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ABSTRACTS

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The Relationship between Traffic Signaling Delays and Traffic Flows

Ayşenur HİSAR[1]
Mesut TIĞDEMİR[2]

Abstract

A macro has been studied in order to prevent traffic congestion problems that may occur in the transportation systems on existing highways and to provide adaptive control of critical intersections that cause this congestion. In order to minimize the unnecessary waiting time of drivers and pedestrians in traffic, green light times are optimized by arranging them according to vehicle density. Traffic demand is received in order to meet the changing demands during certain time periods (morning peak, daytime, evening peak and night hours, etc.). By taking the demand-service values of the round-trip directions, signal duration optimization is made for different time periods. In this study, the total waiting time per circuit was analyzed with the help of a macro created with the Excel Visual Basic program, according to the traffic volume values of the two intersections in the Salihli district of Manisa province. In addition, Webster's method, which is one of the many approaches used for the assignment of green light times and delay values, which provides the minimum delay at signalized intersections, was preferred. Signal times, optimum circuit times and average vehicle delay times of the approach arms of the intersections were calculated using Webster's method. The current signal times, circuit times and average waiting times of the intersections were compared with the values found by Webster's method. Then, a reanalysis was performed by increasing or decreasing the traffic volume values of the approach arms.
In this study, the behavior of the intersection was observed by comparing the time used in the current situation with the new times calculated under all conditions.
Keywords: Circuit time, Macro, Signal time, Congestion, Webster

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Fibonacci Sequences in Finite Groups

Engin ÖZKAN[1]

Abstract

Fibonacci numbers, which emerged with the famous rabbit problem, have attracted the attention of many scientists with their observation of nature. Thus, Fibonacci numbers have found application both in every branch of mathematics and in many sciences. [1-26]
Depending on how Fibonacci numbers are expressed, we will sometimes refer to them as Fibonacci sequences. In this paper, I give the applications of Fibonacci numbers in finite groups.
Keywords:

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Determination of the Effect of Diagonal Bars on Dynamic Parameters of Model Steel Bridge with Finite Elements

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Abstract

In this study, a model steel bridge was constructed under laboratory conditions. It is aimed to investigate the effect of diagonal elements on dynamic parameters. For this reason, two different model experimental structures, with diagonal connection and without diagonal connection were analyzed. In the analysis, the effects of the model steel bridge on the dynamic behavior of the structure were revealed by using the finite element method (SAP2000) program. These dynamic parameters consist of natural frequency, period and mode shapes.With the comparison of the results obtained it is seen that the effect of the steel test structure of the diagonal elements on the dynamic parameters provides a 62.06% increase in the dominant frequency and a 61.70% decrease in the dominant period.When the mode shapes of the model steel bridge in both diagonally connected and unconnected cases are examined in general, the diagonal elements in the steel test structure reinforced with diagonal elements have been replaced by the torsional mode shapes compared to the model steel bridge test structure. In the mode shapes, on the other hand, with the addition of diagonal elements, more balanced and smaller deformations were observed in other directions instead of the displacement values in the y direction.

As a result, it has been seen that the diagonal elements have a positive contribution to the balanced distribution of the horizontal loads on the steel test structure.

It has been concluded that the model steel bridge is made safer against dynamic effects by using diagonal elements.

Keywords: Diagonal elements, Steel bridge, Period, frequency, Mode shape, Finite Element Method (SAP2000)

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Morphometric Parameter Effects on Floods; A Case Study of Solaklı and Fol Basins

İrem ŞAHİN[1]
Önder KOÇYİĞİT[2]

Abstract

Flood can be defined as the spread of a stream to the environment as a result of overflowing from its bed due to many reasons, especially meteorological and geomorphological features. This natural event affects settlements and agricultural lands, interrupts casual socio-economic activities and even threatens living life. The destructive effects of the flood are felt more than usual lately due to wrong planning in the settlements and wrong choices in land use. However, meteorological and geomorphological studies should be done for determination of the variables needed in the planning and land use works. For this reason, a research aiming to interpret the hydrological characteristics of the basin was carried out with the data obtained as a result of the analysis of the morphometric parameters reflecting the land characteristics. For the purpose of the research, the effects of the features of the rivers in the selected basin on the development of floods were examined. Basins of the Fol Stream and the Solaklı Stream, which are located in the Eastern Black Sea Region and where one of the most flood events occur actively in Turkey, were chosen as the case study basin. This region has inherently very high risk in terms of flood potential. Sixteen morphometric parameters were determined for the sub-basins of both streams using ArcGIS and Excel software. In the study, the parameter prioritization of the flood potential was carried out. Principal Component Analysis was applied while determining prioritization order. SPSS software was preferred in the prioritization analysis. Results of the research indicated that the five morphometric parameters the most affect the flood potential for Fol sub-basin are Ro Coefficient, Texture Ratio, Form Factor, Drainage Density and Stream Frequency. However, results obtained from the Solaklı sub-basins are slightly different than Fol sub-basin case.

Keywords: Morphometric, Flood, Fol Stream, Solaklı Stream, Principal Component

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Effect of Traverse Geometry on Load Transfer in Railroads

Sait GÜL[1]
Mesut TIĞDEMİR[2]

Abstract
Traffic volume, in highway and airline transportation, is increasing constantly. With this increase, in highway and airline transportation, traffic jams occur more frequently. These jams necessitate railroad transportation. In recent years, investments made on the railroads, domestic and abroad, supports this necessity as well. All the materials and the components inlayed or used, in order to build a safe, comfortable, fast and economic line, which the railroad vehicles travel, form the superstructure. Superstructure is formed of; a pair of railroad tracks that conserve the determined line width, traverses, placed perpendicular to road axis under the tracks, connection components between the tracks and the traverses, ballast layer that fills the area between the connection components, the traverses and the substructure. Railroad vehicles are improving day by day. With the improvement in the railroad vehicles, materials and components of the superstructure, which provide the transfer of the axle load of the vehicles, are improving as well. As the technology advances, along with the use of objects, the efficiency of them is also investigated. Therefore, parts that make a whole should be designed optimally. Traverse are superstructure components that pin the tracks and transfer track loads to the ballast layer. In this study, a railroad track is designed in computer environment, using material properties from the literature. In this track, geometries and material properties of; ballast, underlayer of the ballast and base ground were kept unchanging. Only the traverse geometries are altered. Most commonly used traverse is the B70 concrete traverse. Along with this traverse model, 3 different traverse geometries were modelled. In the models, loading is applied on the middle of two traverses and on the traverse. After the loading, static analysis was carried out using finite element program. Displacement and stress results were obtained from the analysis. Obtained results are presented comparatively.
Keywords: Railroad, Traverse Geometry, Finite Element Method, Modelling, Static Analysis

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The Effect of Mixing Ratios and Curing Time on Physical-Mechanical Properties of Sorel Cement

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Hatice AKÇA[2]
Nuri IŞILDAR[3]

Abstract

Sorel Cement has superior mechanical properties compared to Portland cement. These properties are high mechanical strength, good resistance to abrasion and fire, low thermal conductivity are some of them. It consists of a mixture of calcined MgO and MgCl2 in certain proportions. As a result of the reaction of these 2 basic components, 4 basic phases are formed. However, the mechanical properties of Sorel cement are closely related to the formation of Phase 3 and Phase 5. Under normal curing conditions, it controls the Phase 3 and Phase 5 formation, the molar ratios of MgO/MgCl2 (A) and H2O/MgCl2 (B). In this study, Sorel cement mortars were prepared in 4 different molar ratios of A (7-16) and B (11-23) by using calcined MgO and MgCl2.6H2O. The mortars were poured into 40x40x160 mm prismatic molds, and after the samples were removed from the mold, they were cured at 23°C - 50% relative humidity conditions for 7, 14 and 28 days. The dry unit volume masses of the samples were determined according to the TS EN 1015-10 standard, the flexural and compressive strengths were determined according to the TS EN 1015-11 standard and the capillary water absorption coefficients were determined according to the TS EN 1015-18 standard. As the ratio of A and B increased, the densities and compressive strengths of the samples decreased, while the capillary water absorption coefficients and flexural strengths increased. The highest compressive strength (87 MPa, A: 7, B: 11) in the M1 sample and the highest flexural strength in the M3 sample (15 MPa, A: 12, B: 17) were determined during the 28-day curing period.

Keywords: Sorel cement, molar ratio, density, compressive and flexural strength, capillary water absorption.

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Yapılarda Depolama Sistemlerinin Yapı ve Maliyet Açısından İncelenmesi

Şeyma SABANCI[1]

Özet

Her geçen gün hızla büyüyen ve ülkemizin en büyük istihdam kaynaklarından olan inşaat sektöründe yeni inşaat metodolojilerine ihtiyaç duyulmaktadır. Yeni metot ihtiyacı inşaatın yapılacağı coğrafyanın iklim şartları, yüzey şekilleri, tektonik hareketleri ve yasalarla bağlayıcı olan standartlarına göre şekillenmektedir. Bu çalışmada Kızılay'a ait olan soda fabrikasının yapı türünün çadır, konteyner veya klasik yapı seçeneklerinden en uygun olanı kar, yağmur, rüzgar yükü analizleri ve maliyet kıyaslamaları yaparak belirlenmektir. Seçilen yapı türünün tasarımı ve yapısal analizleri TS 498 Yapı Elemanları Boyutlandırılmasında Alınacak Yüklerin Hesap Değerleri Standartı göz önünde bulundurularak SAP2000 programında gerçekleştirilmiştir. Her bir yapı türünün tasarımı yapılarak; kar, yağmur ve rüzgar yükleri analizleri sonucunda maruz kalacağı deformasyon hesaplanmıştır.
Anahtar Kelimeler: Depolama, konteyner, çadır, klasik yapı

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Mechanical Behavior Of Concretes Containing Macro Synthetic Fibers And High Strength Steel Fibers

Fatih ÖZALP[1]

Abstract

In this study, four different concrete mixtures were prepared, one plain concrete, one macro synthetic, and the other two normal strength and high strength steel fibers added. The slenderness (L/d) and length (L) of the steel wires used in the study are the same, L/d = 65 and L = 60 mm. The macro-synthetic fiber is of polyolefin origin and L/d=100 and L= 50 mm. In the concretes produced, steel fibers were used at the same rate as 78.5 kg/m3 (1%), macro synthetic fiber 9 kg/m3 (1%). Some properties of concretes in the fresh and hardened state were investigated. With the addition of fiber, there was a slight decrease in the slump values of all concrete mixtures in the fresh state and the workability of the concretes decreased. In the hardened concrete properties, the compressive strength of the concretes did not change much with the addition of fibers. Significant increases were obtained in bending strength, splitting tensile strength, and especially fracture energies. With the addition of synthetic fiber, normal strength steel fiber and high strength steel fiber, the flexural strength of concrete reached 1.2, 2.4, and 3.3 times that of plain concrete, respectively. Splitting tensile strengths reached 1.3, 1.9, and 2.1 times that of plain concrete, and fracture energy values reached 37, 79, and 107 times that of plain concrete, respectively. Water absorption tests were also carried out to determine the permeability properties of concrete. It was determined that the fiber addition did not have a significant effect on the water absorption properties of the concretes. When all the mechanical behavior results obtained in the tests are evaluated together, it is understood that the addition of fiber is very effective in improving the mechanical properties of concrete and higher mechanical properties can be obtained by using high-strength steel fiber.

Keywords: Steel Fiber, Macro Synthetic Fiber, Mechanical Behavior, Fracture Energy, Permeability

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Performance of Autonomous Vehicles on a Bottleneck: A Simulation Study with SUMO

Mehmet Nedim YAVUZ[1]
Halit ÖZEN[2]

Abstract

In recent years, the implementations of intelligent transportation system (ITS) have been increasing thanks to the developments of computer science and information technology. One of the new technologies is the autonomous vehicles (AVs) technology and it has potential to effect traffic flow and mobility. Although it is not clear when the autonomous vehicles will place our live widely, it is expected that these vehicles have substantial impacts on road capacity, traffic safety, car ownership, mobility behavior etc. There are numerous studies to investigate these effects on traffic and mobility behavior in the literature. Most of these studies are based on simulation studies. The aim of this paper is to investigate the effects of varying penetration rates of autonomous vehicles with increased traffic volume scenarios on a hypothetical network with a bottleneck by using open-source Eclipse SUMO simulation software. It can be seen from results of simulation study; average trip duration and average delay decreased with increased of penetration rate of autonomous vehicles. Average trip duration reduced by 54% with the full penetration rate of AVs when traffic volume exceeded the capacity of the road. This reduction reached by 90% in terms of average delay for the same case. Moreover, autonomous vehicles were found to improve roadway mobility.

Keywords: Intelligent transportation systems, Autonomous vehicles, Simulation models, Eclipse SUMO

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Numerical Investigation of the Spillway Water Surface Profile Using Different Turbulence Methods

Eyyüp Ensar YALÇIN[1]
Erdinç İKİNCİOĞULLARI[2]
Nihat KAYA[3]

Abstract

Computational fluid dynamics (CFD) method is one of the current analysis methods used to study fluid motion. This method provides solutions with basic equations expressing fluid flow such as Navier-Stokes and continuity equations while calculating the flow motion. CFD method is very fast in getting results since it can evaluate many hydraulic parameters together. With the development of computer technologies, CFD analyzes, which provide researchers with significant savings in terms of time and economy, are used effectively in the field of hydraulic engineering as in many other fields.

In this study, it is aimed to verify the spillway experiment results obtained from the literature by CFD method. Flow-3D software was used in the analyzes carried out within the scope of the study. In order to see the effect of turbulence method and mesh on the results, the most ideal mesh and turbulence model were tried to be determined by using five different mesh and four different turbulence models (RNG, LES, k–e k–ω). As a result of the analyzes made, it was observed that the Mesh-4 was the most ideal solution network. According to different turbulence models, it was observed that the LES (Large Eddy Simulation) turbulence model gave the most compatible results, and the error rate between the experimental and numerical results was around 4.5%.

Keywords: Computational Fluid Dynamics (CFD), Flow-3D, Spillway

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Influence of Cellulose Nanocrystals and Nano Silica on Mechanical Performance of Cement-Based Materials

Ali Satar Jaber AL-ASKARY[1]
Didem OKTAY[2]

Abstract

Nanomaterials are used in various fields to enhance the material properties. In recent years, eco-friendly and nanomaterials have been widely used in concrete technology. By considering the developments in this field, the effects of using cellulose nanocrystal (CNC) and nanosilica (NS) on the mechanical performance of cement-based materials have been investigated within the scope of this experimental study. Cement mortars were prepared with the inclusion of 0.25%, 0.50%, and 0.75% wt. with a 0.5 w/c ratio for NS groups, and similar contents for CNC groups. compressive strength, flow table, and water absorption tests were performed with 7 different mixtures in order to examine the influence of different type and amount of nanomaterials. The flow table results showed a decrease in flow diameter with the increase of CNCs. NS has decreased the flow diameter but did not cause a significant change compared to CNC conclude that NS has low effectivity in low quantities, which requires higher NS amounts to show an influence on the flow table. A compressive strength test was used for 3, 7, 28, and 90 days, the results for CNC concluded that increasing CNC content in the mixture increased the compressive strength where it showed high compressive strength in 0.75% dosage. Similarly, NS inclusion showed higher compressive strength in 0.75% content. The absorptions test results showed that increasing CNCs content led to the absorptivity increasing, while the void content showed decreasing. NS results in absorptivity showed stable results, at the same time, the void ratio decreased only in 0.50% dosage. The detailed results of this study will be shared as the study proceed.

Keywords: Nanosilica (NS); Cellulose Nanocrystals (CNC); Cement-based materials; Compressive strength; Workability; Water absorption.

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Temperature on Global Climate Change: The Case of Ankara

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Mehmet Furkan ÇELİK[2]

Abstract

Global climate change is just one of the most important and up-to-date issues in today's world. Increasing greenhouse gases and fossil fuel consumption, especially since the industrial revolution, have triggered the increase in temperature worldwide. Global climate change has many negative aspects such as the shortening of the time between the transitions of the seasons, the inability to grow agricultural products grown in a certain region, and floods and overflows. The increase in temperature, which is one of the climate parameters, directly affects climate change negatively. After the first half of the 19th century, especially since the 1980s, when urbanization increased, temperature values tend to increase perceptibly. Many studies on climate change indicate that temperatures around the world will rise between 2°C and 4°C by 2100. With the increase in greenhouse gases throughout the world, it is expected to have more tragic results in the next century than today. In this study, a trend analysis of the temperature values obtained from the data of a total of 7 stations belonging to Ankara region, Beypazarı, Esenboğa airport, Etimesgut airport, Kızılcahamam, Nallıhan and Polatlı stations belonging to Ankara province was carried out from the General Directorate of Meteorology. Mann-Kendall and Innovative Trend Analysis tests were applied in the study. Analyzes were made separately as annual total temperature and seasonal total temperature. As a result of the study, although there are more significant results in the innovative trend analysis test, there is an increasing trend in temperature values both on a seasonal and annual basis compared to both tests in general.

Keywords: climate change, trend analysis, mann-kendall, temperature, ankara province

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Quantity Increase in FIDIC Red Book and Public Procurement Contracts Law

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Abstract

The forms of the International Federation of Consulting Engineers (FIDIC) are based on common law concept, and they are widely used throughout the world. Public works contracts in Turkey evolved through civil law. The contracts signed by contractors and contracting authorities are based on Typical Contract for Public Works which is an appendix of tender documents. Implementation of contracts in Turkey is rigidly regulated by Public Procurement Contracts Law (PPCL) and Turkish Law of Obligations. Turkish Public Procurement Law Article 3 allows use of FIDIC contracts provided that international credits are used. Administration of FIDIC forms in Turkey will be affected by incorporation of supplementary rules and contradiction with mandatory rules. The FIDIC Red Book form is a remeasured contract to deal with variation of quantities. PPCL and secondary regulations involves rigid provisions for increase in quantities. In the probability of excessive quantity increase, some risks such as termination of contract may come into picture. Even, contractor may not be entitled to remedies to loss of profit and damages. Therefore it is possible that some mandatory rules may ruin the balance between employer and contractor in local applications of FIDIC forms. This paper studies the provisions of the FIDIC Red Book within the context of the PPCL to evaluate such problems.

Keywords: FIDIC Red Book, Turkis Public Procurement Contract Law, Quantity Increase

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Effects of Portland Cement Replacement on the Fresh State Properties and Long-Term Strength Performance of Calcium Aluminate Cement Mortars

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Muhammer KESKİNATEŞ[2]
Burak FELEKOĞLU[3]
Kamile TOSUN FELEKOĞLU[4]

Abstract

Calcium aluminate cement is generally preferred in applications where rapid setting ability, high early strength development and resistance to chemical attack are required. However, the long-term strength development of calcium aluminate cement may cause durability problems in the long-term depending on environmental conditions due to the occurrence of transformation reactions. In addition, the high cost of materials compared to Portland cement limits the application areas of Calcium aluminate cement. In order to propose a solution to the above-mentioned problems, blended mortar mixtures were prepared by replacing Calcium aluminate cement with variable amounts of Portland cement within the scope of this study. With the use of additives, it is aimed to improve the fresh state properties of calcium aluminate cement and to eliminate the long-term strength problem. The fresh state properties such as spread flow, consistency and rheological behavior of these mortars with additives were determined and compressive strength development of mortar specimens up to 400 days were investigated under semi-dry curing conditions at 20±5°C and 60±20% RH. As a result, by adding Portland cement to the calcium aluminate cement in certain proportions, a repair mortar material exhibiting higher consistency and shorter setting time was obtained. Similar long-term compressive strength values were obtained with 20% Portland cement replacement compared to that of 100% Calcium aluminate cement mortars. With the addition of Portland cement, the fresh and hardened properties of calcium aluminate cements are improved; At the same time, calcium aluminate cement mortars have become preferable with the decrease in high material costs.

Keywords: calcium aluminate cement, portland cement, rheology, strength

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Trend Analysis of Somali Precipitation Data

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Abstract

Since the industrial revolution the World's rapidly increasing global climate change has affected many countries in the World. This change include precipitation and temperature. These climate change also affected in Somalia. In this study 10 precipitation stations in Somalia were examined for annual and seasonal precipitation trends between (1981-2019). They were analysed using different methods. Firstly, absolute homogeneity (Pettit, SNHT, Buishand and Von-Neuman) tests were applied to the annual and seasonal precipitation data, and it was tested whether there was a change in the stations over time that was not dependent on the climate. Afterwards, Mann-Kendall, Sen's slope and Sen's innovation trend methods were used to examine precipitation trends. As a result of the study, three stations became 2nd case (non-homogeneous), while the rest of the seven stations became 1st case (homogeneous). According to Mann-kendall and Sen's slope tests, decreasing trends of four stations were determined. Also, increasing trends for two stations were determined. However, different slopes were observed for low, middle and high according to the innovation Sen test. During this study, the impacts of climate change were revealed regions in Somalia. Apart from that, drought formations of the ten stations has been analysed both annually and seasonally by using the Standardized Precipitation Index (SPI). After the analysis different drought classes were found.

Keywords: Mann-kendall, Innovative Sen Method, Drought, SPI, Somalia

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Free Vibration of a Heavy Column with an Intermediate Support and End Mass

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İrfan COŞKUN[2]

Abstract

This study presents the free bending vibration of an axially loaded standing uniform column with an intermediate support and an eccentric rigid end mass. The column's own weight and the mass moment of inertia of the end mass are accounted for in the analysis. It is well-known that the natural frequencies of flexural vibration decrease when the axial load is compressive. To maintain the dynamic properties of a column under axial load and tip load, an additional rigid or elastic support may be atteched within the column span. This additional intermediate support does not only hold the column firmly, but is also employed to improve the structural performance, such as reducing the excessive lateral deflection or raising the natural frequencies. In the analysis, the equation of motion with variable coefficients and associated boundary conditions are carried out by using Bernoulli-Euler beam theory. Assuming a harmonic solution in time, these equations which govern the motion for linear modes of the column are obtained. Then, this system is analytically solved by using the Frobenius method, and natural frequencies are numerically calculated from the roots of characteristic (frequency) equation. The influence of the rotary inertia and/or eccentricity of the end mass and the location of the intermediate support on the natural frequencies is examined and some of the results are presented in the form of tables and plots.

Keywords: Natural frequency, Uniform column, Axial load, End mass, Intermediate support

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Effect of Marble Powder Additive on Physical and Mechanical Properties of Zeolite-Based Geopolymer Mortars

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Abstract

In the production of geopolymer, industrial wastes such as fly ash and blast furnace slag can be used as binders, as well as natural resources such as natural kaolin, zeolite and red mud. In this study, the physical and mechanical properties of zeolite-based geopolymer mortars with marble powder were investigated. A binder was formed by adding marble powder at the ratios of 10%, 20% and 30% by weight into the zeolite. The binder formed in zeolite and marble powder has been activated with sodium hydroxide and sodium silicate. The mixture consisting of zeolite, marble powder and basalt aggregate, activator and water was mixed in the mixer. Prepared geopolymer mortars were placed in molds with dimensions of 40×40×160 mm. Mortar samples were kept at the activation temperature for 24 hours at 95 °C, 105 °C and 115 °C. The samples were removed from the molds and then stored at room temperature for up to 28 days. Then, ultrasound pulse velocity, unit weight, porosity, water absorption ratio, compressive strength and flexural strength were performed on the samples. As a result of the experiments, 6.9 MPa flexural strength and 17 MPa compressive strength were determined in the samples that didn't contain marble powder. On the other hand, 8.5 MPa flexural strength and 25 MPa compressive strength were determined for samples containing marble powder. It has been determined that the increase in activation temperature and the addition of marble powder cause an increase in strength in the samples.

Keywords: Geopolymer, zeolite, marbel powder, flexural strength, compressive strength

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Cost Optimization of Reinforced Concrete Structures Based on Genetic Algorithm

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Abstract

In recent years, the use of deterministic and heuristic optimization methods in civil engineering applications has become one of the prominent research issues. Dealing with the design problems encountered in civil engineering by considering various optimization methods paves the way for more economical designs compared to traditional design. Additionally, it provides an advantage in terms of sustainability also as it saves materials amount. For this reason, optimum design of structural elements has become more important day by day for the environmental reasons. Within the scope of this paper, an optimization algorithm was prepared for cost optimization of two-dimensional reinforced concrete frame systems. The genetic algorithm method preferred in this paper is a metaheuristic optimization method inspired by evolutionary biology. This method is frequently preferred in research articles dealing with structural engineering applications. Structural analysis result, which constitute the inputs of the optimization algorithm, were obtained by using the Open Application Programming Interface (OAPI) as an interoperability tool offered by SAP2000. SAP2000 OAPI tool was used through MATLAB software where genetic algorithm functions were coded. The use of SAP2000 software in optimization algorithms expands the scope of the optimization algorithm in terms of design flexibility. In addition, it provides automatic iterative analysis. For these reasons, it is preferred in optimization algorithms made in recent years. In the design of reinforced concrete elements, the design conditions in the TS500 standard were considered as the constraint function of the optimization. The prepared optimization algorithm was examined on a numerical example. As a result of the numerical study, it has been seen that the optimization algorithm prepared has a high convergence speed and is quite close to the exact solution depending on the termination condition considered.

Keywords: SAP2000 OAPI, Optimization, Genetic Algorithm, Reinforced Concrete

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Beton Gradasyonu ve Lif İçeriğinin Betonun Mod-I-II Karışık Mod Geçişi Kırılma Davranışına Etkisin

Yousra Mustafa
Abdussamet Arslan

Özet

Bilindiği gibi, liflerin betona eklenmesi betonun özelliklerini değiştirir. Çelik lif, betonda en sık kullanılan liflerden biridir. Kırılma parametrelerini tahmin etme yöntemleri ise, değişen dayanımlara sahip çelik lifli betonun (SFRC) kırılma davranışına bağlı olarak değişiyor.

Bu çalışmada, çelik lifli beton (SFRC) kırılma davranışını, (70 mm 140 mm 550 mm) boyutlarında, 3 farklı beton sınıfı (C40, C80 ve C120), 4 farklı Çelik lif oranı betonun ağırlığına göre yüzde (0.0, 0.75, 1.50 ve 2.25) ve 4 farklı çentik mesafesi kirişin mesnete doğru 0, 40, 80 ve 120 mm uzaklıkta 45 mm boyunda, 48 farklı deney numunesi üzerinde. Üç noktalı eğilme testleri kullanılarak incelenmiştir.

Bu çalışmanın temel amacı, değişen lif oranlarına ve basınç dayanımlarına sahip mikro lifli betonlarda mod-I ve mod-II kırılmalarının mekanik performansını belirlemektir. Çentik merkezden yana hareket ettirilirken mod-I'den II'ye geçişin kırılma özelliklerinin araştırılması amaçlanmıştır.

Sonuç olarak çentik merkezden uzaklaştıkça kırılma enerjisi artar ve çentik doğrudan merkezdeyken, kırılma tipi mod I'dir, ancak çentik yana doğru hareket ettikçe, kırılma türü karışık moda geçer.

Anahtar Kelimeler: Çelik lif, yüksek dayanımlı beton, eğilme testi, kırılma mekaniği

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Influence of Hydroxy Gas Introduction on Performance and Soot Emissions of a Diesel Engine

Ali Can YILMAZ[1]

Abstract

This experimental study aims to reveal the effects of hydroxy gas (HHO) introduction in diesel fuel on brake mean effective pressure (bmep) and smoke opacity (soot) of a single cylinder diesel engine. HHO is a special gas derived from electrolysis of an ionic aqueous solution (potassium hydroxide, KOHaq) via a custom made 316L stainless steel electrode. HHO gas was fed through the inlet manifold as supplementary fuel at a mean flow rate of 2 L/min while the diesel fuel was directly injected into the combustion chamber of the engine which has not undergone any further modification. The custom HHO feeding system, designed and manufactured by the author, required no storage tanks for the gas as it was introduced in the cylinder as soon as it was produced in the reactor. The KOH ratio in aqueous solution was fixed to 2% by mass due to dramatic reduction in overall electrical resistance and extreme increase in voltage supplied by the 12V DC battery when this mass level was exceeded. HHO gas possesses monoatomic structure which triggers rapid combustion and thanks to rapid burning rate, low ignition energy, higher lower heating value (Hu) than diesel fuel and very wide flammability limits within wide equivalence ratio (Φ) range, HHO addition in diesel fuel yielded an average increment of 10.51% in bmep and an average reduction of 13.72% in soot formation compared to neat diesel fuel. It is understood that HHO introduction in diesel fuel depicts promising results in terms of performance and soot emissions which can be challenging issues for diesel engines especially at high loads.

Keywords: Hydroxy gas, diesel engine, soot, brake mean effective pressure

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Damage Detection in Mechanical Structures via Transmissbility Concept

Hakan UÇAR[1]

Abstract

During their long life, mechanical structures experience several dynamic loads due to the excitation of the machinery. These loads lead to excessive vibration on the structure and may cause structural damage or even possible failure afterwards. As a consequence, it is critical to develop methods that can simultaneously detect the existence of damage prior to failure. In this paper, a damage detection method via transmissibility concept is presented. Transmissibility concept covers the measured transmissibility between the selected points on the structure and requires the external forces as the inputs and vibration quantities by sensors attached on the structure. As a case study, an analytical study along with transmissibility concept is conducted on a three-degree-of-freedom model. The results indicate that damage on the model are detected properly.
Keywords: damage detection, transmissibility, three-degree-of-freedom

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Development of Weldless Fence Gate with High Corrosion Resistance

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Mustafa Türker UZUN [3]

Abstract

The use of resources in the production and assembly of fence doors harms human health, nature and the environment. Especially in the most preferred galvanized material in the market, the burning of the galvanized during welding; It changes the chemical properties of the material and weakens its corrosion resistance, leading to rust. It creates an additional cost with the need for additional coating to eliminate the damage caused by the weld, even if it is small. Materials such as welding wire, energy, welding machine, welding tubes, post-weld grinding products used for welding also increase costs. The welding process is open to mistakes due to the human factor, but it also increases the workmanship.

In this study, it is aimed to design a weldless fence gate with high corrosion resistance, easy and fast assembly. It is aimed to increase corrosion resistance by manufacturing all kinds of metal and non-metallic products, since the fence gate design is non-welded and there is no need to subsequently galvanize the frame parts consisting of four profiles thanks to the plug-in apparatus. Thus, it will be possible to provide strength without the use of welding with connection apparatus and to manufacture a disassembled system that is easy to apply with less labor in a short time.

The developed fence door design consists of 1-high security post, 2-panel anti-flexing top fastener, 3-panel anti-flexing top fastener, 4-profile-panel connector, 5-door bollard and 6- square profile corner connector. It basically consists of six parts. Static analysis was performed on the designed weldless door system in St-37 material, by applying a load of 1300 N/m2 in the SolidWorks simulation program. The adjusted value of 1300 N/m2 is the force magnitude corresponding to a wind speed of 150 km/h. The mass of the product is 18.63 kg. The maximum stress was measured as 64.516 MPa (64.516 MPa<235 MPa below the yield value of the material). As a result of the applied load of 1300 N/m2, a maximum displacement of 1.679 mm was observed in the door system. It has been determined that this amount of displacement is predominantly in the middle sections of the door.

Keywords: Fence gate, mechanical design, static analysis, welding, corrosion

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Development of in Cabin Temperature Sensor for Vehicles

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Abstract

The purpose of the study is design and development of low cost in cabin temperature sensor for automotive applications. Current sensor located inside a duct behind a grill on dashboard to protect thermistor from driver knee and hand impact. This architecture requires air intake from cabin with additional blower and electronics control it which increases part cost. In proposed architecture, a thermistor covered by small thickness plastic to be located directly at cabin interior surface. In concept definition step, new location alternatives (on roof, instead of grill on dashboard, on fuse cover plastic above H point level in Z) compared by Pugh method considering style, ease of assembly, minimum integration investment, minimum calibration requirement and ECE21 safety risk. Fuse cover defined as a best location thanks its minimum investment requirement. Air temperature profile of various cabin locations measured during cooldown and warm up conditions. Fuse cover location gives similar temperature profiles with current grill location in each testing conditions. Response time becomes the critical performance especially when air circulation inside the cabin is very slower. In design/development step, geometry of cover, filling material and type of the NTC optimized with Design for Sig Sigma method to obtain efficient heat transfer. Increasing heat transfer surface area of plastic cover by oval shape and decreasing oval diameter are calculated as most critical design parameters. With optimized design, %5 accuracy increase and 7.5 db signal to noise reduction to be achieved together with -%60 cost reduction achievement.

Keywords: In Cabin Temperature Sensor, Design for Sig Sigma, Response Time, Heat Transfer, Cost Reduction

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Frequency Analysis and Geometric Optimization of Built-in Oven Carrier Elements

Halit AKDOĞAN[1]
Hamdi TAPLAK[2]

Abstract

Smart ovens produced with the latest technology of today are the latest products of this development and prove how much technology has developed from wood ovens to the present. One of the most important issues to be considered in built-in ovens is the problem of vibration and noise. The main reasons for this are that the motors create vibration and noise when they run. Preventing this problem is important both for the operation of the oven and for the comfort of the user.

In this study, the vibration and noise problem of the household electric built-in oven will be examined with theoretical and experimental studies. Vibration is defined as the repeated movement of objects relative to a fixed reference axis or a nominal position (equilibrium position). Vibration is a ubiquitous concept that affects the structure of engineering desings. Vibration types can be the deciding factor for engineering desings. Preventing vibration will help eliminate the noise problem. One of the methods of detecting vibration is finite element simulations. Accurate analysis result will guide in determining the desing. According to the simulation results to be obtained, the shaping of the sheet metal parts to be used in the built-in oven helps to determine both vibration, noise and rigidity. The ovens thats work quiter, increases quality perception.

Keywords: Vibration, Built-in Oven, Analysis, Noise, Sheet Metal

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Application of NiTi Coatings on Implant Material Cp-Ti Substrates Using by RF Magnetron Sputtering Method

Mehmet POYRAZ

Abstract

The aim of this study; It is the improvement of the friction and wear properties of commercially pure titanium (Cp-Ti), which is widely used in medical implants and has a high unstable friction coefficient. For this reason, NiTi film coatings on Cp-Ti substrates at different substrate deposition temperatures were coated using Radio Frequency Magnetron Sputtering Technique. In the literature, it has been observed that NiTi coatings can transform the applied stress into elastic deformation, give low hardness to the implants, and are sticky and biocompatible as implant materials. For this reason, it was preferred to use NiTi films as coating material in this study. In the studies examined in the literature, it has been seen that additive coatings such as Ag are added in varying proportions to NiTi coatings in order to improve their friction and wear properties. In this study, it was revealed how the coating friction coefficient and wear rates were affected by the changes in the substrate deposition temperature, without any other additive coating on the NiTi coating, as a result of testing at 10 mN load and 0.3 mm/s speed in the nano tribometer wear device. Chemical compositions were determined from the surface of the films after coating using the EDS detector of the Scanning Electron Microscope. In order to understand the effect of coating substrate deposition temperatures on the changes in the structural properties of the films, X-Ray diffraction measurements were carried out at room temperature using the XRD device. As a result of the study; It was determined that NiTi films deposited on Cp-Ti substrate at a substrate deposition temperature of 300 ºC gave the lowest friction coefficient and wear rate, and it was determined that the film structure became crystalline from amorphous compared to coatings deposited at room temperature. This study, which can be an alternative to previous studies made by adding additives such as Ag to NiTi films in which friction properties are improved, is important in terms of showing that tribological properties can be improved again by simply increasing the substrate deposition temperature without using additive coatings during NiTi coatings.

Keywords: Tribology, Friction, Wear, NiTi Film Coating

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Damping Behavior of Rubber/metal Compound Material Under Impact

Sefa ÇİNDİR[1]

Abstract

In this study, vibration analysis of metal/rubber composite materials bonded with the same type of adhesive under different impact loads is discussed. The general purpose finite element code ANSYS (2018) was used for our finite element models. All six types of materials: copper, steel, aluminum, rubber type A, rubber type B, and our adhesive are all assumed to be linear elastic isotropic materials. In our models with the same type of adhesive, all materials are prepared in the same geometric structure. The results show a good correlation between the experimental findings and the numerical results of the proposed models. For model 6082Al/Type A rubber/6082Al, the natural frequency is 854.88 Hz, the model result is 882 Hz; For 6082Al/Type B rubber/6082Al it is 653.17 Hz, model result is 622 Hz. For the CU/Type A rubber/CU model, its natural frequency is 660.75 Hz, the model result is 882 Hz; For CU/Type B rubber/CU it is 582.37 Hz, the model result is 622 Hz. The natural frequency for the 1040/Type A rubber/1040 model is 831.03 Hz, the model result is 882 Hz, for the 1040/Type B rubber/1040 it is 538.68 Hz, the model result is 622 Hz. The frequencies for our Type A rubber/ Type A rubber/ Type A rubber models are 136.89 Hz, 122.96 Hz, 128.18 Hz, respectively, and the model result is 198 Hz. For our Type B rubber/ Type B rubber/ Type B rubber models, the frequencies are calculated as 28.91 Hz, 24.56 Hz, 20.2 Hz, and the model result is 382 Hz. In the model, which material is rubber B the margin rubber is high and we accept this as a model error.

Keywords: Rubber, copper, aluminum, steel

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The Effect of Blade Structure and Position in the Radial Fan Impeller

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Abstract

Blowers are employed in different industrial applications, air conditioning and residential heating-cooling systems. It is desired that the energy consumption and noise levels of the fans are low, their efficiency and the pressure difference value obtained for the same flow rate values are high. In this study, a numerical investigation on the fan performance is conducted by using the blade structure and their positions in the impeller. In order to decide on the aerodynamic blade structure to be used in the analyses, four different aerodynamic blade profile were considered in the computational fluid dynamics (CFD) analysis. The velocity and pressure distributions of each blade structure were obtained by using CFD computations. Lift coefficient for each blade profile were also calculated. Selected wing structures were placed in two different ways according to the trailing edge direction. Thus, five different fan design CAD models were created using aerodynamic blade structures and flat radial blade structure. The same numerical modeling was made for all designs and the effect of the blade structure and ıts position, even if the same blade structure is used, on the result has been examined. When the results were compared, it was concluded that by changing the blade structure and its position, higher pressure values can be obtained for the same flow rates, thus reducing the energy consumption and noise level.
Keywords: Radial Fan, Blade Profile, Trailing Edge, CFD, Energy Efficiency

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Behavior of Plain, Interply and Intraply Angled Glass/Carbon Hybrid Composites Under Tensile Load

Mehmet Çağrı TÜZEMEN[1]

Abstract

In recent years, the use of composite materials has been gradually increasing in areas requiring high technology such as defense and aerospace industry. In line with the increasing needs, hybrid composites were needed as well as plain composites. While studies on interply composites are increasing, there are limited studies on intraply composites. In this study, the behavior of plain glass fiber, plain carbon fiber, interply glass/carbon fiber composite, and angled intraply glass/carbon composites under tensile load were investigated. The models are designed using unidirectional fiber composites in four layers. The fiber direction is adjusted to be in the same direction as the force. While the same fiber is used in each layer in plain composites, it is designed to be one layer of glass and one layer of carbon fiber in interply composites. In angled intraply hybrid composites, both glass and carbon fiber are used together in the same layer. It is designed with 15°, 30°, 45°, 60°, and 75° angles between the joints in intraply hybrid composites. Fixed support from one end and tensile force from the other end was applied to the models. To make the results of the finite element analysis independent from the mesh structure, a mesh optimization study was carried out. The Tsai-Wu failure criterion was taken into account in the analysis. According to this criterion, the specimen that could withstand the highest tensile force without being damaged was found to be the plain carbon fiber composite. In the interply hybrid composite, a tensile force was found between the plain composites that formed it. In the intraply composites, on the other hand, there was a decrease in the highest tensile force it could withstand due to the fiber discontinuity at the joints.
Keywords: Interply/Intraply hybrid composites, mechanical properties, finite element analysis, unidirectional composites.

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Topology Optimization Design for Additively Manufactured Parts Based on Random Vibration

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Oğuzhan YILMAZ

Abstract

Additive manufacturing methods are used in many important industrial areas due to the flexibility in design and the ability to manufacture parts made of multiple materials. Since this technology has entered our lives, the design approach has also been changing. The response of structures used in engineering under the influence of static and dynamic forces has a great importance in the design phase. Topology optimization comes into play in this direction. Thanks to optimization studies, it is possible to produce parts with complex geometry, light lweight and desired mechanical properties.

During the cruise of the sea vehicles, many loads are placed on the structure. Vibrations caused by these loads are inevitable. Mechanical vibrations have negative effects on the working performance of antennas and antenna subsystems in marine vehicles. With the additive manufacturing method, it is possible to manufacture complex geometry radar antenna structures and connection brackets.

While examining the mechanical properties of the parts produced by additive manufacturing in the current literature studies, it has not been emphasized how it behaves when exposed to dynamic loads.

In this study, antenna bracket structures were produced by additive manufacturing. Topology optimization is used to minimize the vibration loads that the antenna is exposed to under operating conditions and to lighten the weight. Modal, harmonic, random vibration and shock analyses were carried out using dynamic loads defined in military standards. According to the results of these analysis studies, topology optimization studies wre carried out.

Keywords: Additive Manufacturing, Random Vibration, Topology Optimization.

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State Feedback's Gains Limitations with Routh Hurwitz Criteria for Controling Rotary Inverted Pendulum

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Ulaş BELDEK[2]

Abstract

Rotary Inverted Pendulum is well-known test equipment and it has several real-time applications such as transportation vehicles, rocket and missile systems, and aircraft landing systems. However, Rotary Inverted Pendulum with its nonlinear characteristics and unstable structure is an important control problem. As is an underactuated system its joints outnumber its actuators and in addition, sustaining the pendulum in an upright position motionless requires controlling this system at an unstable equilibrium point. Due to the underactuated structure the system possesses, this control task is a hard control problem. For this reason, several control strategies have been developed for Rotary Inverted Pendulum. In this study, a control algorithm used to control this pendulum is state feedback. Initially, the nonlinear mathematical model of the system is obtained with Lagrange Euler Method. Secondly, due to the mathematical model linearization operation is performed in order to obtain the linear model of the system that corresponds to an unstable equilibrium point when the pendulum is motionless at an upright position. After this step, state feedback control is applied to the linearized system and the characteristic equation of the controlled system is achieved. Finally, the Routh Hurwitz method is applied to the characteristic equation to obtain inequalities that give limitations and bounds about the state feedback gain values.

Keywords: Rotary Inverted Pendulum, Routh Hurwitz Method , State Feedback Control, Nonlinear System Equations, Linerization

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Design and Optimization of an Axial Flow Gas Turbine Stage

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Halit KARABULUT[3]

Abstract
Gas turbines are power machines used in aerospace and other industrial fields, converting chemical energy into mechanical energy and providing uniform power. Gas turbines produce thrust or shaft power according to the area they are used. Improving the thermal efficiency of these machines due to high-capacity power generation saves a great deal of energy. The aerodynamic design of turbine blades significantly affects the efficiency of the gas turbine. The blades in gas turbines enable the energy of the fluid coming from the combustion chamber to be converted into mechanical energy. Turbine blades are divided into two type as radial and axial according to the flow direction. In this study, an aerodynamic design of an axial gas turbine stage is performed. Initally, the overall dimensions of the turbine blades and turbine stage were determined by the one-dimensional mean-line method. Then, the flow occurring at mid-blade height is assumed to be uniform throughout the turbine stage and the losses to occur in the turbine stage are determined using the Soderberg correlation. After the preliminary design, the changes in the radial direction of the flow were calculated by the constant reaction degree method. Thus, three-dimensional effects were taken into account in the design of the turbine stage. Different blade profiles were designed for rotor blades, the changes in flow coefficient and loading coefficient depending on these profiles were calculated and their effects on turbine performance were investigated. In addition, the changes in power, torque and efficiency obtained from the turbine stage were investigated by changing the rotor entry angle, axial cord length and pitch spacing. Turbine power was determined to be 6.68% higher in the stage design, which was made by taking into account the radial flow effects, compared to the case when the radial flow effects were ignored.
Keywords: Gas turbine performance; Blade optimisation; Blade profile design; Mean-line flow design; Turbomachinery.

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Evaluation Effects of Gurney Flap Structure on Airfoil Aerodynamic Characteristics

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Cuma KARAKUŞ[2]
Sevgi ASLAN[3]

Abstract
In this study, the effects of the Gurney flap structure on NACA 0012 airfoil aerodynamic characteristics were investigated in 2 dimensions (2D) by Computational Fluid Dynamics (CFD) program. The Reynolds Number which is determined according to chord length was a constant value as $1{,}0 \times 10^6$ in all done analyses. There were used 7 different angles by increasing the angle of attack (α) by 3° between 0°-18°and were used 6 different angles by increasing the Gurney flap angle (θ) by 15° between 0°-60° and 90°. The Spalart –Allmaras(S-A) and the SST k-ω turbulence models which were often used in aerodynamic applications were used and the results were compared with available literature studies. The coefficient of correlation was examined to the understanding relationship between the lift coefficient of experimental data and the lift coefficient of used turbulence models. According to the result, the coefficient of correlation which is between the data of the SST k-ω turbulence model and experimental data is generally too close to "1" and the average correlation coefficient of SST k-ω and S-A turbulence models is 0.975, and 0.961 respectively. The using SST k-ω turbulence model is a better choice than the S-A turbulence models. The reference airfoils have less lift coefficients than Gurney flapped airfoils. θ angle is another parameter that is examined. According to the results, the maximum value is 50 in SST k-ω which cases θ=30° and θ=90° at α=6°. The case of θ=90° has more than θ=30° so it can be a true argument which is θ=90° is the most efficient mounting angle.
Keywords: Gurney Flap, Computational Fluid Dynamics, Turbulence Model, Airfoil, Aerodynamic

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Effects of Sol – Gel Process Parameters on HA/rGO Coatıngs of Metallıc Implants

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Abstract

Nowadays biocompatible biomaterials, which are increasingly used, and implants placed in the body to support the tissues or organs in the human body and to fulfill their functions are in contact continuously with body fluids. Therefore, improvements in mechanical properties are expected by coating the metallic biomaterial Ti6Al4V, with hydroxyapatite, (HA) which is most similar to the bone structure, due to its good biocompatibility, high strength, low elastic modulus and improved resistance to corrosion and the additive is rGO (reduced graphene oxide).

In this study, HA, a bioactive ceramic that can chemically bond with tissue as a coating material on Ti6Al4V metallic biomaterial, is doped with rGO and coated with a constant speed at 50°C, 60°C, 70°C, 80°C and 100°C and at a constant speed with sol-gel dip coating method and thin films were formed. the mechanical properties were determined by coating the samples 6 times for each temperature. The surface and mechanical properties of this coating were investigated. X-Ray Diffractometry (XRD) for the characterization of the prepared rGO-doped HA powder, Scanning Electron Microscopy (SEM) for the characterization of the formed thin films, Microhardness for its mechanical properties, Scratch wear test and Surface Profilometry analysis has been made to determine the change in the coating surface in the scratched areas. According to the analyzes made, HA was produced successfully, the coating made with the sol-gel coating was not homogeneous, the microhardness increased with increasing temperature coatings, the sample at 70°C provided the best abrasion resistance in the scratch abrasion test, and therefore the surface profilometer analysis showed the best surface properties that the same sample in the scratched area, It was determined.

Keywords: : Sol – gel coating method, HA, rGO, Mechanical properties, Coating temperatures

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Numerical Investigation of Heat Transfer and Flow Characteristics in Fluid Channels Manufactured by Friction Stir Welding Process

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Özgen AÇIKGÖZ[2]

Abstract

In electronic cooling, the use of liquid-cooled cold plates with heat load on both sides has become quite common due to the reduction in the size of the elements and the increase in the heat load per unit area. Because of its simplicity in manufacturing and low cost, Friction Stir Welding (FSW) production is frequently preferred manufacturing technique for liquid cold plates working under high pressure in recent years. For a compact design of products, mostly on two sides of the cold plate, high heat flux can need effective cooling. Therefore, the design of cold plates depending on the thermal performance and structural integrity becomes essential. For efficient cooling, all fins are aimed to be in contact with the heat load enabling low thermal resistance. In this study, a clearance between the opposite straight rectangular fins in the cold plate is left to investigate the thermal and hydrodynamic performance of the channel depending on the Re number ($270<Re<670$) and the clearance height from 0.1 mm to 1 mm. Ethylene glycol water mixture (EGW) has been used as the coolant due to the harsh environment and military conditions. As a result, it is seen that the clearance has an optimum value depending on the Re number, fin thickness, and fin height and has a positive effect on the hydrodynamic performance of the cold plate. When channel height is increasing from 3mm to 5mm, thermal resistance (R_T) is decreasing but the clearance effect on R_T/R_{T0} at 3mm is more than 5mm channel height. In the same way, the fin thickness effect on R_T/R_{T0} is more effective at 3mm channel height. All the clearances have lower pressure drop than the reference channel so thermal resistance becomes the main criterion for the selection of the optimum fin clearance in the channel.

Keywords: Friction Stir Welding, Heat Sink, Cold plate, Electronic Cooling, Two-Sided Heat Flux

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Investigation of the Effect of Different Fiber Angles on Strength Properties of Glass Fiber Reinforced Epoxy Matrix Plates Under In-Plane Load

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Abstract

In the realization of an imagined product design, it is necessary to choose a material that will meet the principles of need during the application of the relevant design. Making this material selection to meet the required capacity at the optimum level is important both in terms of ensuring reliability and cost analysis. In recent years, with the developing technology, single materials have been replaced by a new type of material consisting of at least two types of materials called composite materials. Composite materials are used in line with the needs in all sectors, especially in the automotive and aircraft industry. Composite materials provide high specific strength, high corrosion resistance, high fatigue resistance, high wear resistance properties compared to single building materials. Selection of the ideal matrix-fiber pair, production technique and optimization are also important for the formation of all these properties. Experimental applications are carried out together with analytical solutions to reach these ideal elements. By comparing the results obtained with each other, the optimum matrix-fiber pair and production technique can be reached. Deformation is not desired in a design under load. The correct determination of the material dimensions to be applied simultaneously with the material type selection is important in terms of deformation safety. In this study, deformation analyzes of glass fiber epoxy composite material plates under in-plane load were carried out for different fiber angles by taking the loading and plate dimensions constant by computer program simulation based on the finite element method. The deformation changes of the composite plate under constant load for different fiber angles were examined in tables and graphics, and the effects of fiber angle degrees on the deformation of the glass fiber epoxy composite plate were determined.

Keywords: Glass-epoxy composite material, Fiber angle, In-plane load Deformation analysis, Composite plate.

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Cold Flow Properties and Calorific Values of Biodiesel Fuels of Various Feedstocks

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Abstract

Biodiesel has a great potential for use in the transportation industry. Despite the problems negatively affecting international trade like the Covid-19 pandemic and the Ukraine-Russia war, worldwide biodiesel consumption is increasing regularly. Biodiesel can be produced from many feedstocks including edible and in-edible vegetable oils, waste frying oils, waste animal fats, algae, etc. However, since each feedstock has different physico-chemical properties, the fuel properties of biodiesels obtained from them will also differ. Although biodiesel is generally used in road transport, projects are being developed for the use of biodiesel fuels in air transport by mixing with jet fuel in certain proportions. At this point, the cold flow properties of biodiesel fuels are very critical. In general, three concepts (cloud point, pour point, and cold filter plugging point) are used to characterize the cold-flow quality of liquid fuels. The cloud point is the first temperature at which the crystal cloud, which is an indicator of the onset of freezing, is seen on the fuel surface. As the temperature drops, the crystallization increases, and consequently the fluidity of the fuel decreases. The pour point is defined as the lowest temperature at which fuel can still be pumped. The cold filter plugging point (CFPP) is the temperature at which the pumped fuel cannot pass through the fuel filter as a result of crystallization, and it is more accurate to use the CFPP value for internal combustion engines. Another critical fuel property is the calorific value. It directly affects fuel economy. In this experimental study, biodiesel fuels were produced from 11 different feedstocks and their CFPP and calorific values were compared to each other. CFPP temperatures of biodiesels were significantly different. Waste frying oil biodiesel had the highest CFPP of 9 ºC while algae, rapeseed, and hazelnut oil biodiesels had the lowest CFPP of -10 ºC. Calorific values of biodiesel fuels of different origins were so close to each other. The difference between the highest calorific value (soybean oil biodiesel) and the lowest calorific value (sunflower oil biodiesel) was about 0.95%.

Keywords: Biodiesel, feedstock, aviation fuel, cold flow, calorific value

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Using MoS2 & BN Nano Particles for Manufacturing Self-Lubrication Nanocomposites by Powder Metallurgy

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Abstract

In the present work, the dry sliding wear behavior of Al-12 wt. % Si matrix composites reinforced with single addition of 4 wt. % MoS2 or 4 wt. %BN and hybrid addition of 4 wt. % (MoS2 + BN) Nanoparticles were investigated. All Nanocomposites samples were fabricated by powder metallurgy and mechanical milling of micro powders of the base alloy (Al-12 wt. % Si) and Nanopowders of MoS2 and BN followed by cold pressing at 7 ton and sintering at 550 ºC for 180 min. Archimedes technique was used to measure the density of sintered samples and porosity calculated as physical tests of sintered samples. Pin on dram Abrasive tests were carried out at room temperature under dry sliding conditions using different normal loads and sliding times. Worn surface micrographs were investigated based on the optical and scanning electron microscopy observations of wear tracks and wear debris morphology. It has been found that the hybrid Nanocomposite with 4 wt. % (MoS2+BN) nanoparticles show the highest hardness and wear resistance than other Nanocomposites. It has been found that Nanocomposite with 4 wt. % MoS2 nanoparticles show the highest hardness and wear resistance than other Nanocomposites. It was observed that the wear rate of Nanocomposite samples increases with the increase in applied load and sliding time. But the all Nanocomposite samples showed a lower wear rate than the base alloy within the same conditions.

Keywords: Al-12 % Si, Nano composites, powder metallurgy, self-lubrication, wear resistance

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Production and Characterization of Al-B4C-Gr Hybrid Composite Material by Powder Metallurgy Method

Engin DEMİRCİ[1]
Prof. Dr. Halil ARIK[2]

Abstract

In this study, hybrid type composite material with Al 7075 matrix and B4C-Graphite reinforcement was produced and characterized by powder metallurgy method. 74 µm sub-sieve atomized Al 7075 alloy aluminum powder was used as matrix material. As a reinforcement element, 10% B4C with 16 µm sieve and HAF type carbon black at varying rates (0.16-0.50% and 0.75%) were used. After the mixing process of the matrix, composite and hybrid powders, which were weighed precisely, in the turbola device containing steel balls, powder metal block parts were produced by hot pressing. The hot pressing application was carried out for 1 hour under a pressure of 150 MPa and a temperature of 560 °C in the unidirectional axial steel mold of the powder samples. Microstructure examination, density and hardness measurements, cross fracture tests were performed on the powder metal parts produced, and the changes in the microstructure and mechanical properties of the composite/hybrid material produced according to the matrix structure were revealed.
Keywords: Powder Metallurgy, Hot Pressing, Al 7075, Hybrid Composite, Characterization

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Research of the Effects of Heat Treatment Parameters Applied to Connecting Rod on the Structure and Mechanical Properties

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Gizem KARABULUT[2]
Nuray BEKÖZ ÜLLEN[3]

Abstract

The connecting rod, which is connected to the crankshaft in internal combustion engines, carries the entire load for force transmission. The connecting rod is under the influence of multi-directional forces such as compression, tension, bending, and torsion forces from different directions. The mechanical properties of the connecting rod can be improved by applying heat treatment in order to have a long service life under repetitive loads and to have a higher and permanent performance without deformation. It is important to choose the appropriate heat treatment process and parameters in order not to encounter any negativities after the heat treatment and to obtain good results. For this reason, determining the optimum heat treatment conditions is a very important role in scientific studies. All of the main heat treatments applied to the steels are related to the transformation of the austenite phase. The type, composition, and metallographic structure of the transformation products greatly affect the physical and mechanical properties of the steel. In this review, it was investigated how the changes in the material structure of the heat treatments applied to the connecting rods made of various materials affect the mechanical properties. Studies on the subject in the literature have been examined in detail and presented in an appropriate flow.

Keywords: Connecting rod, heat treatment, structure, mechanical properties, parameters.

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The Effect of Heat Treatment Applications on the Surface and Microstructure Characteristics of Engine-Bearing Elements

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Gizem KARABULUT[2]
Nuray BEKÖZ ÜLLEN[3]

Abstract

The bearing elements are used to reduce the friction caused by the rotational movement in the engine and to fix the parts to which they are attached in the correct position. Although engine-bearing elements have similar tasks, the force factors under their influence vary. Bearing elements in the engine; is known as the main bearing, arms-bearing, and engine-bearing bush. These parts in the engine such as crankshaft, connecting rod, and piston are difficult to replace and their costs are quite high. For this reason, it is desired to protect the main parts by collecting the wear that occurs over time on the bearing elements. Therefore, bearing elements must have high wear resistance, high fatigue strength, and high hardness. These materials can be made to afford these different desired superior properties by applying heat treatment. Different heat treatments are applied to improve toughness, hardness, ductility, wear-resistance, and machinability properties, refine grain structure, and remove residual stresses. In this review, the effects of heat treatments on the surface properties and microstructure of the materials that make up the engine-bearing element were evaluated together with the studies in the literature.
Keywords: Wear, heat treatment, microstructure, hardness, engine-bearing elements.

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Welding Processes in 2024 And 7075 Aluminum Alloys and Its Effect on Properties

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Selin AK[2]
Gizem KARABULUT[3]
Nuray BEKÖZ ÜLLEN[4]

Abstract

Today, aluminum and its alloys are widely preferred in areas such as automotive, aviation, railway, and defense industries, due to superior properties such as low density, easy formability, and high corrosion resistance. The reasons why aluminum is preferred in these areas are its high strength, high ductility, corrosion and wear resistance, high electrical and thermal conductivity and easy workability. Especially in the defense and aerospace industry; 2024 and 7075 aluminum alloys are widely used due to their high fatigue strength. In general, the welding properties of high-strength aluminum alloys are not good. For this reason, parts in the aviation industry are mostly produced using riveted joints. For more effective use of aluminum alloys, it is necessary to know the weldability properties. Generally, friction stir, laser, diffusion and resistance welding methods are used for welding these alloys. After the welding process, the mechanical properties of welding parts decrease significantly due to the microstructure changes in the heat-affected zone. In this review, various welding methods applied to 2024 and 7075 aluminum alloys and changes in their mechanical and structural properties after welding are discussed. The studies in the literature were examined and arranged in an appropriate flow, and it was aimed to create a detailed resource for those who study in this field.

Keywords: 2024 alloy, 7075 alloy, welding, mechanical properties.

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Production of Fire-Resistant Pvc Nanocomposites Having Sılıca Nanotubes

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Abstract

Polyvinylchloride (PVC) is one of the mostly used thermoplastic materials in the industry. It is used in many engineering applications due to its fire resistance, chemical resistance, and mechanical properties. The fire resistance of PVC can be improved by adding various fillers. In this study, halloysite nanotube (HNT) was used to improve the thermal and mechanical properties of PVC/$Mg(OH)_2$ compounds. The compounds were produced by melt-mixing of PVC with plasticizer, magnesium hydroxide, HNT and other processing additives in an internal mixer The test samples were prepared by spraying them with a laboratory-type extruder in the form of strips. The DSC and TGA analyzes were performed to determine thermal properties of the composites. The limiting oxygen index (LOI) values and tensile mechanical properties of the composites were also investigated. All the composites having the HNT filler resulted in higher degradation onset temperatures and residues at 600 °C as well as lower degradation rates as compared to that without the silica nanotubes. These results are good indications of enhanced thermal stability and fire resistance of the PVC/$Mg(OH)_2$. The LOI and tensile strength values of the composites including 5, 10, 15 and 20 % HNT in the amount of total filler ($Mg(OH)_2$ and HNT) were found to increase in comparison with those of the composite having only $Mg(OH)_2$. On the other hand, use of only HNT instead of $Mg(OH)_2$ showed lower tensile strength and LOI values indicating that hybrid filler system involving both $Mg(OH)_2$ and HNT seems to be advantageous for enhancing thermal properties of the PVC compounds

Keywords: PVC compounds, halloysite nanotubes, limited oxygen indeks, mechanical properties.

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Ostenitik ve Ferritik Paslanmaz Çeliklerin Çözelti Tavlaması İçin Bir Kritik: Ekici-daniş Denklemleri

Hamdi EKİCİ
Fahri Serhan DANİŞ

Özet

Paslanmaz Çelikler, yüksek korozyon özellikleri ve mukavemetleri ile kullanımı her geçen gün daha çok artan mühendislik malzemesi grubudur. Özellikle mekanik şekillendirme sonrası özelliklerin muhafaza edilmesi, bu kullanımı daha da arttırır. Paslanmaz çeliklerin, genellikle son ürün kullanımı da mekanik işlemler sonrasında olur. Nihai işlemler sonrası özelliklerin muhafaza edilmesi veya geliştirilmesi, doğrudan soğuk deformasyon ve çözelti tavlaması gibi yarı mamül ön işlemlerine bağlıdır.

Bu çalışmada östenitik paslanmaz çeliklerin ana alaşımı olan AISI 304 ile, ferritik paslanmaz çeliklerin ana alaşımı olan AISI 430 temel alınarak soğuk deformasyon ve çözelti tavlaması ısıl işlemleri modellenmiş ve buradan yola çıkarak yarı mamül eldesinden sonraki nihai ürün için mekanik şekillendirme sonrası kalite sınırları belirlenip EKİCİ-DANİŞ denklemleri türetilmiştir. Yarı mamül kalite belirlemede Schaeffler diyagramları çizimi ve faz analizi için Cr-Ni eşdeğerliklerinde meta analiz kullanılmış ve buna dayanarak sertleşme kabiliyeti olarak tahmini modeller ortaya konmuştur. Sonrasında sertleşme kabiliyeti sınırı alt ve üst değerlerinde derin çekme işlemleri yapılarak portakallanma efekti, çekme dayanımları, sertlik değerleri ve uzama üzerine etkisi incelenmiştir. Soğuk deformasyon miktarından bağımsız olarak çözelti tavlaması ısıl işlem sıcaklığı-sertlik değeri korelasyonu ile proses hedefine yönelik parametre limitleri belirlenmiştir. Sonrasında türetilen denklemler AISI 316 östenitik ve AISI 410S paslanmaz çelikler ile de test edilip doğrulanmıştır.

Daha önce literatürde bulunmayan sertleşme kabiliyeti hesaplama yöntemi, EKİCİ-Daniş denklemleri paslanmaz çelik faz analizi ve termomekanik proseslerinin optimizasyonu için literatüre kazandırılmıştır.

Anahtar Kelimeler: Soğuk haddeleme, Tavlama, Paslanmaz Çelik, Faz Analizi

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Investigation of CASS test and Cycle Corrosion Test Results of Organic Coatings After Nano Coating Applied on 1xxx, 5xxx, 7xxx Aluminum Type Materials

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Abstract

Aluminum is increasing its effectiveness and frequency of use in many sectors day by day. Aluminum is an advantageous element in terms of material selection, thanks to its light weight, resistance to corrosive effects, thermal and electrical conductivity, easy formability and weldability. In particular, its alloys can have very different properties. It is decided which alloy element will be according to the environmental conditions and usage function in which it is used. In this article, 1xxx, 5xxx, 7xxx type aluminum materials used in the automotive sector, defense industry, industry and aircraft industry were used. Firstly, nano coating was applied on the materials. Afterwards, organic coatings such as cataphoresis coating, powder coating and zinc flake coating processes were applied. These processes applied are very different from each other in terms of method. The parts coated in these processes were subjected to performance tests. The first test is the adhesion test, which gives us preliminary information about whether the coating adheres well or not. After passing this test successfully, the parts were subjected to cycle corrosion test and cass test processes, and their results were compared. Results are evaluated according to the qualification times in the specifications of the cycle corrosion test and the cass test. Samples that reach the times determined by the specification are accepted as suitable. The test results of the samples that did not reach the sufficient time were accepted as unsuitable.

Keywords: Coating, aluminum, cataphoresis, powder coating, zinc flake, cass test, adhesion test, cycle corrosion test.

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Fem-Based Analysis of Safety Factor of Two-Stroke Unmanned Aerial Vehicle Engines for Different Materials

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Burak ÖZTÜRK[2]

Abstract

Today, with the development of Unmanned Aerial Vehicles (UAV) technology, the use of these vehicles in defense and social areas has increased. Engines with different cylinder numbers, fuel volume and material properties are used in these vehicles.
In particular, two-stroke engines are used in the production of low altitude (between 1000-2000m) and small scale (wingspan 1,5-5m) UAVs. These engines have an average flight time of 6 hours and a high carrying capacity.
In this study, a UAV with the world's best selling 61 cc engine was investigated in terms of safety factor and stress variations for different materials. Reverse Engineering and Finite Element Method (FEM) were used in the study. It has been observed that the single-cylinder engine, which can operate at a maximum speed of 6 hp and 7500 rpm, produces 5.69 Nm of torque in the calculations. It has been calculated that a bursting force of 325.1 N is generated on the piston during detonation. In the FEM analysis, the stress in the piston, crank and crank arm was found to be 24.3 MPa. In the light of these stress results, considering that each limb can be produced with three different materials, safety and fatigue analysis were also performed.
As a result of this research study, the researchers determined the ideal material properties and produced a prototype engine. Flight tests of this engine were carried out in 2021 with a UAV with a wingspan of 3 meters. With this research, a UAV engine that can compete with imported products has been developed within the scope of university-industry cooperation.
Keywords: Internal Combustion Engine, UAV, FMA, Reverse Engineering.

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Fabrication of hBN-PEO Based Electrohromic Device Using Sol-Gel Process

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İbrahim İNANÇ[1,2]

Abstract

In this study, electrochromic device (ECD) based on tungten oxide (WO_3) and polymer electrolyte was fabricated. The device consists of WO_3 film as electrochromic layer, polymer electrolyte as the Li+ ion conductor layer. Indium tin oxide (ITO) coated polyethylene terephthalate (PET) film was used as substrate and ITO films act as the transparent conductive electrodes. The WO_3 films were deposited on ITO coated PET substrates (0.3 Ω) by sol-gel spin coating process. Polymer electrolyte films were deposited on ITO coated PET substrates by sol-gel dip coating process. Polymer electrolyte consists of Lithium bis(trifluoromethanesulfonyl)imide (LiTFSI), Polietilen oxide (PEO), and hexagonal boron nitride (hBN) nanoparticles. We obtained optimization of thickness and homogeneity of ECD for better performance. Morphological properties of WO_3 and polymer electrolyte thin films were examined by Scaning Electron Microscopy (SEM). We sandwiched WO_3 and polymer electrolyte thin films sealing with glue. We obtained colored and bleached state by giving -3V and +3V voltage. The color of the device changes from transparent (bleached state) to deep blue (colored state). The optical transmission spectrum was measured over the range from 200 to 800 nm with a ultraviolet-visible (UV-Vis) spectrophotometer. This study presents practical and economical way of developing high performance electrochromic devices.

Keywords: electrochromic devices, polymer electrolyte, tungsten oxide, sol-gel process, nanoparticle

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Effect of Mechanical Properties on Engineered Stone by Using Different Type and Rate of Filler/Resin

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Hüsnügül YILMAZ ATAY[2]

Abstract

Composite stones, in other words quartz surfaces, are generally used as kitchen countertops, floor and wall coverings, and are a building material with high performance thanks to its technical and physical properties. In composite stones, the content of which is approximately 90% quartz and 10% resin, the voids between the quartz grains is filled with resin and filling material and cured. Thus, a composite structure that has high mechanical properties, does not absorb water and can be easily cleaned is formed. In this study, the effect of using different ratios of powder filler and resin, which fills the voids between 212-500 µm quartz grains, on the mechanical properties of the stone was investigated. Quartz and talc were used as filler.

In the first step of the study, the void ratio between 212-500 µm sized quartz grains was determined as a result of the void test. The amount of resin in the mixture to fill the voids was determined between 45-60% and the amount of filler was determined between 55-40% by volume. When the trial was made at the determined rates, it was seen that the gaps were not fully filled by filler and resin. Experiments were carried out by increasing the void ratio by 5%, 10% and 15% and using talc filler. The mechanical and physical properties of the produced plates such as surface morphology, fluxeral strength, and water absorption percentage were investigated. As the amount of filler and resin filling the voids increased, it was observed from the SEM images of the plates that the pores were closed. The amount of water absorption decreased, flexural strength increased. In the trials using talc filler, the fluxeral strength was lower and the water absorption percentage was higher than the trials using quartz filler. It has been observed that quartz filler fills the voids better than talc filler.

Keywords: Mechanical properties, engineered stone, composite stone, quartz surfaces, rate of filler/resin

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Studies on the Bioformulation of Antagonist Pseudomonas Strains Against Clavibacter Michiganensis Subsp. Michiganensis in Tomato

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Ali KARATAŞ
Eda GEYLANİ YÜZBAŞIOĞLU
Yılmaz KARABIÇAK
Recep KOTAN

Abstract

Tomato bacterial cancer and wilt disease caused by Clavibacter michiganensis subsp. michiganensis causes considerable quality and yield losses in tomato production of Turkey as well as in the world. Since there is no effective way of control against the disease, alternative control methods are still required to be developed. Biological control studies involving antagonist bacteria are successfully used in the control of bacterial plant diseases. Seven isolates out of 394 candidate antagonist isolates obtained from within the scope of the project numbered TAGEM-BS-12/09-02/02-10 carried out between 2013-2016 in Eastern Anatolia region of Turkey were effective between 75% and 97.5% against Clavibacter michiganensis subsp. michiganensis. In this study, selected seven antagonist Pseudomonas isolates (A2, A77, A119, A133, A185, A290 and A298) were identified by sequence analysis using 16s Ribosomal DNA regions. The best growth medium, temperature, pH value of these isolates and their growth potential at 37oC were determined. In addition, ability to colonize in the tomato plant of 100 mg/ml rifampicin resistant isolates of these antagonists were determined. As a result of these studies, A119 and A298 isolates were selected for bioformulation studies. These isolates were loaded on five different liquid carriers and in order to determine the longest shelf life they were kept at +4oC and room temperature. Bioformulations of A119 and A 298 isolates were stored to determine their longest shelf life at room temperature. Number 2 liquid carrier at room temperature conditions for A119 isolate; For the A 298 isolate, the liquid carrier number 3 at room temperature was determined as the formulations with the longest shelf life. This is the first stage to develope a bioformulations available usage to control Clavibacter michiganensis subsp. michiganensis. Bioproduct to be developed will be contribute to sustainable agriculture, integrated pest management and protection of natural balance.

Keywords: Clavibacter michiganensis subsp. michiganensis, tomato, biological control, bioformulations

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Evaluation of the Productivity Status of Olive Orchards Soils at Different Ages in Kahramanmaraş

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Abstract

This research was carried out to determine the fertility status of the soils of olive orchards of different ages in Kahramanmaraş province. The soils that the farmers in different regions brought from their own 58 olive orchards of different ages and from 0-30 cm depth as described to them constituted the study material. Texture, pH, electrical conductivity (EC), lime ($CaCO_3$), organic matter, available phosphorus and potassium analyzes were made in the soil samples brought. Soil analyzes were carried out in the Soil, Plant and Water Analysis Laboratory of Kahramanmaraş Eastern Mediterranean Transitional Zone Agricultural Research Institute. According to the findings, 60.34% of the investigated soils are clayey loam, 25.86% are clay and 13.79% have loam texture, 62.07% of the soils are slightly alkaline, 36.21% are neutral and 1.72% are slightly acidic and all of them were found to be in the non-saline class. It was determined that the soils of olive orchards are generally calcareous and 67.24% of organic matter contents are less than 2%. It has been detected that 87.94% of the soils are poor in available phosphorus (P_2O_5) and 87.93% are sufficient in available potassium (K_2O). As a result, the findings obtained have shown that there are nutritional problems in olive orchards in Kahramanmaraş province, and farmers do not have conscious fertilization programs based on soil and plant analysis for their gardens. For this reason, in addition to the need to increase the fertilization studies in olives and determine the doses of fertilizers to be given, producers should be aware of soil fertility and plant nutrition based on scientific foundations in order to give the necessary importance to soil and leaf analysis.

Keywords: Kahramanmaraş, soil analysis, soil fertility, available phosphorus, olive orchards.

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Comparison of Yield and Yield Components of Some Durum Wheat (Triticum durum L.) Cultivars in Eskişehir Dry Conditions

Zekiye BUDAK BAŞÇİFTÇİ[1]
Nazife Gözde AYTER ARPACIOĞLU[2]

Abstract

In this study carried out in Eskişehir dry farming conditions, yield and yield components of 8 different durum wheat (Triticum durum L.) cultivars (Amanos-97, Ceylan-95, Dumlupınar, Sarıbaşak, Altıntaş-95, Meram-2002, Fuatbey-2000, Yılmaz-98) were examined. The study was carried out at Eskişehir Osmangazi University, Faculty of Agriculture, Field Crops Department, in the research and application field, for two years in the 2014-2015 and 2015-2016 production seasons. In the study, plant height, spike length, spikelet number, grain number per spike, grain weight per spike and grain yield parameters were investigated. Years, genotypes, and their interactions, which are the year x genotypes interactions, were found to be significant in all the traits examined. According to the two-year average results, the plant height of durum wheat cultivars is 69.33-90.92 cm, spike length is 6.04-9.67 cm, the spikelet number is 7.30-12.27, grain number per spike is 24.17-36, 25 g, grain weight per spike, 1.00-1.99 g, grain yield varied between 246.33-327.50 kg/da. The results obtained in the first year in all yield and yield components examined were higher than in the second year. As a result of the research, the highest grain yield was obtained from the Fuatbey-2000 cultivar in both years. Similarly, the Fuatbey-2000 cultivar gave the highest spikelet number, grain number per spike, and grain weight per spike. According to the results obtained from the research, Fuatbey-2000 cultivar showed superior performance compared to other cultivars and were found to be more suitable for Eskişehir conditions.

Keywords: Durum wheat, yield, yield components

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Effect of Jasmonic and Salicylic Acids Foliar Spray on the Galantamine and Lycorine Content and Biological Properties in *Galanthus Elwesii* Hook

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Saadet KOÇ GÜLER[2]
Muhammed Akif AÇIKGÖZ[3]
Beril KOCAMAN[4]

Abstract

Galanthus species are of interest as bioactive compounds in the nutraceutical and pharmaceutical field. This research was conducted based on randomized complete block design with four replications to evaluate the effects of jasmonic acid (0 (water), 1% ethanol, 0.1 mg/L, 0.2 mg/L, 0.4 mg/L and 0.8 mg/L) and salicylic acid (0 (water), 1% ethanol, 0.5 g/L, 2.0 g/L and 8.0 g/L) in *Galanthus elwesii* Hook. Jasmonic acid (JA) and salicylic acid (SA) were applied by spraying on the plants before and during the fruit setting period. The total phenolic content (TPC) and flavonoid content (TFC) were determined by Folin-Ciocalteu and aluminum chloride colorimetric assays, respectively. Antioxidant capacities were evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay. The quantfication of galantamine and lycorine were identified by reversed phase-high-performance liquid chromatography (RP-HPLC). The antimicrobial activities of the volatile oils were determined with disc diffusion method. The microdilution method was used to determine minimum inhibitory concentration (MIC). Antioxidant activity, TPCs, and TFCs were the highest in the treatment of 0.1and 0.2 mg/L JA and 2 g/L SA among the tested doses, respectively. The optimum biosynthesis of lycorine was obtained in the treatment of 0.4 mg/L JA compared with the control groups, with an increase of 3.03 times (59.93 µg g^{-1}). Galantamine wasn't found in the control and application groups of the study. In terms of antimicrobial effect, the effect of 0.4 mg/L JA on selected bacteria was found to be comparable to the relevant antibiotics. The groups treated with JA showed antimicrobial effect in selected yeast and fungi, but these values were quite low compared to antibiotics. These results show that JA and SA treatments may be a good strategy for improving galantamine and lycorine content and biological properties in *G. elwesii*.

Keywords: Abiotic elicitor, Alkaloids, Amaryllidaceae, Minimum Inhibitory Concentration Snowdrop
Acknowledgement: We are thankful to Scientific Research Projects Unit (BAP) of Amasya University for providing support to this research, with the number of FMB-BAP 20-0457 Project.

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Biopesticides and Future Perspective of the Agriculture

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Abstract

The increasing world population and the growing agricultural consumption are one of the important problems of today and the future of the agriculture. In plant production, agricultural areas and genetic resources are limited . In order to prevent product loss, pesticide consumption is an indispensable element against to agricultural diseases, pests and weeds in management. Recent studies in pesticide pollution and residue show that intensive pesticide use will lead to serious ecological and human health hazards in the near future. Because of using intensive pesticide, it has been reported that many ecological harm and pesticide resistance in plant pest, plant disease and weed control. In terms of ecology and human health, GRAS (Graduated as safe) status pesticides is gaining importance day by day. The future agriculture perspective is shaped by the principle of clean environment and zero residue. Biopesticides and ecological friendly applications come into prominence from this perpective. It is important to improve biopesticides that will reduce or replace the use of conventional pesticides in pest management and to raise awareness of end users on this issue. In the future ecological vision, within the framework of a new consciousness, presented as "Green Development" in Turkey and "Green Deal" in Europe, it is aimed to reduce the pesticide consumption in pest management warfare by half by 2050. For this purpose, the importance of the using of biopesticide derivative products and replace the traditional pesticides are gainig importance. Biopesticide types are increasing consumption in terms of preference, market value, biopesticide effectiveness in manage of superpests and future agricultural applications. It is emerging that sustainable and healthy agricultural practices will be more prominent in the future. In Turkey, pesticide, biopesticide consumption preference and accurate planning of integrated control components in the agriculture of the future will provide sustainable ecological agricultural outputs with higher market value.

Keywords: Biyopesticides, ecological, Green Deal, Future prospect, Agriculture management

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Determination The Oviposition Behaviour And Hatching Performance For The Mass Rearing Of The Predatory Bug Orius Laevigatus (Fieber) (Hemiptera: Anthocoridae) On Different Succulent Plants

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Sadık Emre GÖRÜR[2]
Ahmet DOĞRU[3]
Şebnem TİRENG KARUT[4]

Abstract

Orius laevigatus (Fieber) (Hemiptera: Anthocoridae) is one of the most important predatory bug and using commercially against trips and other soft insect pests in greenhouses. This study was conducted to determine the most suitable host plant for the mass rearing of this natural enemy. 5 different host plant were used to determine the oviposition condition of *O. laevigatus* in the laboratory condition. Experiments were done with 25 replications at 25° C±2, %65 ±10, and 16:8 L-D in climate cabinets. Leaves were changed daily and laid eggs were counted 10 days during this study. According to results of this study, the mean daily laid eggs by *O. laevigatus* were detected as 4.21, 4.48, 5.14, 6.20, 6.73 from *Sedum nussbaumerianum*, *Kalanchoe daigremontiana*, *Kalanchoe blossfeldiana*, *Senecio Barbertonicus* and *Aptenia cordifolia* respectively. Moreover, the highest number of total laid eggs were obtained from *A. cordifolia* (84.67) and *Kalanchoe*, (74.24). In addition, the highest rate of the number of nymphs of *O. laevigatus* were detected as %75.01 from *K. blossfeldiana*, and the lowest rate was determined as%42.85 from *S. nussbaumerianum* during this study. Consequently, *A. cordifolia*, *K. blossfeldiana* showed better performance than *S. Barbertonicus* and *S. nussbaumerianum* in terms of the number of daily and total laid eggs, the rate of hatched nymphs and may be used as a host plant for the mass-rearing of *Orius laevigatus*.

Keywords: *Orius laevigatus*, host plant, oviposition, mass-rearing, Biological control

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Effect of Various Levels of Dietary Whole Cottonseed on in Vivo and in Vitro Digestibility

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Abstract

In this study, it was aimed to determine the effect of using whole cottonseed (WCS) in the ration on digestion values by in vivo and in vitro methods. The first stage of the study was carried out for 12 days, including a 5-day acclimation period and a 7-day fertilizer sum period. After the classical digestion trial was completed, in vitro digestion trial was conducted. In the in vivo trial, the effects of WCS consumption at different rates (0%, 8.5% and 17%) on dry matter (DM), organic matter (OM), crude protein (CP), crude fiber (CF), NDF and ADF digestion rates were investigated. Nine male Awwasi lambs (7-8 months old, average 42.6 kg live weight) were used as animal material. In the experiment, the nutrient digestion values were determined by giving 80% of the normal consumption amount from rations containing 8.5% and 17% CS for the control group, 15% roughage and 85% concentrate for the other two groups. As a result of the in vivo digestion trial, it was determined that the use of 17% WCS in the ration significantly decreased compared to the other two groups in terms of DM, OM and ADF digestion. In addition, a statistically significant increase was found in the CP and NDF digestion rates of both groups consuming WCS, compared to the control group. However, adding WCS to the ration did not cause a significant change on CF digestion rate. As a result of the in vitro digestion trial, it was observed that the use of WCS in the ration decreased the DM digestion rate numerically.
Keywords: cottonseed, awwasi, in vivo, in vitro

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Determination of the Control Methods of *Convolvulus Arvensis* L. (Field Bindweed) in Cotton Fields in Çukurova Region

Mine ÖZKİL[1]
İlhan ÜREMİŞ[2]

Abstract

Cotton (*Gossypium hirsutum* L.), which is used in many industrial products and provides employment opportunities in many sectors, is one of the most economically important crops. The yield and quality of cotton during the first post-emergence period is decreased due to weed competition. Therefore weed control strategies in cotton fields should be done properly. Field bindweed (*Convolvulus arvensis* L.) is known as one the most important perennial, broadleaf and cosmopolitan weed species of cotton fields both in the world and Turkey. This weed causes %20-80 yield loss owing to large root system and high competitiveness. In this study, it was aimed to provide effective control strategies against *C. arvensis* (CONAR) in cotton fields in the Mediterranean Region. The field experiments were carried out in Yuregir district (Adana province) in 2018 and 2019 growing seasons. In the study; %85 Pyroxasulfone (PYRS), %75 Trifloxysulfuron sodium (TRFS), 383 g/l Pyrithiobac-sodium (PYBS), 480 g/l Glyphosate isopropylamine salt (GLYI), 915 g/l S-metolachlor+ 45 g/l Benoxacor) + Hand Hoe (HH), Rotary Hoe (RH) + Hand Hoe Above The Row (HHAR) applications were used. The effectiveness of applications against (CONAR) were observed from dry matter amount, and the effects of TRFS, PYBS, HHAR, GLYI applications showed more than %70 efficacy. The highest efficacy rate against CONAR was found for PBYS (2 times application) ((%76.0; %77.1). TRFS (2 times), HHAR, GLYI found effective after PBYS, respectively. However, phototoxicity (%20) was seen on cotton after GLYI application. As a result, CONAR was caused above %50 yield loss on cotton, and all applications increased fibre and product yield.

Keywords: Cotton, *Convolvulus arvensis*, control methods, biological effectiveness

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Determination of Food Pad Dermatitis and Some Meat Quality Characteristics of Semi-Intensive Bred Mast and Domestic Geese according to Gender

Hasan ÜRER
İskender YILDIRIM

Abstract

The study was conducted to investigate Food Pad Dermatitis (FPD) and meat quality of Mast and Domestic (female/male) geese raised in semi-intensive conditions. The study was examined in 2 stages. A total of 100 animals were used, including 25 Male/25 Female Mast geese and 25 Male/25 Female Domestic geese. The animals used in the project were selected by random sampling from a total of 2200 animals brought to the slaughterhouse. For the detection of FPD after grouping, the individual feet were subjected to scoring after erasing. In the scoring method, 3 stages of scoring were used, including 0 (none or very small), 1 (does not spread to the entire base pad), 2 (usually the larger surface of the base pad is affected, with lesions), which is also most used in the Scandinavian Countries. It was found that the Native geese (0.76%) with FPD 0 value among the groups had higher foot sole dermatitis Dec Mast geese (0.32%) ($P<0.05$). If FPD is 1, Mast geese (1.32%) were found to have higher foot sole dermatitis than Domestic geese (0.88%). The differences between the group averages are statistically significant ($P<0.05$). The differences between FPD 2 values in Mast and Domestic goose groups Dec statistically insignificant ($P>0.05$).
In the second stage of the study, the parameters of meat quality of the related genotypes were determined. For this purpose, 10 Mast excavations and 10 Domestic geese were evaluated. As meat quality parameters, pH, Water Holding Capacity (NGO), chemical composition (Moisture, crude protein, Crude oil, Crude Ash), Cooking Loss and Penetrometer values were examined. As a result of the evaluations, no statistical difference was found in terms of the averages obtained ($P>0.05$). In terms of color analysis, L* brightness measurement, a* redness and b* yellow color measurement criteria were also found in Mast and breast meat of domestic geese. Mast and indigenous groups in goose breast meat L* values, while there are no statistical differences between ($p>0.05$), a* mast geese in the value (% 15,82) domestic geese (%14,24) were found higher than group averages and the differences between them were statistically significant ($p<0.05$). In addition, it was found that domestic geese (6.42%) had a higher value of b*, which is also a quality criterion, than mast geese (1.83%) the difference was statistically significant ($P<0.05$). In terms of chest feathers, the average feather weight of Mast geese (3.10%) was found to be higher than that of domestic geese (2.42%) ($P<0.05$).
Keywords: foot pad dermatitis , mast excavation, domestic goose, meat quality, goose tickling- back feather

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Determination of Resistance Source in Durum Wheat Genotypes Against to Warrior Race of Stripe Rust (Puccinia striiformis f. sp. tritici)

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Dr. Ayten SALANTUR[3]
Gökhan KILIÇ[4]
Muhsin İbrahim AVCI[5]
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Abstract

Yellow Rust (Puccinia striiformis f. sp. tritici) is one of the important biotic stress factors limiting wheat yield and quality in our country. The development and use of resistant/tolerant varieties are one of the most effective methods of disease control. The aim of this study; Seedling and adult plant reactions of 400 genotypes in the Durum Wheat Preliminary Yield Trial (DWPYT) created by the Field Crops Central Research Institute (TARM) Breeding and Genetics Department, Durum Wheat Breeding Unit were determined in the 2019-2020 production season. Warrior (PstS7; active on 1,2,3,4,-,6,7,-,9,-,-,17,-,25,-,32,Sp,AvS,Amb resistance genes) yellow rust race used. Seedling period tests were carried out in greenhouses located in TARM Yenimahalle campus.

The suspension of urediniospores with mineral oil (Soltrol 170®) was prepared and inoculated into plants grown at 15-20ºC greenhouse conditions. (The plants were inoculated at 9ºC for 24 hours in 100% humidity and then transferred to greenhouse conditions at 15-20ºC. Reactions were evaluated 15-17 days after inoculation using the 0-9 McNeal scale. Genotypes showing 0-6 reactions were evaluated as resistant and 7-9 as susceptible. Adult tests were conducted using the Modified Cobb scale at TARM, Ankara İkizce Research, and Application Farm. It was carried out while the plants were in the milk production phase when the 90S reaction was reached in sensitive control varieties. The material with an infection coefficient of ≤20 was evaluated as resistant. As a result of seedling period tests, 73% of genotype was resistant, as a result of adult tests, 11% of genotype was resistant, 41% of genotype was medium resistant.

Keywords: Yellow rust *(Puccinia striiformis* f. sp. *tritici)*, durum wheat, resistance source, reaction test

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Weed Species, Densities and Frequency Determination of the Greenhouse Tomato and Pepper Production Areas in Adana and Mersin Provinces

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Abstract

Weeds are one of the most important plant protection problems (insects, pathogens, weeds, etc.) in today's agriculture. If weeds are not controlled in agricultural areas, there are serious yield losses in crops. This study was planned to determine the densities (weed m^{-2}) and frequency (%) of the weed species that cause yield loss in greenhouse tomato and pepper production regionally in Adana and Mersin. In 2020-2021, surveys were carried out randomly before harvest in production areas where greenhouse tomatoes and peppers were grown in Fall and Spring. A total of 45 greenhouses was examined in 42.9 hectares, and 18 weed species belonging to 12 different families were determined. The frequency of *Amaranthus retroflexus* L. (35.56%), *Cyperus rotundus* L. (13.33%), *Portulaca oleracea* L. (13.33%), *Solanum nigrum* L. (13.33%) and *Digitaria sanguinalis* (L.) Scop. (11.11%), and the density of *A. retroflexus* L. (0.86 weed m^{-2}) and C. rotundus L. (0.19 weed m^{-2}) were recorded as the highest and most common weed species in greenhouse surveys. For the plant families, Poaceae 22.22% (4 species), Fabaceae 16.67% (3 species) and Amaranthaceae 11.11% (2 species) took the first three ranks. As a result, with this regional study, weed species that are major problems in tomato and pepper greenhouses were determined and compared with other regional surveys. In addition, detected major or potential weed species in tomato and pepper greenhouses are thought to form the basis for the critical period studies, economic threshold studies and appropriate weed management strategies.

Keywords: Weeds, tomato and pepper, greenhouse, frequency, density

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Extraction and Characterization of Fenugreek Seed Proteins

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Abstract

In this study, alkaline classical extraction using magnetic stirrer (750 rpm) and ultrasonic-assisted extraction (max. 500 W, 20 kHz) conditions of defatted fenugreek seed proteins were investigated. Moreover, physicochemical properties such as coagulated protein, water holding capacity, oil holding capacity, foaming properties and emulsion properties of defatted fenugreek seed proteins were determined at different conditions. Firstly, the effects of different pH levels (pH 9.0 and pH 12.0) to the extraction of fenugreek seed proteins were determined. At pH 12.0, the protein extraction yield was higher than that of pH 9.0. After determination of the pH level, the effects of extraction time (0- 8 hours) and NaCl concentration (0, 0.5 and 1 M) on the protein extraction yield were investigated. Results showed that 4 hours of the extraction time gave similar yields when compared to 6 and 8 hours of the extraction time, hence the extraction time for the further analysis was selected as 4 hours. Furthermore, NaCl addition into the extraction media negatively affected the protein yield and theextraction processes were carried out without NaCl addition. Solid–solvent ratio (20, 40 and 60 g/L) was also investigated for the protein extraction yield. Extraction yields of >90% were achieved for 20 and 40 g/L of solid–solvent ratio at pH 12.0 and 4 hours of the extraction time. After the classical extraction process, ultrasonic-assisted extraction was applied to the samples and higher yields were obtained at shorter extraction times (30 minutes). The extracted proteins were precipitated using isoelectric point method and the precipitation conditions were determined as pH 4.0 and 6 hours of precipitation time. Isolated proteins were freeze dried, and characterization analysis showed that protein isolates of ultrasonic-assisted alkaline extraction showed better emulsion properties than classical extraction counterparts.

Keywords: Fenugreek seed, alkaline extraction, ultrasound, vegetable protein, physicochemical properties

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Physicochemical, Textural, and Microbiological Quality of Cuttlefish, Octopus, and Squid Processed By Sous Vide Process During Refrigerated Storage

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Talha DEMİRCİ[3]
Ainiwaer TUDİ[4]

Abstract

This study evaluates the physicochemical (pH, TBARS, color), textural (TPA and extended craft knife), and microbiological properties (Total mesophilic aerobic bacteria, Total coliform bacteria, *Escherichia coli*, *Staphylococcus aureus,* and *Vibrio parahaemolyticus*) of cuttlefish, octopus, and squids after sous vide (SV) process during refrigerated (4 °C) storage 30 days. The pH values of SV treated cuttlefish and squids were affected ($p < 0.05$) by storage time. The TBARS number of SV processed cuttlefish and squid samples increased depending on the storage period, while the TBARS number of SV processed octopus samples did not change significantly ($p > 0.05$). Storage period did not affect ($p > 0.05$) the color (*L*, a*, b**), TPA (hardness, springiness), and extended craft knife (firmness, work of shear) values of all seafood samples. At the end of the storage period, no significant differences ($p > 0.05$) between SV processed seafood samples were determined for cohesiveness, gumminess, chewiness values. The SV processing applied was effective in preventing the growth of *Escherichia coli*, *Staphylococcus aureus,* and *Vibrio parahaemolyticus* in the SV processed cuttlefish, octopus, and squids stored at 4 °C for up to 30 days. As a result, sous vide process was found to be an effective cooking method for cuttlefish, octopus, and squids.

Keywords: Cuttlefish, Octopus, Squids, Sous vide, Texture

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Efficiency of the Use of Chitosan in Clarification of Sour Cherry Fruit Juice

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Abstract

Clarification is one of the most important step in the fruit juice processing industry. At this stage, clarification aids such as gelatin, kizelsol, bentonite are generally used. In this study, chitosans from shrimp shells which has different degree of deacetylation are used as an alternative aid for sour cherry fruit juice clarification. Chitosan 1 used in the study has a degree of deacetylation of 78,2%, a molecular weight of 182 kDa and, Chitosan 2 has a degree of deacetylation of 84,95%, a molecular weight of 127 kDa. Experiments were carried out varying chitosan concentration (1-1,75-2,5g chitosan/L), process temperature (30-40-50°C), and process time (30-60-90 min). As a result of all applications, turbidity values were determined. The turbidity values of Chitosan 1 at 30°C and 40°C, and Chitosan 2 at 30°C were above the detectable limits in all process conditions. Best process conditions were found to be 1,75/L chitosan at 50°C, and a process time of 90 min for both chitosans. Clarification of sour cherry fruit juice at these conditions resulted in the values of turbidity were 0,32 NTU and 0,02 NTU, respectively. Chitosan is a natural, low cost, non-toxic and abundant polymer, it can be a suitable and a more economic process for sour cherry fruit juice clarification.
Keywords: Chitosan, clarification, sour cherry fruit juice, turbidity

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Direct and Indirect Heating Systems on UHT Technology

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Rukiye MAVUŞ[2]
Cemre ÇELİKTEN[3]
Ebubekir DİŞLİ[4]

Abstract

Heat treatment is the most common method used to extend the shelf life of milk, as it destroys pathogenic microorganisms and most of the bacteria that cause spoilage. Product quality can be particularly affected by chemical changes that occur during heat treatment, such as protein denaturation, cooked flavor, vitamin loss or color changes. In order to minimize these effects, appropriate temperature-time parameters and the methods applied to the milk should be determined. The most common heat treatment methods used in the heat treatment of UHT milk are direct and indirect heating methods. While UHT process can be carried out by steam injection and steam infusion methods in direct heated systems, plate and tube heat exchangers are used in indirect heated systems. In the direct systems, either the milk is pulverized on the steam or the steam is pulverized on the milk. In the indirect system, milk is sterilized in tubular or plate heat exchangers without encountering steam. The main difference between these two methods is that the cooling process takes longer after reaching the target temperature in indirect systems. Since rapid heating and rapid cooling are applied in direct systems, milk components are less damaged and thus have a positive effect on the shelf life of the product. Slow cooling in the indirect system increases energy and process costs. On the other hand, since the steam given to the product in the direct method cannot be recovered 100%, dilutions occur in the product. This disrupts the component balance. Although the indirect system is used more in the dairy sector today, new technologies can be developed based on the fact that the direct heating method preserves the nutritional values and extends the shelf life. In this technology, almost all of the vapor in the producy can be recovered by vacuum.
Keywords: UHT, heating systems, direct steam injection

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Ancient Grains and Their Current Uses

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Abstract

Grain-based food products constitute an important part of the daily diet. Throughout history cereals have been an important source of protein, dietary fiber, bioactive compounds with antioxidant and anti-inflammatory effects, and they still maintain their importance today. Cereal-based foods such as bread and porridge were already an important part of the human diet in prehistoric times. There is strong evidence that prehistoric man was able to prepare gruel from grain and water. Nowadays, there is now a renewed interest in foods based on ancient grains, as consumers often consider such foods to be healthy and sustainable. Due to the increasing demands for adaptation and the urgent need to preserve genetic diversity, interest in ancient grains is increasing day by day in farmers and the food industry. However, in the narrowest sense "grains that have not changed genetically in the last few hundred years" is defined as whereas; in the most general sense, it can be defined as "certain types of cereal grains, pseudocerealsand pulses that have been traditionally grown and consumed for hundreds of years and have undergone a relatively limited genetic change". The importance of genetic resources derived from ancient grains has also been emphasized by many authors as they can adapt to changing environmental conditions resulting from global climate change. In this review, information about the compositional properties of ancient grains and their potential effects on human health and their current use (potential) has been tried to be summarized.

Keywords: Ancient grains, nutrient composition, pulses, wholegrain

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A Nutritious Special Food Consumed in Syria: Falafel

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Abstract

Falafel is a popular Middle Eastern "fast food" made of a mixture of chickpeas (or fava beans), fresh herbs, and spices. This mixture is formed into small patties or balls. It's thought that falafel originated in Egypt as Coptic Christians looked for a hearty replacement for meat during long seasons of fasting or lent and it is known as Tameya. Nowadays, several countries, like Palestine, Jordan, Lebanon, Syria, and other Middle Eastern countries, use chickpeas to prepare this popular fast food which is eaten for both breakfast and dinner. Falafel is a deep-fried ball or patty that is made from dried ground chickpeas, fava beans, or both after being soaked for some time in the water. In Syria, chickpea is used to make falafel which can be eaten wrapped in a flatbread with pickled vegetables and tahini-based sauces. In Jordan, a mixture of chickpeas and fava beans is much more preferred for preparing falafel. The inside of falafels is usually yellow or green, which comes from the herbs such as parsley. There are several health benefits associated with high-fiber food. They help in reducing the blood lipid levels such as cholesterol, heart diseases, as well as reducing risks of colon cancer. Falafel is packed with several key nutrients including calcium, iron, magnesium, phosphorus, potassium, zinc, copper, manganese, vitamin C, vitamin B, and folate.

Keywords: Falafel, chickpea, tameya, beans

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Investigation of Changes in Bioaccessibility of Bioactive Components after Drying of Fruits and Vegetables

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Abstract

Bioaccessibility, which is defined as the fraction of the nutrient that can be released from the food matrix, was measured using an in vitro method. Bioaccessibility is the most important characteristic of bioactive compounds, because it plays a crucial role in the design and manufacture of functional foods. Bioactive components found in fruits and vegetables are secondary metabolites that are important for health, such as total phenolics, flavonoids, anthocyanins, phenolic acids and carotenoids.

One of the most common methods used in the preservation of fruits and vegetables is drying. With the drying process, the water activity (aw) of the foods is reduced and the product becomes resistant in terms of microbiological, enzymatic and chemical aspects. In this way, the products are provided with ease of storage and transportation for a long time.

Thermal processing, such as drying, is one of the factors affecting the bioaccessibility of bioactive components. The purpose of this paper is to discuss the changes in bioaccessibility of bioactive components after drying of fruits and vegetables. Although heat, light, and oxygen sensitive phytochemicals degrade during drying, thermal treatments can improve the overall bioactive component potential of processed fruits and vegetables in different ways. Therefore, different results have been reported for various fruits and drying conditions or even by different researchers for the same products. Overall, this paper highlighted that drying process may be an effective way for preservation of bioaccessible bioactive components in fruits and vegetables.

Keywords: Bioaccessibility, drying, phenolic acids**,** carotenoids, flavonoids

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Alternative Medium Development for Pediococci Isolation

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Abstract

Pediococci, the member of lactic acid bacteria, are Gram-positive, catalase-negative, facultative anaerob cocci. In order to isolate these bacteria, commercial media such as De Man Rogosa Sharpe (MRS) and M17, which are the basic media for the growth of other lactic acid bacteria are preferred. However, since the media used mostly do not show selective properties in pediococcal isolation, alternative media are needed. Although there are modified media recommended for pediococci in the literature, the information presented on this subject is very limited. In the current study, development of alternative media for the isolation of pediococci from fermented food samples was searched. For the isolation of bacteria from different types of fermented food samples, MRS and TGYE (Tripton Glucose Yeast Extract) media prepared from the compound were included in the trials. In the preparation of modified media; antibiotics such as novobiocin, vancomycin and nystatin and components such as TTC (Triphenol Tetrazolium Chloride) that help to differentiate colonies as chromogenic were added to the medium. Fermented foods generally contain a mixed microflora rich in yeast and bacteria, and it is very important to eliminate yeast in order to allow bacterial growth. In the study, it was determined that yeast growth could be limited in media with nystatin addition. On the other hand, different components should be preferred for the elimination of lactobacilli, which are generally found together with pediococci in fermented food environments. It has also been determined that antibiotics to which lactobacilli are sensitive in media modified with antibiotics are not sufficient to suppress this group of bacteria. In the study, the most successful results were obtained in the medium with the addition of TTC, and it was observed that pediococci and lactobacilli showed different morphologies in this medium.

Keywords: pediococci, selective media, novobiocin, vancomycin, nystatin, TTC
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Smartphone Based Color Measurement in Food Analysis: An Easy and Low-cost Alternative to Spectrophotometric Measurements

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Abstract

Food analysis is very important in terms of ensuring food quality and food safety. Spectrophotometers have an important place among the devices used within the scope of food analysis. These devices are far from accessible as they require high investment cost, maintenance and expertise. Also, since they are not portable, they do not allow on-site analysis. In addition to these, the growth of the market also causes an increase in the number of analyzes and reducing the cost of analysis in today's conditions is an important parameter. All these reasons necessitate innovative methods that allow food analysis to be done on-site, fast, reliable and cost-effective.
Within the scope of this study, it is aimed to examine the potential of using smart mobile phones, which are used by everyone without exception, in food analysis. Smartphones are a promising platform with the ability to capture high quality images with their camera, review/process the images, and evaluate the processed images. It is possible to measure color from the image captured with smart mobile phones and to determine the L*a*b color space values in accordance with international standards with the phone. Within the scope of this study, images of colorimetric food analyzes were obtained with a smart phone, color measurement was made and then compared with the absorbance measurement results performed with a spectrophotometer. As a result, it has been observed that quantitative analysis is possible with the color measurement made with a smart phone, and it has been demonstrated that colorimetric food analyzes can be done at low cost and easily without the need for any investment in the use of a smart phone.
Keywords: Food analysis, color measurement, smart-phone, L*a*b* color

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Numerical and Experimental Validation of Water-Sucrose Solution Freezing İnside a Cavity

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Abstract

In this study, three different amount of crystal sucrose was mixed with water and freezed inside stainless steel cavity. According to the previous studies, freezing points were calculated theoratically and compared with the experimental results. From previos literature studies, three main enthalpy correlations were used at numerical analysis and the numerical and experimental results were compared. During the experiments, the freezing time was determined and compared with the numerical results. Phase change duration of the phase change was observed and it was found that the temperature of the phase change was not constant, which was due to the mass transfer of the water phase by the sucrose solution. Commercial software was used for numerical analysis and tetrahedral meshes were employed. A high precision temperature probe was used to determine the temperature of the solution during the experiment. It was found that the initial temperature of the phase change decreases as more crystalline sucrose is present in the water. In contrast, as the amount of sucrose increases, the total freezing time decreases. Although the duration of the phase change decreases, the total freezing time is lower than for higher concentration solutions. It was also found that the weight additive enthalpy method is the most compatible correlation when the initial phase change temperatures are compared. On the other hand, all three entalphy methods are unable to correlate the freezing curve after the phase change is complete.
Keywords: Water-sucrose solution freezing, freezing inside cavity, mass concentration, freezing curve, phase change temperature

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Identification of at Distance Materials Using Laser Signals and Deep Learning

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Abstract

Objects are made of various materials such as glass, metal, plastic, wood. We often encounter objects made of different materials with the same appearance in our environment, and camera images of these objects can also have the same appearance. In such cases, it may be difficult to identify materials from camera images. In addition, there are also difficulties in detecting material from images taken in extreme light, dark or foggy environments. Based on the difficulties mentioned in this study, it is recommended to define low-power laser signals using deep learning algorithms for material identification. In the study, laser beams are reflected on the material and laser signals reflected from the material are recorded. After the data preparation steps, the obtained laser signals are trained with Neural Circuit Policies (NCP), a layered deep learning network inspired by the brain cells of worms, and material classification is made. Unlike other deep learning architectures, NCP has the advantage of a small number of neurons and a small number of connections between neurons. In this study, the performance of NCP deep learning architecture, which has the advantage of less processing cost, on laser signals is discussed. In the NCP deep learning network structure, neurons can be connected to each other randomly and with a determined number of connections within the framework of determined rules. This ensures that the designed network is fast and scalable. In the deep learning architecture designed with NCP, there are only 29 neurons and they are connected to each other with only 113 connections. This study was also compared with different deep learning algorithms. As a result of the study, 92.66% accurate identification success was achieved for 10 different materials at long distances, which are frequently used in daily life.
Keywords: Laser, Material Classification, NCP, Neural Circuit Policies.

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To Demonstrate of Relationship Between of Breast Cancer and Thyroid Cancer Using Essembl Machine Learning Classification Model

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Duygu KIRKIK[2]

Abstract

Breast cancer is the most common type of cancer in women that causes death. Age is the most important risk factor and although the incidence increases with age, it is more aggressive in younger women. There is some significant genes in breast cancer such as BRCA1, BRCA2, p53 and PTEN are mostly observed in familial breast cancer histories. According to studies, thyroid nodules can be detected in many patients with breast cancer. When these thyroid nodules were examined, 10-15% of them were found to be thyroid cancer. Patients with breast cancer and thyroid nodules have a high risk of developing thyroid cancer in the future. In this study, we showed that relationship between thyroid cancer and breast cancer using essembl machine learning classification model in computer engineering. Because of the development of sequencing technologies, the biological sequence data which are critical for basic research and applications like disease research, precision, and medicine, are growing rapidly. However, in this field, the lab experiments are time-consuming and expensive. Thus; in this study, we analyzed structural and functional data using computer engineering tools and bioinformatics tools. Moreover, we used machine learning techniques and we showed that relationship between of breast cancer and thyroid cancer using sequence-based analysis and prediction are fundamental bioinformatics tasks. In result, we facilitated understanding of the sequence(-structure)-function paradigm for DNAs, RNAs, and proteins. In conclusion, we showed that instead of using only one classification model, for increasing the prediction performance we have constructed an ensemble machine learning classification model to predict breast cancer.

Keywords: breast cancer, thyroid diseases, structural and functional data, machine learning, supervised classification, bioinformatics, essembl learning

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Modeling the Theoretical Speed Curve of a Wind Turbine Using a Nonlinear Autoregressive Exogenous Model (NARX) Neural Network

Mahmut DİRİK[1]

Abstract

Wind energy is an affordable and environmentally beneficial alternative to fossil fuels. Prior to planning wind energy development, predictive modeling is essential to determine the predicted energy. The theoretical energy production of wind turbines is proportional to wind speed. The main objective of this research is to develop a model of the theoretical speed curve of a wind turbine using a nonlinear autoregressive external (NARX) neural network and simulate its dynamic behavior. To develop an effective diagnostic method for such a model, this research proposes a control system based on the construction of artificial neural networks. The data used comes from the SCADA systems that are readily available in modern wind turbines. The data was split into several different ratios for training, validation, and testing, and the performance of the model was tested using three different learning methods and a variable number of neurons. The results have proven that NARX networks can accurately calculate the energy generated as a function of wind speed, making it a very powerful computational tool for simulating wind turbine installations.

Keywords: Forecasting, Prediction of wind speed, Time series, NARX, Neural network

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Ensuring Data Security of IoT Systems Using Blockchain

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Abstract

A logarithmic increase has been observed in the IoT industry field in recent years. Despite such a large increase, IoT devices remain vulnerable in terms of privacy and security. IoT devices with decentralized topology and resource constraints do not have the traditional security and privacy features. This situation of IoT devices, which are insufficient in security and privacy issues, also brings about privacy and security problems of the data shared among themselves. The data used in the IoT is transferred almost without human interaction. Due to the sensitive data and service potential of IoT solutions, the security and privacy concerns of the data they collect and process is one of the issues that should be taken into consideration. The security and sustainability of the data on the IoT is very important in terms of data privacy and integrity. To overcome these data security and privacy issues in IoT, researchers have focused on blockchain applications. Blockchain is an emerging technology for over a decade. Despite various developments in blockchain, there are still problems to be overcome in IoT. Features of blockchain such as decentralization, consensus mechanism, smart contracts and data encryption make it well suited for building distributed IoT systems to reduce transaction costs and prevent potential attacks. With its decentralized nature and a transparent database platform, blockchain has the potential to take the performance of IoT security to a higher level. In this study, blockchain solutions used for the security of data received from IoT devices are presented. For this purpose, first of all, how blockchain technology works is emphasized, an overview of IoT technologies is made and its integration with Blockchain and IoT is analyzed. Then, the potential solutions of blockchain for the security of data received from IoT devices are discussed.
Keywords: Data integrity, Blokzincir, IoT, internet of things, internet of things security

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Malware Detection Using Consensus Learning and Specialized Classifiers

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Abstract

The place of information technologies and information assets in people's daily lives is constantly increasing. Parallel to this increase, threats to information assets are also constantly increasing. One of the main threats to information assets is malware. Malware is software that is used for purposes such as performing unauthorized operations by gaining unauthorized access to an information asset, or partially or completely blocking the functions of an information asset. There are different types of malware such as virus, worm, trojan, spyware, rootkit, ransomware, adware, logic bomb, backdoor, fileless malware. Protection from malicious software is of great importance within the scope of the continuity of accessibility, confidentiality and integrity of information assets and information services. The reasons such as the increase in the number of new malware produced every year and the effective use of avoidance techniques such as obfuscation and packet fragmentation render signature-based malware detection approaches ineffective in detecting newly produced malware. At this point where signature-based detection approaches are insufficient, machine learning-based malware detection approaches can be used. With machine learning, either binary classification of files as malware and benign or classification of malware families can be made. A large number of machine learning algorithms can be used within the scope of malware detection, and better results can be obtained from within the scope of metrics such as accuracy, precision and precision by using the ensemble learning approach. It is possible to detect malware more effectively with the approach of using supervised learning methods together with unsupervised learning methods and training specialized classifiers using clustered sub-datasets. In this study, malware detection with consensus of classifiers and specialized classifiers is investigated and analysis results are given.
Keywords: Ensemble Learning, Consensus, Specialized Classifiers, Malware Detection, Cyber Security

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Prediction of High School Students' Field Choices with Educational Mining Methods

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Pınar Yıldırım[2]

Abstract

Educational Data Mining (EDM) is a research field that develops methods to investigate the types of data obtained from the field of education and to get to know students and learning environments better. EDM methods and techniques can be used in education in subjects such as reaching meaningful information by analyzing big data, revealing patterns and trends, forecasting and decision making applications, and developing recommendation systems. EDM has emerged as a combination of many areas. These areas are cognitive science, education, statistics and psychometrics. It can be thought of as a combination of these areas. EDM aims to better understand learners and learning environments. The aim of this study is to analyze the effects on high school field selection by using data mining methods based on the various inventory results applied to the students. As a result of the application of classifier algorithms, Random Forest made the best estimation of the fields selection performance. It is expected that the results of the research will be a guide for researchers who will work on this subject in the future. For this reason, it can be suggested that new studies be carried out by developing different perspectives on different variables by researchers.

Keywords: Educational data mining, Classification algorithms, Data analytics, Choosing fields

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A Comparative Analysis of Helmholtz Principle in Extractive Automatic Document Summarization

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Abstract

The enormous amount of data available on the internet today has reached unpredictable volumes; therefore, it is not possible using human power in order to efficiently sift useful information from it now. Consequently, automatic text summarization has gain more importance as a task. In this study, an extractive summarization approach using the Helmholtz principle metric is modeled to create an automatic text summarization system. CNN Daily/Mail data set was used to evaluate this proposed approach. In this data set, there are both original full-text documents and summary documents of these original documents produced by human summarizers. The similarity of the summary document produced by the proposed Helmholtz-based extractive text summarization approach with the original summary in the CNN Daily/Mail data set was calculated using the Spacy text similarity algorithm. When the results are examined, summary documents can be generated with a 38.2% average similarity. Moreover, the results obtained with the BertSum, Luhn, and SumBasic extractive summarization algorithms are also compared with proposed model.

Keywords: Automatic Document Summarization, Extractive Document Summarization, Helmholtz Principle, CNN Daily/Mail Data Set, Natural Language Processing

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Comparison of Data Mining Algorithms on Health Data

Abdullah BAYKAL [1]
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Abstract

Data mining is the process of finding useful rules or creating relationships from existing data that can be used to make predictions about new data. Data mining, the rapid collection of large amounts of data as a result of the development of information technologies, and the use of statistics, artificial intelligence and machine learning disciplines, with various algorithms applied on the collected data, aiming to make forward-looking predictions by revealing hidden information and patterns. It is a new branch of science. Various methods are used in data mining studies. Data Mining methods, which are applied in many different fields, are also used intensively in the field of Medicine. There is a wide variety of commercial and open source software programs for data mining. In this study, SEER (Surveillance Epidemiology and End Results) database, which contains statistically significant data on cancer cases provided by the National Cancer Institute (NCI) in the United States, was used. The classification algorithms of various software were compared using the SEER database, which is a reliable data source that includes different cancer groups and has an extremely important place in scientific research. In the SEER database, there is a large amount of field information about cancer patients. In the study on survival prediction with breast cancer data in this database, the patients' Age, Regional-Nodes-Positive, CS-Tumor-Size, Tumor-Marker-1, Tumor-Marker-2, Surgery-of-Primary-Site, Areas such as Scope-of-Regional-Lymph-Node-Surgery, Surgical-procedure-of-Other-Site were selected and used for classification algorithms. In order to evaluate the results of the study, the models created were examined according to their accuracy and error rates, and the best classification method was tried to be determined.

Keywords: Data Mining, Classification Analysis, Open Source Data Mining Tools, Health Data

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Deep Learning Based Secure Routing Protocols in Wireless Sensor Networks

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Abstract

Wireless Sensor Networks are systems that are used in many fields such as industry, military, health and social life areas, do not require infrastructure unlike traditional networks, work synchronously with each other and transfer information about the environment to the relevant center. According to the environment information to be transferred, features are added to the sensor nodes. However, the increase in usage areas makes sensor networks the target of cyber attackers. These attacks are sometimes aimed at stealing data, sometimes manipulating data, and sometimes making sensor network systems inaccessible, depending on their purpose. There are detection methods according to the type of attack. Node and network traffic information is important, especially when detecting DOS-DDOS attacks, which are types of network layer attacks. These information, which are accepted in the literature, such as packet delivery rate, remaining energy amount, packet drop amount, packet delay amount, are used in attack detection. By examining these parameters, it is determined whether the node or traffic is harmful. Different approaches and models are used to detect or prevent attacks. When the studies in the literature are examined, it is seen that besides the classical models, deep learning models, which have increased in popularity in recent years and give better results than classical models, are frequently used. In the examined studies, attack detection is carried out by using different deep learning models on network data sets obtained in simulation environments. According to the structure of the network topology, malicious node information detected by deep learning models is transmitted either to the cluster head node or to the central nodes such as the base station and the malicious nodes are removed from the network traffic. Thus, network traffic is provided with normal nodes over alternative routes. Thus, attacks are prevented, data is protected and the working life of the network is extended. In this study, deep learning-based secure routing protocols in sensor networks were investigated and analysis results were given.

Keywords: Deep Learning, DDOS Attacks, Cyber Security, WSNs, Routing Security

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Prediction of Heart Failure Disease with a Proposed Method Based on Deep Neural Networks

Gaffari ÇELİK[1]

Abstract

Heart failure is a very serious disease that can be seen at almost any age and can result in death if early measures are not taken. Different causes appear to be effective in this disease. It has been seen that extremely successful results have been obtained in the diagnosis of heart failure disease with the increasing number of data and advances in computer science in recent years.

In this study, a deep neural networks (DNNs) based architecture is proposed for the detection of heart failure disease. In addition, performance analysis was performed using different Machine learning techniques such as decision trees, random forest, XGBoost classification, support vectors machine and Gradient boosting machines. Accuracy, precision, sensitivity, F1 and confusion matrix techniques were used for performance analysis. Two different applications were carried out according to the use of age and gender characteristics. In the first application where all the features in the dataset were used, the proposed DNNs architecture achieved the highest performance with a success rate of 90.22% according to the accuracy metric. Similarly, it showed the highest performance with 0.90 according to precision, sensitivity and F1 metrics. According to the proposed architecture, accuracy, precision, sensitivity and F1 metrics, in a second application in which age and gender characteristics were not used, it was observed that it provided the best success with the rates of 90.76%, 0.90, 0.91 and 0.91, respectively. In addition, when the performances of the methods were examined according to the confusion matrix, it was observed that the proposed architecture showed a higher performance compared to the other methods. At the same time, it was observed that there was a general increase in the performance of the methods when age and gender characteristics were not used.

Keywords: Heart Failure, Machine Learning, Deep Neural Networks, Support Vector Machine, Random Forest Algorithm, Confusion Matrix

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Comparison of Success Levels of Resnet50 and Xception Deep Learning Models in Grading Diabetic Retinopathy

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Erdal GÜVENOĞLU[2]

Abstract

Diabetic Retinopathy (DR) is a common consequence of diabetes mellitus resulting in lesions in the retina that cause visual impairment. If not detected early, it can cause blindness. DR is not a treatable condition. With the early detection and treatment of DR, the risk of vision loss can be greatly reduced. Unlike computer aided diagnosis systems, manual diagnosis of retinal fundus images by ophthalmologists requires time, effort and cost. In this study, ResNet50 and Xception deep learning models, which are widely used from Convolutional Neural Networks (CNN) models, were used in order to make DR disease ratings from color fundus images using deep learning techniques. In line with this purpose, four levels of DR disease severity, 'Mild', 'Moderate', 'Severe' and 'Proliferate_DR', were examined with ResNet50 and Xception deep learning models, considering the fundus images without DR disease. CNN was trained with 1750 labeled fundus images to classify DR. The trained CNN was tested with 750 labeled fundus images. The success levels of ResNet50 and Xception deep learning models used for training and testing were compared with each other. As a result of the comparison, it was determined that the ResNet50 deep learning model had a success rate of 73,67%, and the Xception deep learning model had a success rate of 78,39%. For this reason, it was determined that the success rate obtained as a result of the training in the fundus dataset used was close to each other, but the Xception deep learning model, with a success rate of 78,39%, made a better classification than the ResNet50 deep learning model.
Keywords: Deep Learning, Convolutional Neural Networks, Diabetic Retinopathy

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Role of Corn Gluten in Levan Production From Erwinia Amylovora and Antifungal Activity of Produced Levan

Gözde KOŞARSOY AĞÇELİ[1]

Abstract

Levan is an exopolysaccharide that can be obtained from various microorganisms and plants with the levan sucrase enzyme. Levan is used as a color stabilizer and flavoring in the food industry, while it is also used in the medical and pharmaceutical fields. In this study, the effect of corn gluten on the levan production process was investigated and the antifungal effect of the produced levan against some plant/food fungi was determined. *Erwinia amylovora* culture was inoculated into the medium prepared by adding 5 g, 10 g, 20 g, 30 g corn gluten to Nutrient Broth + 5% sucrose medium, respectively, and incubated at 28°C for 2 days. The ethanol precipitated polymer was weighed after complete drying. The amount of levan in the medium used as the control group was found to be 15.60± 1.70 g/L, while the amount of levan obtained from the medium containing 30 g of corn gluten was found to be 28.15±2.60 g/L. The resulting levan biopolymers were characterized by Fourier Transform Infrared Spectroscopy (FTIR). Measurements for antifungal activity were performed in 3 replicates. To determine the antifungal effect of the levan, 0.5 g of polymer was dissolved in 50 mL of sterile distilled water. *Aspergillus niger* and *Penicillium digitatum* were used for antifungal testing. The zone diameters were measured by adding the stock levan solution to 6 mm wells. A zone diameter of 16.00±1.0 mm was measured for *Aspergillus niger* and 20.00±1.5 mm for *Penicillium digitatum*. The effect of corn gluten on levan production is reported for the first time with this study. In the study, it was reported that the yield of levan obtained from *Erwinia amylovora* increased with corn gluten and the usability of this polymer in fungal infections.
Keywords: Levan, corn gluten, *Erwinia amylovora*, biopolymer

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The Use of Single-Walled Carbon Nanotubes for Removing Arsenate in Ulutan Lake Water: Zonguldak Case

Kadir Özdemir[1]

Abstract

Carbon nanotubes (CNTs) have been used for promising adsorbent for the removal of heavy metals such as zinc, nickel, arsenic and other compounds from water treatment technology in recent years. On the other hand, these are important properties such as high reactivity, easy separation and large surface area for increasing of arsenate (As(V)) removal efficiency. The subject of this paper is to explain the (As(V) removal from fresh water sources using Single-Walled Carbon Nanotubes (SWCNTs) as an aid cougulant. This process is also known as combined coagulation in the international scientific literatüre. Ulutan Lake, in Zonguldak -Turkey was prefered as a water sample collection source. Coagulation experiments was carried out using polyaluminum chloride (PACl). Water samples were synthesized by spiking 300 µg/L As(V) into ULW samples and also all As(V) removal tests were performed with As(V). Using only SWCNTs as a coagulant, the highest As(V) removal was found as 72%. With the application of PACl, the removal of As(V) increased nearly 15%. The higher As(V) removal (>85%) was determined with SWCNTs + PACl. While the As(V) removal was 45% with only PACl, the highest removal of As(V) (93%) is observed with the SWCNTs + PACl. The outcomes illustrate that proposed method is more useful than conventional coagulation alone for the As(V) removal.

Keywords: Arsenate, Single walled-carbon nanotube, Fresh water, Coagulation

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Investigation of Vanadium Removal from Drinking Water with Iron (III) Chloride

Kadir Özdemir[1]

Abstract

Vanadium is a naturally occurring metal that can be found in the earth's crust at concentrations of 100 mg/kg. Vanadium are annually entered the water, soil and air environment from natural sources almost 65.000 tonnes and from anthropogenic sources almost 200.000 tonnes. As a result of weathering of rock and soil erosion, vanadium is naturally released into water and soil. The concentration of vanadium in water is affected by geographical features. For example, coal and petroleum oil contain 1 to 1500 mg/L of vanadium, and water in these environments can have a high vanadium concentration. In this study, vanadium removal was investigated by precipitating iron (III) chloride (FeCl3) from a synthetic vanadium solution prepared with tap water. The experiments were carried out on a laboratory scale. Studies were performed at different iron (III) chloride (Fe)/vanadium (V) ratios. In addition, the effect of different pH values on vanadium removal was also investigated. Vanadium was effectively removed by co-precipitation with iron hydroxides produced by dosing ferric chloride. The optimum vanadium removal efficiency was obtained as 84% at pH 7 and 90 minutes settling time. While the removal was not affected much in the pH 6-9 range, the vanadium removal ratio towards pH 10 was severely affected. Cationic polyelectrolyte as a flocculant aids was used to evaluate effects on vanadium removal, the Fe/V ratio, and the settling time. After a 90-minute settling time at pH 7, vanadium removal increased from 84% to 90.2% with the addition of a 0.2 mg/L cationic polyelectrolyte as a flocculant aid. Thus, addition of cationic polyelectrolyte can provide flexibility in settling time and Fe/V ratio in vanadium removal.
Keywords: Vanadium, Iron Salts, Drinking Water, Coagulation, Flocculation

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Research of Minimization of Energy Consumption by Life Cycle Analysis of Washing Units Used in Metal Industry

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Beytullah EREN [2]
Murat SOLAK [3]

Abstract

Environmental problems such as global warming, consumption of natural resources, depletion of the ozone layer, and reduction of biodiversity that threaten the world are increasing day by day. Sustainable development approach should be adopted for the solution of environmental problems. Life cycle analysis studies are used as a support tool for this sustainable development approach.

Life cycle analysis aims to improve environmental labeling, prevent or reduce environmental impacts by changing or redesigning the raw material possibilities of products, production process, equipment used in production.

In this study, aluminum washing and aluminum ultrasonic washing units of a company that has machining, pipe forming, welding, washing and assembly processes in the automotive sector were evaluated by life cycle analysis. With the life cycle analysis, it is aimed to decide on the unit that provides optimum environmental and economic conditions.

Data belonging to two different washing processes were obtained from the company. With these data, energy consumption and water consumption parameters were analyzed and the effect of alternative renewable energy use on processes was examined. It is planned to establish a solar power plant on the roof area of the company, which is 4800 m^2. The daily average solar radiation value of Düzce is calculated as 3.70 kWh/m^2 -day and the average sunshine duration is calculated as 6.5 hours per day. It is predicted that 17,684 kW of electricity will be generated per day from the planned solar panels. The amount of kg CO_2 was calculated according to the electricity consumption calculated separately for the washing units. The life cycle analysis of the two units and their effects on climate change, which is one of the impact analysis categories, were compared. By evaluating the data, the process providing the optimum conditions was determined.

Keywords: Life Cycle Analysis, Renewable Energy

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Temporal Variation of Airborne Pollen Grains in Gelibolu (Çanakkale) Atmosphere

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Abstract

Pollen grains are atmospheric bio-organic aerosols, most of which are classified as respiratory allergens. Pollen allergy is a known world plague on human health. It becomes more critical day by day with the increase of pollen-sensitive individuals, especially those who are living in developed countries and urbanized regions.
In this study, airborne pollen quantities, diversity, and annual variation were carried out for three years, between January 2018 to December 2020 in Gelibolu (Çanakkale) atmosphere. Durham sampler, which is the device of the gravimetric method, was used in the research. A total of 43749 pollen grains were determined; of these, 40252 (92.01%) belong to woody (33 taxa) and 3450 (7.89%) belong to herbaceous (21 taxa) plants. Identified and counted 11303 pollen were belonging to the first year, 15287 to the second, and 17159 to the third year. The most abundant pollen types in the atmosphere were; Cupressaceae/Taxaceae (51.02%), *Pinus* (25.09%), *Olea* (4.21%), *Quercus* (3.67%), *Platanus* (2.46%), Poaceae (1.88%), *Fraxinus* (1.68%), *Ambrosia* (1.51%), Amaranthaceae/Chenopodiaceae (1.32%), and Urticaceae (1.08%). The highest pollen amounts were recorded in March (3927 pollen) based on a 3-year average, and this is due to the presence of a high number of pollen belonging to the Cupressaceae/Taxaceae in the air. March-May term is an overlap of pollination periods and can be thought of as a risky period for sensitive individuals for the region. The stated pollen calendar for this region may be useful for visitors of this well-known tourism center and for allergologists to establish an exact diagnosis.
Keywords: Aeropalynology, Aerobiology, Allergy, Biomonitoring

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Development of Hydroelectric Power Plants in Turkey and the Effects of Climate Change

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Abstract

Hydroelectric Power Plants are among the renewable energy sources preferred as an alternative energy source in recent years. Along with the developing technology, the number of Hydroelectric Power Plants in Turkey and their installed power have increased over the years. Hydroelectric energy is the most preferred renewable energy source, depending on Turkey's current water potential and technological conditions. In this study, the environmental realization of the hydroelectric energy potential in Turkey was analyzed, and the effects of climate change and the regime disruption experienced in precipitation on the installed power and energy production were examined. As of 2020, the share of hydroelectric energy in renewable energy sources is 60.24%. The number of hydroelectric power plants in operation in Turkey is 714. Despite the increase in installed power over the years, the same rate of increase in energy production has not been determined. Climate change and the regime disorder experienced in precipitation cause the desired energy not to be produced in Hydroelectric Power Plants. Decreases and irregularities in the flow rates to the Hydroelectric Power Plant negatively affect the energy production efficiency. It has been determined that the annual energy production amount of the Hydroelectric Power Plants registered to the Renewable Energy Resources Support Mechanism is below the annual production included in the license. As a result of the inability to produce the desired energy, it is concluded that Hydroelectric Power Plants are built above the environmental carrying capacity. Instead of using all the hydroelectric potential in our country, it is recommended to examine the environmental effects in detail and to realize projects that are at the level that only the environment can carry from the Hydroelectric Power Plants to be established in the region.

Keywords: Hydroelectric Power Plants, Climate Change, Environmental Impact

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An Assessment of Toilet Paper Discharges to Prevent Blockages in Household Plumbing Systems

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Fatih KARADAGLI[2]

Abstract

Personal hygiene products such as toilet paper and flushable wipes are disposed of into sewer systems. In sewers, they blend with other wastes such as grease and sand to form a mixture of waste materials that accumulate over time and cause sewer backups. Wastewater authorities and household residents incur financial costs, property damage, and health risks due to sewer blockages. To minimize such risks, this study assesses the amount of toilet paper that can be transported safely through toilets and household drains with a single flush (4 L). For this analysis, we collected various toilet paper samples and categorized them into two groups as 1- Economical, 2-ply, and thin products versus 2- Premium, 3-ply, and plush products. Then, representative samples from each category were tested according to toilet and drain-line clearance test protocol developed by the International Water Services Flushability Group, an organization representing wastewater authorities from around the world. The results elucidated critical loadings that are classified as sewer-safe, risky, and unsafe. As an example, up to 20 sheets of economical and 2-ply toilet paper was discharged safely with a single flush; hence, this range was defined as sewer-safe. Similarly, 20-40 sheets constituted a risky range for accumulations, while >40 sheets choked the toilet. For comparison, up to 8 sheets of premium and 3-ply toilet paper was transported safely, while 8-15 sheets were risky for accumulations, and >15 sheets caused blockages. In light of the findings, economical type toilet papers are preferable to prevent potential backups in household toilet and drain-line systems. In particular, economical products are highly recommended for entities such as shopping centers, student dormitories, and sports arenas.

Keywords: Toilet paper, safe loading, wastewater, sewer backup, blockage

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Investigating the Effect of Colloidal Foulants on SDI and MFI Tests

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Oruç Kaan TÜRK[2]
Mehmet ÇAKMAKCI[3]

Abstract

Silt density index (SDI) and Modified fouling index (MFI) are tests to measure and assess the fouling potential of pressure driven membranes such as reverse osmosis (RO) and nanofiltration (NF), which are widely used in water treatment applications. The process efficiency and the useful membrane life of such systems are mainly affected by the fouling phenomenon. Membrane fouling happens by the deposition of solid matters present in the feed water onto the membrane surface. Foulants such as particulate and colloidal matters cause plugging of the membrane and adversely impact the process productivity and operating costs. A comprehensive understanding to the fouling potential of the feed water and the reliability of the fouling index is crucially important in the design and operation phases of such systems. In this study, SDI and MFI experiments were carried out with synthetic feed water solutions containing different combinations of particle and colloidal foulant concentrations. The filtration performance data were presented systematically, and the reliability and sensitivity of both indices were compared. MFI values were sensitive to both particle and colloidal foulants and exhibited good consistency with increasing foulant concentration. Plant operators and academicians are encouraged to utilize the MFI test as a fouling prediction tool.

Keywords: SDI, MFI, Fouling Index, RO and NF membranes

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Sperm Cryopreservation in Sex-Reversed Female Rainbow Trout (Oncorhynchus Mykiss)

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Mehmet KOCABAŞ[3]
Erkan CAN[4]

Abstract

For commercial aquaculture, the obtainment of all-female salmonid populations is important in fish farms. Sex-reserved females (masculinized females, neomals) have a female genotype (XX), even if they have a male phenotype. Sex-reserved female trout is produced sperm cells with a male phenotype. Sex-reserved females usually lack spermatid ducts and sperm is obtained from the testicles and fish must be killed. Previous studies showed that testicular sperm differed from ejaculate sperm of normal male characterized by variable spermatozoa maturity, decrease in sperm motility, higher sperm concentration and, significantly reduced fertilization success after freezing process. The reasons for the poor characteristics of the sperm of sex-reserved females after cryopreservation are not fully understood. For these reasons, it is crucial to determine the effects of antioxidant supplementation on cryopreservation of sperm from sex-reserved females with respect to cryoinjury.

Keywords: Sex-reserved, cryopreservation, sperm, rainbow trout.

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Forecast of Electricity Generation from Wind Energy with Artificial Neural Networks

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Abstract

Today, depending on the developments in both technology and industry, the need for electrical energy in the world is constantly increasing. Nowadays, most of the energy needs are covered from non-renewable energy sources, namely fossil fuels (such as natural gas, oil, coal). The use of renewable energy sources, which have many advantages compared to non-renewable energy sources, has recently become widespread and has become the determining fact of the energy policies of the world countries due to the damage of non-renewable sources to the environment, their depletion over time, and the fact that they cause global warming. One of the most important renewable energy sources is wind energy and shows a rapid development with the development of wind technology. In addition, recently, with the rapid establishment of wind turbines and the reduction of electrical energy produced from wind turbines cost, it has approached a competitive level with other energy sources. In this present work, the wind energy potential of Çanakkale Mahmudiye region was estimated with the help of artificial neural networks (ANN). In the model we created, three years wind speed data was used as input data and the output powers of six different wind turbines (GamesaG97, SuzlonS.88, SiemensSWT2.3, NordexN100, EnerconE82, and VestasV117) were calculated, so that electricity generation from wind energy was tried to be estimated with ANN. It has been found that the predictions made by our ANN model we created in the regression curves are reliable and consistent. According to our estimation results, it has been gained that the wind potential of the region we have chosen is good enough and that high-capacity energy production can be achieved with the appropriate turbine selection.

Keywords: renewable energy sources, wind energy, artificial intelligence, artificial neural networks

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Industrial Image Processing Based Thickness Measurement Method for Stamp Parts With Narrow Tolerance

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Semih ALAN[2]
Mehmet ATAK[3]

Abstract

Workpieces produced with precise tolerances are frequently used in aviation, space and especially in the automotive industry. Workpieces with very narrow tolerances must be checked to provide quality requirements whether they are produced to the correct dimensions. For the rapid control of mass-produced sensitive parts, camera inspection systems are generally used due to their high success. In this study, a thickness measurement algorithm developed for the measurement of thickness values of a ring-type stamp piece is proposed. An experimental setup consisting of telecentric lenses and an industrial camera was created for precise measurement of the workpiece with a tolerance of ±0.1 mm. In the proposed algorithm, first the upper thickness value of the part is calculated. A serial measurement of the upper region is evaluated with the measurement lines taken from the top and bottom for the ear-shaped projection region. The most repeated measurement value throughout the series gives the measure of the upper thickness value. Secondly, the bottom thickness value of the workpiece is measured between the glass surface and the upper ear according to the most repetitive measurement approach. MSA(Measurement System Analysis) tests were carried out for a total of 25 parts which have ground truth. According to the obtained results, it was seen that the measurement uncertainty of the system with proposed algorithm is approximately 3µm. In the repeatability analysis, the C_g - C_{gk} values were calculated as 1.58-1.55 for the upper thickness, 3.41-2.99 for the lower thickness. In the reproducibility tests, the GRR value was measured as 8.90% for the top thickness and 5.71% for the bottom thickness. According to the results, it is thought that the proposed method can be used directly in the industrial environment and will make a great contribution to the field of industrial image processing.

Keywords: Industrial Image Procesing, O-ring, Thickness, Measurement

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Analysis of Tungsten Disulfide Contribution to the Reflected Phase of the Four-Arm Bilayer Nanoantenna Structure

Duygu GÜMÜŞCÜ[1]
Ekin ASLAN[2]
Erdem ASLAN[3]

Abstract

In this study, plasmonic nanoscatter-based metacells supported with tungsten disulfide will be analyzed in terms of phase gradient. Numerical analyzes are made for the design of nanoscatterers using the finite difference time domain method. In this context, first, the non-rotational and rotational resonant behavior of gold nanoscatterers in the optical spectrum, which is determined as the basic nanoantenna, is examined. At the considered resonant wavelength, the effect of the versions derived from basic nanoantenna structure supported by tungsten disulfide and rotated, on the phase gradient is analyzed. Here, since tungsten disulfide layers have large transmittance values in visible spectral ranges, it is expected to increase resolution in phase.
Keywords: Nanoscatterers, Phase Gradient, Metasurface, Plasmonics

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Interaction of Neutral Current with Unbalanced Loads and Harmonics

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Abstract

While most loads in the past were linear (incandescent lamps, heaters, etc.) and used sinusoidal currents, today's loads use non-sinusoidal currents because they are not linear. Non-linear loads cause harmonic currents to flow in the distribution system together with the fundamental current. Harmonic currents can cause fires as well as equipment malfunctions. Harmonic currents also cause extra costs in the operation due to the decrease in energy quality. All single-phase non-linear loads cause the same harmonic currents to flow in the distribution system or facility. All of the singular harmonics (3rd, 5th, 7th, 9th, 11th, 13th, 15th, 17th etc.) occur in the system due to non-linear loads. Harmonic currents cancel each other out in the neutral wire, except for the harmonics called "triplens" (3rd, 9th, 15th, 21st, 27th etc.), which can be divided into three and are singular. Triplen harmonic current flow generates heat from losses throughout the distribution system. Therefore, the excess current passing through the conductors causes the wires to heat up. If the plant is built with small cross-section neutral conductors and high triplen harmonic current is flowing, it may overheat and especially the connection parts may get hot enough to melt and cause fires. Due to the heat caused by harmonic currents, it can cause various malfunctions and even untimely opening of the circuit breaker. In this study, measurements were made with a power analyzer in four plants, triplen harmonics, which are the causes of neutral current formation, and unbalanced load conditions in phases were examined. As a result, it has been observed that the current in the neutral conductor is caused by triplen harmonics and unbalanced loads in the phases.
Keywords: Voltage unbalance, triplen harmonics, load unbalance, neutral current.

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Busbar Voltage Regulation in Alpaslan II Hydroelectric Power Plant

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Altuğ BOZKURT[2]

Abstract

Hydroelectric power plants, which have an important position in the world's energy production since 1882, are still used today and continue to be used to produce clean energy for our environment. Although its technology and working principle are old fashioned, hydroelectric power plants are still in the top 6 in terms of power potential list of largest power plants today. For this reason, it is of great importance that hydro power supports the grid in electricity transmission and contributes to more quality in the power transmission lines. In this study, the 280 MWe Alpaslan II hydroelectric power plant was examined. Electrical network effects of the reactive power management and voltage regulation of the excitation system of the Alpaslan II hydroelectric power plant is discussed and examined with real test results. The control modes of the excitation system are divided into 4 as reactive power management, stator voltage, power factor and busbar voltage regulation mode. While the units of the power plant are synchronised, the induced voltage value to the rotor is applied at the under-excited, over-excited and nominal level and the effects on the electrical network are observed as the reactive power values change. According to the results obtained from these tests, an automatic control block was designed and the desired voltage levels were supported on the high voltage side of the transmission lines.

Keywords: Control Systems, Hydroelectric Power Plant, Busbar Voltage Regulation, Reactive Power Management

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Smoke Detection in Forest Fires With Deep Learning Method

Türem TOPALHAN[1]
Hüseyin CANBOLAT[2]

Abstract

Forest fires cause many damage to forest ecosystems. Direct or indirect destruction not only affects animal and plant ecosystems, but also affects many areas such as climate change, tourism, industry and health in the long run. In order to minimize these damages, it is necessary to intervene in forest fires early. Early intervention in forest fires depends on the detection of the fire as soon as possible. As a result of the researches, the importance of unmanned aerial vehicles is great in the early intervention of forest fires. In this study, it is aimed to intervene in fires early thanks to the images taken from the drone and to detect smoke using the image processing technique as well as the deep learning techniques that have been popular in recent years and to compare these two techniques. Python programming language and Tensorflow library were used for smoke detection. The CNN method, which is successful in terms of accuracy and speed, has benefited the study on smoke detection, and ResNet architecture, which has proven to be very effective in the field of image classification, was also used in the study. In the later stages of the study, smoke analysis will be performed with the clustering method by training with data sets and the accuracy rates of the study will be tested.
Keywords: Uav, Deep Learning, Smoke Detection, Forest Fire, İmage Processing

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Utilization of Exogenous Melatonin on Plants Growth and Development

Esra Nurten YER ÇELİK[1]

Abstract

Melatonin is a stimulating plant growth regulator that promotes the growth and development of plants. Melatonin (N-acetyl-5-methoxytryptamine) has been discovered in eukaryotic unicells, prokaryotes, fungi, algae, mammals, and plants. In 1958, it was identified in the pineal gland of vertebrates for the first time. In 1995, the occurrence of melatonin in plants was discovered. It has recently attracted scientific attention and has become the focus of study and projects. According to several studies, it is a hormone that affects plant growth, development, and response to biotic and abiotic stresses. It's a strong reducing agent with the ability to detoxify up to ten reactive oxygen species per unit. Melatonin's primary role is to protect plants from biotic and abiotic stressors. Abiotic stress induced photosynthesis is partially recovered in the presence of melatonin, resulting in improved plant growth and enhanced stress tolerance. This research focuses on how melatonin interacts with phytohormones and influences genomic and transcriptomic changes in plants, as well as how melatonin modulates abiotic stress signaling pathways in plants. Finally, discussed that the importance of identifying melatonin receptors and components during signaling transduction pathways, as well as methods for doing so. Melatonin serves as a potent radical, according to research, and this can boost stress tolerance, growth, and development in plants.

Keywords: Phytomelatonin, plant regulation, abiotic stress, exogenous melatonin

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Production of LiFePO4 by Glass-Ceramic Method and Investigation of It's Electrochemical Performance

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Serdar ALTIN[2]

Abstract

$LiFePO_4$ powder with lead doping was produced by the Glass-ceramics technique. The starting components were mixed and melted after heat treatment at 1200˚C for 2 hours. The obtained glass materials were grounded with the addition of 10% glucose and re-heat treated at 850˚C for 5 hours. The morphological structure and performance of lead doping $LiFePO_4$ produced by X-ray diffraction (XRD), scanning electron microscopy (SEM), DTA temperature analysis, intensity analysis and FTIR spectroscopy were investigated. Since no impurity phase was observed in the XRD analysis, it was observed that Pb-Fe (lead- substitution took place. Electrochemical impedance spectroscopy (EIS), cycling voltametry (CV, seen n Figure 1), C-rate, and battery life-cycle tests of the produced Pb (lead) doped LFP battery were performed. It was predicted that the results may use for the commercial cells in future

Keywords: $LiFePO_4$, Lead, Pb, battery, glass-ceramics.

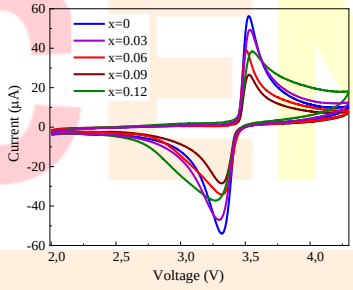

Figure 1. CV of lead doped LiFePO4

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Predicting Explosive Weight from Explosion Data with Artificial Intelligence Methods

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Ibrahim TURKOGLU[2]

Abstract

The use of third generation artificial intelligence in the field of defense and security has been continuing and developed for many years. In particular, the use of artificial intelligence technologies offers convenience in terms of fast statistical calculations and cost-time. Artificial intelligence in the field of defense: it is used in systems such as reconnaissance, quick decision making, target identification, target destruction, and calculates and estimates the damage and risk areas of terrorist attacks. Current technologies obtain data during the explosion event in a controlled manner. During these detonations, the amount of explosive is known beforehand. However, the amount of explosive is not known at the time of a possible explosion and its damages are determined only after the explosion event. In addition to these, the damages of possible terrorist attacks in city planning and various structures cannot be known without the explosion. Therefore, it is aimed to find a solution to the mentioned problems by using artificial intelligence approaches to detect the weight of explosives. In this study, the weight of explosive was estimated by artificial intelligence methods by using the explosion data. The study consisted of three stages. In the first stage, the data set was generated. Accordingly, the data were obtained by the Kingery-Bulmash method, which is the most widely used method for calculating burst loads. In the second stage, the data were classified with SVM, KNN and ANN classifiers. In the last stage, the performances of the classification algorithms were compared and only the accuracy evaluation criterion was used. At the end of the study, the highest estimation process was obtained with the SVM classifier with an accuracy score of 91.02%.

Keywords: Kingery-Bulmash, Blast loads, Artificial intelligence methods

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SORT Cycle CO2 Emission Simulation of an Intercity Bus with VECTO

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Tarkan SANDALCI[2]

Abstract

Lorries, buses and coaches contribute to road CO2 emissions in a substantial way, in spite of their low share in vehicle fleet. CO2 emissions determination and certification are executed using a dedicated simulation software (VECTO). Currently, CO2 emissions of lorries are regulated by the European Union and consequently, buses and other types of heavy-duty vehicles will be regulated as well. On the other hand, the Standardized On Road Cycle (SORT) is still in use for bus fuel consumption measurements. The current study performed a simulation by modelling the SORT cycle operation conditions using VECTO. Utilizing a standardized cycle for fuel consumption simulation decreased the uncertainties. Combining this driving cycle with a gas pedal signal generator that ensured the fixed acceleration pedal positions further improved the repeatability and the precision of the measurements. Setting the auxiliary parameters according to the SORT standards reduced the number of auxiliary types and brought their energy demand closer to the measured on-road values, thus, improved the simulation quality in terms of fuel consumption estimation. The simulation results for SORT 1-2-3 indicated values in 0.8-1.4% margin with the on-road measurements, depending on each cycle. The difference was referred to wind speed conditions as the other parameters were precisely defined thanks to the standardized cycle. The results point out that collecting detailed wind conditions data throughout the measurements has a potential to further improve the accuracy of simulation results.

Keywords: intercity-bus, on-road CO2, VECTO, SORT

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Production of Vanadium Doped Na-ion Cathode Materials and Investigation of Their Electrochemical Performance

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Serdar ALTIN[2]

Abstract

Vanadium doped Na-ion cathode materials were produced by the quenching of the mixture after heat treatment. The obtained powders were used for the cathode production for CR2032 cells. The half cell configuration was used for the electrochemical measurements. the cells were assembled in Argon filled glove box using Na-metal as an anode in the cells. $NaClO_4$ (in PC/EC) electrolyte was used for the cells.

The structural properties of the powders were determined by X-ray diffraction (XRD), scanning electron microscopy (SEM), and FTIR spectroscopy. The electrochemical properties of the CR2032 cells were investigated by Electrochemical impedance spectroscopy (EIS), cycling voltammetry (CV), C-rate, and galvanostatic cycling tests. The results obtained are within the expectations and studies are being carried out to increase the battery performances. The results showed that Vanadium doped Na-cathodes have promising results for future battery technologies.

Keywords: Vanadium,Na-ion battery

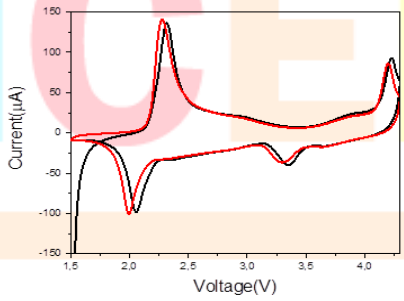

Figure 1. CV of lead doped V-doped Nai-on cathode

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Catalan Transform of the Gaussian Fibonacci Sequence

Mine UYSAL[1]
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Abstract

Number sequences continue to attract the attention of researchers for a long time. Number sequences, especially Fibonacci sequences, find applications in many branches of science as in every branches of mathematics. Many generalizations have been made and analyzed in these numbers. One of these generalizations is the Gaussian Fibonacci numbers.

Gaussian numbers were given by Gauss in 1832. A Gaussian number is a complex number $z = a + ib$, where a and b are integers.

The Gaussian Fibonacci numbers GF_n are defined by

$$GF_n = GF_{n-1} + GF_{n-2}$$

where $GF_0 = i,\ GF_1 = 1$ and $n \geq 2$.

In combinatorial mathematics, Catalan numbers are a sequence of natural numbers that often appear in various counting problems involving objects defined recursively. They are named after the French-Belgian mathematician Eugène Charles Catalan.

The Catalan numbers with general term $C(n)$ are defined by

$C(n) = \frac{1}{n+1}\binom{2n}{n}$.

Generating functions of the Catalan numbers $C(n)$ are given by

$c(x) = \frac{1-\sqrt{1-4x}}{2x}$.

In this study, we present the Catalan transform of the Gaussian Fibonacci sequence. We examine the properties of the sequence. We find some terms of the Catalan transform of the Gaussian Fibonacci sequence and represent these terms as a matrix. Then we obtain the generating function of the Catalan transform of the Gaussian Fibonacci sequence. Also, we apply the Hankel transform to the Catalan transform of the Gaussian Fibonacci sequence. We get an interesting property regarding the determinant of the Hankel transform of the sequences.

Keywords: Fibonacci numbers, Gaussian Fibonacci numbers, Catalan transform, Hankel transform, Generating function.

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On Arithmetic Functions

Emre ÖZTÜRK[1]

Abstract

Arithmetic functions have rather rich properties and very useful tool for both in number theory and algebra. Furthermore, they have many implementations in science such as computer science, cryptography, graph theory etc. The essential arithmetic functions are multiplicative and additive functions. Simply the completely additive functions have $\psi(mn) = \psi(m) + \psi(n)$ and completely multiplicative functions have $\psi(mn) = \psi(m)\psi(n)$, for all natural numbers m and n. On the other hand, ψ is additive if $\psi(mn) = \psi(m) + \psi(n)$ for all coprime natural numbers m and n, or else ψ is multiplicative if $\psi(mn) = \psi(m)\psi(n)$ for all coprime natural numbers m and n. Some fundamental multiplicative functions are sigma function (σ), tau function (τ), Euler totient function, Möbius function, Dedekind psi function etc. In the present study, we investigate interesting properties of these functions by an elementary approaches and we give some applications. We mainly focus on well-known Euler's totient function and similar arithmetic functions in terms of structure of residue class modulo m. By the help of divisor function (d) and Euler totient function, we obtain an inequality. Then, we derive new inequalities by former ones. Moreover, we use these functions in order to prove some theorems in field theory. Finally, we give some examples and procedures about our results.

Keywords: Arithmetic function, Euler totient function, Residue class, Galois extension, Field theory

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Existence of Positive Periodic Solutions in Shifts $\delta_{\pm}$ for a Dynamic Equation with Variable Delay on Time Scales

Ülkü ASLANSOY[1]
Erbil ÇETİN[2]

Abstract

Let $\mathbb{T} \subseteq \mathbb{R}$ be a periodic time scale in shifts $\delta_{\pm}$. The purpose of this paper is to present sufficient conditions for the existence of positive periodic solutions in shifts $\delta_{\pm}$ on a time scale of the following nonlinear neutral dynamic equation with variable delay by using Krasnoselskii's fixed point theorem

$$((x(t) - g(t, x(\delta_-(\tau(t), t)))^{\Delta} = r(t)x^{\sigma}(t) - f\left(t, x\left(\delta_-(\tau(t), t)\right)\right), \quad t \in (t_0, \infty) \cap \mathbb{T}$$

For applying the Krasnoselskii's theorem we represent the above equation with a sum of a contraction and a compact map. This study extends and unifies periodic differential, difference, h-difference, and q-difference equations by a new periodicity concept which is introduced by Adıvar [1] on time scales. The results obtained extend the works of Raffoul [2] and Ardjouni and Djoudi [3,4]. In these papers, authors considered the existence of periodic solutions for differential and dynamic equations satisfying the condition

$$\text{there exists a } P > 0 \text{ such that } t \pm P \in \mathbb{T}, \forall t \in \mathbb{T}$$

However, there are many time scales which do not satisfy this condition. A new periodicity concept on time scales does not oblige the time scale to be closed under the operation $t \pm P$.

Keywords: Periodic solutions in shift, time scale, existence of positive periodic solutions
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On Some Conclusions the Relationship between Demand and Supply

Hasan KELEŞ[1]

Abstract

This article is about the demand and supply function, which is one of the functions of a single variable, which is frequently used in economic, economic, business, financial, applications of mathematics. In the calculation of the equilibrium point, $f_D(x)$ demand and $f_S(x)$ supply functions;

$$f_D(x) = f_S(x)$$

using the equation, for $\forall x \geq 0$;

$$\frac{f_D(x)}{x} = \frac{f_S(x)}{x}$$

Here, the representations of , $L(x), P(x), I(x), E(x)$, are considered as loss function, profit function, income function and expense function, respectively. Different from the market calculations, the known situations in the real structure were studied on the concepts that were initially considered as linear functions on the plane by using mathematical operations. Some of the cases where the results of the concepts of average demand and average supply were examined. In an economic activity, the importance of the demand and supply functions is as important as the profit and loss. In addition, profit and loss functions were obtained in relation to the concepts of average demand and average supply. The direct relationship between the loss function and the demand function was obtained. Namely, it was calculated that the derivative of the expression obtained by multiplying the loss function by the unit corresponds to the demand. It was also concluded that to obtain the profit, the integral of the difference between supply and demand must be twice. Univariate function results between profit, loss, unit, demand and supply functions were obtained. It became intuitively clear that it could be a function of two variables involving demand and supply. Although the equilibrium point is associated with demand and supply functions, it has been observed that profit and loss functions can also be calculated. Thus, it was perceived that the averages should not be kept constant in constantly changing market applications.

Keywords: demand, average demand, supply, average supply, profit, loss, income

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On Some Conclusions the Relationship between Profit and Loss Functions

Hasan KELEŞ[1]

Abstract

In this article, the cases where the profit and loss functions are equal or different, which are one of the functions of one variable, which are frequently used in economic, economic, business, financial, ... applications of mathematics are discussed. Here, the representations of , $L(x), P(x)$, $I(x)$, $E(x)$ are considered as loss function, profit function, income function and expense function, respectively. While calculating break-even points from $I(x)=E(x)$ the remainder of the economic activity consists of situations where the $I(x)$ and $E(x)$ functions are not equal. The fact that the control, management and planning of this activity took place in this area determined the direction of the study. Briefly, for the demand functions $f_D(x)$ and supply functions $f_S(x)$, the situation where the income and expense functions are not equal [4,5].

$$xf_D(x) \neq xf_S(x)$$
$$I(x) \neq E(x)$$
$$E_{av}(x) \neq I_{av}(x).$$

Scientific and technological developments make the benefit and necessity of profit and loss account in financial reporting even more important by increasing the development of increasingly complex activities, increasing the interest in business performance for solution-oriented economic, financial and economic dynamic information. This situation increases the interest in mathematics, which produces more systematic and even predictable solutions instead of local solutions. This article is studied in terms of revealing the planar and even spatial structures necessary for the management of the market economy in the real sense and producing solutions.
At the beginning, it is examined how the profit and loss functions of income and expenses are calculated when the demand and supply (price) are known. It has been researched that the increase or restriction of continuous production is fixed results, so the turmoil of profit-making in societies made economic activity unworkable after a while. As a result of this, it is increased the necessity and importance of the analysis and planning of complex economic structures. Although there is limited study in mathematical calculations, it is important that activities in the life principle of this subject develop more clear and measurable concepts. It is observed that

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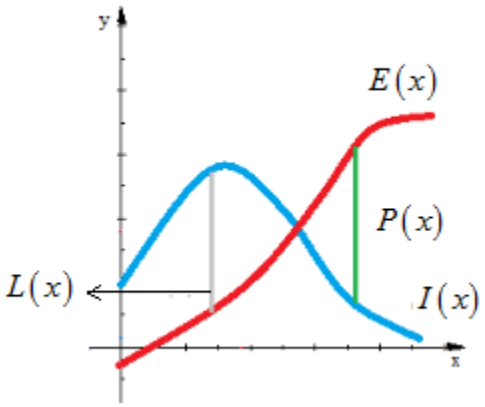
there can be infinite concepts, considering that partial calculations are replaced by another calculation after a while.



Keywords: demand, supply, breakeven point, profit, loss, income function, expense function, profit function, loss function

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On Row Co-divisors and Column Co-divisors in Regular Square Matrices

Hasan KELEŞ[1]

Abstract

This study consists of a comparison between column co-divisors defined in 2010 and row co-dividers newly defined in March-2021. This study consists of a comparison between column co-divisors defined in 2010 and row co-dividers newly defined in March-2021. In column co-divisor definition, two regular square matrices are calculated by taking the determinant by replacing all the columns of the first with the columns of the second matrix, respectively. For the same matrices, in the definition of row co-divisor, the rows of the first of the two matrices, which also have the same conditions, are defined by taking their determinants by replacing the rows of the second matrix, respectively. The common aspects of these two definitions are examined. Examples of different situations are given. The meanings of the concepts known in the literature and some of the features that may be related to these two were discussed. In two definitions, it is determined that there are new approaches that can bring to the literature. It is investigated whether there are new accounts that are the same or different on a matrix.

It is concluded that new, rapid results were obtained in the local and even holistic comparison of the matrices obtained from the systems. Therefore, it is expected to make a significant contribution to the comparison of technological solutions. On the contrary, this approach allows observing mass solutions, variation between local solutions.

Keywords: horizontal division, vertical division, row co-divisor, column co-divisor

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Standard Grey Model Theory and Turkey's Greenhouse Gas Emission Estimates

Berkan ZİLE
Halis BİLGİL

Abstract

Greenhouse gas emissions cause serious damage to the global climate. CO_2 emission reduction can make positive contributions to regional sustainable development and atmospheric environmental management. Of the proposed gray models for making estimates based on small sample data, the standard GM (1,1) model is useful due to the large number of data requirements, simple operation and computational features.
In this study, estimates were made for the years 2021-2028 using Turkey's greenhouse gas emission data from 2011 to 2020. Mean absolute percentage error (MAPE) compares the actual values with forecasted values to evaluate the precision. It is evaluated that the total greenhouse gas emission indicator of Turkey will increase exponentially within next eight years.
Keywords: Grey modelling, Least squares method, Data estimation, Error analysis, Differential equations

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Element-/organic Diradicals in Terms of Theory

Cem Burak YILDIZ[1]

Abstract

Open-shell molecules like radicals, diradicals, carbenes, and electronically excited-state molecules with high energy are attractive species for experimental and theoretical chemists due to their intriguing reactivity and electronic properties. Molecules with two radical centers are described as diradical. In the case of radical centers being carbon, they are called organic diradicals, whereas the element diradicals contain main group elements on the corresponding centers. When the dipole−dipole interaction in a molecule is strong enough, two spin states can be produced. In this case, the diradicals can be named as singlet with the spins in the opposite direction or triplet with the spins in the same direction. Herein, we would like to report our recent results on the organic diradicals and element diradicals in terms of theory. The effect of the molecular structure was examined in parts for the potential synthesis of triplet ground state diradicals. Additionally, the excited-state chemistry of singlet diradicals will be useful for their potential use in material chemistry and provide further impetus to this field. The results will open a gate for the synthesis of π-conjugated open-shell compounds. The published experimental studies by other groups also confirmed our findings.

Keywords: Diradicals, DFT, Theoretical Chemistry

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Obtaining Polyvinyl Alcohol-Like Material from Waste PVC Sawdust

Fatih EYDURAN[1]

Abstract

Poly(vinyl chloride) PVC can use to obtain poly(vinyl alcohol) PVA. Substitution reactions of OH and Cl for dechlorinating of PVC in various conditions have been carried out and a white coloured PVA has not obtained to up now. For example; PVA was obtained from PVC in EG at 190 °C. But, the obtained yield of PVA has about %20 (red product). On the other hand, poly(acetylene) PA (~%16) instead of the PVA was obtained from PVC via nucleophilic substitution in DMF at RT for 6h. In another study; it is seen that from hydrolysis of waste PVC with NaOH in mixture of DMSO/H2O at 80°C for 3h obtained brown PVA having the least chlorine content. According to these results can be said that the obtained PVAs have C=C double bond conjugation. Because, it is known that when the number of the conjugated C=C bond increases, the colour changes from white to yellow, orange, red, brown and black.

In this study, it was aimed to obtain white coloured PVA from waste PVC sawdust. Firstly, according to the method given above in DMSO, poly(acetylene-vinyl alcohol) P(A-VA; dark-brown) was obtained from waste PVC sawdust. Then, poly(epoxy-vinyl alcohol) P(E-VA; pale-yellow) was obtained from by reacting the P(A-VA) with CH3COOOH (prepared from CH3COOH, H2SO4 and H2O2). Finally, PVA (pale-mustard-yellow) was obtained by reacting P(E-VA) with aqueous NaOH solution. As a result of this study, pale mustard-yellow PVA (or PVA-Like) was obtained instead of white PVA. Structures of P(A-VA), P(E-VA) and PVA-Like were characterized by FTIR spectra. The band at 1750 cm-1 in FTIR spectrum of PVA (invisible in PVA-Like) indicates that the CH3COO- group is bounded to the structure of P(E-VA). From this observation it can be said that the structure of P(E-VA) is very similar to PVA synthesized from the hydrolysis of poly(vinyl acetate).

Keywords: Pvc, Epoxıde, Chemıcal Recyclıng, Waste, Transformatıon

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Effect of antioxidant, antibacterial and physical properties of chitosan-polyvinyl alcohol films incorporated thyme oil

Nedim GÜRLER [1]
Ferit Can YAZDIÇ [2]
Altuğ KARAMAN [3]
Zeynep EROĞLU [4]

Abstract

The fact that synthetic plastic packages used in daily life is non-biodegradable and cause environmental pollution has increased the interest in biocompatible and biodegradable polymers. In addition, it has recently become very important in many applications as antibacterial and antioxidant packaging materials. Thyme oil is a natural phenolic compound as antioxidant and antibacterial. In this study, the effect of different amounts of thyme oil (0%, 0.25%, 0.5% and 1%) on chitosan and polyvinylalcohol polymer was investigated. The physical, antibacterial and antioxidant properties were determined. The solubility of the films shows a slight decrease and are 48%, 46%, 42%, 38% (0%, 0.25%, 0.5% and 1%) respectively. The films were more opaque compared to the film without thyme oil, but with the increase of thyme oil content, the films exhibited transparency. The color scales of the films (L*, a*, and b*) were also fulfilled. With thyme oil content, L* (brightness) and a* (redness) values decrease and b* (yellowness) values increase. The water vapor permeability values of the films were 3.82×10^{-6} g m^{-1} s^{-1} Pa^{-1}136, 3.14×10^{-6} g m^{-1} s^{-1} Pa^{-1}, 2.08×10^{-6} g m^{-1} s^{-1} $Pa^{-1}$and 1.59×10^{-6} g m^{-1} s^{-1} Pa^{-1}, respectively. Antibacterial activities of Staphylococcus aureus subsp. aureus (ATCC 25923) and Escherichia coli (ATCC 25922) were tested against bacteria using the agar-well diffusion method. The antibacterial properties of the films containing 1% thyme oil were more effective and significantly different. In addition, films containing 1% thyme oil were mostly potent and effective in inhibiting the growth of gram-negative bacteria, namely E. coli, when compared to stains of gram-positive bacteria responsible for antimicrobial activities. The antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay were carried out. The antioxidant properties of the films also increase with the increase of thyme oil content of the films. Therefore, the prepared films can be presented as both antioxidant and antibacterial food packaging materials.

Keywords: Chitosan, thyme oil, packaging material, poly (vinyl) alcohol

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The Investigation of Activated Carbon Produced From Pistachio Shell in Terms of Morphological, Structural and Surface Area

Hacer DOLAŞ[1]

Abstract

One of the environmental problems is the accumulation of solid waste materials. Progressing and reuse of solid wastes and inspections on this subject are important issues in environmentally sensitive societies (Aly-Eldeen M A., 2018). Agricultural solid waste is one of the important raw materials frequently used by researchers in the production activated carbon due to its abundance in nature, cheap and high quality fibrous structure. Thanks to these studies carried out, it is ensured that both contribute to environmental cleaning and obtaining activated carbon with cheap materials. The quality of activated carbon varies depending on the raw material, the chemical type used in activation, the ratio of this chemical, the activation time, the type of inert environment gas used during carbonization, the temperature and time of carbonization (Dolas H, 2010). In this study, pistachio shells were used as waste material. The activated carbons obtained by carbonization at the appropriate temperature and atmosphere after activation with the suitable chemical were characterized by using the results of Brunauer-Emmet-Teller (BET) surface analysis, scanning electron microscopy (SEM) image, Fourier transform infrared (FT-IR) spectroscopy, thermal analysis (TG-DTA). 10% NaCl and 10% sulfuric acid solutions were used as activator. The carbonization process was carried out by keeping it in a nitrogen gas atmosphere at 800 ^{o}C for 1 h. Figure 1 presented the adsorption isotherm and SEM images of obtained activated carbon. According to the results obtained, activated carbon had a BET surface area of 2093 m^2/g and a Langmuir surface area of 3939,573 m^2/g. In addition, with the DR method, the average pore width of the activated carbon was 11,897 A^{o}, the adsorption energy was 10,927 kJ/mol, the micropore surface area was 2963,759 m^2/g. SEM images clearly showed the pore structure of activated carbon.

Keywords: Activated Carbon, Carbonization, Surface Area, Pore Volume, SEM

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Lower Critical Solution Temperature Behavior of Maleic Anhydride-Styrene Copolymer in Some Common Organic Solvents

Ersen YILMAZ[1]

Abstract

Many studies have been conducted on the lower critical solution temperature (LCST) of polymers in aqueous media, but their behavior in organic solvents has not been studied much. This is because polymers generally do not exhibit an LCST behavior in organic solvents. Although there are some studies done under tough conditions, the number of studies done especially in mild conditions is even less. Maleic anhydride-Styrene (MAS) is an alternative copolymer. In this study, first the polymerization reaction of maleic anhydride and styrene was carried out by free-radical solution polymerization in 2-butanone solvent under relatively mild conditions at our laboratory, and then some of its structural properties were elucidated, and then the phase behavior of Maleic anhydride-Styrene copolymer in different organic solvents (tetrahydrofuran, hexane, propyl acetate, n-alkanes, 1,2-dichlor ethane, butyl acetate) has been studied. The copolymer formation was confirmed by FT-IR and the average molecular weight was determined as 32,000 $g.mol^{-1}$ by gel permeation chromatography using tetrahydrofuran (THF) as the eluent solvent and standard polystyrene for molecular weight calibration. LCST phase behavior of the synthesized copolymer was observed at different ratios of solvents and under mild conditions and the turbidity temperature of the polymer solution can be adjusted with appropriate ratios.

Keywords: Maleic anhydride, Organic solvent, LCST, Turbidity

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Electrochemical Synthesis, Characterization and Anticorrosive Properties of MnO_2 Doped Poly(*N*-vinyl carbazole) Films on Steel

Eda ŞİMŞEK[1]
Berrin DURAN[2]

Abstract

MnO_2 doped poly(*N*-vinyl carbazole) coatings (PNVnCz-MnO_2) were electrochemically synthesized on 304 stainless steel (304-SS) by cyclic voltammetry. *N*-vinyl carbazole, tetrabutyl ammonium perchlorate and MnO_2 containing non-aqueous acetonitrile solution was used for the synthesis. In order to determine synthesis conditions of best protective coating, each of the cyclic voltammetric electropolymerization parameters (potential range, scan rate, cycle number) was changed by keeping the others constant; thus PNVnCz films were synthesized on SS surface under different conditions. Afterwards, potentiodynamic polarization curves of the PNVnCz coated stainless steel electrodes (SS/PNVnCz) were recorded in 1 M H_2SO_4 corrosive test solution and compared. It was found that the PNVnCz film synthesized at 0.3 V to 1.5 V potential range, 50 mVs^{-1} scan rate and 10 cycle number has the best protective corrosion performance. These determined synthesis parameters were used for MnO_2 doped PNVnCz synthesis and PNVnCz films were doped with three different amounts of MnO_2 (0.05%, 0.10%, 0.15%). In order to determine the optimum amount of MnO_2, the potentiodynamic polarization curves of SS/PNVnCz(MnO_2) electrodes were compared and it has been found that 0.10% MnO_2 doped PNVnCz films provided better protection performance. The synthesized PNVnCz(MnO_2) coatings were characterized by ATR-FTIR and SEM. Corrosion performances of PNVnCz(MnO_2) coatings were investigated by E_{ocp}-time curves, potentiodynamic polarization (PP) and electrochemical impedance spectroscopy (EIS) techniques in 1 M H_2SO_4 solution and compared with the data of undoped PNVnCz. It has been found that the PNVnCz(MnO_2) coating exhibited better and longer time protection performance than the undoped PNVnCz coating.

Keywords: Poly(*N*-vinyl carbazole), electropolymerization, MnO_2, stainless steel, corrosion.

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Determining Structural Properties of InGaN/GaN MQW by Using Reciprocal Space Maps

Ahmet Kürşat Bilgili

Abstract

InGaN/GaN MQW(Multi Quantum Well) is grown on sapphire substrate by using MOCVD(Metal Organic Chemical Vapor Deposition) technique. During this growth procedure GaN is used as buffer and epitaxial layers. Structural properties of InGaN/GaN MQW is investigated by using HR-XRD (high resolution x-ray diffraction technique) dependent on In ratio. RSM (reciprocal space mapping) technique is used to convert w-theta data to RSM data with a convenient software. Lattice parameters are calculated from w-theta and FWHM(full width at half maximum) data. It is seen that especially a-lattice parameter calculated from RSM data is nearer to the universal value if compared with the one calculated from w-theta data in literature. This value is calculated as 3.2650 nm for sample A in (105) asymmetric plane. The same parameter is determined as 3.2570 nm for sample B. These two values belong to GaN layers in sample A and B. Strain and stress calculations are made by using these lattice parameters. Strain and stress values for GaN layer in sample A is found as 0.02363 and 8.6051 GPa respectively. Other results will be given in presentation in table format. Edge, screw and mix type dislocations are determined as mosaic defects. All calculations are made in (002) symmetric and (105) asymmetric planes. This study proves that RSM data give more sensitive and accurate results. Calculated a- lattice parameter is the best indicator of this prove.
Keywords: InGaN, GaN, MQW, RSM, HR-XRD, Structural.

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Calculation of Radiation Shielding Parameters of Material and Phy-x Methodology

Özgür Fırat ÖZPOLAT

Özet

Bu çalışma, günümüzde nükleer fizik literatüründe geniş kullanıma sahip olan ve radyasyona karşı koruma sağlaması için üretilen malzemelerde yapıya katılan tüm elementleri temsil eden "etkin atom numarası (Z-effective)", "efektif elektron yoğunluğu (N-effective)", "efektif iletkenlik (C-effective)", "kütle soğurma katsayısı (MAC)", "lineer soğurma katsayısı (LAC)", "yarı kalınlık değeri (HVL)", "onda-bir kalınlık değeri (TVL)", "ortalama serbest yol (MFP)", "atomik tesir kesiti (ACS)", "elektronik tesir kesiti (ECS)" ve radyasyonun malzeme içerisinde ilerleyişini temsil eden "eşlenik atom numarası (Z-equivalent)" terimlerinin önemlerini, kullanım nedenlerini ve hesaplanış metodlarını ortaya koymaktadır. Ayrıca; eşlenik atom numarasının hesabı için gereken metodolojideki eksikliklerin literatürde henüz karşılık bulamamış olması nedeniyle Phy-X platformunda kullanıma sunulan metodolojinin temellerini, seçiliş nedenlerini ve bu metodoloji kullanılarak yayınlanan akademik çalışmaları incelemektedir.

Çalışmamızda ayrıca, radyasyona karşı zırhlama parametrelerinin ilk basamağı olan "etkin atom numarası (MAC)" değerinin Phy-X platformu öncesinde NIST tarafından sunulan uygulama ile hesaplanması halinde dikkat edilmesi gereken ayrımları ve bu ayrımların dikkat edilmemesi halinde sonuçları etkileme düzeyi araştırılmıştır. Bu kapsamda kimyasal formüllerin "kütlece kesir (mass fraction)" veya "molce kesir (mole fraction)" ayrımı yapılmadan ve yapılarak elde edilen 50 kimyasal kompozisyon için sonuçlar kıyaslanarak grafiklendirilmiştir. Ayrıca, gerçekleştililen kıyaslamanın ve literatürde sıklıkla karşılaşılan kesir hatasının kaynağı olan NIST tarafından tek tip kimyasal kompozisyon girişine alternatif olarak, Phy-X platformu üzerinde sunulan yöntem ele alınmaktadır.

Anahtar Kelimeler: Phy-x, Zırhlama, Etkin Atom Numarası, Eşlenik Atom Numarası

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Thermoelectric Safety System

Özge BAKAR[1]
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Abstract

In this study, a safety system with an autonomous thermoelectric generator working with soil heat, which is a renewable heat source, is designed. For this, the optimal transfer methods of the heat exchange in the thermoelectric generator were investigated, the electronic systems of the existing safety devices were examined, and the thermoelectric 'earth-air' safety system was designed and realized according to all this scientific information, and its physical parameters were examined. Here, parameters such as power P(W), voltage U(V) and current I(A) produced by the generator according to ΔT are examined. The temperatures at the depth and surface of the soil, which are equal to the length of the generator, were measured in four regions of Ankara in four seasons, and a modeling was made according to these values. In addition, soil-air temperature differences in 4 regions of Ankara for 4 seasons were examined in detail. The Thermoelectric Security System equipment, which will be used around the border border and mass housing area by hiding it under the ground, will generate its own electricity with the help of the heat in the soil without the need for any electrical cables and will notify the security unit with the help of sensors in case of area violation. In this way, it will not be affected by undesired situations such as power cuts and will continue to function continuously. A modeling was made according to the actual temperature differences obtained. For this purpose, a special experimental setup was established and the thermoelectric properties of the 'earth-air' generator were investigated in the laboratory environment and the working conditions of the electronic security system were determined.
Keywords: Thermoelectricity, Generator, Earth-Air, Security System, TEGS.

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Synthesis and Investigation of Electrical Properties of ITO/Al Doped CdO/Coronene Multiple Hybrid Heterojunction

Fatih ÜNAL[1]

Abstract

In this study, coronene was grown on 1%Al doped CdO film by physical vapor deposition method. CdO, exhibits n-type semiconductor behaviour, is a widely used material in the field of solar cells, sensors, etc. Improvements of electrical properties were observed when doping with some metals (In, Al, etc.). Coronene, $C_{24}H_{12}$, is a good organic semiconductor with p-type conductivity and application areas such as OLED, transistor. In this work to offer a new alternative to the field of opto-electronic application, metal oxide CdO and coronene structures which have never been epitaxially grown on each other before, were brought together in the form of multiple hybrid heterojunctions and its electrical properties were investigated in dark and 60mW/cm² light intensity under ±1.5V potential range. 1% Al doped CdO films were grown on glass/ITO substrate by electro-deposition method with a solution containing 5mM $Cd(NO_3)_2.4H_2O$ and 5mM $Al(NO_3)_2$ at 60°C temperature, -0.8V application potential. Afterwards, glass/ITO/CdO(1%Al)/coronene heterojunction was fabricated by growing of 200 nm thick coronene film by thermal evaporation and its surface analysis was investigated with a profilometer. It was observed that the film was homogeneous and the average roughness value was 238nm. Ag metal contacts were grown on the ITO and coronene layers to perform the electrical analysis of the multi-hybrid heterojunction. Parameters such as diode ideality factor (n), series resistance (Rs), reverse saturation current (I_0), photocurrent (I_{ph}), photoresponsivity (R) and photosensitivity (S), were determined using Cheung&Cheung and traditional methods. The calculated n, Rs, I_0 values are 12.9, $8x10^3\Omega$, $1.16x10^{-6}$A in the dark environment, while these values are 2.9, $1.3x10^3\Omega$, $9.6x10^{-5}$A in the light environment. Additionally, I_{ph}, R and S values are $3.9x10^3$A, $1.2x10^{-1}$A/W and $1.9x10^{-8}$S.m/W, respectively, under 1.5V potential. Consequently, it has been seen that the Ag/ITO/CdO(1%Al)/coronene/Ag multi-hybrid heterojunction exhibits photoconductive and typical photodiode behavior and offers an alternative to optoelectronic applications.

Keywords: Metal oxide, CdO, Coronene, Hybrid heterojunction, Opto-electronic.

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Nickel Foam Supported Material Synthesis and Electrochemical Analysis For High Performance Supercapacitors

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Abstract

With the effect of rapidly increasing population, industrialization and globalization, energy demand is increasing day by day. With the energy shortage in the world and the increase in environmental pollution, it becomes necessary to use renewable energy. Supercapacitors as a new type of energy storage device; exhibits excellent properties against capacitors and batteries. The use of supercapacitors has begun in many areas such as electric cars, power systems and wireless communication devices. In general, supercapacitors can be classified as electric double-layer capacitors (EDLCs) and pseudocapacitors on the basis of their charge storage property. One of the points that distinguish supercapacitors from rechargeable batteries is that they can withstand multiple charge and discharge cycles. Supercapacitors have many advantages such as long cycle life, high power density, fast power transfer, fast charging, environmental friendliness and high specific capacitance. In this study, the usability of Co3O4/Ni foam and Co3O4/Co3V2O8/Ni foam nanocomposite materials prepared by hydrothermal synthesis method (T=120°C) as electrode material in supercapacitors was investigated. Electrochemical performance can be improved by nanostructure design consisting of large surface areas to allow homogeneous dispersions and fast ion and electron transfers at the nanoscale.

Especially Ni foam is known to have a porous architecture with large surface area, good electronic conductivity and structural stability. The synthesized nanocomposite electrode materials were characterized by X-ray diffractometry (XRD), Field emission electron microscopy (FE-SEM) methods. In addition, the specific capacitances and capacitances of the materials were determined for each electrode using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and galvanostatic charge / discharge (GCD) methods.

Keywords: Supercapacitor, nanocomposite, EIS, electrochemistry, nickel foam

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Co-pyrolysis Characteristics of Medium Density Fiber Sawdust and High Density Polyethylene Blends Using Thermogravimetric Analysis

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Abstract

Medium density fiberboard (MDF) consists of wastes of beech and hornbeam trees, which have low economic value as a result of the regeneration of forests, and polyethylene is among the most produced plastics in the world. Wastes can be converted into fuels with high economic value. In this study, co-pyrolysis behavior of high density polyethylene (HDPE) and MDF blend was investigated by thermogravimetric analysis under non-isothermal condition at inert atmosphere. The pyrolysis characteristics of MDF and HDPE itself and the blends containing 20%, 40%, 50%, 60%, and 80% (w/w) of HDPE with the rest being MDF were studied. Thermogravimetric analysis data was obtained at heating rates of 10, 20, and 40 °C/min at temperatures between 25 and 800 °C.

The results indicated that MDF was decomposed in the temperature range of 200-450 °C, while the decomposition range of HDPE was 450-550 °C. The pyrolysis process took place in three stages including one active decomposition stage for each material, and co-pyrolysis of HDPE/MDF blends occured in four stages. With the increase in heating rate, the characteristic temperatures of the active pyrolysis stages shifted to higher values and maximum mass loss rate increased. However, different blend ratios did not have a distinct influence on characteristic temperatures for each heating rate, whereas the increase in blend ratio of HDPE/MDF resulted in an increase in maximum mass loss rate of HDPE and a decrease in maximum mass loss rate of MDF. In addition, synergistic effect was investigated by the determination of difference between theoretical and experimental mass loss values. The results indicated that co-pyrolysis of HDPE and MDF had a substantial synergistic effect in the decomposition region.

Keywords: Medium Density Fiberboard Sawdust, High Density Polyethylene, Co-pyrolysis, Thermogravimetric Analysis, Synergistic Effect

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Barium Adsorption Study of Chitosan Produced From Caridea and Brachyura Shells

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Abstract

As a result of increase in industrial, technological developments and human population around the world, environmental pollution became a threat for future generations and water pollution takes a big part of the environmental pollution. In order to decrease the effects of the water pollution, many recycling methods have developed which are not fully sustainable. These methods have high cost and can cause more pollution after the processes complement. In this study, the chitosan produced from *Caridea* and *Brachyura* shells and its behavior as an adsorbent material was examined. This chitosan is a sustainable method for adsorption of Barium heavy metal in the water. The difference of the shell particle size was chosen as a parameter of chitosan production: +60, -60 +40 and -40 +18 mesh. The production was accomplished in three steps: deproteinization, demineralization and deacetylation at 80 °C. In each step, the yield was calculated and compared for the chitosan in different meshes and raw materials. It was observed that the deacetylation yield from chitin was 73.30% for shrimp and 77.09% for crab in average. The acquired chitosan was used as an adsorbent material in the water with 20 ppm Barium heavy metal stock solution. The adsorption was carried out 0.1 g of chitosan with each different meshes and raw materials for 1, 2 and 3 hours. After the filtration, the heavy metal solutions were examined with ICP-OES analysis in order to obtain the amount of adsorption. According to results, in the case of +60 mesh particle size and 3 hours of adsorption, the shrimp and crab had highest adsorption capacity with 18.80 ± 0.71 mg/L and 16.29 ± 0.56 mg/L concentration of heavy metals. Also, crab had higher adsorption capacity than shrimp at each particle size and time point.

Keywords: pollution, chitosan, adsorption, yield, barium

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Mathematical Modelling of the Passion Fruit Dried by Microwave Method

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Abstract

Fruits are food groups that contain high vitamins and minerals. For this reason, fruit consumption is very important for human health. On the other hand, fruits contain a high amount of water. In this case, fruit is one of the most prone to spoilage food products due to its high enzymatic microbiological activity. Increasing the shelf life of a fruit product is possible by stopping this microbiological activity. In this study, microwave drying method were chosen in order to examine the effects of different power levels on the mathematical modelling of drying curves. Before microwave drying, the moisture content of passion fruit was calculated as 74.28% by using oven. For the experiments, microwave power levels were chosen as 140 W, 210 W and 350 W. The experiments were performed in a closed system with controlled power level. Results obtained from experiments are modelled in Statistica computer programme to determine the best model. Among the several widely used models in the literature, the models for this study were chosen as Henderson & Pabis, Lewis, Parabolic, Two Term Exponential and Wang. Considering R^2, RMSE and χ^2 values, the best fitted model for microwave dried passion fruit was Two Term Exponential with R^2 values varied between 0.9985 and 0.9980, RMSE values varied between 0.013 and 0.015 and χ^2 values varied between 0.0002 and 0.0004. Average fitted models were Henderson & Pabis, Parabolic and Wang with R^2 values varied between 0.9928 and 0.9746, RMSE values varied between 0.0298 and 0.0565 and χ^2 values varied between 0.0013 and 0.0048. The least fitted model was chosen as Lewis with R^2 values varied between 0.9784 and 0.9675, RMSE values varied between 0.0520 and 0.0606 and χ^2 values varied between 0.0032 and 0.0042.

Keywords: Drying, Microwave, Mathematical Modelling, Passion Fruit, Moisture

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Intercalation and Exfoliation of Simav (Turkey) Kaolinite with n-Butanol and Isopropanol

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Abstract

The Simav located in the western part of Anatolia is the largest known kaolin deposit in Turkey. These kaolins, which are very important economically, are the most abundant industrial raw material in the region. Kaolin is a sub-group of a kaolin-serpentine group of phyllosilicates and is characterized by one tetrahedral, one octahedral (1:1) sheet, dioctahedral structure, the chemical composition of Si, Al, O, and H and with chemical formula $Al_2Si_2O_5(OH)_4$. Kaolinite consists of a tetrahedral (T–SiO_4) sheet and an octahedral (O–AlO_3+3OH) sheet. In this study, washed kaolinite minerals were firstly intercalated with dimethyl sulfoxide and then *n*-Butanol and isopropanol to prepare intercalation compounds Kaol-*n*-BuOH and Kaol-IPA. The crystallographic changes in the mineral were determined by X-ray diffraction, field emission scanning electronic microscopy, and fourier transformation infrared spectroscopy. XRD results exhibited that the intercalation of *n*-BuOH into the kaolinite sheets resulted in a very limited basal spacing increase from 0.71 nm to 0.78 nm. However, the intercalation of IPA into kaolinite layers caused an obvious increase in the basal spacing from 0.71 nm to 1.07 nm (0.36 nm). FTIR revealed that the dehydroxylation temperature of Kaol-*n*-BuOH and Kaol-IPA were clearly lower than that of natural kaolinite. In micromorphological observations, the intercalation process of Kaol-*n*-BuOH was not clearly observed, only it was clearly determined that only kaolinite layers were exfoliated. In the intercalation process of Kaol-IPA, rarely nanoscrolls from the edges of the kaolinite sheets were observed and also nano-tubes. These new exfoliation methods revealed that the Kaol-IPA method is could be more hopeful than Kaol-*n*-BuOH in natural kaolinites of the Simav.

Keywords: Kaolinite; *n*-Butanol; isopropanol; XRD; FE-SEM; FTIR

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Production and Characterization of Therapeutic and Broad-Spectrum Antimicrobial Nanofiber Wound Dressing for Use in the Treatment of Diabetic Foot Wounds

Ogün BOZKAYA[1]

Abstract

Diabetic foot wound infections are usually more violent and more difficult to cure than infections in nondiabetics. Recent research is focused on the development of effective wound dressing materials that are antimicrobial, therapeutic, and biocompatible. Among the antimicrobial agents, polyhexanide (polyhexamethylene biguanide, PHMB) is best known for its broad-spectrum antimicrobial and antifungal activity. Hyaluronic acid (HA) is a natural polyanionic glycosaminoglycan and one of the major components of extracellular matrix (ECM). It has been used extensively in several fields, including ophthalmic and joint surgery and particularly wound healing. Polyethylene oxide (PEO) is one of the biodegradable, biocompatible, non-toxic and FDA-approved synthetic polymers that dissolve in both water and organic solvents. In this work, a new nanofiber wound dressing composed of PEO/HA incorporated with PHMB was designed by the mutual two-nozzle electrospinning method. The synthesized nanofibrous material have been characterized by scanning electron microscopy (SEM), verifying of bead free and smooth morphologies. The chemical structure of nanofiber and its constituents were characterized by Fourier transform infrared spectroscopy (FTIR). Its thermal properties were analyzed by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Air permeability, water contact angle, water vapor transmission and mechanical properties were investigated in order to verify that the produced wound dressing had the necessary physically conditions to accelerate the wound healing process. Moreover, to foresee their potential in the wound healing, MTT cytotoxicity and *in vitro* scratch assay were performed on L929 fibroblasts cell line. During *in vitro* studies, it was determined that the scratch closed faster than control group and cell proliferation increased. It has also been proven to show antimicrobial activity on *E. coli*, *S. aureus* and *C. albicans* species. Thus, results show promise of the PEO/HA/PHMB nanofiber wound dressing for diabetic foot wounds treatment. However, it is recommended to be supported by *in vivo* clinical studies.

Keywords: Diabetic Foot Wound, Electrospinning, Wound Dressing, Polyhexamethylene Biguanide, *In Vitro* Scratch Assay

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Biosynthetic Silver Nanoparticles as Biomass Enhancers for In Vitro Plant Cultures

Pınar NARTOP[1]

Abstract

Silver nanoparticles have been frequently used in many areas of biotechnology. They are smaller than 100 nm and their properties depend on their shapes and sizes. They are known as eco-friendly nanomaterials and are also known for their strong antiseptic, antibacterial, antifungal and antiviral effects. They can be easily synthetized via cost-effective biological methods at large scales in a few hours. Therefore, silver nanoparticles have become interesting materials for nanobiotechnological applications. In our studies, silver nanoparticles, synthetized via a biological method called green synthesis, were used to trigger biomass accumulations on *in vitro* plant cultures. For this purpose, biosynthetic silver nanoparticles were added at different concentrations into culture media and their effects on biomass accumulations of *Rubia tinctoru*m and *Linum usitatissimum* were determined. The growth parameters of these plants' cultures (seed germination percentages; callus formation percentages; root, shoot and callus fresh and dry weights; shoot elongations; multiple shoot formations) were evaluated. The results showed that biosynthetic silver nanoparticles can be used to trigger biomass accumulations *in vitro* plant cultures. Lower amounts of biosynthetic silver nanoparticle amounts in culture media, especially at 10 mg/L, enhanced biomass accumulations. However, higher concentrations of biosynthetic nanoparticles caused decreases in growth parameters. Data showed that concentration optimization was important when biosynthetic nanoparticles were used in plant cell and tissue cultures.
Keywords: Biosynthetic silver nanoparticles, *Rubia tinctorum*, *Linum usitatissimum*, Biomass accumulation

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Reactive Blue-247 Removal with Shrimp Shell Chitin

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Abstract

Dyestuffs are one of the main causes of water pollution, as they have a wide range of uses such as textile, plastics, food processing and cosmetics. Untreated dye containing effluents cause environmental problems. Chitin is a mucopolysaccharide that is abundant in nature. It is insoluble in water like cellulose. It is thought that it can be used as an adsorbent in the removal of environmental pollutants, since it is not soluble in water and is renewable. In this study, it was tried to remove the adsorption of Reactive Blue-247 dye from the aqueous medium with shrimp shell chitin. The pH value of the medium t where the absorption takes place is a very important parameter as it affects both the adsorbent and adsorbent charge. In this study, it was observed that the maximum adsorption capacity was reached at pH 3. The Freundlich and Langmuir isotherms models are two models that are used to explain adsorption mechanisms. The Freundlich adsorption isotherm explains the heterogeneous and multi-layered adsorption on the adsorbate surface. The Langmuir adsorption isotherm explained the assumption of a monolayered adsorption, fixed number of binding sites, no interaction between adsorbate molecules, and all binding sites have the same energy level. Adsorption of Pb(II) with chitin obeyed Langmuir isotherm

Keywords: Adsorptio. chitin, reactive blue-247,isotherms, dye removal

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Effects of Carbofuran on Egg Production and Heart Rate in Daphnia magna (Crustacea: Cladocera)

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Abstract

Daphnia, known as the water flea, is a small crustacean that lives in fresh water such as lakes, ponds, and streams. The water flea serves as a prominent food source for fish and other aquatic organisms. *Daphnia* is excellent organism used in laboratory experiments because it is sensitive to changes in water content and daphnids are simple and cheap to grow in aquariums. They mature in a short time, so it does not take long to grow a culture of test organisms. Therefore, in this study, the effects of Carbofuran on heart rate and egg production in *D. magna* individuals were evaluated. Four groups were formed as control and treatment groups and each group included 10 individuals. Water fleas in the treatment group were exposed to different concentrations of carbofuran (3 µg/L, 6 µg/L, 12 µg/L). All experiments were performed in triplicate. Heart rate variability was examined for 96 hours, and heart rate was calculated using a video camera. In addition, the number of eggs per individual in each experimental group was recorded for 21 days to evaluate the effect of the pesticide on egg production. An increase in heart rate was observed due to exposure to Carbofuran, depending on the degree of concentration. Carbofuran exposure adversely affected egg production. A decrease was observed in the number of eggs per individual depending on the concentration levels.

Keywords: Daphnia, carbofuran, heart, egg

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Assessment of the Environmental Impacts of Municipal Waste Management Activities in the Thrace Region of Turkey

Nesli AYDIN[1]

Abstract

This study provides a life-cycle assessment of municipal waste management system in the Thrace Region of Turkey by using the WRATE (Waste and Resources Assessment Tool for the Environment) software academic version in terms of global warming (GWP–kg $CO_{2\text{-eq}}$), acidification, aquatic ecotoxicology, eutrophication, human toxicity potential and depletion of abiotic resources. The municipal waste management system in the project region was assessed according to two scenarios based on small-scale provincial landfilling [Scenario 1 (Sc1): current case] and regional landfilling [Scenario 2 (Sc2)]. The results show a high contribution to eutrophication and global warming potential in both scenarios because of the generation of leachate and air pollutants from landfilling. Leachate could cause eutrophication, or a lack of oxygen leading to increased growth of plants in aquatic sources. The global warming contribution of the scenarios corresponds to 88 738 and 82 360 t $CO_{2\text{-eq}}$. for Sc1 and Sc2, respectively (6 866 Eur. person eq. for Sc1 and 6373 Eur. person eq. for Sc2). Although Sc2 performs better compared to Sc1 in terms of global warming potential, Sc1 outperforms Sc2 when only transport-related global warming effect is taken into consideration due to long distance transport of wastes in Sc2 compared to Sc1. This study could be further developed by using more comprehensive and environmentally-friendly scenarios as landfilling is abandoned and recycling is actively implemented in Turkish cities. The main advantage of the research is to introduce a life-cycle approach in developing regions where this methodology is not known and/or implemented. The results could be obtained for similar regions with the cooperation of the universities, which can receive academic license and deliver technical expertise on how life-cycle tools are applied, and the municipal authorities, which can explain the benefits and limitations of the life-cycle approach to local stakeholders.

Keywords: Environmental impact, global warming potential, life-cycle approach, waste management, WRATE software

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Solid Waste Characterization and Determination of Recycling Potential at Bursa Uludağ University

Ezgi GÖZEN[1]
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Abstract

Each day the increasing waste problem has become more difficult issue to manage. While the limited resources are rapidly decreasing due to he consumption society, the wastes that are thrown unconsciously pollute the nature and take away a sustainable future from us. In order to manage the waste correctly, it is necessary to prevent the formation of the waste at the source, reduce it, reuse it, and implement the recycling and recovery steps at every point of life. Also in order to make this management system work, it is necessary to know the composition of the waste. Waste should be evaluated by recognizing and managing without harming the environment with a zero waste approach.

Universities play a key role for a healthier future. A modern society that has achieved sustainable development goals is only possible with the existence of well-educated and conscious individuals. With this study, a step will be taken to become a more environmentally friendly university with an applicable and effective management plan. In this study, characterization analysis was carried out in order to determine the amount and content of solid wastes generated in Bursa Uludağ University Görükle Campus to manage waste management in a sustainable and correct manner. In this project, the campus area was divided into 10 regions and the waste was collected for 4 days and a characterization study was carried out. The average daily wastes thrown away on campus are 22,284% glass, 14,263% plastic, 10,271% kitchen waste, 8,955% paper, 8,824% cardboard, 8,556% volume cardboard, 7,018% metal, 1,546% volume metal, 0,921% park and garden waste, 0,304% electrical-electronic equipment wastes constitute 4.073% hazardous waste and 12.99% other wastes. The fact that these discarded wastes consist of 71.45% recyclable and 11.19% compostable content reveals the existence of a great recovery potential.

Keywords: Solid Waste Management, Sustainable Campus, Zero Waste, Recycling, University

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Salmon Egg Sorting Using Computer Vision Technology

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Abstract

Salmon eggs are commonly red-orange in color. They are taken from the inside of the fish. The fish eggs offer many of the same healthy vitamins and minerals as eating fish meat. The fish egg is an important food option, rich in essential nutrients, and low in calories. Many studies have shown several potential health benefits to salmon eggs rich in omega-3 fatty acids. However, it should be consumed in a short time due to the preserved fresh for its healthful ingredients. The freshness of the salmon eggs depends on the storing conditions. The color of the egg is evolving faster when it is not in a cold environment. The non-freshness cause to loss of healthy vitamins and minerals, and risks human health. In this study, the salmon eggs are evaluated using computer vision (CV) technology for determining their freshness of the eggs. The images of eggs are captured using a rolling shutter (RS) camera with a white color background. In total forty images are evaluated concerning color properties with the help of image processing technology. The results are corrected with the help of an expert by eye observation. Experiments show that there is a good linear relationship between observation and CV software outputs. The linear regression coefficient (r2) is found around 0.95 in the experiments. The CV performance for the accuracy was determined above %95 for a constant of 0.1 m/s.
Keywords: Fish egg sorting, computer vision, image processing, salmon egg.

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Vest Detection of Field Staff with Yolo V4

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Abstract

In this study, a fiction has been made on the follow-up of the personnel who are obliged to wear vests in the production area within the framework of occupational safety rules. With the camera on the autonomous vehicle, which is responsible for carrying cargo between the lines in the field, the status of the personnel can also be monitored. The autonomous vehicle can be cross many points during the movement in the field. Instead of using a camera fixed at a certain point, using a camera that is actively navigating the field is provided flexibility in use in terms of reaching more points. The personnel, who are detected not to wear vests on the field at the points where the vehicle is traveling, are warned audibly with a buzzer.

YoloV4, one of the artificial intelligence architectures, has been used in this study for vest detection. The training has been carried out on the Jetson Xavier AGX microcomputer over the GPU. As a data set, photographs of 350 different people in different places with different colored vests has been taken. The data set has been increased to 2100 using the Data Augmentation method. 20% of the data set has been used for testing and 80% for training purposes. In order to prevent different objects from being perceived as vests, first of all, human detection has been made. A ready-made algorithm offered by YoloV4 has been used for human detection. Afterwards, it has been examined whether there are a vest in the human findings or not. With the weight values obtained, success has been achieved in the detection of people with and without vest at a rate of 98%.

Keywords: YoloV4, Jetson AGX, GPU, Vest Detection, Data Set

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Performing Inter-Process Transportation Sterile with AGV in the Factory Environment

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Muhammed YILDIZ[3]

Abstract

In recent years, autonomous vehicle technologies have been used in many areas. The food industry is one of these areas. In this study, it has been planned to increase efficiency in a factory environment and to carry out inter-process transportation in a sterile way. For this purpose, crossings between lines has been carried out using an embedded system-based AGV (Automatic Guided-Vehicle). AGV's route control has been provided with line tracking and RFID reading features.

The concept of ISO 22000 HACCP has been created to monitor food products from the most basic production stage to delivery to the consumer. ISO 22000 is a food safety concept based on the protection of products with a properly functioning systematic structure and their reliable presentation to the consumer. Considering within the framework of ISO 22000; with this study product transfer between production lines is carried out in a more rapid and sterile manner and it is planned to increase productivity by employing workers from these lines in more specific tasks.

With this developed system, AGV continuously has been performed the defined task and continued on its way by analyzing the obstacles in front of it. AGV, which moves in the determined route, has been followed the road on a line drawn (magnetic) on the ground, and it performed this process with fifteen analog sensors under it. In the direction of the data coming from the sensors, AGV tries to keep the line in the middle by moving in the direction of the line. At the same time, with RFID cards mounted on the tracked surface, it can be perform tasks such as stopping, turning back, and determining the direction at crossroads. In addition, with a button on it, AGV can be switched to manual mode and can be controlled with a remote control.

Keywords: AGV, RFID, Transportation, Food industry, Embedded System

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An Overview of Unmanned Aerial Vehicles (UAVs) in Logistics and Supply Chain Management

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Abstract

Unmanned aerial vehicles are one of the game changing technologies in logistics and supply chain management (SCM). This study aims at providing an overview for the application areas and advantages of the technology from civilian logistics perspective. Main application areas are identified as: a) usefulness for the transportation and delivery of customer purchases especially for the urban areas, avoiding heavy traffic congestion; b) accessing areas which are hard-to-reach, dangerous or cannot be accessed by other modes of transportation, expanding the radius of action for the shipments; c) convenience in emergency situations, providing rapid transport of relief and rescue packages (medical items, food, hygiene, equipment and material) to remote areas during humanitarian logistics operations; d) practical use in last mile delivery; e) enabling optimized parcel shipments by combining with other transportation modes to provide; f) aerial monitoring of inventories from outside the warehouse, powerlines, rescue operations and construction sites. Main advantages identified are minimizing human intervention in transportation processes, enabling reductions in distribution costs and delivery times, resulting in faster deliveries and flexible distribution processes, as well as bringing about positive environmental outcomes, serving for the relief of traffic and reduction of carbon emission. Consequently, the study reveals that unmanned aerial vehicle technology became an integral part of today's logistics systems, and their integration into logistics and SCM processes leads to radically new delivery models which are responsive, agile and customer oriented.

Keywords: Unmanned aerial vehicles, Logistics, Supply chain management

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Artificial Neural Network-Based Stock Market Forecast

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Abstract

Forecast models are seen as useful tools in predicting the future for decision makers in the field of financial investment, as in many scientific fields. Along with the developing technological process, in addition to traditional forecasting models, artificial neural networks and other methods and algorithms used in artificial intelligence also contribute to decision makers in predicting the future. With the help of new methods and informatics tools developed day by day, it is a phenomenon that cannot be ignored in today's world to analyze the past data in the markets and to obtain forecasts for the future.

In this study, a stock market index prediction model has been created based on past macroeconomic indicators datas. First of all, the datas on the macroeconomic indicators to be used in the model has been determined by examining the studies on causality between macroeconomic indicators. Relevant indicators with causality and relationship between them have been used to estimate the BIST-100 index with the help of artificial neural networks, which form the basis of artificial intelligence studies. In the conclusion part of the study, the datasets of the six indicators determined and the BIST-100 index dataset of the relevant period have been placed in the relevant model and the predictive ability of the model have been discussed.

Keywords: ANN, Prediction, Bist-100, Macroeconomi, Stock Market

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Examining the Factors Affecting Travel Behaviour: Literature Review

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İrem AYHAN SELÇUK[2]

Abstract

It is seen that the modern transportation planning approach basically follows policies to increase transportation supply and these policies cannot solve the current problems and increase the existing problems. Considering the relationship between land use decisions in the city and travel behavior, it is thought that examining these problems in transportation infrastructure is very important in order to prevent current and future problems.

Work, shopping, education, leisure, etc. It is known that the spatial distribution affects the type and amount of transportation required to meet the daily needs of individuals. In this direction, the changes in the built environment characteristics that occur with the land use decisions change the travel behavior of the individual. For this reason, the coordination and land use policies between transportation systems and urban planning studies become important. After examining the factors affecting travel behaviors; possible contribution to the process of spatial planning and transportation planning studies will be discussed. Although the relationship between land use and travel behavior is the subject of many researches in the literature, it is seen that there are fewer studies in the domestic literature. Therefore, it is thought that the study will make an important contribution to other studies in this field. This study is a product of Dokuz Eylul University Graduate School of Natural and Applied Sciences Master's Thesis.
Keywords: Behavior,Transportation Behavior, Travel Behaviour, Transportation Structure and Land Use, Travel Analysis, Transportation Mode.

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Examination of Diyarbakır Hasan Paşa Inn Regarding the Persistence of Memory Space

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Mehtap ÖZBAYRAKTAR[2]

Abstract

Inns have led the spaces, which have witnessed social, historical and cultural events for centuries. They bear the traces of social identity and memory since they have witnessed various historical events. In this study, the aim is to reveal and protect the unique spatial character and identity of Hasan Paşa Inn, which is one of the memory spaces of Diyarbakir, based on its properties, retain the memory and develop suggestions for habitable inns. A three-stage study was conducted to develop suggestions for Diyarbakır Hasan Paşa Han, in line with the purpose mentioned above. In the first stage, data about Diyarbakır and Hasan Paşa Inn were accessed through literature search (published sources, historical maps and photographs) and these data were used in the evaluation of the inn's present situation. The second stage consists of the evaluation of the present state of Hasan Paşa Inn by way of on-site observation. In the third stage, a survey was conducted on memory and evaluation of the present state with 22 property owners or managers who agreed to talk face to face in 20 different stores in Hasan Paşa Inn. During the preparation of the survey, Nihat Çolak's master's thesis entitled "Spaces, which form the memory of the city: Ankara passages," was utilized. The model of the survey used is "open-ended survey model." Following the study conducted, it was revealed that, the historical structure and texture of Hasan Paşa Inn, regarded as one of the memory spaces of Diyarbakır, has been preserved to a very large extent and reached the present day. As a result of the "memory space survey" conducted, it was revealed that the properties of the inn coming from the past are still remembered and the collective memory can be transmitted to the future, in which the inn exists.

Keywords: Diyarbakır, Inn, Memory, Ottoman, Space

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Contemporary Annex Designs in Industrial Buildings Re-Functional for Cultural Purpose: The Case of Lochal Library

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Didem TELLİ[2]

Abstract

After the Industrial Revolution, with the development of technology, machines began to be used instead of manpower. Production styles have changed and industrial structures that are now located in city centers have been built. As a result of technological developments, these industrial buildings, which were abandoned by not responding the needs, started to be re-functionalized for the evaluation of the building stock. The re-functioning of historical buildings, which carry the construction techniques and traces of the period in which they were built, ensures the protection of cultural heritage. In this regard, the spaces in industrial buildings that have been re-functioned are functionally inadequate. Contemporary annexes are needed as a result of insufficient spaces. The aim of the study is to raise awareness about contemporary annex designs applied to repurposed industrial buildings. In this case, material selections, relationship with the old building, relationship with the environment, positive and negative aspects and effects, design decisions of the contemporary annexes of LocHal Library, which received the "WAF 2019 (World Architecture Festival) Building of the Year" award in the re-functioning branch, were examined. The information obtained was analyzed with the evaluation table created. Contemporary annex designs added to the re-functional industrial buildings are evaluated through architectural criterias. These data are intended to be an example for future studies.
Keywords: Industrial Heritage, Conservation, Reuse, Contemporary Annex, LocHal Library.

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Investigation of UAV-Based Networks for Next Generation Communication Systems

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Hacı İLHAN[2]

Abstract

With the increasing number of devices in need of wireless communication, the necessity for new technologies in wireless communication networks is increasing. The Unmanned Aerial Vehicle (UAV) is used as a base station in the air to prevent or minimize the density, malfunction, and connection errors that occur in the wireless communication network. The communication networks in which UAVs are used as base stations in the air are called UAV-Based communication networks. The ongoing increase in the number of users and devices causes the communication infrastructure used today to be insufficient to meet the communication needs. To meet the high connection need UAV used as base stations in the air, easing the load of the communication network on the ground and providing communication in rural areas where the ground infrastructure cannot provide connection. UAV positioning optimization is required to ensure optimum performance in UAV-Based communication networks. The positioning optimization made ensures that the Path Loss (PL) and energy efficiency problems encountered in the use of UAV-Based networks are overcome. UAV-Based communication networks provide high LoS connection possibility, reducing PL and increasing coverage area. It is expected that UAV-Based communication networks will play a crucial role in the future generation communication systems, thanks to the advantages that it brings to the wireless communication network. In this study, the performance gain of UAV-Based communication networks in the Fifth Generation (5G) and beyond 5G communication networks are explained. In addition, to achieve optimum performance in the communication network, the optimum altitude of the UAV and PL values in the communication network according to the coverage area are indicated via simulations.

Keywords: UAV-Enabled Communication Networks, Non-Orthogonal Multiple Access, Sum-Rate Analysis, Orthogonal Multiple Access, Optimum Altitude**.**

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Millimeter Wave Patch Antenna Design For 5G Applications

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Abstract

This study presents a simple and compact microstrip patch antenna design with high values of return loss and bandwidth, operating at millimeter-wave frequencies and suitable for next-generation 5G applications. The CST Microwave Studio software is used to model and simulate the created structure. To improve the return loss and bandwidth of the antenna, a 5-stage design is developed. In the first stage, the length of the feed line and the dimensions of the rectangular patch are determined using the transmission line model. In the second stage, a quarter-wave transformer is added to the microstrip line. In the third stage, a spiral structure is added to both sides of the microstrip line, and in the fourth stage, spiral slots are opened in the ground plane. In the last step, the antenna design is completed only by a spiral slot in the ground plane of the proposed antenna. The proposed antenna is based on a dielectric layer of Rogers RT /duroid 5880 with a dielectric coefficient of 2.2 and a size of 12x10x0.787 mm3. The bandwidth is fixed at 2.286 GHz between the frequencies of 26.806 GHz and 29.092 GHz. At the center frequency of 28 GHz, the return loss reaches -78.797 dB, the gain 7.97 dB, and the directivity 8.74 dBi. Compared with other studies in the literature, the simple design, compact structure, easy fabrication, low cost, gain, directivity, bandwidth, and return loss are such that our design is suitable for use in 5G applications.

Keywords: 5G technology, Millimeter wave, Patch antenna, CST microwave studio, Return loss

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A Review on Millimeter Wave Antenna Designs For 5G Applications

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Abstract

Recently, with the rapid spread of technology in all fields, the demand for wireless communication systems has also increased steadily. The adventure of wireless communication, which began with the transmission of analog audio signals, has reached a new turning point with the increase in the number of users and the number of technical devices. Features that distinguish 5G technology from previous generations include very low latency, wide coverage area, high data rate, low power cost, and high efficiency. It takes advantage of millimeter waves outside the existing frequency spectrum. Millimeter waves facilitate the work of 5G technology. However, problems arise that will complicate the work of antenna designers. Atmospheric conditions (gases in the atmosphere, rain, fog, vegetation) and path loss attenuations (diffraction, scattering, reflection) external factors that impair the quality of communication signals are among the disadvantages of the millimeter-wave spectrum. To overcome these disadvantages and support 5G network performance, the design of high-gain, high-bandwidth, and MIMO antennas have necessary. Microstrip patch antennas are the most widely used type of antenna due to their cheap production and low profile characteristics. This article compiles and presents studies conducted in recent years to improve the gain, bandwidth, and isolation of antennas designed to operate in the millimeter-wave range.

Keywords: Fifth Generation (5G), Millimeter wave, Patch Antenna, Bandwitdh, MIMO

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An Archaeo Geophysical Survey Using Electrical and Ground Penetrating Radar Methods in Yeşilöz Village Hodul Mountain Ören (Ürgüp, Türkiye)

Oğuz Cihangir SAĞIN[1]
Sedat YILMAZ[2]

Abstract

In this study, a geophysical survey was carried out in the Hodul Mountain Ören locality of Yeşilöz Village, Ürgüp district of Nevşehir province in the Cappadocia region. Geophysical methods are non-destructive and non-invasive methods that allow the archaeological site to be studied without being destroyed in the process and do not require excavation or direct access to the underground. For this purpose, ground penetrating radar (GPR) and electrical resistivity tomography (ERT) methods of geophysics were used, which help to detect different physical parameters such as dielectric constant or electrical resistivity that reveal layer boundaries or anomalies in the underground. An ERT device with 48 electrodes and GPR system with 250 MHz antenna were used for field measurements. ERT measurements were performed on 11 profiles at 1 m intervals according to the Wenner-Schlumberger electrode array. Res2DInv software was used for the inversion of the field apparent resistivity data obtained. Evaluated datasets were presented as both two-dimensional vertical sections and floor maps. GPR measurements were performed on 40 profiles at 0.5 m intervals. The ReflexW program was used to evaluate the raw radar data. The datasets, which were passed through the data processing stages, were visualized as depth sections. According to the results of the archeogeophysical research, many promising anomalies were observed in the ERT and GPR sections. It was concluded that these anomalies were caused by buried wall remains..

Keywords: Archeogeophysics, Electrical Resistivity Tomography, Ground Penetrating Radar

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19 Mayıs 2011 Simav Depremi (*M*w=5.9) Öncesi ve Sonrası Coulomb Gerilme Değişimleri

Hatice DURMUŞ[1]

Özet

19 Mayıs 2011 Simav depremi (Mw=5.9), Batı Anadolu'nun önemli tektonik yapılarından biri olan Simav fay zonu üzerinde meydana gelmiştir. Bölgenin aletsel dönem deprem aktivitesi incelendiğinde 2011 Simav depreminin meydana geldiği bölge ve yakın çevresinde yoğun hasara ve çok sayıda can kayıplarına neden olan orta büyüklükte birçok depremin meydana geldiği görülmektedir. Bu çalışmada ilk olarak 2011 Simav depremi ve öncesi geçmiş depremsellik dikkate alınarak kosismik (deprem esnasındaki kırılma kaynaklı) Coulomb gerilme değişimi modelleri hesaplanmıştır. Bu şekilde hem 2011 Simav depremi öncesi hem de sonrası gerilme değişimi modelleri ortaya koyulmuştur. Buna göre, geçmiş depremsellikten kaynaklanan kosismik Coulomb gerilme değişimi modeli 2011 Simav deprem kırığı üzerinde hesaplandığında 2011 Simav depremi kırığının 1 barı aşan gerilme yükü altında olduğunu göstermektedir. İkinci olarak ise artçı deprem dağılımları ile kosismik gerilme değişimi modelleri arasındaki ilişkiyi ortaya koymak amacıyla hem sadece 2011 Simav depremi hem de 2011 Simav depremi dahil geçmiş depremsellikten kaynaklanan kosismik Coulomb gerilme değişimleri hesaplanmıştır. 2011 Simav depremi sonrası bir yıllık zaman dilimi içerinde meydana gelen artçı depremlerin (M≥3.0) dışmerkez dağılımları incelendiğinde, bu depremlerin, ana şoku da içine alarak çoğunlukla ana şokun güneydoğusunda meydana geldiği dikkati çekmektedir. Buna göre 2011 Simav depremi ile geçmiş deprem kırılmalarından kaynaklanan Coulomb gerilme değişimi modeli artçı deprem dış merkezlerinin hemen hemen tamamının gerilmenin artış gösterdiği alanlarda toplandığını ortaya koymaktadır.

Anahtar Kelimeler: Artçı deprem dağılımı, Coulomb gerilme değişimi, 2011 Simav depremi.

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Time in Natural Phenomena, Space of Time

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Abstract

Mathematical formulas cannot accurately describe natural phenomena. They, like measuring instruments, can only give approximate estimates of natural phenomena. This is due to the fact that all natural facts are formed by taking into account all the influences (actions) of the surrounding objects and the environment, in automatic self-regulation. Despite this, the qualitative and quantitative methods of mathematical analysis allow one to obtain very valuable theoretical and practical results. In the same way, time implements potential and kinetic energies (stresses) that appear in natural phenomena in the space of a dynamic system. As examples, it points to numerous observed phenomena and processes in nature. In addition, it gives an analysis of how human, potential and kinetic energies can be distributed during his working activity. Time and thoughts are the products of the maturation of natural phenomena throughout the maturation of the Universe.
Keywords: natural phenomena, dynamic systems, births, maturation, maturation, lifetime.

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Biofuel Production Potential of Turkey

Koç Mehmet Tuğrul[1]

Abstract

It is predicted that fossil fuels will run out in the near future. This situation accelerates the search for alternative solutions to the fundamental problems faced by the world such as sustainable development, global warming and climate change, especially for economic reasons, of fossil fuels such as oil, coal and gas. As in the world, Turkey intensifies its studies on renewable energy sources to meet its energy needs. Biofuels are among the important renewable energy sources as agricultural energy sources. Biofuels and energy systems based on biofuels offer significant potential for both present and future technological developments. However, as in petroleum, Turkey is not self-sufficient in the production of crude oil, which is especially needed for biodiesel production, and is dependent on imports. Although it has the potential to close the crude oil deficit by bringing fallow lands to agriculture and encouraging oilseed production in this way, it is not considered an appropriate choice to evaluate the oil it will produce as biodiesel instead of the food industry. In this respect, it is a more correct option for Turkey to first establish the infrastructure to evaluate vegetable and animal waste oil, and then evaluate the emission values that it will provide with biodiesel by investing in electric vehicles.
Keywords: Energy consumption, bioethanol, biodiesel, biofuel production, biofuel potential

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A Research on Determining the Structural Problems of Dairy Cattle Facılıtıes in Bursa Nilufer District Karacaoba Neighborhood

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Ercan ŞİMŞEK[2]

Abstract

Dairy cattle breeding is of great importance in the agricultural sector.Population growth increases the demand for food and increases the demand for food products such as meat and milk, which are important for human nutrition.This increasing demand and need can be met by efficient animal husbandry in modern enterprises and facilities, where the structures inside are regularly planned, optimized in terms of environmental conditions, and animal welfare is ensured.

This research was carried out in dairy cattle farms in Bursa province, Nilüfer district, Karacaoba Neighborhood.Nilüfer district has 12836 cattle animals according to 2019 TUIK data, 3791 of which are milked cows.Considering the milk yield, the annual total milk production was 13,013.53 tons.Milk yield per animal is 9.53 kg/day. This value is not efficient enough for an economic enterprise.Although it is thought that the reason for this situation is due to the lack of nutrition and care, in addition to this, the fact that the operating structures are not suitable for animal welfare, the negative impact of the environment and working conditions in the shelter on the employees and the decrease in work efficiency are also effective.

In this study, animal shelters and other farm structures belonging to 15 dairy cattle farms located in Karacaoba neighborhood of Nilüfer district were examined in terms of their structural and environmental characteristics.In the research, in order to evaluate the compliance of the shelters with the animal welfare criteria, the dimensions of the shelter, the floor arrangement, the dimensions of the ventilation inlet and outlet openings were measured on-site, and a face-to-face survey was conducted with the breeders. While findings that may affect animal health and welfare and decrease milk production efficiency in small-scale enterprises engaged in traditional production, various structural problems were determined in other enterprises.

Keywords: Nilüfer Karacaoba, dairy cattle business, shelter, animal welfare

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A Numerical Work for the Optimization of Mesh Sizes and Simulation Parameters regarding with the Preliminary Thermal Design of Geo-Satellites

Yunus MURAT[1]
Prof. Dr. Ahmet Selim DALKILIÇ[2]

Abstract

In recent years, satellite design and manufacturing studies have an increasing importance. During their mission period in orbit, satellites are exposed to extreme thermal conditions of the space environment. In order to keep equipment that is accommodated on the structural panels of satellites within their allowable flight temperature limits, thermal control system design plays a crucial role. For this reason, it should be modeled, simulated, and tested accurately considering possible worst-case scenarios. Within the scope of this study, the general design steps, modeling, and simulation studies of a concept geostationary communication satellite have been performed. The study also includes the basic understanding of the thermal modeling and analysis of satellites under space conditions.

In the early stage of the study, some analytical calculations are performed for the determination of heat rejection capabilities of payload panels. In the next step, by using a commercial software (NX-Space Systems Thermal) based on the finite element method, five thermal models that have different element sizes are created. After running simulations of these models, a comparison that consists of temperatures results, simulation times, and size of result files is made for evaluations of the sufficiency of the models. In addition, the effects of changing some simulation parameters such as orbital calculation points, radiation simulation methods, etc. have been investigated. According to the obtained results, suggestions are given on the mesh density of models which will be sufficient to use in different phases of the satellite project.

Keywords: Satellite Thermal Design, Thermal Modelling and Orbit Simulation, Geo-Satellite, Finite Element Method, Satellite Project Phases.

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Geometric Optimization and Performance Analysis For Convergent-Divergent Nozzle Used By CFM56-7B

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Abstract:

A turbofan engine consists of two sections such as a power generation unit and a thrust generation unit. The power generation unit involves a compressor, a combustion chamber, a turbine and a nozzle. The power generation unit generates not only power but also some of the thrust. The thrust is generated at the exit nozzle of engine. One of the most used turbofan engines is CFM56-7B. The nozzle used in this engines is a convergent nozzle. This study investigated the applicability of convergent-divergent (C-D) nozzle to CFM56-7B turbofan engines. Initially the exhaust system of the CFM56-7B engine was drawn in two dimensional form via using SolidWorks 2021. Then, the drawing was transferred to the ANSYS Fluent and, a Quasi-1D analysis was performed using the Realizable k-ε turbulence model. In this analysis, the entry conditions of the nozzle are determined according to 121kN take-off thrust force. The accuracy of the analysis was assessed by comparing the calculated values with reference data of engine company. There was 5.301% difference in the nozzle outlet velocity and 15.132% difference in the thrust. The method used in this analysis was found to be robust. Subsequently, by using compressible flow relations, four different C-D nozzles were designed for 1.3, 1.5, 2 and 2.5 values of the Ma number and their performances were compared with given reference value. The thrusts of the designed nozzles were lower than given reference values. The exit velocities of nozzles with Ma=1.3 and Ma=1.5 were 32.909% and 45.159% higher but, not enough to improve the thrust because of outlet pressure. In the other two nozzles, shock wave formations have been observed inside the nozzle and due to this reason some velocity drops occurred at the nozzle outlets. As the result, the supersonic nozzles were found to be inappropriate for CFM56-7B turbofan engines.

Keywords: C-D Nozzle, Supersonic, Shock Wave, Compressible Flow, Mach, CFM56, Ansys

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Mineralogical and Petrographical Properties of the İncesırt (Kırklareli-Demirköy) Skarn type Deposits

Hasan AVCI[1]
Aykut GÜÇTEKİN[2]

Abstract

The mineralization in the NW-SE trending Strandja Metallogenic Province, which is the subject of the study, has outcrops in NW Thrace close to the Bulgarian border. The mineralization in the province is hosted by Jurassic rocks that unconformably cover the metamorphic rocks of the Strandja Crystalline Complex and felsic plutonic rocks intruding these rocks. Skarn type mineralizations are observed in the contacts of these rocks with scarce outcrops. The intrusive rocks are mostly classified as granite, granodiorite and diorite with their moderate to high-silica contents ranging between 55 and 65 wt.%. These rocks have high K2O content, calc alkaline and peraluminous character. In the chondrite-normalized REE diagram, the samples form a regular and semi-parallel patterns and there is common enrichment in LREE relative to HREE. They are enriched in large ion lithophile elements (LILE e.g, Ba, Cs, Rb, Th, U), and depleted in high field strength elements (HFSE e.g, Y, Ti, Yb) normalized to primitive mantle. Mineralization zones such as garnet-fels, muscovite-biotite schist, calc-silicate hornfels and wollastonite-mica-fels were determined according to the mineralogical- petrographical investigations at the contacts of the intrusive rocks in the study area. The ore minerals observed in these zones and plutonic rocks are pyrite, pyrrhotite, chalcopyrite, sphalerite, galenite, molybdenite, to a lesser extent magnetite, ilmenite, rutile, arsenopyrite and hematite, and as secondary minerals marcasite, enargite, bornite, digenite, realgar, covellite, fahlerz and limonite. Although it was not observed in microscopic analysis, according to the results of geochemical analysis, it is understood that gold and silver mineralization also take place in the ore paragenesis.

Keywords: Skarn deposit, mineralogy, NW Thrace

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Creating a Geochemistry Map by Investigation of the Cu Concentration of Plant, Soil and Sediment Samples in the South Region of Salda Lake (Burdur)

Betül COŞKUN ÖNAL[1]
Zeynep ÖZDEMİR[2]

Abstract

Various geochemical exploration methods are used to locate a mineral deposit in nature. Geochemical exploration methods are based on the statistical interpretation of chemical analyzes of elements found in systematically collected rocks, sediments, water, soil and living things (mostly plants). Considering the importance of Salda Lake in recent years, geochemical studies with plant, soil and sediment samples are very limited, especially in the region. For this reason, 91 samples (33 plants, 33 soils and 35 sediments) were systematically taken from the region in order to determine the Cu concentration of the southern region of Salda Lake (Burdur) and to create a geochemistry map. Cu concentration of the samples taken was determined by ICP-MS device. The chemical analysis results obtained are based on literature data for plant and soil samples (Cu concentration is 22.5 ppm on dry weight in plant samples, 2-1920 ppm in soil samples), NIST (10 ppm) and average ultrabasic rock values (20 ppm) for sediment samples. According to the results of the chemical analysis obtained, Cu concentration was determined as 1.63 - 16.69 ppm on dry weight in plant samples, 5.1 - 47.1 ppm in soil samples, and 2.3 - 73.1 ppm in sediment samples. When the literature data and chemical analysis results are compared; It was determined that the Cu concentrations of plant and soil samples were within normal values, while the values of sediment samples were above the generally specified standard values. It is thought that the source of the high Cu concentration determined in the sediment samples may be geogenic (the tectonics forming the Marmaris Peridotites, the basic unit of the region, and altered basic character volcanics over the cumalates) or the main source may be anthropogenic (a pesticide known as bluestone ($CuSO_4$), which is widely used during agricultural activities in the region). In addition, with the geochemistry map of the Cu concentration created for the region in general, the regions where the Cu enrichment or pollution are concentrated are presented visually.

Keywords: : Salda Lake (Burdur), Plant, Soil, Sediment, Cu concentration

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Evaluation of the Cost of Chain Arm Cutting Machine Used in Marble Block Production by Activity Based Costing Method: an Application

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Abstract

In today's competitive conditions, companies strive to sell their products at low cost as well as high quality. In determing the cost, cost information such as direct labor, raw materials and materials, indirect costs, which are the main elements of the traditional costing system, cannot be reached properly. Companies apply the Activity Based Costing (ABC) method in order to be able to determine the difference between the activities that result in profit and the activities that do not create added value. In the Activity Based Costing method, instead of collecting the activities in a single cost pool, separate cost pools are formed for products that are used close to each other. These pools can be in the form of labor cost pool, machine cost pool, general cost pool, quality control cost pool, depending on the status of the activities.

In this study, Activity-Based Costing analysis of chain arm cutting machines, which is one of the equipment used in the production of marble blocks, has been made. The cost information kept by the traditional costing method for 7 chain arm cutting machines used in the marble quarry is divided into labor, machine and administrative pools according to the Activity-Based Costing method. The cost analysis of the chain arm cutting machines has been calculated by taking into account their working time. According to the activity-based costing method, it has been calculated that the ABC belonging to the chain arm cutting machine, which is numbered 6405, is higher. Considering the working time, it is observed that the working time of this equipment is higher in direct proportion with cost.

According to the result of this study, it is possible to say that the Activity-Based Costing method is a useful costing method that should be implemented in the mining sector, particularly in the marble sector. Especially in marble quarries, cost items are not kept properly. With this system, marble companies can evaluate costs in more details, prevent mistakes, reduce costs to the lowest level, and thus avoid unnecessary costs in order to increase profits.

Keywords: Activity Based Costing, Mining, Marble, Chain Arm Cutting Machine, Traditional Costing

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The Effect of Drying Condition of Epoxy Resin in Beige Natural Stone's Flexural Strength

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Abstract

Natural stones are the most important natural building and cladding materials used in the construction industry and art since ancient times. However, natural stones with cracked structure caused by their formation are produced as blocks from the quarry, and significant production losses occur during the production of plates in the natural stone plants. Crack repair processes are one of the last stages of beige natural stone production. Therefore, the importance of production losses at this stage increases even more. Because if epoxy applications are not applied to the beige stone to be cut and commercialized; beige natural stones can not been turned into slabs and is completely wasted. In this study, the technical properties of the beige natural stone samples whose cracked systems were repaired with epoxy and the untreated beige samples which has not been applied epoxy were investigated.

Within the scope of this study, samples with almost the same structural properties (crack systems and textures) were obtained from the same block and divided into 4 groups. The samples belonging to the 1st group were not applied to any treatment (raw), the 2nd group samples were epoxy applied and dried under atmospheric conditions. The samples in groups 3 and 4 were dried in tunnel oven and storehouses oven by applying epoxy. The changes in the natural stone samples were determined by performed the 3-point flexural strength and water absorption at atmospheric pressure tests of the samples that were treated and untreated with epoxy in different drying conditions. When the 3-point flexural strength test results were evaluated, the lowest values were obtained in the raw samples without epoxy application, and the highest values were obtained in the epoxy coated samples. When the effect of the drying technique on the 3-point flexural strength results is examined, it is seen that the natural drying (DK) and the storehouses oven (KF) methods are more effective. When the water absorption values at atmospheric pressure are examined, it has been determined that the epoxy filled or coated the cracks at a significant rate and there is a significant decrease in water absorption rates. When the effect of the drying technique was evaluated, it was seen that the natural drying (DK) method was better.

Keywords: Natural stones, beige, crack, epoxy, drying lines, flexural strength

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Analysis of Disability Standards in Parks: An Example of Atatürk Park

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Abstract

There are 1 billion disabled people in the world. There are 9 million disabled people in our country. Parks should be organized and unimpeded not only for people without disabilities, but also for people with disabilities. Instead of designing separate spaces for people with disabilities, spaces should be provided where living conditions are created freely that remove obstacles together with healthy people.

The study was carried out through Atatürk Park, an open green area with the largest area of the Aydın province Söke district. The standards created for people with disabilities have been compiled by conducting a comprehensive literature review. The aim of the research is to investigate the comfortable availability of parks used by disabled people in common. Parking space; accessibility (the park entrance, pedestrian path, stair, ramp, parking), landscape ornament elements (living elements, signs and signage, lighting elements, the trash), use and activities (children's play area, sports field) finally planting the properties for field work, site observations, measurements were measured by compliance with the standards. It has been concluded that Atatürk Park is insufficient for the combined use of people with and without disabilities. Standard solution suggestions have been produced for the problem points. In accordance with the recommendations, if Decommissioned, the parking space will provide conditions suitable for the combined use of disabled and barrier-free people.

Keywords: Disabled standards, Barrier-free design, Barrier-free parks

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Developing Ecological Design Suggestions Against Flood Risk in Urban Areas: The Case of Antalya, Kemer

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Abstract

There are many possible effects of global climate change such as loss of vegetation in urban and rural areas, deterioration in agricultural pattern, increase in heat island effect and deterioration of climate order. One of these effects is the floods that occur due to the deterioration of the precipitation regime. Floods threaten ecosystems and human life in urban and rural areas in many ways. In this context, many methods have been developed in the last centuries to struggle the flood risk. Landscape architecture discipline also plays an active role in reducing the effects of floods that will occur with the structural and vegetative measures it has taken. With the ecological design approach that came to the fore in the 20th century, the possible effects of flood risk can be reduced. This study comprises the center of Kemer, which is the district of Antalya, and its nearby neighborhoods. Kemer district has been determined as the study area now that it is faced with flood disasters at different times of the year. The study consisted of 3 stages. In the first stage, literature research was conducted. In the area determined in line with the data examined in the second stage; slope, aspect, land use, soil, precipitation and distance to stream maps were graded according to Multi-Criteria Decision Making (MCDM) method in ArcGIS/ArcMap 10.7.1 program, then flood risk analysis was performed through ArcGIS. According to the results of the analysis, it was concluded that 893 ha of agricultural land and 2/3 of the settlement areas in the study area will be flooded in a possible flood. As a result of the study, ecological landscape design proposals are developed in areas with high flood risk, and economic and social benefits are provided besides ecological benefits. In addition, with this study, it has been concluded that the possible effects of the flood disaster that may occur in the future can be solved by ecological landscape designs.

Keywords: Climate change, flood risk, multi-criteria decision making, ecological design, Kemer

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Recovery of Hydrolyzed Silk Proteins From Bombyx Mori Cocoon with Membrane Systems

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Şeyma AĞIRAL AKGÜN[4]

Abstract

Silk, obtained from the cocoon of the bomcyx mori, is of great importance in the field of biotechnology with its biocompatible structure and protein structure with superior mechanical properties. The silk fibers obtained from this cocoon are composed of natural macromolecule proteins, sericin and fibroin. Sericin wraps around the fibroin with its sticky structure and holds the silk fibers together. Due to its functional properties, fibroin is used in biomedical applications, while sericin is used in cosmetics, food and pharmaceutical systems. Hydrolyzed silk proteins, obtained by recycling sericin and fibronin together, have a growing market with their use in advanced technological products in the food, medical and cosmetic fields, but their production and process information is limited and they are produced only in some Far East countries such as China, South Korea and India. For this purpose, a study was initiated for the recovery of hydrolyzed silk proteins. In this context, it is aimed to separate sericin and fibroin from the cocoon and to recover them with membrane technologies. Sericin is soluble in water and as a result of boiling the cocoons in water, most of the sericin in the cocoon passes into the water. For this reason, the cocoons were boiled in some water to obtain sericin and a solution containing sericin was obtained. Some sericin and fibroin remain in the cocoon. In order to obtain these proteins, after the dried cocoons were dissolved in an inorganic solution, a solution containing fibroin and sericin, hydrolyzed silk protein, was obtained. It is aimed to recover the proteins and concentrate the solution by feeding the obtained sericin and hydrolyzed silk solutions separately to the nanofiltration membranes under 10-20 bar pressure and 40-50°C temperature. After this step, the concentrated protein solutions can be fed to the spray dryer and these proteins can be obtained in powder form.

Keywords: Silk cacoon, silk proteins, sericin, fibroin, membrane technologies

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Sustainable Smart Transportation Systems Management "Bursa City Review"

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Gökhan GELİŞEN[3]

Abstract

The concept of smart city, which envisages the effective use of Information and Communication Technologies in order to gain an effective and sustainable management approach in cities, came to the fore in the early 2000s. The aim of this approach, in which components such as smart economy, smart governance, smart environment, smart life, smart transportation and smart people are connected; increasing the quality of life of the society and ensuring the sustainability of cities. Having environmental awareness in shaping the future of cities is the basis of sustainability. In our age, developing new technologies need to be applied to urban management, infrastructure and superstructure. For this reason, "Sustainable Smart Transportation Systems" applications should be developed by using technological developments and integrating them into the city, including factors such as increasing energy efficiency, ensuring safety in transportation and reducing carbon emissions. It is seen that the concept of smart transportation has taken its place in transportation policies and local government practices in Turkey in parallel with all the developments in the world. This article is to reveal how sustainable smart transportation systems affect the development of the city and transportation policies. The smart transportation policies and practices implemented by the Metropolitan Municipality within the scope of "smart city" practices in Bursa, which is an industry and tourism city, receiving rapid migration and seeking solutions to various urban problems, are examined and the sustainability approach is discussed.

Keywords: Sustainabile, Smart City, Smart Transportation, Smart Transportation System (STS)

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Actinide Transmutation Performance Evaluation of Accelerator Driven Subcritical Core with Thorium Bearing Fuel

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Abstract

Spent fuel discharged from nuclear power reactors is a mix of various radionuclides. It contains roughly 95.5 weight percent (w/o) uranium and 1 w/o plutonium with fissile contents of about 0.85 w/o and 65 w/o respectively. The remainder of the spent fuel contains 3 w/o fission products and 0.5 minor actinides. Because of this radionuclide mix, spent fuel is highly radioactive and generates heat. The majority of fission products decay fast and their radioactivity reduces considerably 300 years after being removed from the reactor. On the other hand, even though the long-lived minor actinides constitute a small fraction of the spent fuel, they are responsible for the majority of the heat dissipation and radiotoxicity. Therefore, for the sustainability of nuclear power production, the management of long-lived actinides is considered to be the key issue to be addressed. In recent years, efforts are made to transmute minor actinides in advanced nuclear systems to shorter-lived radionuclides to reduce the amount and radiotoxicity level of waste to be sent to disposal. Accelerator-driven reactor is one of the proposed systems to transmute long-lived actinides. In this study, the actinide transmutation feasibility of a subcritical accelerator-driven reactor with Thorium bearing fuel is assessed by simulating the system with the Serpent burnup and depletion code.

Keywords: Actinide, ADS, Serpent, Thorium, Transmutation

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Expression Analysis of Some Fatty Acid Desaturase Genes Induced by Chromium on Safflower (Carthamus tinctorius L.) Plants

Ekrem BÖLÜKBAŞI[1]

Abstract

Heavy metal pollution is a major environmental problem all over the world. It is known that heavy metals accumulated in high concentrations in soil and water cause genotoxicity and damage to most of the functional biomolecules. For example, Chromium is one of the most abundant, toxic heavy metals in the earth's crust. Despite being toxic, chromium also has a nutritive feature. Chromium toxicity in plants affects growth and development, causing changes in the germination process, as well as affecting roots, stems and leaves. Safflower is an important agricultural plant grown for its seed and oil obtained from the seed. Safflower oil is an important source of oleic acid and linoleic acid used in food and industrial applications. In this current study, the expression levels of CtFAD2 genes (FAD2-6, FAD2-7, FAD2-11) responsible for the conversion of oleic acid to linoleic acid in root, cotyledon and leaf samples of four different safflower cultivars (BALCI, BDYAS-04, LINAS and ASOL) exposed to different concentrations of chromium heavy metal stress were determined by Real-Time PCR. Safflower cultivars were exposed to chromium heavy metal stress at different concentrations (0, 40, 80, 160, 320, 640 mg/L) for 24 hours after being grown in a controlled environmental growth chamber for 21 days. RNA isolation, cDNA synthesis and Real-Time PCR analysis were performed from root, cotyledon and leaf samples of safflower cultivars exposed to heavy metal stress for 24 hours. While there was a decrease in the expression levels of FAD2 genes in safflower cultivars exposed to increasing chromium concentrations, it was observed that there was a re-increase after 80 mg/L, 160 mg/L and 320 mg/L. When the data obtained were evaluated as a whole, it was determined that the expression levels of FAD2 genes increased at low concentrations in safflower cultivars subjected to chromium stress. The decrease in the expression of FAD2 genes at increasing chromium concentrations and their re-increase after 160 mg/L and 320 mg/L, which can be considered as the critical point, is accepted as an indication that the defense mechanism against the stress is activated and FAD2 genes play a role in the defense against stress.
In conclusion, it has been shown that FAD2 genes are also associated with stress and play a role in the defense mechanism in safflower.
Keywords: Safflower, Real-Time PCR, FAD2 gene, Oleic acid, Linoleic acid, Chromium.

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The Numerical Hydrodynamic Investigation of Different Maneuver of a Controllable Pitch Propeller

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Abstract

In recent years, controllable pitch propellers have started to be preferred in propulsion systems to increase efficiency and improve maneuverability in ships. The main capability of the propellers, which can have different blade numbers, is that all blades can be angled by rotating them around the rotation axis of the blade so that the desired pitch is obtained at the same time. In this study, a controllable pitch propeller is numerically modeled to obtain reverse thrust by directing the blades without changing the propeller direction and reducing the speed during full-speed forward operation. In the study, the performance of the propeller in terms of thrust, efficiency and blade torques was investigated at different propeller speeds and different astern speeds.

Keywords: Controllable pitch propeller, CPP, Numerical analysis, Feathering maneuver, computational fluid dynamics, CFD, Astern Maneuver, Ahead Maneuver

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Investigation of the Effects of Topographic Variables of Mount Karanfil and Its Neighborhood (Pozantı-Adana) on Climate Structure

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Abstract

The aim of this research is to determined the effect of topographic variables of Karanfil Mountain and its surroundings on the climate structure. Karanfil Mountain and its immediate surroundings, located in the Mediterranean Basin, have an ecologically unique position due to their topographical features. Particularly at the points where the elevation changes in short distances due to the rugged topographic structure, steep slopes and narrow-bottom deep valley profiles are seen, climatic differences greatly affect the climatic conditions from the abiotic elements of the area. In the research, causal research and relational model methods were used. Because, in the research area, topography and surface shapes, differences in climatic conditions shape the climate control in the region. Various data from existing data sets (MGM bulletins, Climate-Data, Metoblue, etc.) were used as data collection tools in the study. The research was conducted within the borders of Pozantı-Adana. Thornthwaite App, Climograma-Excel, Arcgis 10.5 package program, IDW Interpolation were used in data analysis process. In this context, in order to reveal the climatic character of the area, the monthly and annual temperature, annual rainfall sets and wind character between 1980-2018 were analyzed in various climatological software and programs such as ThornthwaiteApp, Climograma.exe, and the climate types of the area were revealed according to the findings. tried to be put. Thornthwaite, Erinç De Martonne and Emberger bioclimate statistics were applied to reveal the climate types. As a result of the climate analysis, it is understood that the area and its immediate surroundings contain different climate types in terms of precipitation regime development, precipitation efficiency development and bioclimatic characteristics.

Keywords: Karanfil Mountain, Topografic variable, Climate Structure

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Production and Characterization of CuO Doped Nanofiber Structures

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Abstract

Copper (II) oxide (CuO) structures are of great importance due to their key role as superconductor, photovoltaic material, sensor and catalyst. Improved aspect ratio of CuO yields unignorable enhancements in its physical and chemical properties. In this study, electrospinning technique was utilized in order to increase active surface area and efficacy of CuO. Electrospinning is the process of accumulating the liquid droplets on a plate by thinning and elongating into filamentous heaps utilizing repelling forces between the solution molecules of the prepared liquid polymer solution under a strong electrical field. This study is based on doping of CuO in polyvinyl alcohol (PVA) polymer and production of nanofiber surface under electrical field. Physical, chemical and thermal properties of the fibers were analyzed via Fourier Transform Infrared Spectrophotometer (FTIR), Scanning Electron Microscopy (SEM-EDX), thermogravimetric (TG) analysis. The morphology, particle size and main chemical composition were determined by SEM-EDX. FTIR was also used to observe the chemical composition and stretching vibrations in the structure. Thermal stability of the nanofiber was specified using TG analysis. Nanofiber surface, consisting of CuO doped PVA, was successfully procured using electrospinning. CuO/PVA composite fibers were produced subsequent to production of pure PVA. Electrospun fibers separately obtained from CuO, PVA and CuO/PVA composite were compared in terms of their specifications. It was deduced that CuO/PVA composite nanofiber steps forward in the context of being a good candidate for superconductors and/or sensor applications due to its effective surface area.

Keywords: Nanofiber, electrospinning, CuO, PVA

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A Comparative Analyzes of Troposphere Models Determined using Different Datasets

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Abstract

In space geodetic techniques such as GNSS and VLBI, error sources should be eliminated to achieve precise positioning. Troposphere, one of the major error sources, affects radio signals due to the dry air and water vapor in its content. The signal delay because of the dry air can be obtained accurately using empirical formulas. However, meteorological observations should be considered to obtain signal delays because of the water vapor. Since obtaining real-time meteorological parameters is onerous, troposphere models are used to determine initial values of the parameters. Troposphere models can be produced using radiosonde observations and Numerical Weather Model data. In this study, two different troposphere model, which have been determined using ERA5's monthly averaged and daily datasets from 2015 to 2019 produced by European Center for Medium-range Weather Forecasts, have been compared. Precision and accuracy analyzes have been performed. In order to obtain accuracy of the models, ERA5's monthly averaged and daily products from 2020 have been used. According to first results, it has been seen that precision of the model produced using monthly averaged datasets is higher than daily's. In addition, the highest accuracies have been obtained with the model, which has been produced using monthly averaged data, by validating monthly averaged datasets.
Keywords: Troposphere Model, GNSS, ERA5, Accuracy, Precision

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Comparative Investigation of Mechanical, Physical and Heat Transfer Properties of Goose Feather Reinforced Polyethylene Biocomposites

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Mahmut Ali ERMEYDAN[2]

Abstract

Traditional petroleum-derived polymers such as polyethylene, polypropylene and unsaturated polyester and composites produced with these polymers have a wide range of uses in today's industry. However, it is seen that scientific studies and researches on the subject of "biocomposites (composites containing biomaterials)" have increased in the recent years because of increasing environmental awareness against harmful effects, unsustainability of petroleum-derived polymers and synthetic additives. In this study, it was aimed to produce low-density polyethylene matrix, goose down fiber reinforced biocomposite materials, and to investigate insulation properties, especially thermal conductivity and acoustic tests and physical and mechanical performance properties by testing and analysis methods. Polyethylene, which is the most consumed thermoplastics among the competitors used in our country with a rate of 34%, is one of the biggest reasons for choosing it as a polymer matrix in this study. The reason for the use of a natural reinforcing element is to increase the applicability by creating new areas of use and to obtain new properties without causing out-of-tolerance changes in the properties of petroleum/natural gasderived polymers, which are widely used in various industries today, and to meet the existing polymer need with natural reinforcing materials. 5% and 15%(w/w) goose feather fiber, which was chosen as the reinforcement element in the study, was mixed into the low density polyethylene matrix by using an extruder device. Then, test samples were prepared by injection molding method, and the physical and mechanical properties of the samples were compared and examined. With these comparisons, the adhesion of the reinforcing material with polyethylene and the advantages and disadvantages of using these two materials together were revealed.

Keywords: Goose Down Fiber, Polyethylene, Biocomposite, Polymer, İnsulation Properties

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Investigation of the Effect of Process Parameters on the Compressive Strength of Al6061/GNP/MWCNT Composites

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Sare ÇELİK[2]

Abstract

In this study, it was aimed to form a hybrid composite structure by reinforced Al6061 matrix with carbon-based nano reinforcement group Graphene Nanoplatelet (GNP) and Multi-Walled Carbon Nanotube (MWCNT). Before the consolidation project, the powders were mixed by ultrasonication and mechanical alloying. Under the determined process parameters, the Al6061/GNP/MWCNT composite was produced by the hot-pressing device. The sample produced was cylindrical and its dimensions were 15 mm in diameter and 10 mm in length. Densities of the composites were measured according to the Archimedes Principle and their porosity was determined. After conducted compression tests, the effect of GNP and MWCNT reinforcements on the compressive strength was investigated. Compression tests were carried out according to ASTM E9-09 standard. Taguchi analysis was carried out to examine the effects of production parameters on the compressive strength of composites. L8 array was used in Taguchi method. It was reported that it was obtained from the composite produced under sintering time and 50 MPa pressure conditions. It was reported that maximum compressive strength (308,592 MPa) was determined from the hybrid composite produced under 450 °C sintering temperature, 15 min sintering duration, and 50 MPa pressure. As a result of the study, a 3.71 fold increase in compressive strength was obtained compared to the unreinforced Al6061.

Keywords: Metal matrix composite, Aluminum alloy, Compressive strength

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Predicting Tuberculosis From X-Rays By Using Deep Learning

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Mehmet KARA [3]
M Serdar GUZEL [4]
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Abstract

In recent years artificial intellegence has become an important part of the solutions for diseases diagnosis in health care industry. Especially diagnosis from medical images like X-rays, CT, MRI and microbiological images is so popular and powerful with the advance of deep learning methods like Convolutional Neural Networks (CNN). Beside these tuberculosis is a significant health problem all around the world which has around 1.5 million deaths and 10 million new cases annualy. But the good point is it can be easily treated; therefore, the World Health Organization recommends systematic screening to facilitate the management of the disease. So in this study a novel fine tuned CNN model is proposed to diagnose tuberculosis from X-ray images dataset. The high accuracy results as %98 on validation data which demonstrate that the proposed model has prominent success over state-of-art models.

Keywords: CNN, Deep learning, Chest X-rays, Tuberculosis

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Preparation of Polyvinyl Chloride Blends by Using Calendering Process

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H. Aylin Karahan TOPRAKCI[2]
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Abstract

The materials produced with polymer raw materials have many different superior properties. Today, the products produced from polymers can attract attention in this regard, with the aim of making the products cheap and having the desired properties. The easy processing properties of polymers, the availability of different types of processing possibilities, their resistance to chemicals, the ability to produce products with desired mechanical properties, and their low cost can be shown as superior features. The superior mechanical properties and low density of polymers are increasingly replacing metals. Since the energy consumption during processing is less compared to metals, it is also in the foreground in terms of cost. Polyvinyl chloride (PVC) is one of the most used polymers all over the world. Many different additives can be used to improve the mechanical and processing properties of PVC. Calendering is one of the most used route for the production of many products in plastic industry. Also, it is of importance in the production of films, packaging materials or coated products. Although calendering is an old production route, it is still advantageous compared with other processing methods. Its suitability for mass production of polymeric products, ease of maintanence and applicability, make calendering process better than other production routes. Calendering is used especially in the products made out of PVC. In this study, preparation of polymer blends including PVC by calendering process has been reviewed.

Keywords: Poly(vinyl chloride) blends, calendaring process, polymer

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Predicting Tuberculosis From X-Rays By Using Deep Learning

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Mehmet KARA [3]
M Serdar GUZEL [4]
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Abstract

In recent years artificial intellegence has become an important part of the solutions for diseases diagnosis in health care industry. Especially diagnosis from medical images like X-rays, CT, MRI and microbiological images is so popular and powerful with the advance of deep learning methods like Convolutional Neural Networks (CNN). Beside these tuberculosis is a significant health problem all around the world which has around 1.5 million deaths and 10 million new cases annualy. But the good point is it can be easily treated; therefore, the World Health Organization recommends systematic screening to facilitate the management of the disease. So in this study a novel fine tuned CNN model is proposed to diagnose tuberculosis from X-ray images dataset. The high accuracy results as %98 on validation data which demonstrate that the proposed model has prominent success over state-of-art models.

Keywords: CNN, Deep learning, Chest X-rays, Tuberculosis

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The Use of Valuable Metal Coating Techniques in Jewelery and the Characterization of New Products

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Mehmet Hakan MORÇALI[2]
Erkan TUĞRAL[3]

Abstract

In this study, it is aimed to develop a new silver (Ag) coating process by electrolysis method. The framework of the study; to take an environmentally friendly approach, to create an alternative to the cyanide plating bath and to use silver chloride instead of silver nitrate. Thus, it has been ensured that a new study is carried out, which will be the basis for researching the methods of coating precious metals with non-precious metals on jewelry and developing the silver (Ag) electrolysis coating method. In our study, AgCl powder was obtained by hydrometallurgical method. The resulting AgCl powder was electrolyzed after dissolving with distilled water and sodium thiosulfate. The effect of the coating was investigated by adding ammonia to this prepared electrolysis bath solution. Without changing the ambient conditions, an increase in the amount of ammonia (0-0.4-0.8-1.2-1.6-2) and an increase in the coating thickness (11-13-16-17-18-22 nm) were observed. It was determined that the coating thickness remained constant at the amount of 2-3 ml ammonia. It was determined that the coating thickness (22-20 nm) decreased in 3-4% ammonia additions. This result gives us; showed that the amount of ammonia causes degradation in the electrolysis bath solution after 3%.
Keywords: Silver, Electrolysis coating systems, Ammonia, Silver chloride

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POSTERS

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Analysis of Low Velocity Repeated Impact Behavior in Beam

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Bahadır ALYAVUZ[2]

Abstract

In this study, the effects of different parameters on low velocity repeated impact behavior were investigated by means of finite element models in ABAQUS. Three sequential impact were applied for each analysis. The graphs of the impact contact forces and displacements in the beam and the graphs of the speed of the impacting rigid body during the analysis were examined.

Keywords: Repeated impact, low velocity impact, mechanical behavior, shape effects, finite element method, plastic behavior

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A Case Study on Investigation of High-speed Train Induced Vibration Effects on Adjacent Soils

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Abstract

High speed railway lines (HSR) in Turkey are still developing with new lines currently under construction or in the planning phase. For efficient transportation solutions urban crossing have become inevitable for these lines. On the other hand, due to the high-speed level, HSR train has a dynamic load effect on railway platform and adjacent soils or structures. These structures and facilities can be historical heritage monument and lifeline services or pipelines which has high risk potential for service functions.

HSR dynamic load has high frequency transferred with vibrations. Wave propagation effect arise on 3 main directions. Different functions are used to represent local ground conditions, as vibration intensity is different for soil and rock surroundings. Also railway line components has damping functions. Vibration induced energy transferred to the railway platform and surrounding ground can give damage to the nearby structures and facilities.

The aim of this study is to investigate HSR train induced vibration effects on surrounding soils. For this purpose, train induced vibration recordings obtained for different direction and distances from railway line. These recordings compared with analytical approaches. Environmental effects of these vibrations on adjacent structures evaluated for soil structure interaction. Also, mitigation of vibration induced damage trench barriers and other backfilled alternative solutions investigated and evaluated. Also, some suggestions has made for such future studies.

Keywords: vibration, high frequency, damping, acceleration

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Investigation of Waste Marble Powder as an Alternative Raw Material in Ceramic Industry for Green Production

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Fatma GOL[2]
Emre KACAR[3]
Zeynep Gizem SARITAS[4]
Ali YILMAZ[5]
Melek ARSLAN[6]
PFatih SEN[7]

Abstract

This study used waste marble powder instead of commercial Ca-based material (CoCaM) in ceramic glaze formulation. Waste marble powder is a by-product of a process that contains high levels of contain in similar proportions with CoCaM, their usability in the recycling process in the ceramic industry has been investigated. Waste marble powders were used in the different formulation as a glaze. In the formulations, waste marble powder was added in the same proportions instead of CoCaM. It was fired in a roller oven at temperatures of 1000-1100°C and 1100-1200°C. Chemical analysis of CoCaM and waste marble powder used in formulations were made with X-Ray Fluorescence (XRF) and morphological features were made with Scanning Electron Microscopy (SEM). Crystallographic information was obtained by X-Ray Diffraction (XRD). In addition, hardness and water absorption tests were applied to determine its technical properties. When the hardness test results of glazed samples were examined, the hardness values of the waste marble powder added samples increased by 1.9% compared to the standard samples. According to the results obtained, it has been seen that using waste marble powders in the ceramic industry is very important for both economic and environmental reasons. It is envisaged that this study will support the development of alternative glaze compositions using waste and new studies.

Keywords: Ceramic; Glaze; Marble Powder Waste; Masse; Raw Material

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Production and Characterization of Graphite Reinforced Polycarbonate (PC)/Acrylonitrile Butadiene Styrene Copolymer (ABS) Alloy

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İbrahim KARTERİ[2]

Abstract
The applications of engineering plastic based nanocomposites obtained by adding nanostructured carbon derivatives for the plastics and materials industry are wide. Especially, polycarbonate (PC)/acrylonitrile butadiene styrene copolymer (ABS) alloy is one of the commercially important engineering plastic composites. Due to its excellent impact toughness, high strength, high thermal resistance and good machinability, this alloy has applications for a wide range of engineering and plastics industries [1]. In addition, graphite reinforced PC/ABS alloy is widely used to achieve high strength this graphite added engineering plastic composite is important for the strengthening of the automobile and defense industry [2]. In this study, graphite doped engineering plastic composites was produced. The PC-ABS without reinforcement, 0.5 % wt graphite added plastic engineering materials were obtained in the experiments. ABS and PC were dry mixed mechanically with graphite powders and then melt-compounded using a singles crew extruder to avoid the use of a solvent system. The PC-ABS alloy with graphite composites were produced as pellets. In addition, the characterization of these obtained composites were examined. Fourier transform infrared (FTIR) spectroscopy measurements of the PC/ABS alloy with graphite composites were conducted using an FTIR spectrometer (Perkin Elmer Spectrum). The surface structures of the obtained the PC/ABS alloy with graphite examined by Zeiss Evo scanning electron microscope (SEM). In addition, the mechanical properties of the produced composite were also tested.
Keywords: PC/ABS alloy, graphite, engineering plastic composites

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Fabrication of Flexible Cathodes Based on Polysulfide Host Adsorbents in Li-S Batteries

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Hilal GÜNSEL[2]
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Ali Osman AYDIN[4]

Abstract

With the increase in technology and the introduction of the concept of mobility into our lives, storable energy has gained great importance. Especially with the production and development of electric vehicles, it is of great importance that energy storage technology is long-lasting, safe, low-cost and environmentally friendly. Lithium-sulfur batteries are particularly noteworthy for applications requiring large capacity and long battery life, as they have a theoretical energy density of 5 times higher than state-of-the-art Li-ion batteries. Transition metal oxides have emerged as polar host materials for lithium polysulfides to further modulate the bonding energy with polysulfides and increase the coupling density of the electrodes. Polar metal oxides naturally adsorb polysulfides on their hydrophilic surfaces. Furthermore, sulfur cathodes produced using these metal oxides exhibit significantly improved long cycle performance, showing higher chemical adsorption efficiency compared to physisorption in suppressing polysulfide diffusion and shuttle effect. In this study, the polysulfide adsorbing ability of metal oxides against the shuttle effect will be utilized. For this purpose, free-standing and flexible rGO/NiO/S composite paper electrodes impregnated with sulfur were prepared by combining the transition metal oxide, NiO, which will be used as a polysulfide adsorbent, with reduced graphene oxide (rGO). In this study, morphological and structural analyzes of composite films were carried out by field emission scanning electron microscopy (FE-SEM), energy dispersive x-ray spectroscopy (EDS) and x-ray diffraction (XRD) methods. After the assembly of the CR2032 cell, electrochemical performance tests were performed and the chargedischarge capacities were investigated. As a result, rGO/NiO-based composites have been developed as environmentally friendly materials, further enhancing the electrochemical performance of Li-S batteries.
Keywords: Li-S battery, polar metal oxides, adsorbent, polysulfides, shuttle effect.

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The Effects of Different Sound Stimulation in Poultiy in Pre Incubationand After-Incubation Period

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Abstract

When the sound sensitivity of poultry in the embryonic period was examined, it was observed that they gave auditory responses to different frequencies and sounds. It stated that they recognize and adaptation the sounds they perceive auditorily in the embryonic period in the post-incubation period. When the prototypical anatomy, which enables poultry to recognize and adapt, is examined, cochlea, nucleus magnocellularis, anteroventral cochlear nucleus, nucleus angularis, dorsal cochlear nucleus, nucleus laminaris, medial superior olive, optic tectum, it forms the structure of the auditory brain such as papilla, optic tectum, superior colliculus. When the sounds perceived audibly are heard later, the spontaneous recognition activity comes into play with the activation of the auditory nerve fibers. Stimulation of sounds perceived auditory in the pre-incubation period, instinctive behavior, lung respiration, pulse and respiration rates, keeping and recognizing vocal stimulus in their memory, earlier reaction to stimuli, movement activation, socialization in the flock, sensory system development, hatching efficiency, embryonic development and deaths effects have been observed.
It state that it showed different effects depending on the intensity of sound stimulation in the post-incubation period. It state in studies that acutely sound stimulation causes significant changes in corticosterone, triglyceride and glucose levels, and adversely affects animal welfare with stress and fear in animals. The aim of this study is to give information about the effects of sound stimulation in poultry before and after hatching.
Keywords: Embryonic period, post-incubation, poultry, sound stimuli, various effects

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Properties of Blueberry and It's Use in Health Field

Emre AYDEMİR[1]
Murat ALTAN[2]
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Abstract

Blueberry, known as blueberry in our country, is the berry-like fruit of a perennial plant in the form of a shrub that can be grown in mild climate conditions and is deciduous in winters. It came to the fore in the United States in 1906 for the first time in the world and various breeding and selection studies have been carried out. In our country, it was first grown in Rize in the 2000s. When the production and consumption amount is examined over the years, both in the world and in the world; Turkey had also increased production. Blueberry; In the production of fresh fruit, fruit juice industry, milk and dairy technology, fruit breads, donuts, cakes, puddings and cakes, spice industry, fruit salads, jam, marmalade and canned food industry, tea, diet menus, wine and various alcoholic beverages, plant is used in handle making, as an ornamental plant, in many sectors. In addition to its rich substance content, it has attracted attention in recent years with its use in the pharmaceutical and cosmetic industry due to its anti-inflammatory, antimicrobial, antibacterial, hypoglycemic, antifungal, antimutagenic, anticancer, antimutagenic, neurodegenerative and antioxidant content. In the studies conducted, it is widely used in the treatments of in tumor inhibition, effects on endothelial tissue function and brain development, uremia system, intestine, liver, cardiovascular, diabetes, blood pressure, diabetes, chronic and eye diseases against cancer. In addition, in the protection of neural tissues, sensitivity to light in the receptors, rheumatic diseases, hydroxylation and glycosylation, increasing serum antioxidant capacity, neuronal and behavioral functions, sperm motility, vitality and morphology, stomach and intestinal disorders, especially active immunization, healing oral wounds It is stat that he took an active role. In this study, information about the increasing production of Blueberry over the years, nutrient content, diseases and treatments in which it takes an active role is mentioned.

Keywords: Nutrient content, Blueberry, disease and treatment, production

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Estimating the Amount of Oil and Carotenoids in Maize Kernel by Image Processing Technique

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Cem Ömer EGESEL[3]

Abstract

Oil and carotenoids are quality components adding value to corn grain. Breeding for these components necessitates analyses of samples from thousands of different genotypes, which requires an extensive amount of labor, time, and money. Although recent developments in image processing technologies allow significant savings, to obtain reliable data, relations between the concentrations of the variables and the images created by them must be determined precisely. Based on the facts that the carotenoids give the maize grain its yellow-orange color and that there is a strong correlation between the embryo size and the amount of oil, it seems possible that image processing methods can be used to estimate the amounts of these two variables in the grain. The objective of this study was to determine the carotenoid and oil content in the maize kernel by using image processing techniques. Fifteen maize varieties with different colors and sizes were used, and each was studied with 10 replications. The images of kernels were taken with 3 different cameras, namely multispectral, RGB and infrared. Thereafter, the samples were ground, and the oil extraction was carried out in a soxhlet device. After calculating the amount of oil, absorbance values were taken at 450 nm on the oil + hexane samples using a spectrophotometer to estimate carotenoid amounts. In the image processing, first, an algorithm was designed to work on the images from the maize kernel, which worked in HSV colorspace. In this colorspace, a filter was used to separate the maize kernel image from the background. After that, using the gradient differences with the pixels, the embryo area was separated from the rest of the seed. The color values were calculated from the average hue value, and the area values were calculated based on the pixel count within the embryo. Results indicated that carotenoids and color values had a linear positive correlation, while no correlation could be detected between the oil ratio and embryo size. Carotenoid values could be estimated with an average of 11.96% error.

Keywords: Image Processing, HSV, Multispectral, Maize, Caretenoid

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Recombinant Production of Levansucrases

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Abstract

Levansucrases (Lsc) are microbial enzymes that split sucrose into fructose and glucose, and then polymerize fructose molecules to form levan and fructooligosaccharides (FOS). Levan is a valuable biopolymer which has potential applications food, biomedical and chemical industries. The use of FOS as a food additive also attracts attention due to their health benefits and other functional properties. Levansucrases, can be produced by many gram-negative and gram-positive bacteria. The type of fructans produced depends on the specific properties of levansucrase. For instance, levansucrase from Gram- positive bacteria mainly synthesizes high molecular weight levan. The type of fructans produced from gram-negative bacteria are generally short-chain FOSs. In addition to, most microorganisms are shown to produce both levan and FOS depending on reaction conditions.
Many different levansucrase producing microorganisms are identified to date, albeit most natural strains produce low amounts of levansucrase. In order to produce enzymes for high scale industrial applications as well as enzymes with engineered substrate and/or product specificity recombinant approaches are investigated. In this study different strategies and expression systems utilized for recombinant levansucrase production will be explained. Furthermore, the importance of the type of expression system for food grade and biomedical grade enzyme production will be discussed.
Keywords: enzyme, levansucrase, levan, fructooligosaccharides, recombinant protein

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A Review: Near Infrared Spectroscopy Method Usage For Food Industry

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Abstract

Food quality and safety requirements needs to be investigated during process or after production by producers or researchers for consumer safety, good manufacturing, and desired products. Traditional or innovative techniques are used in different analysis to achieve that. Near Infrared Spectroscopy (NIR) is one of the innovative techniques which is frequently occurring as an example for analyzing method in food industry. NIR spectroscopy has been started to use at 1950s to analyze moisture content. NIR spectroscopy depends on absorption of certain wavelength of electromagnetic radiation. This technique has several advantages in contrast to traditional quality analysis. NIR device generally does not need extra solvent or component during analysis, analysis results can complete a few seconds and minimum scale of sample and nondestructive technique give opportunity to cost minimizing. Food, chemical and pharmacy industries, agriculture studies include NIR applications. For example, quality parameters such as protein ratio, moisture content of cereals, flour, bread; sensory and quality properties of milk and dairy products; sugar content of fruits and juices; aromatic components of different food products can monitor with NIR applications. Different sample selection and calibration methods generated during improving NIR studies. Recently years, improving studies published about NIR spectroscopy method. This paper reviews details about the usage areas of NIR spectroscopy, sampling and calibration for different parameters and products, and fitting to ice cream laboratory studies due to the recent food industry examples.

Keywords: Near infrared spectroscopy, food quality, analysis, absorption, calibration

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A Great Alternative to Conservation of Water Resources: Gray Water

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Abstract

Water is indispensable in human life as it is indispensable in many sectors. Preparation of construction mortar in sectors, preparation of pulp in paper mills, It is the basic need of many industries, such as the preparation of dough in bread factories and the preparation of ceramic mortar in ceramic factories. At the same time, it is used for washing clothes, washing dishes, shower-hand washing, vegetable washing, etc. in human life.
According to the data of the Turkish Statistical Institute (TUIK), the population of Turkey is expected to exceed 100 million in 2040 (TUIK 2018). According to the presentation titled Water published by the Ministry of Environment and Urbanization, there is a consumption of 1566 m^3 per person per year in Turkey and the total usable water resource of Turkey is 112 billion m^3. (www.csb.gov.tr)
The amount of water required in 2030 is 146.1525 billion m3. The current water resource of our country is 112 billion m^3.This is an indication that our current resources will not be enough in 2030. Alternative water sources, namely the reuse of gray water and rain water, and the reuse of wastewater should be started as soon as possible.
According to the National Water Plan (2019-2023) prepared by the Ministry of Agriculture and Forestry, 74% of the water use in Turkey is for agricultural irrigation purposes. At the same time, it is stated in the water plan that the amount of water consumed in Turkey has increased by 40% in the last 20 years.
It has been stated that the amount of water that will be needed in 25 years will increase three times with the growth in population and sectoral basis (Ministry of Agriculture and Forestry, 2017). With the increase in population in our country and in the world, there will be an increase in water consumption. Increasing water consumption will increase its speed and cause water shortage with rapid consumption of natural water resources.
For this reason, it is necessary to protect, save and reuse water resources.
Keywords: Reuse of wastewater, Recycling alternatives of wastewater, Recovery of gray water, reuse of gray water, Conservation of water resources.

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Energy and Exergy Analysis in Wastewater Treatment Plants

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Abstract

The significant increase in wastewater production in recent years due to urbanization and population around the world also rapidly increases the establishment of wastewater treatment plants. Today, increasing energy prices and strict discharge standards introduced by new legal regulations have increased the operating costs of wastewater treatment plants [1]. On the other hand, due to rapidly depleting energy resources, energy efficiency comes to the fore in many areas. Due to the intense energy used in wastewater treatment plants, improving urban wastewater services with new technologies is an important step in ensuring sustainability in the wastewater treatment sector. In wastewater treatment plants, high amounts of energy are needed in processes such as the transportation, treatment, discharge and disposal of sludge. With the increase in energy costs and the frequent use of sustainability studies, energy optimization has gained even more importance in terms of economic and environmental aspects [2]. Energy and exergy analysis, which is one of the methods used to examine the sustainability of the wastewater treatment system; It is very important in determining the improvements to be made in the existing system, the causes of process inefficiencies, their location and size [3]. With the system design in waste water treatment plants and the installation of renewable energy technologies in the existing treatment area, both the energy consumption of the facility can be reduced and the energy needed by the facility can be obtained. In this study, a thermodynamic analysis was performed for a wastewater treatment plant in Istanbul. Plant processes were modeled based on energy and exergy parameters to analyze the efficiency of the wastewater treatment plant system. The data of the system were analyzed with the EES (Engineering Equation Solver) program, and various revision suggestions were made in order to ensure sustainability and energy efficiency at the facility

Keywords: wastewater, energy efficiency, energy, exergy, EES

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Stomach Contents of a Loggerhead Sea Turtle (Caretta caretta) Stranding on the Beach of Samandag

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Şükran YALÇIN ÖZDİLEK[2]

Abstract

Sea turtles are protected by international conventions including Turkey. 5 species of sea turtles (*Caretta caretta, Chelonia mydas, Eretmochelys imbriacata, Lepidochelys kempii* and *Dermochelys coriacea*) are distrubuted in the Mediterranean region. Two of these species are known to nest on the coasts of our country. *C. caretta* are top predators with long lifetimes at sea. It is a key species important to the health and continuity of the coastal ecosystem and is listed as low risk (LC) in the Mediterranean according to IUCN criteria. On the factors that threaten the lives of sea turtles, there are various anthropogenic effects such as predators, uncontrolled fishing and fisherman effect, habitat damage, intervention in nesting beaches, sea pollution, mostly synthetic rubbish, oil wastes and boat crash. The purpose of this study is to determine the food organisms from the digestive tract contents of the C. caretta sea turtle that stranding and to have information about the habitats of the species. For this purpose, the digestive tract contents of 9 C. caretta sea turtles, which stranding on the beaches of Samandağ in 2020, were examined. Relative importance index (%IRI) was calculated by using the frequency (%F), abundance (%N), weight (%W) values in determining the contents of the digestive tract (%IRI=(%N+%W)*%F). When the %IRI values of the nutrients coming out of the digestive tract contents were calculated, it was determined that the %IRI values of Mollusca (40.5%) and crabs (11.9%) were the highest. Nutrients obtained from the digestive system of those who hit the shore stranding will not reflect the food selectivity of the entire C. caretta population feeding in the region, but will show similarity. The digestive system content of C. caretta species found on the coasts of Samandag has not been investigated before, but it is a preliminary study for future studies.

Keywords: Samandag, Stranding, *Caretta caretta*, trach contents

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Investigation of Microstructure and Corrosion Properties of Biodegradable Mg-Sn-Sr Alloy produced by Gravity Casting Under Magnetic Field

Selma ÖZARSLAN[1]

Abstract

In this study, the microstructure and corrosion properties of the Mg-Sn-Sr alloy were investigated both with and without magnetic field application during the solidification process. The effects of magnetic field application on Mg-Sn-Sr alloy at the time of solidification were investigated by XRD, SEM and EDS and the alignment of primary phases was analyzed. When the microstructure of the magnetic field applied alloy was examined, it was observed that the phases were more homogeneous and finely dispersed. Biocorrosion behavior was analyzed by both electrochemical and immersion tests. The results showed that the application of the magnetic field significantly changed the alignment of the grains in the microstructure, and this change in the microstructure improved the corrosion properties.

Keywords: Mg alloy, biodegradable materials, corrosion properties

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The Corrosion Effect on Zinc Selenium Coating with TVA Method on DD13 Quality Sheet Metal Plate

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Suat PAT[2]

Abstract

Corrosion is the common problem of all industries where metals and alloys are used. The formation of corrosion occurs when the structure of the metals and alloys used changes together with chemical and electrochemical reactions. This situation causes high losses in the sectors where metal parts are used. For this reason, studies are carried out on many techniques and methods to slow down corrosion.
With the advancement of technology, studies on the coating technique are increasing in order to slow down the corrosion progression in metal parts. Coating allows surface modification and improvement of mechanical properties in metals. This paved the way for the developed parts to be used for a long time. Zinc (Zn) based materials and electrochemical coating methods are used extensively for corrosion prevention purposes.
In this study, it was studied on the development of the coating technique of DD13 quality sheet metal, which is mostly used in the automotive industry. Zinc selenium (ZnSe) coating was applied to the surface of the DD13 substrate using termiyonic vakum arc (TVA) technique. The applied coating is nano-sized and single layer, and the day-based changes of this coating and its resistance to corrosion were examined in the salt fog test.
Keywords: Corrosion, Zinc Selenide, Nano coating, TVA, DD13 plate iron

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Corrosion Behavior Of Zinc Nano-Coating On Sheet Iron As Substrate For Automotive Parts

Hafizittin Hakan YUDAR[1]
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Abstract

Corrosion is the change in material properties as a result of chemical and electrochemical reactions occurring in the structures of metals and alloys. Due to the formation of corrosion, serious losses are experienced from metal and metal parts. For this reason, many sectors, especially the automotive sector, are working on this problem. Therefore, many new techniques are currently being developed to slow down corrosion.
With the advancement of technology, it is obvious that surface coating is an inevitable reality in metal parts. With the surface coating process, surface modification, improvement or even improvement of the low mechanical properties of the surface can be achieved. Especially after the semi-finished product is the final product, there may be problems in its mechanical properties. However, financial losses in these problems can be minimized by coating methods.
In this paper, it was studied on the development of the coating technique of DD14 quality sheet metal, which is mostly used in the automotive industry. Zinc (Zn) coating was applied to the surface of the DD14 substrate with TVA technique. The applied coating is nano-sized and single layer, and the day-based changes of this coating and its resistance to corrosion were examined in the salt fog test..
Keywords: Corrosion, Zinc, Nano coating, TVA, DD14 plate iron

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Classification Of Some Species Found In Dunes According To Grime Strategies

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Abstract

Coastal dunes are ecosystems that are constantly exposed to stres factors and destructions. Plant species found in coastal dunes react differently to theese factors. The response of dune species to stress and destruction factors varies between species. The main purpose of this study is to classify the common species (*Pancratium maritimum, Xanthium stramarium, Achiella maritima* and *Eryngium maritimum*) in coastal dunes in Samsun province as main and intermediate strategies using Grime's CSR (competitive, stress-resistant, ruderal) method. Based on this classification, it was determined which Grime strategies the species adopted. Within the scope of this study, first seven regions (Çoban Yatağı, Hürriyet, Sindel, Costal, Sahilkent, Doyran and Cernek) including typical coastal dunes in Samsun province were visited. Plant species commonly found in coastal dunes in these regions were determined. In these plant species, canopy length, dry matter content in the leaf, flowering period, lateral spreading condition, dry leaf weight, specific leaf area and blooming start were determined. For *Pancratium maritimum*; usually R/CR and rarely CR strategy were determined. For *Xanthium stramarium*; six types of strategies were identified as S/SC, R/CR, R/SR, CR, S and SR. For *Achiella maritima*; four types of strategies were identified as R/CR, R/CSR, S/CSR and SR/CSR. For *Eryngium maritimum;* usually R/CR and rarely CR and S/SC strategies were determined. Competitive plants show maximum vegetative development and have a high seed biome in unravaged habitats. Ruderal plants have a short life span, have high relative growth rates, produce more seeds and have low seed biomass. The growth of ruderal plants is restricted to moderate destruction. As a result, it was found that almost all of the species showed secondary strategies.

Keywords: CSR strategies, Central Black Sea, Coastal dunes, Destruction, Stress

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End of Line Stretching Process in Food Safety

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Furkan GÜLTÜRK[3]

Abstract

The packaging processes at the end of the line are important in order to ensure reliable food logistics, to prevent the palletized products from tipping over during logistics and to prevent the products from being affected by external factors. An embedded system-based stretch wrapping machine has been designed to ensure a healthier packaging and subsequent logistics. This system adjusts the stretch wrapping ratio, tension, speed and acceleration of the rotary system during movement according to the weight of the product to be palletized.
The process, which starts with the attachment of the stretch to the product and its rotational movement, is followed by the upward winding phase of the opening head mechanism, which can increase the stretch tension up to three times. Each winding turn is counted by the notch in the rotary mechanism. When the winding round is completed, the stretch opening mechanism goes down and the rotating system slows down and stops with a ramp. In this way, the stretching process of the pallet is completed. In the packaging of light products, top pressure is applied considering the possibility of the products to scatter.
By wrapping the bottom boards of the pallet during stretch wrapping, the stability of the pallet has been increased and precautions have been taken against contamination events caused by contamination, water splashing or placing on wet ground. With the top film closure option, the product is completely stretched and precautions are taken against water infiltration, sunlight and impacts that may come from the top. With this system, the product can be stretched at the desired height and up to 120 pallets per hour. With the embedded system-based stretching process we have developed in this context, food safety has been ensured by preserving the products to be stored and transported.
Keywords: Embedded System, Streching, Packaging, Logistics, Contamination

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Optimizing the Employee Selection Process in the Human Resources Department of an Enterprise

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Gültekin ÖZDEMİR[2]

Abstract

It consists of many parts due to its hierarchical structure in the existence order of an enterprise. The structure of the sections considered as a whole is divided into sections integrated with today's technology. The various departments are strategically united in a single headquarters. The department in the main center is considered to be big companies and it has been obtained as a result of researches revealed as "Human Resources". In order for the operation of a business of this scale to be optimal, it must be able to provide sufficient and correct personnel power. All these requirements bring the technology to support an enterprise's optimization effort in the stochastic process. In today's era, there are many algorithms at macro level that each business uses in its own personnel-job pair. The main purpose of the algorithm is to create a function that is an objective function and set it as a key. In all this direction; the aim of the thesis is to make optimization studies in the general structure of an enterprise by using the classification methods of data mining in the human resources department. While performing the optimization work, support is taken from the programming language Python. After developing the candidate infrastructure required for the job, the answers given to the questions presented to the candidates are considered, and a character analysis is performed by assigning meaning to the words in the answers in the program language. Therefore, it was tried to be ensured in a short time that the suitability of all personel-work couple.

Keywords: Human Resources, Optimal, Python, Assigning Meaning, Developing Data

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Investigation of Histopathological Effects of Zinc Oxide (ZnO) Nanoparticles on Tissues of Mediterranean Mussel (*Mytilus galloprovincialis* LAMARCK, 1819)

Berkay GÜNEŞ[1]
Mert GÜRKAN[2]

Abstract

Nanoparticles are increasing importance due to their use in many fields, their specificity and their high reaction activity. It is known that ZnO nanoparticles, which are used in many areas, have negative effects especially on aquatic ecosystems. *Mytilus galloprovincialis* (Black mussel or Mediterranean mussel), one of the most important species of the *Mytilidae* family, is a species that is distributed in the seas of our country and has economic importance due to its consumption by humans. In addition, a bioindicator species *M. galloprovincialis* accumulates many pollutants due to its feeding by filtration. The toxic effects of mussels after exposure of ZnO nanoparticles at different concentrations (0; 0.01; 0.1, and 1 mg/l) for 96 hours were evaluated in terms of histopathological findings. Histological examinations of mussels exposed to ZnO nanoparticles revealed; lipofuscin aggregates, heamocyte infiltration, enlarged central vessel and lamellar fusion in the gills, haemocyte infiltration in the mantle, lipofuscin aggregates, haemocyte infiltration and hypertrophy in the digestive gland. As a result, it was concluded that ZnO nanoparticles had negative histopathological effects on Mediterranean mussels.

Keywords: ZnO, nanoparticle, histopathology, mussel, *Mytilus galloprovincialis*.

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Determination of Atmospheric Pollen Grains in Orhangazi (bursa) District

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Adem BIÇAKÇI[2]

Abstract

Pollen allergy is a common disorder and may result with diseases like allergic rhinitis, conjunctivitis and asthma in susceptible individuals. Atmospheric pollen of wind-pollinated plants are also very important in terms of human health. The purpose of this study was to determine the pollen types, densities and the pollen seasons of main pollen producers in Orhangazi(Bursa) area. Pollen quantities and diversity in the study carried out by the gravimetric method using the Durham instrument were investigated in the Orhangazi district atmosphere for a period of one year between 1 January - 31 December 2020. During one year, the slides were changed once a week and 53 taxa were detected after examination by light microscopy. Of these, 30 of them are belong to woody plants, and 23 of them are from herbaceous plants.. In the research process 12224 pollen grains were detected in cm2 area; 81.71% (9988 pollen grains) of these belong to woody plants, 18.29% (2236 pollen grains) belong to herbaceous plants. The highest amount of pollen was seen in April while the lowest amount of pollen was recorded in November. The plant taxa that pollen grains found dominant in the atmosphere were determined as Pinus, Quercus, Platanus, Olea, Fraxinus,Cupressaceae/Taxaceae, Gramineae, Plantago, Fagus, Urticaceae, Juglans, Carpinus, Morus, Mercurialis, Betula and Amaranthaceae.
Keywords: Aerobiology, Airborne pollen monitoring, Allergenic pollen, Pollen fall, NW Anatolia

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Investigation of Vanadium Removal from Drinking Water with Iron (III) Chloride

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İlayda YARICI[3]
Hilal TOPAL[4]
Mehmet ÇAKMAKCI[5]

Abstract

Vanadium is a naturally occurring metal that can be found in the earth's crust at concentrations of 100 mg/kg. Vanadium are annually entered the water, soil and air environment from natural sources almost 65.000 tonnes and from anthropogenic sources almost 200.000 tonnes. As a result of weathering of rock and soil erosion, vanadium is naturally released into water and soil. The concentration of vanadium in water is affected by geographical features. For example, coal and petroleum oil contain 1 to 1500 mg/L of vanadium, and water in these environments can have a high vanadium concentration. In this study, vanadium removal was investigated by precipitating iron (III) chloride (FeCl3) from a synthetic vanadium solution prepared with tap water. The experiments were carried out on a laboratory scale. Studies were performed at different iron (III) chloride (Fe)/vanadium (V) ratios. In addition, the effect of different pH values on vanadium removal was also investigated. Vanadium was effectively removed by co-precipitation with iron hydroxides produced by dosing ferric chloride. The optimum vanadium removal efficiency was obtained as 84% at pH 7 and 90 minutes settling time. While the removal was not affected much in the pH 6-9 range, the vanadium removal ratio towards pH 10 was severely affected. Cationic polyelectrolyte as a flocculant aids was used to evaluate effects on vanadium removal, the Fe/V ratio, and the settling time. After a 90-minute settling time at pH 7, vanadium removal increased from 84% to 90.2% with the addition of a 0.2 mg/L cationic polyelectrolyte as a flocculant aid. Thus, addition of cationic polyelectrolyte can provide flexibility in settling time and Fe/V ratio in vanadium removal.
Keywords: Vanadium, Iron Salts, Drinking Water, Coagulation, Flocculation

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The Effect of the Design on Adhesive Application in Battery Tray of Electrical Car

Dilek ŞENGÜL NİŞANCI[1]
Enes KURTULUŞ[2]

Abstract

In 2020, approximately 2.5-3 million electric vehicles were sold in the Global Electric Vehicle market. Since 2019, every year sold vehicle number value is an average of 40%, exponentially increasing. In the case of 2021, the sold electric vehicle number value achieved 6,6 million. Between 2020 and 2021 increase number of sales has shown an of more than % 100. With the increase in sales and popularity, all global OEMs and even small-scale companies' competition have still continued at full speed with electric vehicle technology.

The most critical part of electric vehicles, the battery tray, is the part that attracts the most attention from stakeholders. The scope of the development studies includes battery tray structure to cell technology. The battery tray product consists of many subsystems and subcomponents. As a result of all subsystems gathering together, the battery tray is created. After the assembly process of the battery tray, the target/expectation is to validate the production of the battery tray according to customer requirements.

The battery tray subsystems can be evaluated into three main systems: the construction of the battery box, the electronic systems, including the battery management systems (cables, sensors, etc.), and the battery cells. The construction of the battery box itself may be categorized as a cover, mainframe, and bottom plate. Each cover, mainframe, and bottom plate parts may be produced by particular material (such as steel, aluminum, composite) or methodology (such as sheet, extrusion, casting, molding). In addition to this, the cover, mainframe, and bottom plate's joining process are one of the topics still studied in the global arena. In addition to the traditional welding methods (such as arc welding), more innovative joining methods (such as FSW welding, adhesives, and self-riveting solutions) are also actively used on benchmark products. The feasibility and suitability decision is made based on cost and weight targets. Traditional welding and other joining applications have advantages and disadvantages over each other.

In this study, the adhesive was performed on the part of the battery box construction and evaluated the effect between the adhesive solution-application area with mechanical tensile tests. As a result, mechanical strength is more than 2x with minor design revisions applied to the design.

Keywords: Battery Tray, Adhesive, Design Parameter, Aluminium Extrusion

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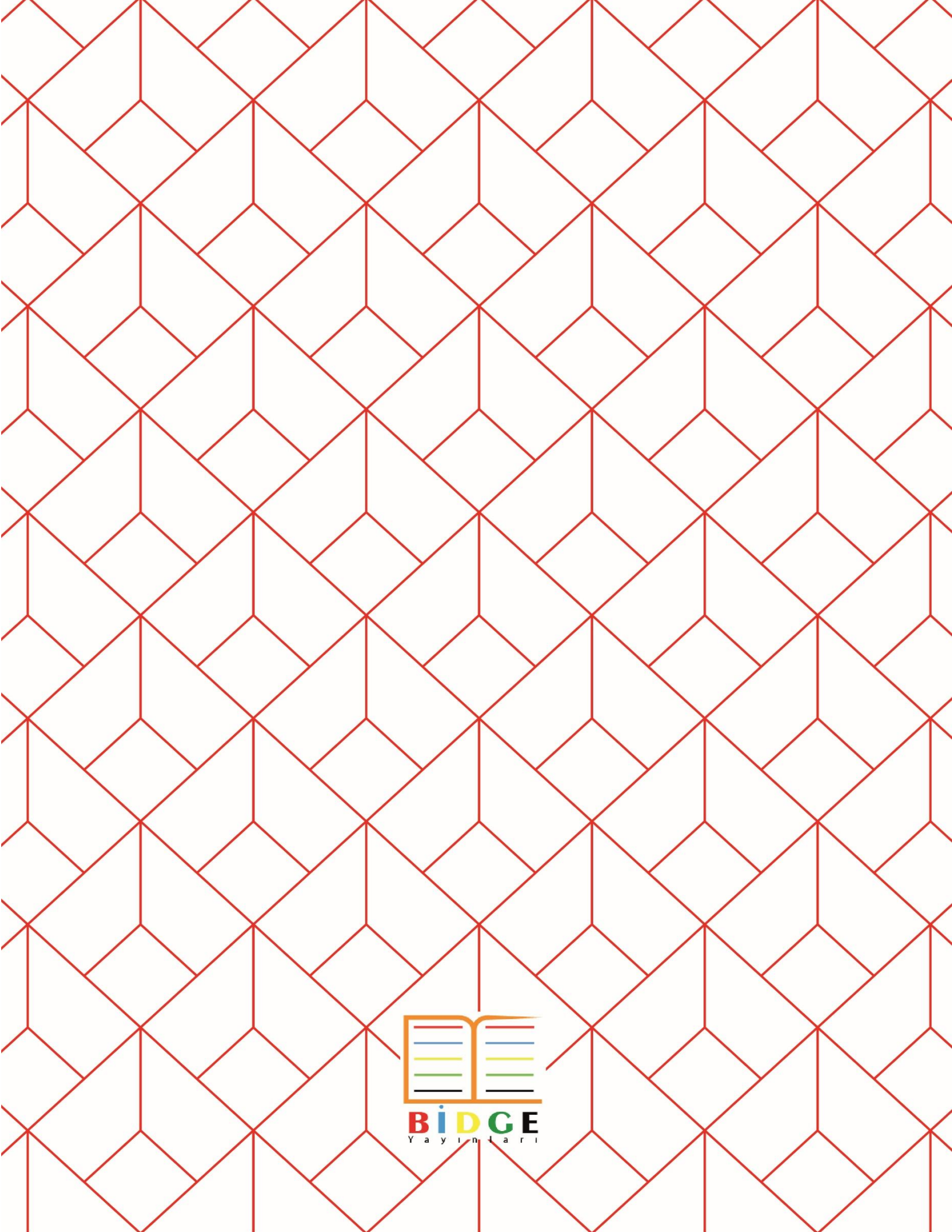
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