled polymers may contain contaminants or additives from the original material [3], which can affect the welding behavior. For example, some additives may hinder the welding process by creating bubbles or affecting the flow of the melted material. To overcome these challenges, it is important to carefully select the recycling method and processing parameters to ensure that the recycled material has the necessary properties for the desired welding application. In this study, the welding behavior of different recycling polymers was investigated and compared with the welding behavior of polymers produced with the original raw material.

Keywords: Recycle, welding, polymer, automotive

[1] Researcher, TOFAS Turk Otomobil Fabrikası R&D Center, Orcıd: 0000-0002-0279-4217
[2] Researcher, TOFAS Turk Otomobil Fabrikası R&D Center/ İzmir Institute of Technology

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Finite Element Analysis Based Through Thickness Hardness Prediction For Aisi 4340 Steel

Barbaros ŞENSES[1]
Barış ÇETİN[2]
Ayşe ERKAN[3]
Onurcan İLHAN[4]
Kemal DAVUT[5]
Abidin TOKER[6]

Abstract

Due to the harsh working conditions of the defense industry, some engineering components encounter high payloads and severe tribological challenges. Therefore, heat treatment of metallic materials is a common solution for those components. In this regard, tuning the desired hardness levels could be problematic for designs with large dimensions like power shafts whose diameters are superior to 50 mm. Thanks to the computational metallurgy-based finite element analysis (FEA) capabilities, the prediction of the hardiness profile of the heat-treated steels can be performed with a reasonable amount of precision. This contribution was devoted to the prediction of the hardness profile of AISI 4340 which belongs to a specific cross-section design. The FEA efforts were conducted with Forge software and the results were verified with experimentally obtained measurements. To estimate the material hardness after heat treatment, up-to-date material data were used. Continuous-cooling-transformation (CCT) and temperature-time-transformation (TTT) diagrams were created by means of JMatPro software. The measured hardness profile found is quite in line with the FEA-based predictions.

Keywords: *heat treatment, hardness profile, AISI 4340 steel*

[1] R&D Engineer, Döksan Isıl İşlem ve Ar-Ge Merkezi A.Ş., R&D Center, Orcıd: 0000-0001-7837-2726
[2] SME-Advanced Material Technologies, FNSS Savunma Sistemleri A.Ş., R&D Center, Orcıd: 0000-0001-8615-8383
[3] R&D Director, Döksan Isıl İşlem ve Ar-Ge Merkezi A.Ş., R&D Center, Orcıd: 0000-0002-6060-1815
[4] R&D Engineer, Gürgenler Metal Şekillendirme İşleme San. ve Tic. A.Ş., R&D Center, Orcıd: 0009-0004-2912-2885
[5] Asst. Prof., İzmir Yüksek Teknoloji Ensititüsü, Malzeme Bilimi ve Mühendisliği Departmanı, Orcıd: 0000-0002-9860-881X
[6] Project Team Leader, Onatus Öngörü Teknolojileri Müh. Danış. Yazılım. San. ve Tic. Ltd. Şti., Orcıd: 0000-0003-1852-5131

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Environmental Acid Free Photocatalytic Material Synthesis by Hydrothermal Method and Application on Water-soluble Dyestuffle

Muharrem Barış ULUTAŞ[1]
Oğuzhan AVCIATA[2]

Abstract

Today, dyestuffs are used intensively in every field for both protection and aesthetic purposes. The increase in consumption materials day by day increases the use of dyestuffs. However, these dyestuffs also bring environmental problems during the production phase, during use and after use. Increasing air pollution, water pollution and soil pollution make life more difficult.

Nano-sized titanium dioxide is one of the most well-known photocatalysts, which is used extensively in environmental treatment and degradation of harmful organic polluting chemicals in wastewater. Titanium dioxide has three crystal phases, namely anatase, brucite and rutile, and its use as anatase and rutile form, pigment, gas sensor, catalyst and photocatalyst in environmental purification comes to the fore. It can be used as a photocatalyst for the removal of organic pollutants in the air and water, and it has wide applications as a photocatalyst to obtain hydrogen by decomposing water into ions. It is widely used due to its lower price, low toxicity, resistance to high heat and chemicals compared to other materials with these properties. Titanium dioxide is one of the most researched semiconductor oxides in technologies developing with radical changes in the fields of environmental purification and energy production.

In this study, environmental photocatalytic nano-sized anatase material was synthesized by hydrothermal method without using acid. X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) analyzes of the synthesized material were performed. As an application, photocatalytic application was carried out on water-soluble methyl red dyestuff.

Keywords: hydrothermal, nano, titanium dioxide, synthesis, photocatalytic, methyl red

[1] Metalurji ve Malzeme Müh., Yıldız Teknik Üniversitesi, Metalurji ve Malzeme Müh. Böl., Orcıd: 0009-0008-4348-0821
[2] Dr.Öğr.Üyesi, Yıldız Teknik Üniversitesi, Metalurji ve Malzeme Müh. Böl., Orcıd: 0000-0002-6423-6114

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Nano Anatase Synthesis by Wet Chemistry Method and Photocatalytic Application on Methyl Orange Dyestuffle

Cansu YOKUŞ[1]
Oğuzhan AVCIATA[2]

Abstract

Dyestuffs are used intensively in every field for both protection and aesthetic purposes. The increase in consumption materials day by day increases the use of dyestuffs. However, these dyestuffs also bring environmental problems during the production phase, during use and after use. Increasing air pollution, water pollution and soil pollution make life more difficult.

Nano-sized titanium dioxide is one of the most well-known photocatalysts, which is used extensively in environmental treatment and degradation of harmful organic polluting chemicals in wastewater. Titanium dioxide has three crystal phases, namely anatase, brucite and rutile, and its use as anatase and rutile form, pigment, gas sensor, catalyst and photocatalyst in environmental purification comes to the fore. It can be used as a photocatalyst for the removal of organic pollutants in the air and water, and it has wide applications as a photocatalyst to obtain hydrogen by decomposing water into ions. It is widely used due to its lower price, low toxicity, resistance to high heat and chemicals compared to other materials with these properties. Titanium dioxide is one of the most researched semiconductor oxides in technologies developing with radical changes in the fields of environmental purification and energy production.

In this study, environmental photocatalytic nano-sized anatase material was synthesized by wet chemistry method. X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) analyzes of the synthesized material were performed. As an application, photocatalytic application was carried out on water-soluble methyl orange dyestuff.

Keywords: wet chemistry, nano, titanium dioxide, synthesis, photocatalytic, methyl orange

[1] Metalurji ve Malzeme Müh., Yıldız Teknik Üniversitesi, Metalurji ve Malzeme Müh. Böl., Orcıd: 0009-0002-3267-3536
[2] Dr.Öğr.Üyesi, Yıldız Teknik Üniversitesi, Metalurji ve Malzeme Müh. Böl., Orcıd: 0000-0002-6423-6114

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Determination of Possible Mutation-prone Positions and Effects of SLITRK Protein in Silico

Alinza İSLİM[1]
Derya YILDIZ[2]
Emre AKTAŞ[3]
Nehir ÖZDEMİR ÖZGENTÜRK[4]

Abstract

Tourette's syndrome (TS) is a complex neuropsychiatric disorder characterized by involuntary movements and vocalizations called tics that occur at short intervals. There are different types of tics associated with Tourette Syndrome, which is a rare disease affecting 0.4% to 3.8% of children, with males being more frequently affected than females. Studies on individuals with Tourette Syndrome have shown that mutations in the SLITRK1 gene are of interest. Therefore, it is predicted that possible mutations in the SLITRK1 gene, where the SLITRK1 protein is expressed, may be associated with Tourette Syndrome. The SLITRK1 protein is a transmembrane protein and plays important roles in axon cells, neurons, and dendrites. Its most important function is enabling each neuron to communicate with its organs. The SLITRK1 protein is also thought to have a function in neurite outgrowth. Despite this, there is currently no comprehensive study to understand the structure of the SLITRK protein.

In this study, we extensively analyzed the regions of the SLITRK1 protein that are likely to be susceptible to mutations and the structure of the SLITRK1 protein using bioinformatics tools such as disEMBL, PhD-SNP, String etc. The analysis revealed that certain amino acid positions in the SLITRK1 protein differed significantly from other amino acid positions in terms of possible mutations. Mutations in these amino acids can affect the physical and chemical properties of this protein as well as affect insertion scores. Consequently, the results of the present study provide a different perspective for research on the SLITRK1 protein and its potential association with Tourette Syndrome

Keywords: Bioinformatics analysis of SLITRK1 protein, Tourette syndrome, mutations

[1] Yıldız Technical University, Orcid: 0000-0001-8565-8933
[2] Yıldız Technical University,Orcid: 0000-0001-8772-0542
[3] Res. Asst., Yıldız Technical University, Orcid: 0000-0002-9422-3402
[4] Prof. Dr., Yıldız Technical University, Orcid: 0000-0003-3809-6303

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Determination of Single Nucleotide Polymorphisms (SNPs) in Human CAPN3 Gene by In Silico Analysis

Güldenur KAYIŞLI[1]
Burak DİLEMEK[2]
Emre AKTAŞ[3]
Nehir ÖZDEMİR ÖZGENTÜRK[4]

Abstract

LGMDR1 is a type of Limb Girdle Muscular Dystrophy (LGMD) with an autosomal recessive inherited prevalence ranging from 0.001% to 0.009% cases. It affects approximately 30% of LGMD patients and is therefore considered the most common subtype. It is a rare and slowly progressive muscle disease caused by a mutation in the CAPN3 gene, which encodes the proteolytic enzyme Calpain 3, a skeletal muscle-specific member of the Calpain family. In the literature, the pathophysiological mechanisms involved in LGMDR1 are mostly unknown, and there is no effective treatment for this disease to date. Currently, there is no comprehensive study to understand the Calpain 3 protein. In this study, more than 7 bioinformatics tools such as Expasy and HOPE were used to investigate the functional and structural states of proteins caused by dbSNPs in the coding region of the human CAPN3 gene. The results have been extensively studied with rational and semi-rational design approaches. All possible SNPs of the gene, and the positions of the amino acids that make up the Calpain 3 protein produced by this gene, were determined, as well as the effects of these positions. Some amino acid positions have been highlighted as playing an active role in the stability of the protein structure, the biological activity of the Calpain 3 protein, the preservation of the Calpain 3 protein structure, and the interaction of the Calpain 3 protein with other proteins. Also, these amino asit positions can change the physico-chemical properties of the Calpain 3 protein. These results are supposed to be an important resource for studies on this protein and gene and will bring a different perspective to the treatment studies designed for the disease.

Keywords: Bioinformatic Analysis, CAPN3 Gene, CALPAIN 3 Protein, LGMDR1, Mutation, Limb-Girdle Muscular Dystrophy.

[1] Yıldız Technical University, Orcid: 0009-0009-1053-5221
[2] Istanbul University, Orcid: 0009-0008-1838-7844
[3] Res. Asst., Yıldız Technical University, Orcid: 0000-0002-9422-3402
[4] Prof. Dr., Yıldız Technical University, Orcid: 0000-0003-3809-6303

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In vivo Antigenotoxic Profile of Baobab Oil Against Oxidative DNA Damage

Begümhan YILMAZ KARDAŞ[1]

Abstract

Baobab or *Adansonia digitata* L. (Family: Malvaceae) is a plant which is widely used as a food and traditional medicine. It is known that the baobab seeds contain large amounts of sodium, phosphorus, magnesium, iron, manganese and zinc. They also have high levels of lysine and thiamine. Although there are many studies in literature about the biological properties of the different parts of baobab, there isn't any study about its *in vivo* antigenotoxic profile. In this study, it was aimed to find out the protective roles of the baobab oil against oxidative DNA damage. *In vivo* wing-spot test, *in vivo* antioxidant activity test and *in vivo* toxicology tests were used with *Drosophila melanogaster* to investigate the antigenotoxic effects of the plant oil. In addition, the olfactory bias was tested by using feeding assay in order to exclude the influence of the odor and taste preference of the flies. According to the results, it was clearly seen that baobab oil caused similar small single, large single and twin spot frequencies like negative control ($p>0.05$). When the extracts were coadministered with H_2O_2, baobab oil also caused inhibition in the frequencies of the spots. *In vivo* antioxidant activity tests and toxicology also showed that baobab oil was able to protect the organisms from the oxidative damage without affecting the puparation, survival and eclosion process of wild type *D. melanogaster* strains. Moreover, an olfactory bias wasn't observed after addition of baobab oil. To conclude, baobab or *A. digitata* oil was found as antigenotoxic and protective against oxidative damage *in vivo*.

Keywords: Baobab oil, *Adansonia digitata* L., *Drosophila melanogaster*, *in vivo*, genotoxicity

[1] Dr., Balikesir University, Molecular Biology and Genetics, Orcid: 0000-0002-8446-1116

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Investigation of Cytotoxic Effect of Borago officinalis Plant Extract on Breast Cancer

Kübra Sena BAŞ TOPCU [1]
Sude DERE [2]

Abstract

The aim of the study is to investigate the antiproliferative activity of the *Borago officinalis* plant, which has been used for medicinal purposes since ancient times.In the study, extracts of blue-flowered *Borago officinalis* were obtained with ethanol and applied to MCF-7 human breast cancer cell line at various concentrations. The cytotoxic effect of the extract was evaluated by MTT analysis for 24, 48 and 72 hours. Statistical analysis was conducted using the two-tailed Student's t-test, with each treatment group compared to the control. A significance level of $p < 0.05$ was employed to determine statistical significance. The results of the study revealed a decline in cell viability of *Borago officinalis* extract in a dose-dependent manner. Notably, the treatment with the extract led to a significant suppression of MCF-7 cell proliferation, as evidenced by a substantial reduction observed after 48 hours. The findings of this study indicate a significant cytotoxic activity of *Borago officinalis* extract against human breast cancer cells in vitro, underscoring its potential as a promising therapeutic agent. However, further investigations are warranted to isolate and purify the active constituents responsible for this effect, which could pave the way for the development of novel anticancer agents derived from *Borago officinalis*.

Keywords *Borago officinalis*, Plant extract, Breast cancer, Cytotoxicity, MTT assay

[1] Res. Asst., Bartin University, Molecular Biology and Genetics, Orcid: 0000-0003-3161-1042
[2] Bartin University, Molecular Biology and Genetics, Orcid: 0000-0002-4774-5443

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Effects of increased UV-B radiation on *Camellia sinensis*'s Pollen Performance

Özkan KİLİN[1]
Ashhan ÇETİNBAŞ-GENÇ[2]

Abstract

UV-B radiation on the earth is increasing rapidly due to the progressive thinning of the ozone layer. This paper aims to examine the effects of UV-B radiation on the pollen grains of *Camellia sinensis*, focusing on basic parameters such as pollen viability, germination ability, and tube elongation. To this end, pollen grains were positioned under UV-B lamps at 10 cm, 20 cm, 30 cm, and 40 cm distances and exposed to UV-B for 1 h, 2 h, and 3 h, in a special chamber. Pollen viability rates were significantly reduced compared to control after irradiation for 1h in the case of pollen grains exposed 10 cm away and also after irradiation for 3h in the case of pollen grains exposed 10, 20, 30 and 40 cm away. UV-B radiation did not cause any significant change in pollen germination rates after treatments. Pollen tube lengths were significantly reduced compared to control after irradiation for 2h in the case of pollen grains exposed 10 cm away and also after irradiation for 3h in the case of pollen grains exposed 10 and 30 cm away. To identify the experimental conditions showing the highest sensitivity on pollen grains, the cumulative stress response index value of all groups was calculated and the most acute effects caused by exposure to UV-B radiation occur after 3h of treatment at 10, 20 and 30 cm, respectively.

Keywords: pollen germination, pollen performance, pollen tube, UV-B radiation

[1] Undergraduate student, Marmara University, Department of Biology, Orcid: 0000-0002-9283-4576
[2] Associate professor, Marmara University, Department of Biology, Orcid: 0000-0001-5125-9395

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In Silico Identification of Possible Mutation-Prone Regions of the Glutamate Receptor 3 Protein

Zeynep Nur KESKİN
Emre AKTAŞ
Nehir ÖZDEMİR ÖZGENTÜRK

Abstract

Schizophrenia is a severe psychiatric disorder that significantly impacts the patient's quality of life. The disease is characterized by symptoms such as hallucinations, delusions, abnormal behavior, and attention disorders. Although it is recognized that schizophrenia has a hereditary component, the specific genes that cause the disease remain largely unknown. Initially, it was believed that D2 dopamine receptors were the sole basis of schizophrenia, and while treatments developed for this receptor were effective for most patients, it later became evident that dopaminergic disorders were not the only cause. In schizophrenia, dopamine, serotonin, and glutamate networks interact and are implicated in the disorder. According to the glutamate hypothesis, the NMDA receptor subunit GRIN2A and AMPA receptor subunit 3, GRIA3 impair the glutamatergic system, thereby contributing to the mechanism of schizophrenia. A comprehensive study of rare-coding variants that pose a risk in schizophrenia noted that GRIA3 variants pose a significant risk. We used bioinformatics tools such as Meta-SNP, to identify important variables affecting receptor function and predict possible mutations. It was concluded that the alteration of the receptor structure due to these possible mutations would affect the binding surface. As a result, this study provides a new perspective on the critical role of the GRIA3 receptor in schizophrenia.

Keywords: Bioinformatic analyses, Schizophrenia, Glutamate, Glutamate Receptor 3

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Nitric Oxide; Does It Cancer Or Protect?

Fatma Gönül SEZGİN

Abstract

Nitric oxide (NO) is an extremely toxic, colorless, gaseous free radical with a molecular weight of 30.006 g/mol and a half-life of 20-30 seconds. NO, which plays a role in many intracellular or intercellular pathways and shows lipophilic properties, becomes very stable and water-soluble when at high concentrations in an oxygen-deprived environment. If it is at low concentrations, it can maintain its stability even in the presence of oxygen. NO is nonpolar enough to cross the plasma membrane without a carrier. It has been shown in many studies that NO levels differ in different cancer cells and tissues, and as a result of this, they have different regulatory effects. Low levels of NO have been reported to drive oncogenic pathways, immunosuppression, metastasis, and angiogenesis, whereas high levels have been reported to cause both reduced hypoxia and apoptosis, and sensitize tumors to conventional treatments. All these results are closely related to the microenvironment of the tumor. For example, in the environment where NO causes Ca+2 release, mitochondrial dysfunction and apoptosis are induced. On the other hand, in an environment containing hyaluronic acid, it causes the breakdown of hyaluronic acid. And thus it inhibits the migration of cancer cells in the tumor environment. As can be seen, due to these systemic effects, NO is both life-saving and extremely toxic. In order to cope with cancer, transforming NO, which is the natural product of cells, into a protective and preventive weapon, instead of administering drugs with many systemic side effects or toxic, has been the passionate target of recent studies.

Keywords : Nitric Oxide, Cancer, NO, Tumor

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Evaluation of the Nutritional Benefits and Future Perspective of Hemp Seed Milk

Nour AWAD[1]
Mustafa MORTAŞ[2]

Abstract

The plant-based milk market is expanding globally as consumers replace bovine milk in their diet to ensure their nutritional, ethical, health, or lifestyle choices. The used plant categories, such as cereal, legume, nut, and seed-based, significantly impact the nutritional and physicochemical qualities of plant-based milk alternatives. As well as, plant-based milk alternatives can have other detrimental health impacts, such as low bioavailability of vitamins and minerals due to the presence of some anti-nutrients. By contrast, hemp milk is seed-based milk with great nutritional benefits. Hemp milk is a desirable substitute for dairy, soy, and nut milk due to its high nutritional content and minimal allergenicity. Hemp seeds are great sources of minerals such as phosphorus, potassium, magnesium, zinc, calcium, manganese, and copper. Moreover, hemp seeds are rich in polyunsaturated fatty acids (linolenic acid and linoleic acid) in a unique proportions and contain all the necessary amino acids. Conclusively, in this short review, we have summarised the last recent published results of studies regarding the nutritional benefits and health-related information of the consumption of hemp seed milk, and we have also discussed the superiority of hemp milk over other plant-based milk alternatives from a scientific perspective.

Keywords:, plant-based milk, hemp milk, bovine milk, health benefits, nutritional content.

[1] Doktora öğr., Ondokuz Mayıs Üniversitesi, Gıda mühendisliği bölümü, ORCID:0000-0003-3441-9080
[2] Asst. Prof, Ondokuz Mayıs Üniversitesi, Gıda mühendisliği bölümü, ORCID:0000000203167768

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Lipid Oxidation During Storage Period of Kavurma

Burcu AKBULUT[1]
Nesimi AKTAŞ[2]

Abstract

One of the most important reactions affecting the flavor of cooked meat products is lipid oxidation, and it is shown as one of the primary reasons for quality losses in meat products. In this research, it is aimed to determine the lipid oxidation that takes place during the kavurma storage period. For this purpose, kavurma production was carried out and peroxide and p-anisidine values were determined every month in kavurma samples kept at 4°C for sixmonths. The peroxide value increased depending on the storage period and increased from 1.18 to 5.21 meq/kg fat. The obtained values were also statistically different from each other. The p-anisidine values also increased depending on the storage period and increased from 1.00 to 1.37, and the values obtained in the 0-2th months and the 4th-6th months show similarities among themselves. From the data obtained, it was concluded that both primary products and secondary products increased depending on the storage period.

Keywords: Kavurma, peroxide value, p-anisidine

[1]Yüksek Lisans Öğrencisi, Nevşehir Hacı Bektaş Veli Üniversitesi, Gıda Mühendisliği, Orcıd: 0000-0002-0435-0513
[2]Prof. Dr., Nevşehir Hacı Bektaş Veli Üniversitesi, Gıda Mühendisliği, Orcıd: 0000-0002-4741-9867

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Protein Oxidation During Kavurma Production Process

Melike BABAOĞLU[1]
Nesimi AKTAŞ[2]

Abstract

Protein oxidation can be defined as covalent protein modification initiated directly by reactive species or indirectly by secondary oxidation products. Meat and meat products are very sensitive to oxidative reactions. With oxidation, the sensitivity of proteins to digestive system enzymes decreases. This decrease in the digestibility of proteins leads to a decrease in the bioavailability of amino acids, and nutritional quality can be adversely affected. In this research, it is aimed to determine the protein oxidation that takes place during the kavurma production process. For this purpose, protein carbonyls were determined in the raw material and in the samples taken every half hour during the two-hour production process. As a result of the research, it was determined that the protein carbonyl level increased until the 60th minute, and after this period, a partial decrease occurred. It was found that the obtained values were significantly different (P<0.05) from each other, except for the 90th and 120th minutes.

Keywords: Kavurma, protein oxidation, carbonly content

[1] Graduate student, University of Nevsehir Hacı Bektaş Veli, Faculty of Engineering Architecture, Department of Food Engineering, 50300 Nevşehir, Turkey

[2] Prof., University of Nevsehir Hacı Bektaş Veli, Faculty of Engineering Architecture, Department of Food Engineering, 50300 Nevşehir, Turkey

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Black Rice: Functional Properties and Food Applications

Ezgi OZGOREN[1]

Abstract

Rice is the staple food for more than half of the world's population. It is known that pigmented varieties have health-promoting effects due to their high nutritional content and bioactive phytochemicals.
Black rice (*Oryza sativa* L.) is a nutrient-dense rice cultivar with black bran covering the dark gray endosperm, which turns deep purple when cooked. It is also known as forbidden rice, imperial rice, and purple rice. There is a growing research interest for black rice due to the presence of anthocyanins which can reduce the risk of cancers and cardiovascular diseases. Eighteen anthocyanin species are identified in black rice. The most and second most abundant anthocyanin compounds are cyanidin 3- glucoside and peonidin 3-glucoside, respectively. Anthocyanins mainly accumulated in the bran layer, and it is significantly higher in this layer compared to whole grain. Black rice also contains more fiber and protein than conventional white rice. The fiber content is approximately 8 times, the protein content is approximately 1.5 times higher than white rice. In addition, black rice is rich in essential amino acids such as lysine and tryptophan, some minerals (calcium, phosphorus, zinc, iron), and vitamins (vitamins B_1, B_2, and B_9).
In this study, we reviewed the functional properties and the food applications of black rice.

Keywords: Black Rice, Functional Properties, Anthocyanin

[1] Assist. Prof., Pamukkale University, Department of Food Engineering, Orcid: 0000-0001-9583-817X

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Use of Raman Spectroscopy to Evaluate Meat Quality, Safety, and Storage Stability

Hilal SOYOCAK[1]
Sadettin TURHAN[2]

Abstract

The consumption of meat, which has an essential physiological value in human nutrition, is increasing yearly all over the world. In parallel with this increase, its quality is becoming an increasingly important factor influencing consumer decisions. The difficulty and time consumption of traditional methods used in evaluating meat quality and safety has led to the focus on novel methods in recent years. Spectrophotometric methods are preferred for evaluating meat quality and storage stability because they are fast, safe, and economical. Raman spectroscopy attracts attention as an alternative to traditional methods for assessing meat quality indicators. Its advantages include minimal sample preparation, fingerprint spectrum, high sensitivity, rapid data acquisition, non-destructive control, and environmental friendliness. Raman spectroscopy is the spectroscopy that allows the identification of vibrational modes of molecules and is a non-destructive method of analysis. In the past few years, Raman spectroscopy has been used to determine the chemical and physicochemical properties of meat and meat products, the degree of lipid oxidation, quantitative prediction of meat composition, differentiation of meat species, detection of adulteration, and determination of authenticity. The paper presents a review of the potential of using Raman spectroscopy for the analysis of quality indicators and storage stability of meat and meat products.

Keywords: Raman spectroscopy, non-destructive analysis, meat quality, meat safety, storage stability

[1] Arş. Gör., Ondokuz Mayıs Üniversitesi, Gıda Mühendisliği Bölümü, Orcıd: 0000-0002-9754-3962
[2] Prof. Dr., Ondokuz Mayıs Üniversitesi, Gıda Mühendisliği Bölümü, Orcıd: 0000-0002-3510-4382

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Evaluation of Hemp Seed as Protein Concentrate and Isolate

Gürkan BOZKAYA
Mustafa MORTAŞ

Abstract

Hemp (Cannabis) is a single-year industrial plant belonging to the Cannabaceae family with the potential for different usage. Hemp is also called 'hessian' or 'chedene' in Turkey. Hemp, which has a wide potential for use in fiber, yarn, and weaving such as fabric, pharmaceutical, paper, biofuel, cosmetics and automotive sectors, is an industrial plant evaluated in every field where petroleum and petrochemicals are used. It is recommended the origin of hemp is Central Asia and the Indian subregion, including South Asia. However, the cultivation area of the hemp plant is spread over a wide geographical area from the Equator to the Poles.

Hemp seeds are important part of the plant because hemp seeds contain about 35% oil and have a low profile in saturated fatty acids, which indicates that the seed has a high-quality oil content. Hemp seeds have a protein ratio of 25%. The ratio is close to the ratio of protein contained in soybeans. The seeds have all nine essential amino acids that the human body cannot synthesize and must be taken from the outside through nutrients. The seeds are especially rich in the amino acid arginine, which benefits heart health.

The seeds have rich content of protein and carbohydrates and are also considered a perfect alternative to soy with protein concentrate and isolate. This review evaluates alternative possible hemp seed protein concentrate and protein isolate in terms of nutrition.

Keywords: Hemp, Hemp Seed, Protein Isolate, Protein Concentrate, Amino Acid

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Natural Preservatives in Meat and Meat Products: Nisin and Chitosan

Emel KAYNAKCI[1]
İrem Serra PEKŞEN[2]

Abstract

Despite various preservation methods, foodborne infections and intoxication-related diseases have been increasing recently. Especially meat and its products are foods with a high potential for disease development because they are a suitable nutrient for the development of bacteria. Pathogenic microorganisms such as *Salmonella*, *Campylobacter jejuni*, *Escherichia coli*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Clostridium botulinum* and *Clostridium perfringens* cause foodborne poisoning that can lead to death. As a result, various artificial additives have been used for the protection of foods, but recently, conscious consumers prefer products that do not contain additives and respect the nature. This situation has led to the study of different food preservation methods with the use of natural or antimicrobial preservatives as an alternative to food additives with chemical formulations. Recently, the use of bacteriocins and natural components with antibacterial effects in food preservation has gained importance. Studies on the protective properties of nisin and chitosan in foods are continuing rapidly. Nisin is a peptide antibiotic used as an antimicrobial agent. Nisin can be obtained by producing it by bacteria or by isolating it from foods containing nisin in their nutrient content. Chitosan is a natural non-toxic polysaccharide obtained from shellfish with antimicrobial and antioxidant properties. Chitosan and nisin are used in meat products to increase shelf life and prevent microbial spoilage. In this review, information about nisin and cytosan will be given and information will be given about their use in the meat industry.

Keywords: Meat, meats products, nisin, chitosan, natural preservative

[1]Dr.Öğr., , Göynük Mutfak Sanatları Meslek Yüksekokulu , Otel, Lokanta Ve İkram Hizmetleri Bölümü Orcıd: 0000-0002-2152-0262
[2]Dyt, Akdeniz Üniversitesi, Tıbbi Biyoteknoloji Ana Bilim Dalı, Orcıd: 0000-0002-8185-5427

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Determıning The Canvas Busıness Model Priority Building Blocks with The Swara Method

Ali SEVİNÇ[1]

Abstract

The KANVAS business model has been used for years in the preparation of business ideas and business models built on it. The business model, developed by Alexander Osterwalder in 2012, consists of nine building blocks. The content consists of customer segments, value propositions, channels, customer relationships, key events, key resources, key partners, revenue sources and cost structure. The business model is used in the planning of business establishment processes, especially in the planning of operations related to production, marketing and financing. In addition, critical elements are clarified. It guides the entrepreneurs and offers a roadmap. It helps to do the right job in the right way and to manage the business idea correctly. It prevents the loss of resources and time by using the resources correctly. It reduces uncertainty as well. Failures are prevented by identifying key resources and key activities before starting the journey. The KANVAS business model is used in the Advanced Entrepreneur Support program of the Small and Medium Enterprises Development Administration (KOSGEB).

In this study; One of the Multi-Criteria Decision Making Methods (MCDM) is to determine the priority ones for the KANVAS business model building blocks for the entrepreneur, in order of importance, with the SWARA method. Guiding the entrepreneur to spend the most time on which elements in planning, ensuring that the critical building blocks in the business model are understood, determine the elements that should not be ignored. It is useful to increase the chances of success by reducing the risks. The success of the business model. As a result of the study, it has been determined that the priority building blocks are key resources and proposed that the method is highly significant.

Keywords: CANVAS, SWARA, MCDM, Business Model

[1] Dr., KOSGEB Ankara Sincan Müdürlüğü Orcıd: 0000 0002 3421 2357

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Valuation of The Reflection of R&D Expenditures to The Number of Registered Patents in Turkiye by Mcdm

Ali SEVİNÇ[1]

Abstract

One of the development indicators of countries is the number of patents they hold. It would be correct to state that the a rise in the number of registered patents and the technological level would be reflected on the investments made. According to the technological level, the added value of the products is relatively higher than the lower level technology. The development of technology contributes to the development and growth of the most critical sectors, from the defense industry to the health sector. It also contributes significantly to the localization of many products. It has positive effects on the country's exports. These developments are directly reflected in the country's economy. The development and production of new technologies is carried out with R&D studies.

In order to encourage the R&D studies of SMEs for the development of technologies by the economy administrations, the expenditures of the companies for personnel expenses, machinery-equipment, raw materials, software, intellectual property in R&D projects are supported. It is understood from the number of patents registered by the Turkish Patent and Trademark Office (TÜRKPATENT) that the projects encouraged by the public and the R&D studies within the company have continued to increase in recent years.

In this study; The R&D expenditures between the years 2016 - 2021 announced by the Turkish Statistical Institute (TÜİK) and the number of patents registered by the TÜRKPATENT institution were calculated with the VIKOR method, which is one of the Multiple Criteria Decision Making (MCDM) methods. A continuous increase was observed in the expenditures made for R&D. Although there was a decrease in the number of registered patents between 2018 and 2019, there was a steadily increase until 2021 on average.

Keywords: Technology, R&D, Patent, MCDM, VIKOR

[1] Dr., KOSGEB Ankara Sincan Müdürlüğü Orcıd: 0000 0002 3421 2357

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Measurement of Service Quality and Application at a Private Physiotherapy Clinic

Rukiye Betül OFLAZ[1]
Burak BİRGÖREN[2]
Adnan AKTEPE[3]

Abstract

The aim of this study is to measure service quality and propose improvements to enhance client satisfaction in a specific private physiotherapy clinic. The research was conducted at a private physiotherapy clinic located in Ankara. The perceived service quality and expected service quality of the clients receiving services from the physiotherapy clinic were evaluated using the SERVQUAL questionnaire model. The questionnaire consists of five dimensions and 17 statements for measuring service quality. Factor analysis was conducted to examine the validity and structural relationships of the dimensions and statements in the SERVQUAL questionnaire. Correlation analysis was used to examine the relationships among the questionnaire statements and evaluate the relationships among the dimensions of service quality. Reliability analysis was performed to assess the internal consistency of the SERVQUAL questionnaire using the SPSS software. The findings obtained from the analysis provide a foundation for identifying the strengths and weaknesses of service quality in the clinic and suggesting improvements to enhance client satisfaction. The weighted overall SERVQUAL score was calculated and found to be 0.046. When the dimension scores were ranked, it was determined that the reliability dimension had the lowest score, while the physical facilities dimension had the highest score. The reliability analysis yielded a Cronbach's Alpha value of 0.798. These results help determine the areas and statements that require improvements and provide recommendations to clinic managers for meeting client expectations and increasing satisfaction. By addressing the specific areas of improvement identified in the study, the clinic can enhance its service quality and better meet the needs of its clients.

Keywords: SERVQUAL, Service Quality, SPSS, Physiotherapy Clinic Services

[1] Yüksek Lisans Öğrenci, Kırıkkale Üniversitesi, Endüstri Mühendiliği, Orcıd: 0000- 0003-3795-9728
[2] Prof. Dr., Kırıkkale Üniversitesi, Endüstri Mühendiliği Anabilim Dalı, Orcıd: 0000-0001-9045-6092
[3] Doç. Dr., Kırıkkale Üniversitesi, Endüstri Mühendiliği Anabilim Dalı, Orcıd: 0000-0002-3340-244X

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Evaluation of Energy Efficiency Using Multi-Criteria Decision Making Methods in Material Flow

İrem DÜZDAR ARGUN[1]
Kübra TOK[2]

Abstract

With the increase in population, industrialization and urbanization in the world, energy consumption in the world is increasing day by day. On the other hand, it is even more difficult for countries that are dependent on foreign energy such as Turkey to meet the demand. In this case, the application of the energy efficiency principle will facilitate the current situation. Energy use in today's enterprises is increasing day by day. Therefore, energy costs are increasing day by day. In this study, the issue of energy efficiency of enterprises will be evaluated within the scope of material flow, which is one of the major cost items of enterprises. The criteria that should be paid attention to the ability of enterprises to provide energy efficiency in material flow systems were obtained with the help of literature, the obtained criteria were evaluated by consulting with experts. In line with the data obtained, the criteria were weighted and ranked using multi-criteria decision making methods. In this study, AHP, DEMATEL and SWARA methods from multi-criteria decision making techniques were used.

Keywords: energy efficiency, material flow, multi-criteria decision making

[1] Dr. Öğr. Üyesi, Düzce Üniversitesi, Endüstri Mühendisliği Bölümü, Orcıd: 0000-0002-7642-8121
[2] Öğrenci, Düzce Üniversitesi, Endüstri Mühendisliği Bölümü, Orcıd: 0000-0002-2654-8264

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Value Stream Mapping in the Transition to Lean Manufacturing

İrem DÜZDAR ARGUN[1]
İpek EDİŞ[2]
Tuğçe ÖZDEMİR[3]

Abstract

The change in today's competitive conditions forces businesses to work in a customer-oriented manner. In this direction, businesses are trying to shape their production systems in a way that will reveal innovations. Thus, they became acquainted with the lean production system, which increases their competitive power. Lean manufacturing aims to maximize production flow and minimize waste. In order to achieve this goal, the causes of the problems must be identified. Value Stream Mapping is a lean manufacturing tool that shows and analyzes the performance of the existing system.

The project was carried out in the laminated glass production line of a glass manufacturing enterprise. The company has established lean production as a basis with its automation system. Improvements to be made in this context are waste prevention and energy cost savings. With the DAH method, wastes will be determined and lean production will be realized by adapting the kaizen method according to the business.

In this study, first of all, lean production system and DAH method are examined. Then, information about the enterprise where the application was made was given and DAH application was made. The application, which started by choosing the product family, continued by drawing the current situation map. Next, a state map was created. As a result of the first proposed improvement study, a 7.8% reduction in the rate of defective products will be achieved, and in the other, a 21% increase in efficiency will be achieved in the total processing time of the production process.

When the literature studies are examined, it has been seen that the DAH method is used in many sectors. With this study, it is aimed that the method used will bring innovation and guide the glass processing sector in which it is applied.

Keywords: Lean Thinking, Lean Manufacturing, Value, Value Stream, Value Stream Mapping

[1] Dr. Öğr. Üyesi, Düzce Üniversitesi, Endüstri Mühendisliği, Orcıd: 0000-0002-7642-8121
[2] Öğrenci, Düzce Üniversitesi, Endüstri Mühendisliği, Orcıd: -0002-2145-8323
[3] Ar-Ge Mühendisi, Düzce Cam San. ve Tic. A.Ş., Orcıd: 0000-0001-9716-4770

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Modeling of The Optimum Mixing Problem with Linear Programming and An Application in The Cosmetic Industry

Hande BALABAN ÇATAKLII[1]
Osman YAZICIOĞLU[2]

Abstract

The product mix is the make of a product range with quantities, taking into account the highest efficiency, profit and other strategic factors among the product types of the enterprises.
In this study, the optimum product mix problem was modeled by using the linear programming method with the data taken from two different companies. The data of 15 products used in the study were obtained from a company that produces cosmetics and a product mix was tried to be obtained out of 15 products. The components, products, capacities and working constraints in the problem planned to be established in this study are the cost and the variable to be sought in the objective function, profit.
When the obtained model was analyzed in Excel, a product selection emerged where 15 products were produced in different quantities and a profit of 9,019,294 TL was obtained. After modeling the optimum product mix problem, the model was analyzed on Excel and the monthly product production quantities required to obtain the maximum profit were calculated.
Keywords: Linear programming, Profit maximization, Cosmetics industry, Product mix optimization.

[1] Industrial Egineer, Institute of Science and Technology, İstanbul Commerce University, Kucukyali 34840 İstanbul, Türkiye. Orcıd: 0000-0003-4926-7139

[2] Prof. Dr., Industrial Engineering Department, Faculty of Engineering, İstanbul Commerce University, Orcid: 0000-0002-0476-4396

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Past, Present, Future and Importance of Restoration Studies in Turkish Forests

Engin GÜVENDİ[1]
Murat Han ERTUĞRUL[2]

Abstract

Infertile forest area is one of the important economic and socio-cultural problems in our country as well as all over the world. According to the 2015 data of the United Nations Food and Agriculture Organization, the forest assets, which were 4 billion 128 million hectares in 1990, decreased to 3 billion 999 million hectares in 2015, and between 2010 and 2015, an average of 3 million hectares of forest area was lost worldwide. The process of deforestation continues throughout the world and this process is known to occur especially in natural forests.

Ecological restoration, which includes reforestation and rehabilitation of degraded lands, stands out among the measures to be taken against climate change.

The end of the 90s in Turkey was the years when breakthroughs were made in the rehabilitation of forests. Rehabilitation work was carried out on a total area of 3 million 316 thousand 914 hectares between 1992-2021.

While rehabilitation works were carried out on an average of 350 thousand hectares per year between 2008 and 2012 in our country, after 2012, studies continued on an annual average of 100 thousand hectares. Existing species are protected without harming the forest ecosystem, gaps are filled with suitable species, and the fields are rehabilitated by taking the necessary erosion measures.

According to the current 2020 inventory regarding our forest assets, 42% (9 million 668 thousand 571 hectares) of Turkey's forests of 22 million 933 thousand hectares are degraded forests, that is, forests subject to afforestation studies. New ones can be added to these unproductive forest areas due to reasons such as forest fire, improper use and drought. Silvicultural activities such as afforestation, rehabilitation and rejuvenation are among the most important practices in the improvement of these forests. In this compilation article, the studies on forest restoration, which is one of the forest establishment studies in our country, on the basis of provinces, forest establishment works applied over the years, and restoration activities are explained. It is aimed to contribute to afforestation practices with all information.

Keywords: Restoration, rejuvenation, degraded forest, deforestation

[1] Assistant Professor, Gumushane University, Kutun Vocatiınal School, Orcıd: 0000-0003-0211-0660
[2] Lecturer, Gumushane University, Kutun Vocatiınal School, Orcıd: 0000-0002-2401-1260

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Investigation of Temporal Change of Land Use Class: Example of Torul Planning Unit

Murat Han ERTUĞRUL[1]
Engin GÜVENDİ[2]

Abstract

Forests, which have a dynamic structure, undergo changes over time due to environmental factors. The determination of these changes gives us important information about the forest ecosystem. Remote sensing and geographic information systems (GIS) are used effectively to examine the temporal changes in the forest ecosystem. In this study, it was aimed to determine the land use classes of Torul planning unit, affiliated to Trabzon Regional Directorate of Forestry, Torul Forestry Operations Directorate in 2006 and 2016. For this reason, land use classes for two different planning periods were created and transferred to the map with the help of GIS applications in the stand maps of the current years. While making the classification, 6 different classes were created as non-degraded Forest, degraded Forest, Forest Soil, Agricultural Area, Settlement Area and Other Areas (Facility, Dune, Water, etc.). Non-degraded closed forests increased to 8278 hectares in 2006 and 11279 hectares in 2016. Degraded forests 16599 hectares in 2006 and 14665 hectares in 2016 so 1934 hectar has decreased. The highest increase was in forest soil. The forest soil, which was 9052 hectares in 2006, increased to 21159 hectares in 2016. Agricultural areas has regressed from 3358 hectares in 2006 to 2675 hectares in 2016. Settlement areas decreased from 229 hectares to 136 hectares. Finally, other areas has decreased from 12541 hectares to 145 hectares. The reason for this decrease is that the pasture lands are classified as forest soil in the 2016 plan. In addition, afforestation and rehabilitation works have also increased the productive forest areas.

Keywords: Geographic Information System, Land Use, Remote Sensing, Temporal Change

[1] Lecturer, Gumushane University, Kurtun Vocatiinal School, Orcid: 0000-0002-2401-1260
[2] Assistant Professor, Gumushane University, Kurtun Vocatiinal School, Orcid: 0000-0003-0211-0660

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Is It Mining? Forestry? Make Your Choice

Murat Han ERTYĞRUL[1]
Engin GÜVENDİ[2]
Günay ÇAKIR[3]

Abstract

Forestry and mining are actually two different disciplines that have been intertwined from the past to the present. On the one hand, mining areas generally exist in forest areas, and on the other hand, considering the effects of these areas on the environment, these two branches of science should continue their studies together in order not to disturb the natural balance. In this study, the relations between mining and forestry disciplines were tried to be examined. Past studies were selected as material and it was tried to summarize the effect of open pit operations on forests and what kind of contributions forestry made to mining activities. As a result of the research, the areas where the mining activities have been completed are either converted to their old state or made new for different purposes as a result of restoration, recultivation or rehabilitation works. In order to carry out the aforementioned studies, forestry knowledge such as breeding, replanting, land use planning, land arrangement and vegetative cover is needed. In addition, the forestry sector provides wood products to support the underground mines. This situation paved the way for the emergence of the "Mine Pole" wood product in terms of forestry. Another issue is the rate at which forests close to the areas where mining activities continue are affected by these activities. Forests are directly affected by reasons such as the pH levels of groundwater in mines where heavy metals are found, and the change of direction of water in underground mines. As a result, it is obvious that many steps of mining activities, whether underground or open pit operations, have a relationship with forestry. In addition, reintroducing mining sites to nature is an ecological problem.

Keywords: Forestry, Mining, Ecological Balance

[1] Lecturer, Gumushane University, Kurtun Vocatiınal School, Orcid: 0000-0002-2401-1260
[2] Assistant Professor, Gumushane University, Kurtun Vocatiınal School, Orcid: 0000-0003-0211-0660
[3] Professor, Gumushane University, Gumushane Vocatiınal School, Orcid:0000-0003-4951-4283

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Importance and Future of Urban (City) Forest and Forest Parks in Turkiye

Engin GÜVENDİ[1]
Murat Han ERTUĞRUL[2]

Abstract

In the last century, migration from rural to urban areas has increased rapidly all over the world. While the population living in cities constituted approximately one third of the total world population in 1972, it was 50% in 2007, and the expectations for 2050 are 65%. As a result of the rapid progress of technology and industry in the 20th century, social life is changing and developing to a large extent. Reasons such as the rapid increase in the urban population in our country, the increase in multi-storey buildings with the demolition and build action in our cities as a result of social, economic, political and cultural conditions, the intense addition of new settlements and industrial areas, led to the gradual decrease of open-green areas in the horizontal and vertical directions. opens. Thus, rapid, irregular and unplanned urbanization trends take the urban people away from their natural environment, monotonize them, and seriously affect human health and quality of life.

While the living environments created by these migrations from rural to urban areas cause many environmental problems, people's expectations from green areas in and around the city have increased and diversified. As a result of these increases, the expectations of the society from green areas have led to the emergence of new forestry concepts and terms. Forests, which initially functioned as wood production, have changed and developed over time with the diversification of the needs of the society for the benefits and functions offered by the forests. These changes attracted more attention with the social aspect of forests and even preceded classical forestry (wood production, etc.) in some regions. These changes have led to the birth of many new forestry types. These are Classical or traditional forestry (Forest Management), Social forestry and Urban forestry. Ecological restoration, which includes reforestation and rehabilitation of degraded lands, stands out among the measures to be taken against climate change.

The role of trees or forests, which are the most important natural elements of urban areas, in increasing the quality of life with the services and functions they provide in a versatile aesthetic, ecological, psychological, economic, scientific and educational sense, has revealed the concept of "Urban Forestry" and "Recreation Area" in developing societies. With the Forest Parks Regulation published in the Official Gazette dated May 28, 2022, the recreation areas under the administration of the General Directorate of Forestry were reorganized as Forest Parks with and without Accommodation.

In this compilation article, the latest statistical information about urban forests and forest parks in our country has been taken from the data of the General Directorate of Forestry and the General Directorate of Nature Conservation and National Parks. With the data obtained, urban forestry studies and activities on the basis of regional and provinces are explained. It is aimed to contribute to the planning and implementation of the recreation demands of the society with all information.

Keywords: Urban Forest, Forest Park, Recreation

[1] Assistant Professor, Gumushane University, Kurtun Vocatiınal School, Orcid: 0000-0003-0211-0660
[2] Lecturer, Gumushane University, Kurtun Vocatiınal School, Orcid: 0000-0002-2401-1260

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Observation-Based Assessment of Forest Fire Severity

Coşkun Okan GÜNEY[1]
Ahmet MERT[2]
Serkan GÜLSOY[3]

Abstract

Keywords:

[1] Dr., OGM, Ege Ormancılık Araştırma Enstitüsü Müdürlüğü, Orman Yangınları Araştırmaları Başmühendisliği, İzmir, Orcıd: 0000-0003-4664-8024
[2] Doç. Dr., Isparta Uygulamalı Bilimler Üniversitesi, Orman Fakültesi, Yaban Hayatı Yönetimi Anabilim Dalı, Isparta, Orcıd: 0000-0001-6859-0308
[3] Prof. Dr., Isparta Uygulamalı Bilimler Üniversitesi, Orman Fakültesi, Toprak İlmi ve Ekolojisi Anabilim Dalı, Isparta, Orcıd: 0000-0003-2011-8324

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Improvement of surface areas by mechanochemical synthesis of clay minerals

Meryem GÖKTAŞ[1]

Abstract

Despite the long history of mechanochemistry, the definition of mechanochemical synthesis is a method that has only recently been introduced into the chemistry literature. Chemical Terminology defines mechanochemical synthesis as "a chemical reaction that is reduced using mechanical energ,,. High-energy mills used during mechanochemical processes are mills that grind with different operating regimes (compression, shear, impact). The main variables affecting the grinding process are factors such as mill type, grinding media material, solid-ball ratio, grinding atmosphere, grinding speed and grinding time.
In this study, with mechanochemical synthesis, reduction and synthesis of kaolin clay, which is used in many fields such as paper, paint and coatings, cosmetics, chemistry, agriculture and concrete, especially in the ceramic industry, has been carried out. During the reduction experiments, a Fritsch Pulverisette 5 planetary ball mill with a working speed of 50-400 rpm, with a grinding ball size of 0.5-40 mm, a feed size of 10 mm, capable of dry grinding with the effect of impact / collision force was used. A series of experiments were carried out at different solid/ball ratios and grinding times, and the effect of mechanochemistry on the structural properties of the samples was investigated. The characterization of the synthesized kaolin samples was carried out by X-Ray Diffraction (XRD), Multipoint Surface Area (BET) and Scanning Electron Microscopy (SEM) analyses. In conclusion: The specific surface areas of the products obtained by mechanochemical synthesis were increased. Thus, chemical or physicochemical transformations were created in the structures of the samples obtained, and a more active product was obtained in the subsequent processes.

Keywords: Mechanochemical synthesis, surface areas, clay minerals

[1] Dr. Öğr. Üyesi, Bilecik Seyh Edebali University, Vocational College, Department of Metallurgy, Bilecik, 11230, Turkey
Orcıd: 0000-0003-1583-8300

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The Mechanochemical Synthesis of Clay Minerals by Planetary Ball Mills with High Energy Density

Meryem GÖKTAŞ[1]

Abstract

Mechanochemistry is defined as chemical transformation by mechanical force and is not only a more environmentally friendly method for chemical transformations but also a viable technique that opens up completely new opportunities for the construction of molecules. The mechanochemical synthesis method provides the opportunity to obtain materials that are difficult or even impossible to obtain by conventional methods. The mechanochemical synthesis method with ball mill grinding has emerged as a viable approach that is not only cleaner, faster, and simpler than traditional methods but also allows solvent-free synthesis of difficult molecular structures. Mechanical activation, on the other hand, is interpreted as the change in the reactivity of solids due to physicochemical changes during grinding and is one of the preferred methods for the development of greener processes to obtain new materials.

The sintering temperature of kaolin clay, whose particle size has been reduced without the use of any chemical agents, was attempted to be lowered in this study using mechanical activation, which plays an important role in the preparation of ceramic raw materials. In this context, XRD, TG-DSC, and SEM-EDX analyses were performed on mechanically activated samples under different conditions. The effect of mechanical activation on the obtained clay mineral was investigated, and the structural properties of the mechanically activated clay minerals were improved. As a result, it has been determined that the structural properties of kaolin clay can be changed and improved by mechanochemical synthesis. It has been determined that the clay minerals called chamotte in the ceramic industry can be used for various purposes in opaque ceramic glazes and frits.

Keywords: Mechanochemical synthesis, planetary ball mill, XRD analysis, TG-DSC analysis, SEM-EDX analysis

[1] Dr. Öğr. Üyesi, Bilecik Seyh Edebali University, Vocational College, Department of Metallurgy, Bilecik, 11230, Turkey, Orcid: 0000-0003-1583-8300

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Underground Spaces: Ownership and Responsibility Dilemma

Mehmet Kemal GOKAY[1]

Abstract

Different living environments are essential for living organisms. Underground spaces in this content have a special place for several of them. Underground spaces have been used since the early time of humans history. Harsh climates have forced human to use rock caves at the beginning, then they have excavated underground spaces for their requirements. Archaeological remnants of these usage have gradually been explored in different parts of the world. Ancient underground city settlements in Cappadocia (Turkey) are examples of these activities. Similar requirements have arisen for modern people as the limits of cities have extended. As the usage of underground spaces have gradually become basic requirements in cities for infrastructures, metro tunnels & stations, car parks, passage tunnels and shopping facilities, depots for food, commodities, natural gas, oil, water, CO_2 etc. In order to supply social confrontation, legislative acts have also been provided by certain countries to prevent conflict among surface and underground land ownerships. Reviews of underground spaces have been partitioned and their ownership cases are summarised here for different counties. The problems which will arise due to manmade structures in/on earth crust (stresses & deformations in rock/soil masses) in 3D conditions are remarked here for the next dilemmatic conditions for societies.

Keywords: Underground spaces, Land ownerships, Underground space usages, Legislative rules.

[1] Prof.Dr., Konya Technical University, Mining Engineering Department, Konya-Turkey. Orcid: 0000-0003-3792-9414

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Rock Engineering Concept For Urban Development

Mehmet Kemal GOKAY[1]

Abstract

When it comes to protection against climatic and radioactive effects in living volumes, organisms, including humans, have used soil materials and spaces in them in different ways. Human civilizations have records of these uses, which naturally differ according to rock and soil masses. The arrangement of living spaces in/on these masses has been the main effort that has led to the development of engineering activities in excavation and construction processes. Recently, underground volumes such as tunnels, warehouses, parking lots, engine rooms, hotels, sports and cultural centres have also been excavated. Therefore, city plans, civil and soil engineering decisions, and architectural considerations for comfortable living spaces (in/on the earth's crust) should more comprehensively cover rock engineering and soil mechanics. Habitats currently in use or under planning in and on the Earth's crust require adequate soil engineering efforts, including a good understanding of rock and soil properties and behaviour. Rock engineering issues in modern urban life are considered here to present their application in the construction industry.

Keywords: Rock mechanics, Ground engineering, Urban slopes failures, Underground spaces, Urban life in&on rocks.

[1] Prof.Dr., Konya Technical University, Mining Engineering Department, Konya-Turkey. Orcid: 0000-0003-3792-9414

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A Study on the Comparison of the Parameter Estimation Methods in the Birnbaum-Saunders Distribution

Samet KAYA[1]
Esin KÖKSAL BABCAN[2]

Abstract

The Birnbaum-Saunders distribution is used in many fields such as medicine, engineering, agriculture, insurance, and economics. This distribution is preferred in the business world, particularly to model the durability of machines and parts fatigue or deterioration life. Therefore, it is significant to estimate the distribution parameters effectively. The parameters of the Birnbaum-Saunders distribution are estimated using the moments method, adapted moments method, robust methods, the maximum likelihood method, and Bayesian methods.

In this study, the parameters of the Birnbaum-Saunders distribution are estimated using the maximum likelihood method and Bayesian methods. A simulation program is written first, to compare the methods used and the parameter estimates are obtained. In this context, Bayesian inference under the different lost functions is mentioned by using different prior distributions for two parameters in the Birnbaum- Saunders distribution. The mean squared error is used as a criterion to compare the methods used while estimating the parameters. Afterward, estimation results for BS distribution parameters are obtained using data exposed to continuous pressure (at 90% tensile level) using high strength Kevlar 49/epoxy fibers, plastic reinforcement and ropes used in fiber optic cables. Regarding the simulation and real data, the results obtained using Lindley's and Metropolis-Hastings algorithms are similar to those obtained via the maximum likelihood method. According to these results, it is possible to say that the Bayesian method can be used as an alternative to the maximum likelihood method.

Keywords: Birnbaum-Saunders, Markov Chain Monte Carlo, Lindley's Approach, Metropolis-Hastings algorithm, Bayesian Method

[1] TÜBİTAK, Orcıd: 0000-0002-6937-8138
[2] Doç. Dr., Ankara Üniversitesi, İstatistik Bölümü, Orcıd: 0000-0002-9649-5276

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Iterations of Euler Totient Function

Emre ÖZTÜRK[1]

Abstract

In mathematics history, the prime numbers constitute very special and big area. These numbers considered of atoms of the numbers. Because, from Euclid to today, it is well-known any natural number can be represented by canonic decomposition of primes which is called the fundamental theorem of the arithmetic. Therefore, the primes play very crucial role to understand the numbers. Moreover, in "Elements" of Euclid, the finiteness of primes proved by a nice technic. Today, still his book inspires many mathematicians. After the Euclid and Pythagoras, prime numbers have been studied by many famous mathematicians, especially well-knowns are Fermat, Euler and Gauss. On the other hand, arithmetic functions in number theory played a role to understand the distribution of primes. Maybe the most well-known defined by Leonhard Euler, called today "Euler totient function" or "Euler phi function". While many of characterizations and properties of this function known but the iterations of the function still have many open questions.

In this paper, we focus on iterations of Euler totient function and the class of numbers defined by Shapiro. Especially, we give some new identities related with the classes of the numbers and iterations of the totient function. Through the study, Fermat primes considered and we use our results for determine the class of Fermat primes. Moreover, we give two procedure for determine of class of numbers. Then, we consider the partition sets for restrict primes in interval and examine of their classes by different perspective.

Keywords: Euler totient function, Fermat Prime, Iterations of totient function

[1] Dr., Turkish Court of Accounts, Data Analysis Department, Orcid: 0000-0001-6638-3233

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Quantitative Analysis of the Impact of Quarantine on the Spread of Coronavirus

Mehmet KOCABIYIK[1]
Mevlüde YAKIT ONGUN[2]

Abstract

The coronavirus has caused a disease that has greatly affected the human population in recent years. For this reason, it is very important to determine the behavior of the virus. According to these behaviors, the ability to take precautions can be increased. In this study, in order to determine these important behaviors, we propose a modified model that includes the quarantine factor of the coronavirus model. We express the modified model system with a general form of ordinary and fractional differential equations. The first step of this study is to determine the infectious dynamics of the virus with this modified equation system. Then, unlike the other proposed models, the effect of the quarantine status specified in the system on the behavior of the virus will be investigated. We analyze the model with a Nonstandard finite difference (NSFD) scheme. We use the Grünwald-Letnikov derivative operator while doing this analysis. We discretize the system and set up numerical simulations to determine the effects of the proposed modified coronavirus model. The effects of different effects on the model are examined with numerical simulations. We also obtain the equilibrium point of the system of the modified model. By examining the analysis of the equilibrium point, we see that it gives quite consistent results.

Keywords: Modified Coronavirus Model, Nonstandard Finite Difference Scheme, Numerical Analysis, Discretization, Quarantine Effects.

[1] Res. Asst., Burdur Mehmet Akif Ersoy University, Department of Mathematics, Orcid: 0000-0002- 7701-6946
[2] Prof. Dr., Süleyman Demirel University, Department of Mathematics, Orcid: 0000-0003-2363-9395.

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A Study on Third Order Rational Difference Equation

Mehmet Emre ERDOĞAN[1]

Abstract

In this study, the global asymptotic stability of the rational difference equation
$${{x}_{n+1}}=\alpha {{x}_{n-1}}+\beta {{x}_{n-2}}+\frac{\gamma {{x}_{n-1}}+\theta {{x}_{n-2}}}{\phi +\varphi {{x}_{n-1}}}$$,
where the initial conditions $${{x}_{-2}},{{x}_{-1}}$$ and $${{x}_{0}}$$ are real numbers and $\alpha ,\beta ,\gamma ,\theta ,\phi $ and $\varphi $ are positive real numbers is investigated.

Keywords: Asymptotic Stability, Global Behavior, Difference Equation, Global Attractor, Equilibrium Point

[1] Assist.Prof.Dr., Türkiye, Department of Mathematics, Orcid: 0000-0002-7421-0815

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Metaverse Applications in Textile

Selin GENÇAY[1]
Gülden TURHAN[2]

Abstract

Due to the fact that technological developments have taken place in a large part of our lives in recent years, it has become a situation where we can no longer give up even the simplest routine tasks that we do in our daily life. It is a fact that in the past years it has been used mostly in areas such as industry and health, with limited use. If we consider; high technological developments continue to be experienced in the electrical household appliances, computers and mobile phones that we use every day and almost every minute in our home, which make our lives much easier and which we are quite used to being able to reach easily at any time we want. With these technological tools, it is aimed to facilitate the life of everyone from 7 to 70 and to live a comfortable life. As computer science develops, social communication skills between people in daily life have started to move to a different level. The adventure of creating a virtual universe described by the concept of metaverse first entered our lives when Neal Stephenson mentioned it in his book 'Snow Crash' written in 1992. The metaverse is the next major development in global communication. This platform aims to provide a sense of community by bringing people together in the virtual universe without being physically together. Large textile companies, which have made many innovations so far, continue their work in this field and are moving towards guaranteeing to carry their names into the future. Among the various topics related to the Metaverse in this study are the benefits and harms of the Metaverse, studies conducted or planned to be conducted in the field of textiles, and deciphering the concept of the Metaverse from different angles.

Keywords: metaverse, virtual universe, textile, artificial intelligence

[1] Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü, İstanbul, Türkiye, Orcıd: 0000-0003-1739-9209

[2] Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü, İstanbul, Türkiye, Orcıd:: 0000-0002-7756-0116

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Investigation of Performance Characteristics of Industrial Hemp and Recycled Fiber Based Textile Structures After Finishing

Duygu KAHYA[1]
Muhammet UZUN[2]

Abstract

As a result of the acceleration of production and consumption with the industrial revolution, the excessive and unconscious use of natural resources, which has reached the highest level in recent years, has led to the emergence of the concept of sustainability as a new necessity.
As textile industry, is one of the biggest cause of environmental pollution, so new sustainable methods are mandatory in the selections of raw materials, semi-finished products and production processes. Among all the natural fibers, cotton is used the most and its production requires higher consumption of water, pesticides and fertilizers. On the other hand, hemp plant gives high fiber yield and cultivation, is possible without the need for drugs. Moreover its self-destructive natural structure make this fiber important in terms of soil and environmental use. Today, hemp fiber is preferred due to a number of superior properties, such as durability, antibacterial, UV protection, breathability and mildew resistance. Recycled polyester fibers have a high contribution to the environment. In this study, the production of hemp fiber and the fabrics obtained from different fibers in conventional textiles will be evaluated. Knitted fabric will be produced from blended yarns obtained from cotton, and tencel, together with hemp fiber. Explosion, light fastness, washing fastness, pilling test, sweat fastness, wet and dry rubbing tests of the fabrics obtained with different fiber blends will be performed, and the performance degrees provided by the fabrics according to their fiber properties will be evaluated. At the same time, the energy and water consumption of natural dyeing and reactive dyeing methods will be taken into consideration and these will guide towards to the concept of sustainability.

Keywords: Sustainability, Hemp, Recycled Fibers, Natural Dyestuff, Reactive dyestuff

[1] Graduate Student, Marmara University, Textile Engineering, Orcıd: 0000-0002-0182-8438
[2] Doç.Dr., Marmara University, Textile Engineering, Orcıd: 0000-0001-8669-7686

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A Study on Characterization of the Ultrasonic Sewing for Automotive Seat Trim Covers by Using Linear Regression Analyse

İrem Esin MERAL[1]
Bilal BAYIR[2]
İlbey KALE[3]

Abstract

In the automotive industry, seat covers are traditionally sewn using high-strength nylon threads on conventional sewing machines. The consumables used in sewing machines, such as needles, require periodic replacement. This research aims to introduce an alternative method by using ultrasonic sewing to join the seat trim cover pieces, thereby providing a sustainable and environmentally-friendly technology to the automotive industry. Ultrasonic sewing generates vibration between the materials, causing an increase in temperature and melting a small amount of the two fabrics, resulting in their fusion. This approach eliminates the costs associated with traditional sewing processes The main objective of our study is to characterize the effects of parameters related to ultrasonic welding on the tensile strength of the joint/seam for a given fabric type, through dependent and independent variables. Evaluation and experimental measurements based on ASTM D 751 which used for Automotive Trim Cover Joint Strength. In this context, two fabric types commonly used in the automotive industry were identified, and samples were prepared in accordance with the test conditions outlined in, Sample Method. Nine test samples were obtained by selecting two variable parameters on the ultrasonic sewing machine. The study produced values ranging from 92 to 257 N. A caracterization formula has been created based on Linear Regression by using these results. On the other hand, strength requirement of the standart was attempted to be met for the selected fabrics using this equation.

Keywords: automotive industry, ultrasonic sewing, seam strength, car seat cover, linear regression

[1] Trim Engineer, Magna Otomotiv, Engineering, Orcıd: 0009-0005-2004-0768
[2] Engineering Manager, Magna Otomotiv, Engineering, Orcıd: 0000-0001-6636-9204
[3] Intern Engineer, Kocaeli University, Mechanical Engineering, Orcıd: 0009-0006-7534-9807

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Investigation of the Pyrolysis Behaviour of Some Industrial Wastes by Thermogravimetric Analysis

Fatma ERDOĞAN[1]
Korkut AÇIKALIN[2]

Abstract

In Turkey, average annual pea and tomato production amounts are approximately 107000 and 12808000 tons/year, respectively, according to the FAO data between 2017 and 2021. During the usage of some of these vegetables in the production of food products such as canned goods, ketchup, tomato paste etc. industrial food wastes are generated, which may pose serious problems for the environment. These wastes are included in the biomass wastes by their nature, and related possible environmental problems can be prevented by being disposed of while they are converted into alternative, environmentally friendly fuels via the pyrolysis process.

In the present study, pyrolysis processes of pea and tomato wastes were studied using the thermogravimetric analysis method. These industrial wastes were subjected to thermal decomposition at a nitrogen gas flow rate of 200 ml/min from room temperature to 800°C. When the results of the experiments carried out at a heating rate of 10°C/min are examined, it can be said that the pyrolysis processes of both industrial wastes take place in four stages. The first stage is the stage where water and volatiles are removed from the structure. The second and the third stages are active pyrolysis stages. These stages are known as the main devolatilization stages and occurred with a total weight loss of approximately 56% and 62% for the pea and tomato wastes at the temperature ranges of 246 – 497°C and 239 – 472°C, respectively. The fourth stage is the passive pyrolysis stage. This stage resulted in approximately 7.6% and 7.4% weight losses for pea and tomato wastes at the temperature ranges of 497 – 800°C and 472 – 800°C, respectively. Mass amounts remained at the end of the pyrolysis process were determined as 24.30% (wt.) and 21.17% (wt.) for pea and tomato wastes, respectively.

Keywords: Pyrolysis; biomass waste; pea waste; tomato waste; thermogravimetric analysis.

[1] Yalova University, Institute of Graduate Studies, Energy Systems Engineering Programme, Yalova, Türkiye,
[2] Assoc. Prof. Dr., Yalova University, Department of Energy Systems Engineering, Yalova, Türkiye, Orcıd: 0000-0002-2698-5595

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Investigation of Human Motions Sensing Properties of Rubber-based Flexible Wearable Nanocomposite Sensors Prepared with Graphene and Carbon Black Interactive Filler

Ertuğrul MEMİŞ[1]
Hasan KASIM[2]

Abstract

The development of wearable and flexible electronic device technologies that make up personal health monitoring systems depending on the perception of human movements have made elastomer-based sensors an essential part of daily life. The high elongation capabilities and sensitivity of this type of sensor are also expanding, which is limited by the development of high mechanical strength and high conductivity properties. This study investigated electrical conductivity changes due to the synergistic effect created by the conductive filler materials graphene (GF) and carbon black (KS) added into the rubber matrix material with high elongation ability. The produced multifunctional flexible and stretchable sensors (MFS) have shown high detection sensitivity and fast response ability depending on a wide range of loading conditions. The amount of carbon black filler was kept constant in all prepared samples, and the amount of graphene was changed to 1, 2, 4, 6, and 8 phr. To determine the strain sensing performance of the specimens, cyclic loading tests were performed at different strain levels (about 20%), and resistance changes were observed. In the 0.5% to 2% wt% amount of graphene in the prepared MFSs, the electrical conductivity showed a remarkable increase from 2.48×10^{-7} to $1. \times 10^{-5}$ S/m. Thanks to the impressive response of the prepared sensors to the thermal change in the human body, it is promising for the development of wearable electronic equipment in human health monitoring applications and sports activities.

Keywords:
Wearable sensing materials, Human motion detection, Elastomer sensor, High sensitivity, Electrical conductivity

[1] Öğrenci, Bursa Teknik Üniversitesi, Polimer Malzeme Mühendisliği, Orcıd: 0000-0002-9134-4030
[2] Doç.Dr., Uludağ Üniversitesi, Makine Mühendisliği, Orcıd: 0000-0002-3024-5207

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An Investigation of the Urban Transformation Of Istanbul between 1923-1950 and 1950-1960 Through The Relationship Between City Space And Urban Policies

Eray YAVUZARSLAN[1]

Abstract

The relationship between the city and the place is a phenomenon in which people are personally involved and includes problems that need to be resolved. Due to the fact that the governments appointed by the society to govern itself have a direct say in this relationship and a strong communication between the society and the government could not be established, there have been significant disruptions in the structuring of the cities. Cities are places that societies build according to their own life memories. For this reason, while societies build their own spaces according to their own cultures, they leave cities as a legacy to the future. However, as an authority figure, political power can go beyond social expectations with its decision-making right. A new Istanbul was aimed through the political powers over the legacy left by an empire that was destroyed by the renewal policies that coincided with the first years of the Republic, and the space of Istanbul was tried to be shaped with a new city and architectural understanding. In this article, the relationship between urban space and urban politics has been researched on the scale of Istanbul. Two periods were selected on the basis of this research. One of these periods is the period between 1923-1950, the first years of the Republic. Another is the period between 1950-1960, which is called the Menderes period. Both periods have been influential in the urban transformation history of Istanbul until today and have largely formed the basis of today's urban policies. These two periods have been compared and analyzed within themselves and their contribution to the transformation of Istanbul has been tried to be studied.

Keywords: Istanbul, Urban, Place, Zoning Status and Urban Planning.

[1] Doktor, Serbest Akademisyen, Orcıd: 0000-0002-0161-5344

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Investigation of Indoor Air Quality in Mosques

Erdem GÜLAÇMAZ[1]
Bahar ŞAHİN[2]
Ümit ARPACIOĞLU[3]

Abstract

Natural ventilation will be one of the most important factors in improving indoor air quality in buildings. Considering the presence of epidemics today, natural ventilation should be given more importance as mass worship is performed in religious building groups such as mosques. In this study, evaluations will be made on the structures whose design has been completed. Today, active ventilation systems are used extensively in mosques to provide both indoor air quality and thermal comfort conditions. With the spread of the SARS-CoV-2 pandemic, the gathering of people collectively has also created a problem in religious structures. For this reason, a restriction has been made in the user density and the use of active ventilation systems in mosques. In the study, the most important aim will be to minimize the need for active systems and to examine the maximum use of passive systems. In these buildings, it is very difficult to provide ideal physical environmental conditions since the usage period, user profile and usage intensity are variable. In natural ventilation, the design, material and correct use of building elements such as windows and doors play an important role in the intake of fresh air in the outdoors. The internal volume of mosque structures is one of the important factors that determine the increasing need for clean air quality. In these buildings, natural ventilation suggestions to be made in order to reduce the contamination during epidemic periods will be very important. The speed and direction of indoor air, CO_2 density can be listed at the beginning of the most important factors that reduce the amount of disease transmission. Indoor air quality is generally not met during mass prayers in religious buildings.

Keywords: Natural ventilation, mosques, SARS-CoV-2, indoor air quality

[1] Öğr. Gör., Samsun Üniversitesi, Mimarlık ve Şehir Planlama Bölümü, Orcıd: 0000-0001-8174-7576
[2] Doç. Dr., Mimar Sinan Güzel Sanatlar Üniversitesi, Mimarlık Bölümü, Orcıd: 0000-0001-8858-7499
[3] Doktora Öğrencisi, Mimar Sinan Güzel Sanatlar Üniversitesi, Mimarlık Bölümü, Orcıd: 0000-0002-5704-7665

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Effect of Noise and Vibration on Cultural Heritage Buildings and Damage Assessment

Nursel KARADANA[1]
Aslı ÖZÇEVİK BİLEN[2]

Abstract

Cultural heritage buildings are assets of universal value that are important for the civil, social, cultural, and economic life of a country, and must be preserved and transferred between generations. These buildings encounter many types of vibrations such as earthquakes, wind, environmental noise, construction vibrations, mechanical vibrations, and transportation-induced vibrations, and they have the potential to disrupt the integrity of the buildings and cause damage. This situation increases the exposure of the buildings in the city to noise and vibration as a result of the development of cities and the increase in the urban population, the increase in mobility, and the development of transportation systems, as well as the function change or re-functioning of the buildings. Especially for cultural heritage buildings, the negative effects of noise and vibrations on the whole of the building and its components may cause the loss of historical and cultural values. Therefore, the fact that vibrations are an increasing concern in residential areas requires evaluating the potential effects of dynamic loads applied to cultural heritage buildings. This effect varies depending on parameters such as vibration source, distance between source and receiver, duration of vibration, direction, and magnitude of vibration. Depending on the changing parameters, various countries have prepared different assessment systems and legal regulations on noise and vibration limit values. For this reason, the noise and vibration limit values accepted by different countries in national and international dimensions differ in order to control the noise and vibrations reaching the buildings. So this paper aims to examine and emphasize the importance of noise and vibration sources in cultural heritage buildings in terms of both practice and legal regulations in terms of literature.

Keywords: Cultural Heritage Buildings, Noise and Vibration, Damage Assessment.

[1] Yüksek Lisans Öğrencisi, Eskişehir Teknik Üniversitesi, Mimarlık Bölümü, Orcıd: 0000-0001-7926-1761
[2] Prof. Dr., Eskişehir Teknik Üniversitesi, Mimarlık Bölümü, Orcıd: 0000-0001-8309-2817

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Cosmological Considerations in Q-Deformed Statistics

Mustafa ŞENAY[1]

Abstract

In this study, we aim to investigate the relationship between MOND theory and the holographic principle by incorporating q-deformed theory. The study begins with a brief overview of Verlinde's entropic gravity proposal, which suggests that gravity can be interpreted as an entropic force arising from the statistical mechanics of quantum fields. Next, we introduce some thermo-statistical properties of the q-deformed fermion gas model in two spatial dimensions. The low-temperature limit is then considered, and the q-deformed thermal energy is derived. The effects of fermionic q-deformation on MOND theory are also investigated, specifically with regards to the q-deformed quantum particle statistics of the bits on the holographic screen. We also examine MOND theory depending on the q-deformed acceleration scale and consider the deformed Friedmann equation, taking into account the Friedmann-Robertson-Walker (FRW) universe. This equation provides a modified description of the evolution of the universe that is compatible with both MOND theory and the holographic principle. Overall, our approach propose a novel approach to investigating the relationship between MOND theory and the holographic principle, incorporating q-deformed theory. The deformed Friedmann equation further enhances our understanding of the evolution of the universe in the context of both MOND theory and the holographic principle.

Keywords: q-Deformed Fermion, MOND Theory, Entropic Gravity, Thermodynamic

[1] Öğr. Gör, Bartın Üniversitesi, Tıbbi Hizmetler ve Teknikler Bölümü, Orcıd: 0000-0002-9480-9040

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Solution Suggestions for the Problems and Sustainability of the Monumental Trees in Bursa Hanlar Region, which is on the UNESCO World Heritage List

Seda ÇİL[1]
Kamil ERKEN[2]

Abstract

Monumental trees are our immovable, living natural assets and cultural heritage that connects the past with the present, the present and the future. Various regulations regarding the protection of monumental trees are included in the Law No. 2863 on Cultural and Natural Heritage, the Regulation on the Procedures and Principles Regarding the Determination, Registration and Approval of Protected Areas, and the principle decision numbered 110 of the Ministry of Environment and Urbanization. However, despite all these legal protection measures, the sustainability of this living cultural heritage is at risk due to intense anthropogenic pressures. The aim of this study is to determine the current status and problems of the monumental trees within the borders of Bursa Hanlar region, which is on the UNESCO World Heritage List, to compare them with the situations they should be, to reveal the difference between the two and to propose solutions to the problems experienced by these trees for their sustainability. This study is important for the sustainability of monumental trees. In the study, the existing height, diameter, circumference, root collar diameter and crown width of the monument trees were measured, the living area left to the monument tree and the characteristics of this area were determined, and the problems that endanger the life of the monument tree were investigated. It has been determined that most of the monumental trees have drying in the crown, the crown form is deteriorated due to deep pruning, cavities and galls are formed on their trunks, and soil compaction problems due to hard ground formation and intense recreational use in the root area. Suggestions have been developed to overcome these problems.

Keywords: Monumental trees, phitosanitary, maintenance, sustainability

[1] Landscape Architect, Bursa Technical University, Landscape Architecture Department, Orcıd: 0000-0002-1960-0394
[2] PhD, Bursa Technical University, Landscape Architecture Department, Orcıd: 0000-0003-3492-7683

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Autism Friendly Space Design: A Systematic Literature Review

Nagehan SEVENİ[1]
H.İlkden TAZEBAY[2]

Abstract

Physical environment is a factor that greatly affects the quality of life of individuals with Autism Spectrum Disorder (ASD). In this context, many scientific researches have been carried out on the design of different places such as houses, outdoor spaces, schools where individuals with ASD live. Autism-friendly spaces are spaces where the social, sensory and communication needs of individuals with ASD are met and supported. Autism-friendly space design, on the other hand, can be defined as being aware of the physical and social factors that affect individuals with ASD and changing the physical space to meet the individual's special needs. In this research, a systematic review of the academic literature examining the relationship between individuals with ASD and space design was conducted within the scope of autism-friendly space design. In the research, Science Direct, Pubmed, Google Schoolar, Web of Science, Scopus databases were searched. The research was carried out between 02.04.2022 and 07.05.2022, by determining the topics related to the design and OIZ, with words suitable for these topics and without year limitation. 33 of the 69 publications obtained by the PRISMA method were used in the meta-analysis. As a result of the research, safety, acoustics, lighting, spatial sequencing, transition zone/threshold/connection, color, escape area, sensory segmentation, stimulation control, wayfinding and navigation, predictability/consistency, boundaries/spatial partitioning/containment, quiet room/sound isolation , therapy garden/sensory garden, using special materials, prosemic/privacy, access, scent, climate (temperature/humidity/ventilation), spatial quality, texture, pattern, physical distribution of furniture, aesthetics and comfort, social comfort, perception, observation, It has been determined that shape and form are important in establishing the spatial relationship for individuals with ASD.

Keywords: Autism Spectrum Disorder, ASD Friendly Space, Space Design, Systematic Literature Review,

[1] Doktora Öğrencisi, Ankara Üniversitesi Ziraat Fakültesi, Peyzaj Mimarlığı Bölümü, Orcıd: 0000-0002-6239-9382
[2] Prof. Dr, Ankara Üniversitesi Ziraat Fakültesi, Peyzaj Mimarlığı Bölümü, Orcıd: 0000-0002-8286-6574

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Investigation of Enhancing Energy Absorption in Aerospace Applications through Gradient Lattice Structures

Erkan TUR[1]

Abstract

Lattice structures have gained significant attention and found widespread use in various applications due to their exceptional mechanical properties, including high specific strength and stiffness, as well as their ability to efficiently absorb large amounts of energy. This study focuses on investigating the energy absorption properties of gradient lattice structures through the utilization of finite element software, Abaqus. The gradient lattice structures were designed by introducing variations in material properties along the loading direction. Through this design approach, the goal was to enhance the energy absorption capacity of the lattice structures. Finite element analysis was performed to simulate the behavior of these structures under different loading conditions. The obtained results revealed that the gradient lattice structures exhibited significantly higher energy absorption capacity when compared to uniform lattice structures. In fact, the maximum energy absorption capacity of the gradient lattice structures was found to be greater than that of the uniform lattice structures. This finding clearly demonstrates the advantage of incorporating gradient designs to optimize energy absorption performance. The outcomes of this study highlight the potential of gradient lattice structures in energy absorption devices and structures, particularly in aerospace applications. Aerospace engineering often requires lightweight materials that can effectively absorb impact energy to ensure the safety and integrity of structures and components. The enhanced energy absorption capacity offered by gradient lattice structures makes them promising candidates for such applications.

Keywords: Lattice Structures, Energy Absorption, Gradient Design, Finite Element Analysis, Abaqus, Mechanical Properties, Aerospace Applications

[1] Middle East Technical University, Department of Natural and Applied Sciences, Orcid: 0000-0002-3764-2184

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Design Iterations and Structural Finite Element Analysis of a Prototype Communication Satellite

Anıl TOYGAR[1]
Mostafa RANJBAR[2]

Abstract

Satellites are subjected to significant mechanical loads during launch. These loads can be given in the form of sinusoidal vibration loads, quasi-static loads, random vibration loads, shock loads, and so on. Each satellite must withstand launching loads during launch. Suitable satellite structures cannot be found without iterative studies. In this study, iterative studies will be carried out using material thickness variations and CFRP composite materials on the primary load carriying structures of a prototype communication satellite, which is in the preliminary design phase, namely the central cylinder and shear panels. After identifying the candidate launch systems, the natural frequency requirements will be determined. Quasi-static load conditions for these launchers will be derived, and these loads will be used for quasi-static analyses and global buckling analyses. Then, sinusoidal vibration profiles will also be derived for these launchers. Mesh convergence study conducted for the central cylinder as a primary load carrying mamber, a finite element model of the satellite will be generated based on the obtained mesh size. Necessary model checks will be performed on the obtained model. The commercial software HyperMesh was used to create the finite element model. To find a suitable iterative model, the natural frequency requirement must first be met, followed by ensuring panel strengths under quasi-static loading and then positive global buckling safety factors. Then, the total mass will be considered in selecting the appropriate model. After selecting the appropriate model, a detailed finite element analysis and primary notch analysis will also be performed. NX Nastran will be used as a solver to solve the finite element model.

Keywords: Communication satellite, stuructural analysis, design iterations, finite element analysis

[1] Master of Science Student, Ankara Yıldırım Beyazıt University, Mechanical Engineering Departmant, Orcıd: 0009-0006-4519-7400

[2] Associate Professor, Ankara Yıldırım Beyazıt University, Mechanical Engineering Departmant, Orcıd: 0000-0002-9670-7371

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Production of Bromelain ($C_{39}H_{66}N_2O_{29}$) Extract from Pineapple Fruit and Wastes and Investigation of Application Areas

Aslıhan TURHAN[1]
Deniz UYGUNÖZ[2]
Emek DERUN[3]

Abstract

In purpose of sustainability at food sector, food recycling studies are increasing. Pineapple wastes contain high value substances and many of them are recyclable. Throughout the pineapple processing chain, wastes such as peel, crown, stem, leaves and core may come out with percentages varying between 45%-65%. Pineapple fruit and its wastes have significiantly amount of bromelain ($C_{39}H_{66}N_2O_{29}$), which is a type of protease. Because of the high demand, bromelain is preferred by the textile, cosmetics, food and pharmaceutical industries.

"Gold Extra Sweet" pineapple which is used as raw material in experimental study had supplied from several local markets and it has been determined that wastes of this type is around 40%-51%. The pineapple crown and peel were dried 40°C, 50°C and 60°C before bromelain extraction. Crude bromelain extracts were prepared by traditional extraction method from flesh and core in water-based and from crown and peel in dry-based in phosphate-buffered solution (PBS) (pH: 7.4). The produced extracts were filtered and then centrifuged. Bromelain extracts purified with 30%, 50% and 70% cooled ethanol (0°C).

This study intended to obtain bromelain from pineapple by extraction of fruit and waste parts and research its use, by the optimum use of the plant, it is aimed to lead other food products in the agricultural waste evaluation process and to develop new visions by contributing to modern applications. It is predicted that research focusing on the extraction, purification and evaluation of target parts from pineapple wastes will contribute to the founding of industrial waste product markets in the future.

Keywords: Pineapple waste, Bromelain, Extraction, Protease, Purification

[1]Student, Yildiz Technical University, Faculty of Chemical and Metallurgical, Deparment of Chemical Engineering, Orcıd: 0000-0002-3772-0410

[2]Res. Asst., Yildiz Technical University, Faculty of Chemical and Metallurgical, Deparment of Chemical Engineering, Orcıd: 0000-0001-8936-6284

[3]Prof. Dr., Yildiz Technical University, Faculty of Chemical and Metallurgical, Deparment of Chemical Engineering, Orcıd: 0000-0002-8587-2013

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Preparation and Investigation of Composite Films for the Treatment of Periodontal Diseases

Fırat YILMAZ[1]
Demet TOPALOĞLU YAZICI[2]

Abstract

Periodontal diseases are common diseases caused by microorganisms that cause microbiological changes in the mouth. Periodontal diseases consist of two stages, which are called gingivitis and periodontisis respectively, can cause tooth loss by affecting the supporting tissues of the teeth. Traditional methods used in the treatment of periodontal diseases have some disadvantages such as short-term effect and less contact with the diseased area. For this reason, drug delivery systems that locally release drugs to the target area come to the fore in the treatment of such diseases. In drug delivery systems, the use of natural polymers is very advantageous compared to other materials, since they do not affect the regeneration of the injured area. In this study, it is aimed to prepare composite films containing natural components that can be used in the treatment of periodontal diseases and to characterize composite films by examining their various properties. Before the preparation of the composite films, optimization studies were carried out on the existing recipe and different composite films were prepared from each recipe determined as a result of the optimization studies in order to make comparisons at the characterization stage. By investigating the swelling properties and physical properties of the substitute composite films obtained from different recipes in various environments, the best recipe was decided. FTIR analysis of composite films prepared using the final recipe was performed and surface morphologies were examined by SEM analysis. In order to evaluate the use of composite film containing natural components as a drug delivery system, the selected model drug was loaded into the film. Drug release kinetics were determined from drug loaded films and drug release profiles were obtained.

Keywords: Periodontal Diseases, Composite Film, Drug Delivery System, Characterization

[1] Research Assistant, Eskişehir Osmangazi University, Chemical Engineering, Orcıd: 0000-0001-9634-4438
[2] Professor, Eskişehir Osmangazi University, Chemical Engineering, Orcıd: 0000-0002-9409-7397

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Effect of Fractal Dimension on Shear Strength of Sands

Ahmet Serdar KÖŞELİ[1]
Havvanur KILIÇ[2]
Murat GÜLEN[3]

Abstract

Understanding the behaviour of soils under load and predicting the interaction of the engineering structure to be constructed is important in geotechnical engineering. The main factors to be considered in the analysis of geotechnical structures are shear strength and shear strength parameters. These factors, which affect the behaviour of the soil at its interfaces with different materials or in itself, should be well known at the design stage. With the developing technology and increasing knowledge, the grain shape properties, one of the most important parameters affecting the friction mechanism in the sliding plane, can be examined in more detail using image processing techniques. In this study, large-scale direct shear experiments investigated the effect of the shape parameters of the grains on the shear strength. The uniform sands used were photographed with the help of the prepared setup. The obtained images were analysed with ImageJ, an image processing program, and their shape properties were determined. The shear strength parameters of the sands, whose shape properties were determined, were obtained as a result of experiments carried out at different normal stresses in a large-scale direct shear box of 300x300 mm. The fractal dimension was used to express the effect of the shape characteristics of the grains on the shear resistance. As a result, it was determined that the fractal dimension value increased with grain angularity. Likewise, it was observed that the internal friction angles were larger in sands with angular grains. In addition, it has been determined that the maximum and minimum void ratios and the difference in void ratios of round grain sands are less.

Keywords: Shape properties, shear strength, fractal dimension, direct shear test, friction angle

[1] Civil Engineer, Yildiz Technical University, Civil Engineering Department, Orcid: 0000-0002-4421-9544
[2] Assoc. Prof, Yildiz Technical University, Civil Engineering Department, Orcid: 0000-0001-9455-1687
[3] Res. Asst., Yildiz Technical University, Civil Engineering Department Orcid: 0000-0003-4143-9266

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Mapping VS and VP Values of Soils in Batman City Center with Geographic Information System (GIS)

Harun TANYERİ [1]
Nurullah AKBULUT [2]

Abstract

It is possible to define Geographic Information Systems (GIS) as a computer system used to collect, store, analyze, and visualize location-based data. The accurate determination of soil properties is of great importance in the field of geotechnical engineering. Soil properties are determined through laboratory and field experiments. Laboratory experiments may not accurately represent the entire layer due to the effects of crushing and small area representation, so it is recommended to use them in conjunction with field experiments. To realistically determine the properties of soil layers, it is preferable to conduct field experiments in addition to laboratory experiments and use the results together. In this study, the data obtained from geophysical studies conducted in the center of Batman Province were analyzed, and using the ArcGIS program based on GIS, maps of estimated shear wave velocity (VS) and compressional wave velocity (VP) values were created with an IDW method (Inverse Distance Weighting Method) with a 10 m grid size, aiming to use geotechnical data more effectively and efficiently in engineering studies. In the studies, at a depth of 5 m within the study area boundaries, the compressional wave velocity was found to be between 715 and 601 m/s in approximately 29% of the study area, between 600 and 501 m/s in 46%, and between 500 and 414 m/s in 25%. Likewise, the shear wave velocity at a depth of 5 m was found to be between 443 and 301 m/s in approximately 43% of the study area, between 300 and 281 m/s in 27%, and between 280 and 221 m/s in 30%.

Keywords: Geographic Information Systems (GIS), Shear Wave Velocity, Compression Wave Velocity, Inverse Distance Weighting Method, Batman

[1] Graduate Student, Hasan Kalyoncu University, Department of Civil Engineering, Orcid: 0000-0001-5586-8147
[2] Assist. Prof. Dr., Hasan Kalyoncu University, Department of Civil Engineering, Orcid: 0000-0002-4280-1581

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An Overview Of Spraying Machines Manufactured In Turkey

Medet İTMEÇ[1]
Ali BAYATI[2]

Abstract

Protection from pests by effectively spraying agricultural products in our country and in the world, attracts the attention of many researchers today. Effective and uniform application of pesticides during the application of pesticides is shown as the success criterion of Plant Protection Machines. In addition, the pesticide application process, which is carried out with little drift and a good leaf surface coating, is very important in pest control. In pest control, the success of the developed Sprayer is as important as the compatibility of the pesticide-machine, operator qualification, application period of the drug (Pulp and Larvae periods), seasonal period in which the drug is applied. If the plant protection machine is not operated well, the pesticide is drifted to the unwanted areas due to the wind, mixed with the soil through water, and accordingly every link of the food chain can be affected. For this reason, the success of pesticide application is not only important in terms of business, but also in terms of environmental awareness and responsibility due to its contribution to Sustainable Agriculture. A significant part of the Plant Protection Machines produced in our country are made similar to the machines offered to the foreign market. In addition, the parts that make up the machines are also purchased ready-made. Plant Protection Machines developed separately for field and orchard applications, there are different types of designs even for the same garden plant. It is offered to the farmer in different sizes according to the demand and the capacity of the agricultural area as knapsack, hand-pulled, suspended type, towed type. The aim of this study is to give information about the general working principles of Plant Protection Machines produced in our country and to examine the designs of these machines.

Keywords: Energy in Agriculture, Energy Efficiency, Garden Sprayer, Turbo Fan Unit.

[1] R.A, Cukurova University Department Of Agricultural Machinery And Technologies Engineering, Orcid: 0000-0003-0714-6232

[2] Prof.Dr, Cukurova University Department Of Agricultural Machinery And Technologies Engineering, Orcid: 0000-0002-7104-9544

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Opinions On Reducing Energy Consumption When Operation Of Turbo Atomizers Used In Application Of Pesticides To Fruit Tree

Medet İTMEÇ[1]
Ali BAYATT[2]

Abstract

Depending on the increase in the use of energy in agriculture, the importance of using energy efficiently is increasing a lot today. Although the use of Sustainable Energy sources is the first thing that comes to mind in terms of Energy in Agriculture, the Energy used in the operation of the machines used in Agricultural Company is also directly effective in this regard. It is important that the machine purchased by the Company can do more work with less energy. Manufacturers of Agricultural Tools and Machines evaluate the machines they manufacture, whether they can fulfill their functionality (sowing, spraying, etc.) in general. However, they often have no idea how much energy is consumed while performing these basic functions (harvest threshing).In the core of this study, a general summary of the studies carried out to increase the Energy Efficiency of the Turbo Atomizer Unit of the Orchard Sprayer, which is one of the Plant Protection Machinery, will be presented. It is possible to increase the air flow produced by consuming the same amount of energy in the orchard sprayer with auxiliary air flow. In this way, it can be mentioned that energy efficiency increases due to the fact that more work is produced. The energy of the air flow created by the fan in the Turbo unit of the auxiliary air flow garden sprayers can be directed to the target with less friction losses with various engineering approaches. Some approaches to consider for this are; Optimization of the number of fan blades can be in the form of changing the fan blade material, changing the fan blade angle, changing the tolerance of the fan housing with respect to the fan blade, reducing the units that disrupt the flow of airflow, and design studies that allow the airflow to pass through the fan housing with less loss. Since the manufacturers generally buy and install these parts ready-made, they cannot recommend the user with which setting the machines will be used. The opinions expressed in this study and the information that will contribute to the energy efficiency of the Turbo Fan Unit will be shared.

Keywords: Energy in Agriculture, Energy Efficiency, Garden Sprayer, Turbo Fan Unit.

[1] R.A, Cukurova University Department Of Agricultural Machinery And Technologies Engineering, Orcid: 0000-0003-0714-6232

[2] Prof.Dr, Cukurova University Department Of Agricultural Machinery And Technologies Engineering, Orcid: 0000-0002-7104-9544

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Effects of Layering on Mechanical Behaviors of Rocks Under Quasi-Static Loading

Özge DİNÇ GÖĞÜŞ[1]
Enes ZENGİN[2]

Abstract

Since many engineering structures are built on layered rock domains, understanding the effects of layering (bedding) on mechanical rock behaviors is critical. However, it is extremely difficult and mostly impossible to analyze such rocks in the laboratory experimentally. In this study, layered rocks' failure and deformation behaviors are investigated through numerical analysis based on the discrete element methodology (DEM), which has been widely used in engineering projects in recent years. For this purpose, numerical models were calibrated by using PFC (Itasca) software, according to the mechanical parameters, uniaxial compressive strength (UCS), tensile strength (UTS), elastic modulus (E), and the Poisson's ratio (υ) of Shandong sandstones (Linyi region, China), which were obtained from comprehensive laboratory experiments presented in the literature. Under quasi-static loading conditions, the unbedded rock model samples' stress-strain behaviors were compared against the model samples' mechanical behaviors consisting of relatively weak rock layers. The results show that the layer thickness, layer number, and degree of interlocking of the discrete elements forming such layers have significant effects on the failure and deformation characteristics of the model samples which have precisely the same dimensions. As a result of layering, the rock behavior transforms from brittle to plastic yielding, while the increase in the number of layers causes this behavior to become more ductile. It is observed that in triaxial compressive strength test simulations driven under different confining stresses (σ_3= 2, 4, and 8 MPa), the peak strength (σ_1) of 3-layered rock models decreases approximately up to 69% of that of unlayered models, while this rate decreases to 65% in 5-layered model samples. The insights obtained in this study provide a very useful and quantitative data platform for engineering studies in which stratification plays a critical role in rock behaviors.

Keywords: Rock strength, Layered rock, Failure Envelope, Discrete Element Method (DEM)

[1] Dr., Istanbul Technical University, Geological Engineering, 0000-0003-3227-309X
[2] Dr., Kütahya Dumlupınar University, Urban and Regional Planning, 0000-0002-5740-7763

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Throw at Extinguish Fire (TAEF/FAYS)

Gülsemin SAVAŞ TUNA[1]
Çağdaş Güvenç AVCI[2]
Arda Efe Berber[3]
Ege Özleyiş AKIN[4]
Ali Arda ÖZEN[5]
Nisanur TEMİZEL[6]
Ömer ZENGİN[7]
Doruk UÇAK[8]

Abstract

Since many engineering structures are built on layered rock domains, understanding the effects of layering (bedding) on mechanical rock behaviors is critical. However, it is extremely difficult and mostly impossible to analyze such rocks in the laboratory experimentally. In this study, layered rocks' failure and deformation behaviors are investigated through numerical analysis based on the discrete element methodology (DEM), which has been widely used in engineering projects in recent years. For this purpose, numerical models were calibrated by using PFC (Itasca) software, according to the mechanical parameters, uniaxial compressive strength (UCS), tensile strength (UTS), elastic modulus (E), and the Poisson's ratio (υ) of Shandong sandstones (Linyi region, China), which were obtained from comprehensive laboratory experiments presented in the literature. Under quasi-static loading conditions, the unbedded rock model samples' stress-strain behaviors were compared against the model samples' mechanical behaviors consisting of relatively weak rock layers. The results show that the layer thickness, layer number, and degree of interlocking of the discrete elements forming such layers have significant effects on the failure and deformation characteristics of the model samples which have precisely the same dimensions. As a result of layering, the rock behavior transforms from brittle to plastic yielding, while the increase in the number of layers causes this behavior to become more ductile. It is observed that in triaxial compressive strength test simulations driven under different confining stresses (σ_3= 2, 4, and 8 MPa), the peak strength (σ_1) of 3-layered rock models decreases approximately up to 69% of that of unlayered models, while this rate decreases to 65% in 5-layered model samples. The insights obtained in this study provide a very useful and quantitative data platform for engineering studies in which stratification plays a critical role in rock behaviors.

Keywords: Rock strength, Layered rock, Failure Envelope, Discrete Element Method (DEM)

[1] Dr., Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID: 0000-0003-2089-2790
[2] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID:0009-0004-3314-7495
[3] 3Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID:0009-0000-0160-8390
[4] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID:0009-0005-4496-1756
[5] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID:0009-0008-2602-8155
[6] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID:0009-0003-6653-0135
[7] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID: 0009-0008-8440-8818
[8] Tekirdağ Anadolu Lisesi, Süleymanpaşa-Tekirdağ, Türkiye. ORCID: 0009-0009-3614-3568

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Spatial and Temporal Dynamics of Marine Litter on Southeast Black Sea Beaches

Koray ÖZŞEKER[1]
Bilal ONMAZ[2]

Abstract

Sea and coastal waters, especially beaches, face many problems that are negatively affected by human activities and cause ecosystem degradation. In this study, the spatial and temporal dynamics of Marine Litter, which is one of the important problems on the beaches of the Southeastern Black Sea Region, were examined. In this context, the beaches, which are used extensively by people seasonally in Giresun, Trabzon and Rize provinces in 2022, were chosen as the research area. Physical conditions ranging from 50 m^2 to 150 m^2 in beaches. The highest densities in number and weight were recorded at station T (Trabzon beach) (summer; 58,63 items/m^2; 400,25 g/m^2). Plastic was the most abundant waste material in terms of number of parts, with a percentage contribution varying between 42% and 93% at all stations. In addition, a high increase was observed in individual-use hygiene materials associated with the Covid-19 period. The difference between the seasons was caused by plastic, hygienic, and medical waste. The main sources of marine litter were anthropogenic effect (use of beaches) (48.5%), river discharge (32%), improper disposal (15%), and other effects (4.5%). In the light of this study, it is concluded that it would be beneficial to carry out awareness activities in a way that includes everyone in the society so that the litter is not thrown into the sea and beaches. In addition, the results of our study form the basis for transport models, local governments and non-governmental organizations. In addition, the manufacture and use of plastic products, especially plastic bottles such as sacks, should be limited in order to reduce solid waste pollution.
Keywords: Black Sea, Marine Litter, Pollution, Plastic, Covid-19

[1] Assoc. Prof. Dr., Karadeniz Technical University, Institute of Marine Science and Technology, Orcıd: 0000-0002-7044-1843
[2] MSc Student, Karadeniz Technical University, Faculty of Marine Science, Orcıd: 0009-0003-7913-7279

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Comparison of Altitude Data Obtained from Remote Sensing Images and UAV Data and Investigation of Usability.

Hüseyin KARATAŞ[1]
Aydan YAMAN[2]

Abstract

Land data is of great importance in both the public and private sectors. The supply of these needed data and maps is seen as an important expense for individuals or institutions in terms of time, cost and workforce. The aim of the study is to investigate the usability of easily available satellite images on this subject.

In this study, it is aimed to check the accuracy by comparing the data obtained from Remote Sensing Satellite images with the data obtained by UAV. If the results are within acceptable limits, it is aimed to calculate the benefit/cost of the project without going to the field, according to the accuracy rate. Accordingly, it is aimed to implement the projects that are considered economically viable by using known methods (Precision measurement methods).

In the study, the data obtained from Göktürk-2 satellite images and the digital terrain model that created by using of these images were compared with the data obtained from the flight study performed with the UAV (Unmanned Aerial Vehicle) of the same region.

Accordingly, two separate pond bodies were designed by comparing the two data, and the level differences between them were reduced and brought to the same level, and the water reservoir that it would hold was calculated. The reservoir calculated according to the Göktürk-2 images was 96193 m^3, and according to the project created with the UAV, the reservoir was 98769 m^3, and the margin for error between the two data was calculated as 2.67794%.

According to this result; It has been seen that the data obtained from Göktürk-2 satellite images can be used in studies such as pond, closed system irrigation studies, land slope analysis, cubage changes, especially in project design preliminary studies. In addition, it has been concluded that more sensitive measurements make in the field should be used in operations that require high precision.

Keywords: Göktürk-2, UAV, Reservoir, Project

[1]Harita Mühendisi, Aksaray Üniversitesi, Harita Mühendisliği Bölümü, Orcıd: 0000-0003-3681-7744
[2]Dr.Öğr.Üyesi, Aksaray Üniversitesi, Harita Mühendisliği Bölümü, Orcıd: 0000-0001-8739-066X

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Determining the Location and Depth of Buried Archaeological Remains using the Euler Deconvolution Technique

Şenol ÖZYALIN[1]
Zafer AKÇIĞ[2]

Abstract

This study is an example of the application of the Euler Deconvolution technique, which is one of the geophysical evaluation methods, to archaeological sites. This technique is a useful tool for obtaining the locations and depths of buried ruined buildings using potential field data. Since it requires very little prior knowledge, it has become one of the preferred techniques for the analysis of magnetic field data. The applicability and effectiveness of the suggested technique have been tested via the magnetic anomalies caused by hypothetical model bodies. Test studies were applied to models of multiple structures as well as single structures. At the same time, the effect of the method's width and thickness of the structure on the solution was also tested. This technique has been applied to real field data based on satisfactory results from hypothetical studies. Real field data were collected on an area of 20 x 25 m in the ancient city of Sapinuwa (Çorum, Turkey). First, the magnetic field map and then magnetic profile data was obtained by taking a cross-section perpendicular to the magnetic inclusions on the two-dimensional magnetic anomaly map. The proposed technique was used to determine the depth and exact location of the source object causing this anomaly. The findings were compared with the building remains unearthed as a result of the proposed trench excavations. The results show that this technique provides a significant improvement in the discovery of buried structures in archaeological sites. It can be assumed that the use of the Euler Deconvolution technique in the evaluation of magnetic anomalies produces promising results.

Keywords: Geophysics, Euler deconvolution, Magnetic anomaly, Sapinuwa ancient city

[1] Assist. Prof. Dr., Dokuz Eylul University, Department of Geophysics, Orcid: 0000-0002-1401-9453
[2] Prof. Dr., Dokuz Eylul University, Department of Geophysics, Orcid: 0000-0002-9978-1681

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Medicine Box with Reminder And Remote Use in Hospital Reduce The Workload of Nurses

Ayşe Nur AY GÜL[1]
Onur TEKER[2]

Abstract

Nursing is a profession born out of the needs of society, which has a long history. When the studies are examined, the majority of nurses continue their profession with very high working hours in Turkey. It is of great importance to research and implements practices that will regulate the work-life balance of nurses working with high working hours and workload and reduce their workload It was determined that nurses in Turkey spend a significant amount of time, such as 176 hours a year, on drug distribution to patients, and the risk of infection increases due to mobility during this distribution. In this study, it is planned that the nurses place the drugs in a medicine box according to the patient, and the patient is reminded of the medicine with the warning system, which is placed next to the patient's bed. With the tracking system, drug intake will be tracked and if the drug is not taken, notification will be made via e-mail. Medicine Box was designed as 5 days and 4 medicine hours and the software of the system was realized in LABVIEW environment. This system is designed for patients of all ages and all types of hospitals. This system ensures that regular medication intake is monitored, the mobility of nurses within the hospital is significantly reduced and their workload is reduced at the same rate. As a result of the implementation of the system, the relevant personnel will mostly be saved from the annual 176-hour time they devote to this work. With the decrease in working hours, nurses will be able to devote their remaining time to themselves and their loved ones, and they will be able to maintain their social and working lives more motivated.

Keywords: nurse, work-life balance, smart system, pill, labview

[1] Asst. Prof. Dr., Sakarya University of Applied Sciences, Mechatronics Engineering, Orcıd: 0000-0002-4448-4858
[2] Student, Sakarya University of Applied Sciences, Mechatronics Engineering, Orcıd:

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Analysis and Classification Of Medical Device Recalls: Fda

Ertunç GÜZEL[1]
Selden ÇEPNİ[2]

Abstract

The main reason of this subject on this project is to understand the reasons and consequences of medical device recalls for health sector. Despite learning the reasons and measuring consequences is a very difficult task to complete, with this way analyzing and classification of medical device recalls helps to finding precise solutions and eliminating complexibility. Medical device recalls can have one or multiple reasons for recalling. These reasons can be design or manufacturing defects, software or electronic related errors or use-related problems. The objective of this project is to identify potential risks and patterns of association with devices finding a solution to minimizing the harm with the data of analysis and classification of medical device recalls before and during COVID-19, also offering a suggestion for technical assessment of the medical device. Many resources, articles, databases and classification systems are searched and used for this project which is shown in reference part. Most used for the database and medical device recalls is from FDA organization because of the accessibility and multitude of the information. Besides FDA agency, in Europe or Turkey there are different agencies responsible for medical device recall such as HPRA, Swissmedic, TITCK etc. With the search of databases and FDA medical device data's, the main objective of this project is achieved which is finding a solution caused by potential risks for medical device recalls before and during pandemic. For the goal of finding solutions, it is supported by comparison method and graphic contents.

Keywords: Analysis, classification, recalls, FDA, COVID-19.

[1] BIOMEDICAL ENGINEER, IŞIK UNIVERSTIY, Biomedical Engineering
[2] Assistant Professor, IŞIK UNIVERSITY

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Methylprednisolone 100 mg Tablet Formulation Using Pea Protein: Experimental Approaches over Intestinal Permeability and Cyto-toxicity

Erhan KOC[1]
Rabia CAKIR KOC[2]

Abstract

This study was carried out to transform the hydrolyzed pea protein isolate into pharmaceutical tablet form by masking the active ingredient of methylprednisolone. Methylprednisolone is a Biopharmaceutical Classification System (BCS) Class II molecule with high permeability that is practically insoluble in water. Because of the poor water solubility, there is a wide range of absorption and limited bioavailability following oral administration. Methylprednisolone can be formulated using spray drying technology, which is a commercially applicable technology. A two-factor experimental design was performed for formulation optimization of methylprednisolone 100 mg tablets. The effect of pea protein and polysorbate 20 on the solubility of methylprednisolone tablets was evaluated. The physicochemical properties, flow capabilities and in vitro release behavior of the tablets produced with the spray dryer were investigated. No film coating was used on the tablets. The optimum formulation determined was evaluated against the reference product by performing cytotoxicity and cell permeability studies. It was observed that pea protein and Polysorbate 20 concentration had a significant effect on both in vitro release behavior and cell permeability tests. The findings showed that methylprednisolone coated with spray-dried pea protein has the potential to be a promising functional excipient in pharmaceutical formulation studies, as it has an effect on the oral bioavailability and masks the bitter taste in tablets made without a film coating

Keywords: Methylprednisolone, design of experiments, quality by design; formulation, spray dry, factorial design, caco2, cytotoxicity

[1] PhD. Candidate, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0003-4100-1555
[2] Unvan, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0002-8545-9878

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FEM Stress Analysis of Human Cornea with Kerataconus Based on İn Vitro And İn Vivo Studies

Filiz KARABUDAK[1]
Muhsin ÜNAL[2]
Hamid ZAMANLOU[3]
Muhammet Bahattin KIR[4]

Abstract

This study was carried out to transform the hydrolyzed pea protein isolate into pharmaceutical tablet form by masking the active ingredient of methylprednisolone. Methylprednisolone is a Biopharmaceutical Classification System (BCS) Class II molecule with high permeability that is practically insoluble in water. Because of the poor water solubility, there is a wide range of absorption and limited bioavailability following oral administration. Methylprednisolone can be formulated using spray drying technology, which is a commercially applicable technology. A two-factor experimental design was performed for formulation optimization of methylprednisolone 100 mg tablets. The effect of pea protein and polysorbate 20 on the solubility of methylprednisolone tablets was evaluated. The physicochemical properties, flow capabilities and in vitro release behavior of the tablets produced with the spray dryer were investigated. No film coating was used on the tablets. The optimum formulation determined was evaluated against the reference product by performing cytotoxicity and cell permeability studies. It was observed that pea protein and Polysorbate 20 concentration had a significant effect on both in vitro release behavior and cell permeability tests. The findings showed that methylprednisolone coated with spray-dried pea protein has the potential to be a promising functional excipient in pharmaceutical formulation studies, as it has an effect on the oral bioavailability and masks the bitter taste in tablets made without a film coating

Keywords: Methylprednisolone, design of experiments, quality by design; formulation, spray dry, factorial design, caco2, cytotoxicity

[1] Gümüşhane Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Makine Bölümü
[2] Gümüşhane Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Makine Bölümü
[3] Atatürk Üniversitesi, Mühendislik Fakültesi, Makine Bölümü
[4] Trabzon Özel İmperial Hastanesi Göz Kliniği

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Production and Characterization of Doped and Non-Doped Titanium Dioxide Coatings

Cemre SÜZGÜN[1]
Ali Can ÖZARSLAN[2]
Mehmet Burçin PİŞKİN[3]
Emek DERUN[4]

Abstract

In recent years, the surface properties of TiO_2 have been studied intensively. Stimulation of TiO_2 semiconductor metal oxide with ultraviolet (UV) light enables it to gain self-cleaning, wettability conversion properties and photocatalytic activites. The unique behavior of these reversible surfaces has provided significant potential in various high-tech fields. TiO_2 has three different crystal structures. These are anatase, rutile and brookite.The anatase crystal structure of TiO_2 has a high reduction power. Molecular oxygen (O_2), which is a very important reaction in the self-cleaning mechanism, can perform superoxide ($O_2^{\bullet-}$) electrolytic reduction. By this property, superoxides formed by decomposing water molecules into ions under UV light break down the ionic balance in the cell membrane of microorganisms and cause breaking of the cell. In this respect, UV doped TiO_2 maintains its antibacterial properties and the amount of product as long as it is used. TiO_2 and TTIP (Titanium (IV) isopropoxide) is used as material source for the photocatalytic activation in the production processes to be realized by the sol-gel method, boric acid as boron source is used. Experimental studies are selected from two methods that give the highest anatase score. Then, this method is doped with different ratios of boric acid and characterization procedures are performed. In this study, antibacterial coatings, which are of great importance worldwide, are produced by using TiO_2 with high photocatalytic properties. Different crystal structures of TiO_2 and these crystal structure transformation modifications were investigated. It has been observed that it can show a high photocatalytic effect at high temperatures.

Keywords: TiO_2, Anatase, Crystal Structure, Photocatalytic Impact, Sol-gel

[1] Biyomühendislik Doktora Öğrencisi, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0002-6400-7266
[2] Doktor, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0002-4864-0598
[3] Profesör Doktor, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0002-2689-8547
[4] Profesör Doktor, Yıldız Teknik Üniversitesi, Biyomühendislik, Orcıd: 0000-0002-8587-2013

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Detection of Parts Defects in Manufacturing Systems with Low Cost Image Comparison Using Android Mobile Phone

Beyza BOZ[1]
Mustafa HAZIR[2]
Serkan YORULMAZ[3]

Abstract

Quality production is essential to survive in today's competitive market. Manufacturing errors can result in both financial losses and reputational loss. For this reason, many companies implement quality control practices in the production process. Manual processes and controls implemented in production often tend to make mistakes and are time consuming. Given these situations, in the production process, the importance of catching errors at the beginning of production is key point. It also protects the company's reputation by preventing the launch of products that will cause problems when they go to the customer. In this study, a low-cost, human error-free, semi-automated visual error detection mechanism was made to prevent the damage caused by visual defects that affect quality, decrease productivity, increase labor cost, and can be seen in the input raw material of the production.

Within the scope of the study, it was aimed to determine whether the main boards that will enter production using a mobile phone camera are suitable for production. Semi-automating the process previously performed with human control, accelerating the production time aims to increase reliability and production quality

Keywords: Android, production, visual comparison, opencv, semi-automation, quality, efficiency, half-human, half-device control

[1] Mühendis, Mustafa Kemal Üniversitesi, Bilgisayar Mühendisliği
[2] Mühendis, Süleyman Demirel Üniversitesi, Makine Mühendisliği
[3] Doktora Öğrencisi (Yüksek Mühendis), Yıldız Teknik Üniversitesi, Elektronik Mühendisliği, Orcid: 0009-0002-8635-5971

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Thermodynamic and Exergo-economic Analysis of the Geothermal Energy Based Transcritical CO2 Rankine Cycle

Serpil ÇELİK TOKER[1]

Abstract

The fact that fossil fuels, which have a number of negative environmental effects such as ozone depletion, acid rain and climate change, provide the majority of the increasing energy consumption brings environmental problems. Geothermal energy, which is among the renewable energy resources, can easily be utilized in place of fossil fuels due to its unaffected by environmental conditions, reliability and continuity. In this regard, this research conducts a thermodynamic and exergo-economic analysis of the transcritical CO_2 Rankine cycle (tCO_2-RC) supported by geothermal energy. The combined system includes of single flash geothermal energy, steam Rankine cycle (SC) and tCO_2-RC. EES software is utilized to conduct the thermodynamic and exergo-economic assessment of the integrated system with geothermal energy. Additionally, parametric research is done to examine at how important thermodynamic parameters, including geothermal water temperature and mass flow rate, affect cycle performance. According to the thermodynamic analysis outcomes, the overall system's energy and exergy efficiencies are founded as 7.87% and 18.80%. In addition, the results of the economic analysis show that the plant's entire cost rate is 63.10 \$/h, the average unit product cost rate is 0.00859 \$/kWh, and the system's total capital investment is 1612×10^3 \$. Moreover, it is discovered that the energy and exergy efficiencies of plant are decreased with an increase in geothermal water flow rate and enhanced with an increase in the temperature of the geothermal resource.

Keywords: Geothermal energy, Transcritical CO_2 Rankine cycle, Thermodynamic, Exergo-economic

[1] Research Assistant (PhD), Isparta University of Applied Sciences, Mechanical Engineering, Orcid: 0000-0003-3572-7907

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Synthesis of Next Generation Si-Anode Materials via Molten Salt Assisted Magnesiothermic Reduction for Li-Ion Batteries

Burak Fedakar[1]
Nilgün KARATEPE YAVUZ[2]

Abstract

Silicon (Si) has emerged as a promising alternative to graphite anodes in lithium-ion batteries, owing to its higher theoretical capacity. However, the challenges associated with the significant volume expansion during lithiation have hindered its practical application. Also, side reactions during the Magnesiothermic reduction reduce the yield of the silicon product, and excessive heat causes particle agglomeration, resulting in reduced surface area and hindered electrochemical performance. To overcome this issues, researchers have focused on developing next-generation silicon materials with improved performance for Li-ion batteries. Molten salt assisted magnesiothermic reduction has emerged as a promising technique for synthesizing advanced silicon materials. This method involves the reduction of silicon oxide (SiO2) by magnesium (Mg) in a molten salt medium. In this study, the effect of using CaCl2 salt as a heat scavenger was investigated. It was observed that the presence of CaCI2 prevetented agglomeration formation. Also, the presence of CaCI2 can suppress side reactions. XRD results indicate that no Mg2Si by-product is formed. As a result, the inclusion of a suitable molten salt in the magnesiothermic reduction process not only prevents agglomeration but also helps minimize undesired by-product formation, resulting in the production of high-quality silicon nanoparticles for improved performance in Li-ion batteries.

Keywords: Si Anode, Magnesiothermic Reduction, Li-Ion Batteries, Stöber Method, Graphite Anode

[1] Araştırma Görevlisi Burak FEDAKAR, Türk-Alman Üniversitesi, Enerji Bilim ve Teknolojileri Bölümü 0009-0007-1738-5364

[2] Prof.Dr. Nilgün KARATEPE YAVUZ, İstanbul Teknik Üniversitesi, Enerji Bilim ve Teknolojileri Bölümü :0000-0002-7392-4103

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Review Of Artificial Intelligence Based Integration Techniques Of Battery Management System For Electric Vehicles

ABDULKADİR MÜHENDİS[1]
RAMAZAN AKKAYA[2]

Abstract

Battery management systems (BMS) play a critical role in ensuring the safety and efficiency of electric vehicle (EV) batteries. Recent advancements in artificial intelligence (AI) technology have led to the development of new AI-based algorithms for BMS. This paper presents a review of the literature on AI-based algorithms integration techniques for BMS in EVs.

This paper aimed to overview of the traditional BMS architecture and its limitations and discusses the key components of AI-based BMS algorithms, including data acquisition, feature extraction, machine learning models, and control strategies. The work presents a comprehensive review of AI-based algorithms for BMS in EVs, covering various approaches such as neural networks, genetic algorithms, and discusses the challenges for the future directions in this field.

On the other hand, it highlights the benefits of using AI-based BMS algorithms, including improved accuracy in state of charge (SOC) and state of health (SOH) estimation, enhanced battery life, and increased the functional safety. The review includes a comparison of the performance of AI-based algorithms with traditional BMS approaches. Furthermore, BMS algorithms are often limited by computational power and memory constraints. Real-time monitoring and control require high computational power and efficient algorithms, which can be challenging to implement in the limited processing power of EV controllers.

This review indicate that AI-based BMS algorithms integration techniques offer significant advantages over traditional BMS approaches in terms of accuracy, adaptability, and safety. However, it is crucial to address these limitations to enhance the reliability, performance, and safety of BMS in EVs. Addressing these limitations can help extend battery life, improve driving range, and optimize energy efficiency, making EVs more accessible and practical for everyday use. This research paper analyzes the impact of AI-based algorithms on battery performance, safety, and overall EV operation, and identifies potential research directions for future advancements in the field.

Keywords: Artificial Intelligence, Battery Management System, Electric vehicles, Machine Learning, Neural Network, Functional Safety

[1] Ph.D. Candidate, Konya Technical University, Electrical and Electronic Engineering, Orcid: 0000-0001-8531-257X
[2] Prof. Dr., Konya Technical University, Electrical and Electronic Engineering, Orcid: 0000-0002-6314-1500


BİDGE
Yayınları