SELCUK UNIVERSITY
FACULTY OF TECHNOLOGY

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November 19-21, 2020

Konya/TURKEY

ABSTRACTS BOOK

Editor
Prof. Dr Sakir TASDEMIR

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International Conference on Engineering Technologies

4th International Conference, ICENTE
Konya, Turkey, November 19-21, 2020

Abstracts

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Sakir TASDEMIR

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PREFACE

International Conference on Engineering Technologies (ICENTE'20) was organized in Konya, Turkey on 19-21 November 2020.

The main objective of ICENTE'20 is to present the latest research and results of scientists related to Biomedical, Computer, Electrics & Electronics, Mechanical, Mechatronics, Metallurgy & Materials and Civil Engineering fields. This conference provides opportunities for the delegates from different areas in order to exchange new ideas and application experiences, to establish business or research relations and to find global partners face to face for future collaborations.

All paper submissions have been double blind and peer reviewed and evaluated based on originality, technical and/or research content/depth, correctness, relevance to conference, contributions, and readability. Selected papers presented in the conference that match with the topics of the journals will be published in the following journals:

- Gazi Journal of Engineering Sciences (GJES)
- International Journal of Applied Mathematics, Electronics and Computers (IJAMEC)
- International Journal of Automotive Engineering and Technologies (IJAET)
- International Journal of Energy Applications and Technology (IJEAT)
- MANAS Journal of Engineering (MJEN)
- Selcuk-Teknik Journal (SUTOD)

At this conference, there are 185 paper submissions. Each paper proposal was evaluated by two reviewers. And finally, 154 papers were presented at the conference from 9 different countries (Brazil, Spain, Iranian, Kyrgyzstan, Macedonia, Pakistan, Poland, Serbia, Turkey) with 98 local and foreign universities and organizations participating,

In particular, to Selcuk University Rector Prof. Dr. Metin AKSOY; we would like to thank the conference scientific committee, session chairs, invited speakers, referees, technical team, participants, and all our colleagues who have contributed. They have made a crucial contribution to the success of this conference. Our thanks also go to our colleagues in our conference office.

Prof. Dr. Sakir TASDEMIR
Editor

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CONTENTS

ACCESSIBILITY OF WEB SERVICES IN CENTRAL ASIA ACROSS SECTIONS

RITA ISMAILOVA[1]

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ABSTRACT

According to the estimations of the World Health Organization, approximately 15% of the world's overall population have some form of disability and they have considerable problems regarding education, working, health, and housing. On the other hand, as the pandemic we are facing nowadays showed, many activities are offered online, and for people with disabilities it is hard to use online services. There are many websites used not only for sharing information about goods or services, but also for information processing and money transactions. In e-commerce application, effectiveness and usability of websites, along with its security, becomes very importance as it directly influences the number of customers. On the other hand, such websites should be accessible by all segments of the population, including people with disabilities. In the current study, the analysis of government websites, educational portals and e-commerce websites in terms of accessibility and usability was conducted. For that, websites operating in three Central Asian countries were selected, with 17 being with .uz domain (Uzbekistan), 33 with .kz domain (Kazakhstan) and 37 Kyrgyzstan e-commerce services (.kg domain). Accessibility was analyzed in compliance with the Web Content Accessibility Guidelines - WCAG (version 2.1) Results of the study suggest, that government websites follow the web accessibility guidelines more strictly than in other two sections, with the e-commerce sector being the least in complying WCAG guidelines. Although the market in the countries, which is covered by the current study, is relatively small (population of Kazakhstan is 18 776 707, Kyrgyzstan – 6 524 195, and Uzbekistan – 33 469 203), it plays a vital role due to geographical location of these countries, which serve as a bridge Europe and Eastern Asia. Therefore, analysis of platforms is important and contribute to the field of knowledge in web accessibility.

KEYWORDS - web services

UNDERWATER WELDING OF HSLA STEELS WAYS TO MINIMIZE THE MAIN DIFFICULTIES

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ABSTRACT

The underwater welding is classified as a special welding process, which is used mostly for repairs the offshore constructions. As the offshore constructions: ships, bridges, wind turbines, pipelines, terminals and harbor structures, are classified. Each years more and more of these constructions were build from high-strength low-alloy (HSLA)steel. Thermal joining of HSLA steel could generate problems as: brittle structures, residual stresses and difusible hydrogen content in the deposited metal. The same factors are cumulated in underwater conditions and provide to cold cracking. It can be stated, that the possibility of occuring cold cracks is increased during underwater welding of HSLA steels. Following this, the investigations of preventing methods are developing annually. Traditional methods, which are used in air, could not be applied in the water. In the water the could be use: 1. The application (for crucial elements only) of austenitic electrodes whose deposited metal is more ductile. 2. The addiction of calcium fluoride to electrode coating which binds hydrogen into a durable compound in welding temperature → special filler materials for underwater welding (high cost!). 3. The increasing of welding heat input. 4. Ultrasonic support → decreasing size of bubbles, which provide to increasing the stability of welding arc (new method). 5. Induction prehearing (one article → huge instability of welding arc). However, the author proposed his own method, as: temper bead welding, different bead sequence and waterproof coatings applied on the surface of the filler material.

KEYWORDS – Underwater Welding, HSLA Steels

MICROPOROUS POLYMERIC MEMBRANES OBTAINED BY EXTRUSION AND LIGHTWEIGHT PLASTIC PARTS OBTAINED THROUGH MICROCELLULAR INJECTION MOULDING

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ABSTRACT

Within the ways to obtain polymeric microporous membranes, it is found the melt extrusion/annealing/uniaxial strain (MEAUS) process. The first step yield films using fast cooling and high draw ratio, which provides the film to have a row-lamellar nucleated structure. The annealing step aims to eliminate defects in the crystalline structure, increasing the orientation and increasing the thickness and uniformity of the lamella. Uniaxial strain is generally divided in two sub-stages, at room temperature and high temperature; the purpose of this stage is the generation of pores and its subsequent enlargement. With respect to the production of polymeric foams, the conventional injection moulding can be adapted to produce cellular materials. By one hand, by using chemical agents that after thermal decomposition, yield gas that is entrapped within the polymer. On the other hand, it is possible to employ a physical foaming, by adding during the plasticisation of the polymer a gas in supercritical fluid state, creating a single gas/polymer solution; once this solution is injected into the mould, the drop pressure precipitates the gas and cell nucleation and cell growth takes place, producing microcellular foams.

KEYWORDS - Microporous Polymeric Membranes, Microcellular Injection Moulding

AN OVERVIEW OF BIOMECHANICAL TESTING METHODS TO DETERMINE BONE MECHANICAL COMPETENCE

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ABSTRACT

Bone fragility is one of the biggest health concerns in the world, affecting more than 10 million people around the word. Yet, the mechanisms leading to bone fracture have not been fully understood. Bone quality, which is the umbrella term of bone mechanical competence, determines whether there is a bone failure under a circumstance such as falling from standing height. In fact, the best way to distinguish between a weak and strong bone is to test mechanically a bone specimen with a certain geometry and dimension at a laboratory under a given condition. The mechanical properties of bone tissue are considered as the basic parameters reflecting the structural and functional character of bone. In this study, we discuss the common mechanical testing methods in determining bone biomechanical properties with their both advantages and drawbacks. These mechanical testing methods include tensile and compressive test, three-point bending test, and fracture toughness test. Among these mechanical tests, fracture toughness test is highly emphasized because of its ability to mimic bone failure in vivo, involving a micro-crack initiation, micro-crack growth and failure. The importance of fracture toughness and future direction are also discussed.

KEYWORDS - Bone Biomechanics, Mechanical Properties, Fracture Toughness, Biomechanical Testing Methods, Bone Quality

AN UPDATE ON MATERIAL SELECTION DESIGN AND BIOMECHANICAL ANALYSIS OF LOWER EXTREMITY PROSTHESES

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ABSTRACT

Amputation is the necessary surgical procedure of extracting a part of human body due to the certain severe conditions such as peripheral and vascular diseases, trauma, tumors, congenital anomalies, chronic infections, and nerve lesions. It significantly affects the life quality of a patient both physically and mentally. The best way to restore the functional and/or cosmetic purpose of a human organ is prostheses. Lower extremity (limb) amputation has been a major source of morbidity worldwide. Thus, not surprisingly, lower limb prosthesis is the leading demand in global prosthesis market. The factors determining the design of a lower limb prosthesis are principally age, gender, daily life and working activity, financial status of the patient, and amputation level. Although there are many different designs to satisfactory the needs of a patient, the essential steps to design and test a prosthesis is similar and involves both computational and experimental parts. In this study, we provide an overview of lower limb prostheses and discuss design and testing procedures of a lower limb prosthesis, involving material selection and both computational (finite element analysis) and biomechanical testing methods. We mainly focused biomechanical data covering the dynamic, kinematic, and finite element analysis in the literature. We provide an overview of recent studies in this field along with future direction.

KEYWORDS - Below Knee Prosthesis, Lower Extremity Prosthesis, Finite Element Analysis, Prosthetic Leg Design, Prosthetic Materials

CONSTRUCTION AND CHARACTERIZATION OF ANTIGEN LOADED METAL NANOPARTICLES FOR ENHANCED CANCER VACCINE EFFICACY

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ABSTRACT

Purpose: To construct and characterise silver nanocubes and gold nanocages, and to determine their antigen loading efficiency for a better cancer vaccine design. Methods: Silver nanocubes were prepared by sulphide-mediated polyol synthesis method. These were then used as sacrificial templates in galvanic replacement reaction to form gold nanocages. Entrapment efficiency and drug loading capacity of ovalbumin were calculated based on BCA assay. Results: Silver nanocubes 50 nm and gold nanocages 60 nm were synthesized. Silver nanocubes demonstrated better loading efficiency at higher concentrations of ovalbumin achieving 290% and 137% loading efficiency using shaking and stirring method, respectively. Gold nanocages had optimum loading efficiency around 50-75 ug/mL of ovalbumin, attaining maximum drug loading efficiency of 66% and 22% by shaking and stirring method, respectively. Conclusion: This study provides supporting evidence that ovalbumin binds to silver nanocubes better than gold nanocages due to its more favourable structure and characteristics which may increase the efficacy of nanovaccine sysytems.

KEYWORDS - Metal Nanoparticles, Vaccine

FEMTOSECOND LASER SOFT TISSUE ABLATION FOR BIOMEDICAL APPLICATIONS

YASEMIN GUNDOGDU[1]

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ABSTRACT

Lasers present opportunities many areas including medicine to industry, one of the important areas for laser application is biomedical research. In biomedical science laser ablation-based tissue investigations are widely used. In this work, we have focused on the optimisation of laser ablation parameters on soft tissues to overcome the tissue damage process using femtosecond laser ablation technique, and this technique gives fast and controllable and reliable results for biomedical applications. Ablated tissues are investigated microscopic imaging to show how the laser ablation can be irradiated on tissue depending laser parameters. The surface roughness and obtained laser ablated width are also dependent on the tissue properties. The aim of this study is to show tissue ablation using femtosecond laser at 800 nm wavelength with 90 fs pulse duration. Obtained results from different tissue samples will be presented and discussed in detail.

KEYWORDS - Femtosecond, Laser, Ablation, Tissue, Biomedical

USE OF MICROPROCESSOR IN ABSCESS TREATMENT

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ABSTRACT

Abscess is a general name given to inflamed fluid accumulation in any part of our body. For the formation of abscess, different microbes such as bacteria and fungi are formed first. These microorganisms are restricted in one part of the body by body defense mechanisms and tried to be destroyed. While the white blood cells in our blood fight the germ, an inflamed fluid accumulates in this part of the body. These fluids need to be cleaned. Patients experience pain during abscess treatment. Considering today's technology, innovations occur day by day, and every newly produced product surpasses the previous one. Depending on the technological developments, there are new treatment methods in the health sector too. As a result of the researches, it has been observed that a new treatment method and device is needed for abscess treatment. In this study, a new device has been designed to be used in abscess treatment. Patient complaints and healthcare professionals' requests have been taken into account in device design. Thanks to the device, both patients do not suffer and the time loss of healthcare workers is prevented.

KEYWORDS - Microprocessor, Abscess, Treatment, Device

BLUE COLOR ANOMALY IN TURKISH CRAYFISH *PONTASTACUS LEPTODACTYLUS* (ESCHSCHOLTZ, 1823) (CRUSTACEA, DECAPODA, ASTACIDAE) FROM ATIKHISAR RESERVOIR IN CANAKKALE, TURKEY

SEMIH KALE[1], SELCUK BERBER[2], DENIZ ACARLI[3], TEKIN DEMIRKIRAN[4], PERVIN VURAL[5], SEFA ACARLI[6], BAYRAM KIZILKAYA[7]

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ABSTRACT

Two individuals of Pontastacus leptodactylus (Eschscholtz, 1823) were collected from Atikhisar Reservoir in Çanakkale, Turkey. The individuals were caught by using a fyke-net. The fyke-nets have 17 mm mesh size and they were placed in the bottom of the reservoir at the depth of 5 m. The fyke-nets were collected after 3-day soaking time from the reservoir on 18 July 2020. The sampling was carried out during the daytime. The sediment of the sampling location had a muddy substrate. Both blue colored individuals of crayfish (Pontastacus leptodactylus) were female. Blue color anomaly was observed in all parts of the bodies of both individuals. Morphometric characteristics were measured and the total lengths were 104.83 mm and 76.92 mm, and weights were 36.09 g and 11.76 g, respectively. Color anomalies in crayfish might be the consequence of several factors such as genetics, environmental conditions, food and diet, stage of development and molting, or a combination of any factors. Blue coloration is an anomaly due to lack of one gene causing a color mutate. The lack of carotenoid pigments (such as astaxanthin and canthaxanthin) is the reason of the blue color anomaly. This paper is the first document reporting the occurrence of the blue color anomaly in crayfish from Atikhisar Reservoir. Therefore, the present study will be driven-force for further investigation of color anomalies in aquatic organisms. The genetics of the mutant species should be examined in future studies to better understanding of the main factors causing color anomalies.

KEYWORDS - Blue Color Anomaly, Crayfish, Pontastacus Leptodactylus, Atikhisar, Çanakkale, TURKEY

Acknowledgement: This paper is a part of a research project financially supported by Çanakkale Onsekiz Mart University The Scientific Research Coordination Unit (Project number: FBA-2020-3250).

ALZHEIMER S DISEASE DETECTION IN MR IMAGES BASED ON WHITE MATTER AND 3D GRAY LEVEL CO OCCURRENCE MATRIX

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ABSTRACT

Alzheimer's Disease is an irreversible neurological disorder that starts with aging. The first indication of the disease occurs with simple forgetfulness. Accordingly, volume losses begin in the memory-related areas of the brain. Many studies examine volumetric loss and tissue degeneration in areas over gray matter such as the amygdala, hippocampus, limbic system, and temporal lobe. The degeneration and volume losses is also occured on the white matter. In this study, a model classifying the disease using white matter, voxel-based morphometry and 3D tissue analysis is proposed. Changes in white matter in 3D MR images between Normal Control and Alzheimer's Patients were examined by Voxel-Based Morphometry method and then 3D masks were created. 3D Gray Level Co-occurrence Matrices were extracted from the regions under the masks. The properties obtained were ordered using feature ranking methods and given to Support Vector Machines-Linear and Support Vector Machines-rbf inputs with 10 cross validation, respectively. The performance of the classifiers was evaluated by sensitivity, specificity, accuracy, and AUC.

KEYWORDS - Alzheimer, White Matter, Magnetic Resonance, Voxel Based Morphometry, Classification

FABRICATION OF NANOFIBERS LOADED EXTRACT OF ALLIUM BOURGEAUI SUBSP BOURGEAUI AMARYLLIDACEAE AND EVALUATION OF THEIR ANTIBACTERIAL POTENTIAL

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ABSTRACT

Nanofibers produced by the electrospinning method are widely used in biomedical, food packaging, and other industrial applications due to their advantages such as ease of production, the possibility of industrialization, and size controllability. Recently, therapeutic and antimicrobial agents have been developed by combining antibiotics, enzymes, silver particles, antimicrobial peptides, and vitamins with nanofibers. It is obtained by blending ecological and renewable plant extracts with various polymers for the production of degradable, biocompatible, and antibacterial composite materials. It is well known that the antibacterial agents existed in plant extracts accelerate the wound healing process and are used as traditional herbal remedies in many countries. In this study, Allium bourgeaui Rech.f. subsp. bourgeaui bulbs were dried in the shade and were pulverized. After adding 250 ml of ethanol to 20 g of powdered material, it was left to maceration at room temperature on a mechanical shaker for five days. At the end of maceration, the organic solvent filtered through the filter paper was concentrated in the evaporator using a 42 °C water bath and the extract was obtained. A solution was prepared from polyvinyl acetate (PVA) polymeric carrier material with 8% by mass of pure water. The solution was stirred at 400 rpm and 40 °C for 2 h on the magnetic stirrer. The extract of Allium bourgeaui subsp. bourgeaui was added to the polymer PVA solution at 10% by mass. The resulting solution was rested at room temperature for 24 h. Electrospinning was carried out by setting the experimental conditions in the range of 18 kV voltage, 0.05 ml/h flow rate, collector distance 12 cm. The nanofibers were kept at room temperature for 24 h. The diameters of the produced nanofibers were determined by SEM and their diameters were analyzed by ImageJ and Origin applications. The obtained nanofibers were analyzed for their antibacterial activity against Staphylococcus aureus (Gram-positive), Escherichia coli (Gram-negative) and Pseudomonas aeruginosa (Gram-negative) bacteria, which promote wound infection and prolong the healing time of chronic wounds. Zones of inhibition were measured and compared by in vitro tests.

KEYWORDS - Electrospinning, Nanofibers, Allium Bourgeaui Leaf Extract, Antimicrobial

COMPARISON OF DEEP LEARNING AND MACHINE LEARNING METHODS TO CLASSIFY RETINAL IMAGES

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ABSTRACT

Deep learning and machine learning are emerging as a powerful tool for analyzing medical images. Various deep learning and machine learning models are used to detect retinal disease using computer-aided diagnosis from retinal fundus images. In this study, retinal images of cataract patients are compared with normal retinal images and classified. A deep learning method and machine learning algorithms were used for classification in this study. As a result of this study, 91.5% success rate for DenseNet deep learning, and 79.5% success rate for the Random Forest method were obtained respectively. The success rates of the applied models were trained and validated to avoid overfitting by the cross-validation method.

KEYWORDS - Deep Learning, Machine Learning, Cataract, Retinal Abnormality

MACHINE LEARNING SOLUTIONS FOR LIMITED DATA IN BIOTECHNOLOGY APPLICATIONS

EMRE CIMEN[1]

[1] Eskisehir Technical University, TURKEY

ABSTRACT

Machine learning helps researchers and experts to make correct decisions. In biotechnology, these decisions can be related to a diagnosis or an experiment among various decisions. Additionally, machine learning tools help users get some insights about the problem—these tools' power increases as the quality and sample size increase. However, for example, when a disease occurs rarely, the data needed by the machine learning tools cannot be obtained easily. In this study, recent machine learning tools and approaches, namely, one-class classification, transfer learning, and zero-shot learning, are discussed from a limited biotechnology-related data point of view. We provided computational results from our tests and the literature.

KEYWORDS - Machine Learning, Classification, Biotechnology, One-Class Classification, Transfer Learning, Zero-Shot Learning

QUANTIFICATION OF FINGER TAPPING VARIABILITY BY AN EMBEDDED SYSTEM IMPLEMENTING POINCARE ANALYSIS IN REAL TIME

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[2] Yeditepe University, TURKEY

ABSTRACT

Development of an embedded system implementing Poincare analysis in real-time to quantify finger tapping variability is aimed. Finger-tapping signals demonstrating large, small, and very small response initiation times are generated synthetically. The embedded system is designed using an Arduino Micro microcontroller unit determining the response initiation time estimates from the signals and calculating the Poincare parameters SD1, SD2, and SD1/SD2 for the estimates. The signals, estimates, and parameters are also analyzed on a personal computer for validation. The embedded system outputs the same results as obtained on the computer. As the variation in response initiation time increases, SD1 and SD2 increase systematically, however, no systematic change is observed for SD1/SD2. Real-time calculation of Poincare parameters by embedded systems is feasible and offers simultaneous quantification of finger-tapping variability that opens up new opportunities for therapeutic devices. Additional work is needed to figure out the potential benefits in practice.

KEYWORDS - Finger-Tapping, Quantification, Poincare Analysis, Real-Time, Embedded System

SPECTRAL ANALYSIS OF ALCOHOLIC EEG DATA

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ABSTRACT

Today, alcoholism is an important health problem in the world. Alcohol addiction is a brain disease and causes many changes in the structure of the brain. Electroencephalography has an important place as a non-invasive electrophysiological method in the investigation of the biological aspect of alcohol dependence. In this study, EEG data from control subjects (non-alcohol dependent) and alcohol-dependent subjects were used. The changes of these data with time were obtained first, then amplitude and phase spectra were obtained. EEG signs of control and alcohol addicts were compared spectrally. Structural differences between these two groups are determined based on frequency.

KEYWORDS - EEG, Fourier Analysis, Spectral Analysis

CLASSIFICATION OF CHEST RADIOGRAPHY IMAGES BASED ON DEEP CONVOLUTIONAL NEURAL NETWORK FOR CORONAVIRUS DISEASE DETECTION

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ABSTRACT

The new coronavirus disease (COVID-19), which started in China in December 2019, has spread rapidly among people living in other countries. According to daily statistics of the European Centre for Disease Prevention and Control, the disease approaches approximately 46,156,540 cases worldwide. Due to the increasing number of cases every day, a limited number of COVID-19 test kits are available in hospitals. Therefore, it is essential to implement an artificial intelligence-based detection system as a rapid alternative diagnosis option to prevent the spread of COVID-19 among humans. In this study, the performance comparison of two deep learning models used to efficiently diagnose coronavirus disease (COVID-19) on chest radiography (X-ray) images was performed. The data set used in the study consists of 219 COVID-19, 219 healthy and 219 viral pneumonia chest X-ray images of individuals. To classify these data, deep convolutional neural network with data augmentation and transfer learning models were used. The images in the data set were classified into three categories as COVID-19, viral pneumonia and healthy people using pre-trained ResNet50 and DenseNet201 deep learning models. The performances of these two deep learning models used in classification were compared in terms of accuracy and loss values. Performance results show that DenseNet201 pre-trained model provides higher accuracy for two different batch size values (94.7% accuracy for Batch Size = 2, 95.45% accuracy for Batch Size = 3) than ResNet50 model.

KEYWORDS - Coronavirus Disease, Viral Pneumonia, Chest X-ray Radiographs, Convolutional Neural Network, Deep Transfer Learning, Data Augmentation

COLON AUTOMATION SYSTEM

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ABSTRACT

Automation systems are designed to supply very high precision and accurate results in almost every work. Therefore, mechanization and computers have joined more and more in our lives. With this perspective, creating an automation system to solve problem of healthcare facilities by the respect of treatments plays a key role to make people's lives easier. In this paper, a robust colon automation system (CAS) is proposed. CAS automatedly detects colon in uploaded computed tomography (CT) colonography images whose extension is Digital Imaging and Communication in Medicine (DICOM). CAS views detected colons based on image reconstruction as a three-dimensional (3D) volume image. CAS gives parametric information to surgeon after processing images. Moreover, it enables surgeon to zoom, measure, rotate the viewing from different aspects without touching any computer parts thanks to Leap Motion controller for preoperative and intraoperative medical purpose. CAS remotely controls surgical clamps, scissors, and forceps during surgery by using Leap Motion controller. For this purpose, a robotic arm that represents forceps behavior is controlled by gesture motions. All information about patients like disease history, surgeries are saved in a database developed in this study. For further use, clinicians' information is kept for both use of system and the possibility of investigation under any bad situations.

KEYWORDS - 3D Imaging, Colon Automation System, Image Processing, Leap Motion Controller, Robotic Arm.

INFORMATION TECHNOLOGY IN HEALTHCARE ARCHITECTURE OF HEALTHCARE INFORMATION SYSTEMS

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ABSTRACT

Many healthcare institutions are only now exploring the possibilities of Apache Hadoop&Spark distributed processing architectures. The manuscript describes the options for the architecture of building an information system based on cloud technologies: centralized and distributed systems for healthcare. The positive and negative aspects of these options are presented, based on which the conclusion is made about the higher prospects of the implementation of distributed architecture. The basic requirements for the development of identification control systems, access, and standards for the construction of electronic health records are formulated.

KEYWORDS - Big Data Technology, Cloud Computing, Healthcare.

IMPACT OF MISSING DATA MECHANISMS ON IMPUTATION METHODS FOR CLASSIFICATIONS PROBLEMS

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ABSTRACT

Handling missing data is the most common issue in machine learning algorithms, which is specifically applied to real-world data sets. Missing data imputation, which is filling missing data with plausible values, is a commonly used approach for this issue. Although there are many imputations methods in the literature, K Nearest Neighbors (KNN), mean imputation, class-mean imputation, and multiple imputation chain rule (MICE) are widely used imputation methods by researchers because of easy implementation. Researchers often do not analyze the underlying cause of missing data while using these methods. There are three mechanisms that cause missing data: missing at random (MAR), missing at completely random (MCAR), and not missing at random (NMAR). Ignoring the missing data mechanism maybe lead to biased predictions in classification problems. In this study, we analyzed the impact of missing data mechanisms on KNN imputation for classification problems. The four data sets used for evaluating the performance of KNN under the different missing data mechanisms were taken from machine learning repositories. To simulate MCAR, MAR, and NMAR mechanism with different missing rates from 10% to 80%, observed values were deleted in these data sets by using appropriate experimental designs. After imputing missing values with KNN, MICE, mean and class mean in these data sets, classification performance of SVM classifier was reported and analyzed.

KEYWORDS - Missing Data Mechanism, Missing Data Imputation, Classification

ANALYSIS OF FLIGHT DELAY PROPAGATION WITH BAYESIAN NETWORKS

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ABSTRACT

Flight delays are becoming more prevalent in airline operations, costing airlines billions of dollars each year. Most flight delays in airline operations are unpredictable and stochastic in nature and are the result of things such as: late-arriving aircraft, air carrier delay, national aviation system delay, and extreme weather. These flight delays can be mitigated by embedded schedule buffer times. To model the complex and stochastic airline schedule system, different optimization and simulation models are employed. In this paper, we investigate the use of Bayesian Networks to analyze flight delay propagation

KEYWORDS - Airline Delay Analysis, Bayesian Networks, Flight Delay Propagation

FORECASTING NATURAL GAS CONSUMPTION OF TURKEY DURING THE COVID 19 LOCKDOWN PERIOD USING MACHINE LEARNING METHODS

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ABSTRACT

The first case of coronavirus 2019 (COVID-19) in Turkey was detected on March 11, 2020. After the first confirmed case, lockdown measures were implemented on a province and country basis to prevent the spread of the epidemic. This unexpected situation, where a global health epidemic has turned into an economic and financial disaster, has caused differences in natural gas consumption as in other energy sources. Therefore, reliable forecasting models are required to manage energy policies that adapt to this dynamic situation effectively. In this study, daily natural gas consumption data is analyzed to forecast the electricity demand of Turkey during the COVID-19 lockdown period. The natural gas consumption data from 16 March 2020 to 31 May 2020 are obtained from the Republic of Turkey Ministry of Energy and Natural Resources website. Four popular machine learning (ML) tools are used as base learners for the time series forecasting of natural gas consumption of Turkey. These tools include the least median squared linear regression (LeastMedSq), sequential minimal optimization regression (SMOreg), multi-layer perceptron regressor (MLPRegressor), and Gaussian process regression (GPR). The results indicate that the SMOreg with polynomial kernel function is superior to other ML regressors used in this study and provides more reliable and accurate results in terms of lower prediction errors for forecasting natural gas consumption. The results of this study may help decision-makers involved in determining energy policies to take control of an unforeseen crisis and develop appropriate policies in these processes.

KEYWORDS - Natural Gas Consumption, Energy, Machine Learning, Time Series Forecasting, COVID-19, Lockdown

NEW APPROACHES TO IMPROVING SOFTWARE CODE QUALITY

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ABSTRACT

The rapid development of technology and increasing customer demands with this development increase the pressure in the software development sector day by day. It is of great importance to launch the developed product as quickly as possible for this competition. With this time constraint and increasing demands, rapidly growing projects cause a decrease in the quality of the written code and an increase in the errors that may occur. In order to avoid these problems, the entire development process should be carefully observed, code evaluations should be made with certain standards and criteria. The criteria used to evaluate the software have a big impact on the goal, so decisions to be made about which metrics will be more efficient based on the needs of the software are very important. However, it can become very confusing as a large number of measurements for a given target will yield various values in different ranges that may be difficult to assess. Our goal is to find a benchmark that covers all these aspects and take a good step towards a successful software. In this article, our aim is to measure the complexity of the software at the design stage for two reasons: Complexity is an important factor that affects the quality of the software in many aspects such as reusability, understandability and maintenance cost. Measuring complexity in the design phase can provide many advantages in quality, due to the contribution of this phase in reducing the cost and effort of redesign and sustainability. In this study, software quality and metrics were examined, and different calculations of code complexity, which is one of these metrics, were discussed, applied and answers were sought for the question of how to make it more efficient. Applications are made in database objects that do not have large quality tools like object oriented programming languages. As a result, it has been proven that the complexity is measurable and controllable in these objects, and it has been seen that a more detailed and extensible model can be used successfully than the existing complexity calculations.

KEYWORDS - Software, Cyclomatic Complexity, Software Quality Metrics, Software Engineering

ANALYSIS OF RANDOMNESS PROPERTIES FOR FT IR RESUTLS OF NANO STRONTIUM APATITES

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ABSTRACT

With the widespread use of industry 4.0 applications, addressing security concerns has become a necessity for many users. The aim of this study is to examine the randomness properties of the values obtained from the FT-IR analysis of of nanostrontium apatite particles. In the study, a random number generator algorithm has been proposed based on FT-IR data as a source of entropy. Then, the statistical properties of the obtained numbers were analyzed using the chi-square test approach. The successful analysis results obtained showed that the generator proposed can be used as a key generator in information security applications.

KEYWORDS - Cryptography, Information Security, Entropy, Substitution Box, FT-IR

WRIST PRINT REGION SEGMENTATION BASED ON DEEP NEURAL NETWORKS

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ABSTRACT

In recent years, biometric recognition based systems have become widespread. One of these is wrist-based recognition systems. In this study, wrist print based recognition system was developed by using near infrared (NIR) camera. Totally 220 NIR camera images taken from 10 for each both hands of 11 people. The obtained data set is allocated 70%(153 images) for training and 30%(67 images) for testing. The wrist regions are labeled on the training set images. The labeled data was trained with YOLOV2 architecture supported by ResNet50 one of the deep neural network models. The trained model was tested with the remaining 30% of the data set. In the test process, the wrist region was determined in the NIR images with the trained model. As a results of the study, it was seen that the wrist regions were correctly detected in all test images and the mean value of obtained similarity rates was %95.26. Therefore, it can be said that the deep learning architectures ResNet and YOLO are effective in the segmentation of the wrist region.

KEYWORDS - Wrist Print Recognition, Deep Neural Networks, Near-Infrared Camera, YOLO

A NEW APPROACH FOR INTRUSION DETECTION SYSTEMS BASED ON GRAY WOLF ALGORITHM

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ABSTRACT

With the scale of cyber-attacks and the volume of network data increasing exponentially, new methods have been developed for organizations to keep their networks and data safe from evolving types of dynamic threats. As more security tools and sensors are used in today's enterprise network, the amount of security incident and alert data generated continues to increase, making the flow of the system difficult. Organizations must rely on new techniques to assist and augment human analysts as they deal with the monitoring, prevention, detection and response of cybersecurity incidents and potential attacks on their networks. In recent years, as organizations move towards becoming dependent on computers and automation, it is necessary to create secure applications, systems and networks. In addition to these challenges, the number of threats increases exponentially due to the increased attack surface thanks to the numerous interfaces offered for each service. To lessen the impact of these threats, researchers have suggested various solutions; however, existing tools often fail to adapt to ever-changing architectures and related perils. In this paper, the algorithm used for intrusion detection system consists of gray wolf optimization algorithm and artificial neural networks algorithms. The gray wolf optimization algorithm used for neural network weights optimization, ensuring that it works with better performance. We used different metrics to measure the performance of the developed algorithm as well as actual and false positives and negatives.

KEYWORDS - Keywords - Intrusion Detection Systems, Gray Wolf Optimization algorithm, Artificial Neural Networks.

SOCIAL CAMPUS APPLICATION WITH MACHINE LEARNING FOR MOBILE DEVICES

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ABSTRACT

In this study, Social Campus Application which can be used on mobile device is explained. Different types of communication have been developed throughout human history. With the rapid change of technology, today's popular communication organs have been the internet and social media. Social media can cause us to spend most of our time on the phone. Social media platforms that offer many options such as quick access to news, instant communication and sharing are indispensables among many of us. This study is about a social media application that is intended to be used among university students. This application was designed which users can be informed of the activity created, open topics and make comments about them, and shop through the market. The application is android-based and contains fp-growth algorithm in the market section. The fp-growth algorithm is an association rule algorithm used to find frequent item sets. The fp-growth algorithm offers the user who supplied together with the analysis of what products the most. The application includes the messaging property between users and this property is based on the technology of firebase, node.js and socket.io. Django and sqlite was used in the web section and the application was developed using the react-native technology.

KEYWORDS - Android, React-Native, Fp-Growth algorithm, Social Campus Application, Social Media.

ON INTUITIONISTIC FUZZY VERSION OF ZADEH S EXTENSION PRINCIPLE

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ABSTRACT

The Zadeh's extension principle is one of the basic ideas that induces the extension of classical In 1986, Atanassov introduced the intuitionistic fuzzy set concept. In this concept, every element in a set is given with a membership function $\mu(x) : X \rightarrow [0, 1]$ and a non-membership function $\nu(x) : X \rightarrow [0, 1]$ such that the sum of both is less than or equal to 1. Hence the difference $1 - (\mu + \nu)$, called hesitation degree, is used to express the lack of knowledge and imprecision in a model. Since intuitionistic fuzzy set theory is an extension of fuzzy set theory, there was a need to extend some concepts from classical set theory to intuitionistic fuzzy set theory. mathematical concepts into fuzzy concepts. It plays an important role in fuzzy set theory. This principle has been studied and applied in fuzzy arithmetic and engineering problems. The most well-known applications of Zadeh's extension principle are the extension of the arithmetical operations on the real numbers to the calculus of fuzzy numbers. The other important applications of the Zadeh's extension principle are the extension of the basic concept of continuity for mappings and the fuzzifcation of classical binary logic operations such as as negation, conjunction and disjunction. Due to the importance of the extension principle, intuitionistic version of Zadeh extension principle was proposed. Analogously, the intuitionistic Zadeh's extension principle for a function indicates how the image of an intuitionistic fuzzy set should be found and it is expected that this image will be an intuitionistic fuzzy set. With the help of the intuitionistic Zadeh's extension principle, it is possible to intuitionisticly fuzzify any mathematical structure based on classical set theory. In this talk, our goal is to examine the fundamental theorems which indicate that the α and β- cuts of an intuitionistic fuzzy number obtained by the intuitionistic Zadeh's extension principle coincides with the images of the α and β-cuts by the crisp function.

KEYWORDS - Intuitionistic Fuzzy Sets, Intuitionistic Zadeh's Extension Principle, Zadeh's Extension Principle

COMPARING THE PRECISION OF GLOBAL AND REGIONAL TEC MAPS

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ABSTRACT

Layers surrounding earth sometimes have distorting effects on GNSS measurements. The ionosphere, is one of these layers, is the most important layer. The ionosphere layer has a structure that delays code measurements and speeds up phase measurements. Therefore, it is possible to determine the retarding and accelerating effects with GNSS measurements. GNSS measurements are used to model the effect of this layer. In the study, using 6 station in CORS-Tr network, RIM-TEC maps were obtained using Global TEC maps. Later on, two-difference solution was realized by using both GIM-TEC and RIM-TEC maps. In the solutions, solar activity, geomagnetic storm values were taken into consideration. Based on the 173rd day of year 2015 in which there are three indexes, and the 174th day of year 2015 and the 7th day of year 2014, in where there are different indexes, the comparison of the coordinates calculated by taking these days and before and after 5 days has been made. As a result of the study carried out, it is seen that TEC maps produced from GIM TEC maps from Global TEC maps give exactly the same results with TEC maps produced regionally.

KEYWORDS - Bernese, GIM-TEC, RIM-TEC, Precision, Positioning

INTERPRETATION OF TURKISH SIGN LANGUAGE WITH DEEP LEARNING AND MOBILE APPLICATION

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ABSTRACT

According to the data of the Federation of the Hearing Impaired, there are more than 4 million hearing impaired people in Turkey. The most important problem faced by hearing and speech impaired people is not to be understood by people without hearing impairment. In line with this problem, the primary aim of this study is to eliminate the communication problems of our hearing-impaired citizens by combining Turkish sign language with deep learning technologies and to increase the awareness of hearing impaired individuals in our society. In this study, a sign language interpretation program has been developed, which we anticipate that productivity will increase with the widespread use of mobile devices. In this context, existing sign language movements will be created with a model trained with deep learning and the model will be implemented in a mobile program. Hence, it is possible to translate the desired movement into Turkish.

KEYWORDS - Sign Language, Turkish Sign Language, Deep Learning.

A MODIFIED SECRET SHARING SCHEME IN VISUAL CRYPTOGRAPHY

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ABSTRACT

Visual Cryptography is a cryptographic technique which intends to hide a secret within images. These images are encrypted into n shares and decrypted without computer calculations. In this work, we briefly describe a new proposed (n,n) Secret Sharing Scheme for grayscale/color images. We will mainly use the algorithm of Cheng et al. We will modify it such that new obtained secret sharing scheme becomes more efficient and more secure. The scheme uses XOR operation sharing images, algebraic function for creating a secret image for authentication, while the size of the original image and shadows are the same. In the paper, we will make use of Cantor function, which makes possible the generation of respective codes for each participant.

KEYWORDS - Visual Cryptography, Secret Image Sharing, XOR operation, Cantor function

CLASSIFICATION OF CUSTOMER COMPLAINTS WITH DEEP LEARNING

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ABSTRACT

The purpose of this study is to classify customer complaints of the financial sector with a deep learning model and to ensure that customer complaints are forwarded to the relevant institution or the relevant department of the institution in question. Nowadays, many companies perform manual classification procedures by company officials assigned on various platforms. Employees following these platforms read and evaluate complaints and forward them to the relevant department within the company. Since this complaint is a human factor in the classification process, the process is slow and troublesome. In this study, it is aimed to develop a web application that bank customers can share their complaints. The department where customer complaints are conveyed is determined by the deep learning model running on the server. This model are developed with Recurrent Neural Networks (RNN) architecture and the dataset includes Turkish complaints. Server communicates with a web application by RESTful API and then a complaint is sent to the relevant department.

KEYWORDS - Turkish Text Classification, Recurrent Neural Network, Deep Learning

MACHINE LEARNING APPLICATIONS IN FOOTBALL GAME

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ABSTRACT

Football considered as most popular sport in the world in both number of spectators and players. It is played by 250 million players in over the world. Machine learning playing big role in the analysis statistics of football matches and players. Gathering of players' statistics begins during training, where it is cover physical, mental and technical skills. Match statistics provide records of significant events that occur during the match like shots on target, corners, fouls, etc. This study reviews the literature on use machine learning techniques in football in five topics. In addition to reviewing three models of football clubs that rely on machine learning in their training programs. The study has shown that machine learning has a great importance in the football sport through their role to transform the football statistics into useful information for helping teams, coaches and athletes in analyses opponents and make better decisions in real-time.

KEYWORDS - Machine Learning, Football, Prediction, Football Analytics.

PHASOR PARTICLE SWARM OPTIMIZATION FOR SOLVING PROBLEMS OF POWER FLOW AND PRICING IN THE ELECTRICITY MARKET USING THE SUPPLY CHAIN EQUILIBRIUM MODEL

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ABSTRACT

This paper proposes the application of the recently developed meta-heuristic algorithm named phasor particle swarm optimization (PPSO) for solving the problem of power flow and pricing in the deregulated electricity market. The market is represented by an equilibrium supply chain (SC) model in which the participants of one tier are competitive with each other but at the same time cooperate with the participants of other tiers of the SC. The cost functions in this model are nonlinear and non-separable. The objective function in determining optimal power flows and nodal prices in the SC is a function of total profit of SC. The results of PPSO application are compared with the results of application of the numeric method named modified projection method (MPM) which was applied to the same model in the published literature. Also, the PSOS-CGSA, as one of the latest meta-heuristic algorithms, is used in the paper for comparison. The results show that PPSO gives the best results compared to MPM and PSOS-CGSA. Moreover, in the case of PPSO application the equilibrium conditions are fully satisfied while in the case of MPM the equilibrium conditions are satisfied with a small error.

KEYWORDS - Electricity Market, Meta-Heuristics, Phasor Particle Swarm Optimization, Supply Chain

ANALYSIS OF CRYPTOCURRENCY PRICE CHANGES WITH BIG DATA TOOLS

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ABSTRACT

Basic and technical analysis methods are used in the determination of trading strategies in stock exchanges. While determining the trading strategies with technical analysis, very large data are encountered. This situation makes it difficult to analyze the data and increases the likelihood of incorrect strategies. Cryptocurrencies is one of the commodities used for trading transactions, and people who are unable to analyze these big data correctly may face huge losses from cryptocurrency investments. Due to the recent emergence of cryptocurrencies, there is no method and approach in the literature to analyze changes in cryptocurrency prices. In this study, data of the 3 cryptocurrencies with the largest market value are used. These cryptocurrencies are Bitcoin, Ethereum and XRP. For the analysis of price changes of these cryptocurrencies, K Nearest Neighbors (KNN), Support Vector Regression (SVR) and Random Forest (RF) algorithms were used. As a result of the study, the estimated data is compared with the actual data. It was seen that the Support Vector Regression gave the most successful result in all data sets.

KEYWORDS - Big Data, Cryptocurrency, K Nearest Neighbors, Random Forest, Support Vector Regression

PREDICTION OF CABLE MECHANICAL PROPERTIES USING MACHINE LEARNING METHODS FOR PRODUCTION OF HALOGEN FREE AND FLAME RETARDANT HFFR CABLES

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ABSTRACT

In this study, the mechanical properties of the halogen-free and flame retardant (HFFR) cable to be produced in accordance with the Construction Products Regulation (CPR) were tried to be predicted by the machine learning method. For production of halogen-free and flame retardant (HFFR) cables, in order for the sheath materials to be halogen-free and contain flame retardant additives, different materials must be produced with recipes developed by mixing in different proportions and then tested to determine whether they meet the standards. Cable sheath production parameters are determined by trial and error method performed by cable manufacturers. Failure to optimize the parameters despite the negative result of the experiment or meeting the standards causes high cost, time and energy loss. Efficiency in cable production is limited by the intuitive prediction ability of the production manager since the optimization of the insulation material based on mathematical data is not performed. The test results of the new cable sheath, which is planned to be produced without making difficult and laborious experiments by using machine learningtechniques, which are one of the data-based prediction methods, are tried to be predicted by using the cable production parameters. Weka program was used for machine learning application. Mechanical properties were predicted for different sheath prescriptions by applying Support Vector Machine (SVM) and Artificial Neural Network (ANN) methods on the Weka program to the limited number of data sets available. Using machine learning methods, sheath mechanical properties of halogen-free flame retardant cables were predicted with an average accuracy of 92.7%. As a result, despite the scarce data available, the mechanical properties of the cable could be predicted with a high rate of accuracy without manufacturing and experimenting.

KEYWORDS - Halogen Free, Flame Retardant, Hffr, Prediction, Machine Learning, Artificial Intelligence, Cable Sheath Material, Artificial Neural Network, Support Vector Machine.

CLOUD COMPUTING BASED TIME SERIES ANALYSIS USING GOOGLE COLABORATORY

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ABSTRACT

Nowadays, with the innovations and developments in technology, there is a great increase in the amount of data users use on the internet. For this reason, the need of various software and hardware tools to store, view, process and analyze this data on the internet is increasing day by day. Millions of data are produced around the world every day. To deal with this situation, Cloud Computing services are provided by leading companies around the world. In this study, time series analysis was performed using Google Cloud-based Google Colaboratory (Colab) service. In the Colab notebook, the Phyton programming language and the SARIMAX model, one of the machine learning methods was used. The well-known international airline passenger number data set was utilized as the time series. The time series was examined and the difference from the first order was taken and then transformed into a logarithm making it stationary (p-value <0.05). The time series (12 years) is divided into two for training (9 years) and testing (3 years). Then, the degrees of the terms belonging to the components of the SARIMAX model were determined and statistically evaluated and the most suitable SARIMAX(0,1,1)(0,1,1)12 model was selected. The SARIMAX(0,1,1)(0,1,1)12 model was trained with the training data set and then tested with the test data set. Performance criteria of the prediction results of the SARIMAX(0,1,1)(0,1,1)12 model are obtained as MAE 18.763, RMSE 22.876, MAPE 4.430% and R-squared 99.131%. The SARIMAX(0,1,1)(0,1,1)12 model developed according to these results has made highly accurate prediction. In this study, Phyton codes and results of time series analysis were recorded in Google Drive using a Colab notebook. While all these operations were done all we needed was a web browser and a computer running this browser. The hardware and software requirements of all analysis processes in the study were performed using Google Cloud Computing Services.

KEYWORDS - Cloud Computing, Data Science, Google Colaboratory, Machine Learning, SARIMAX

CLOUD COMPUTING BASED VOTING CLASSIFIER METHOD USED FOR SURVIVAL PREDICTION OF HEART FAILURE PATIENTS

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ABSTRACT

Millions of people die every year due to functional impairments in different organs caused by Cardiovascular diseases (as myocardial infarctions and heart failures). By analyzing the medical records kept during the treatment of patients with heart failure, it can be ensured that clinicians pay attention to situations that are difficult to detect. In this study, using the medical records of the patients, it was predicted whether the patients would survive with the heart failure clinical records data set. In this study; Machine learning methods such as Artificial Neural Network (ANN), Logistic Regression (LR), Random Forest (RF), Naive Bayes (NB), Support Vector Machine (SVM) and k-Nearest Neighbors (kNN) have been used. Ensemble Learning-based Voting Classifier (VC) method which utilized the predictions of these machine learning models and makes decisions according to the majority vote has been proposed. The performance results of these models have been evaluated and compared. Performance values of the Voting Classifier method have been obtained as F1-Score 0.76%, Accuracy 0.83%, Precision 0.79%, Recall 0.75%, ROC 74.7% and ROC-AUC 0.86%. In this study, it has been concluded that the performance of the proposed Voting Classifier model is higher compared to the study in the literature. It has been concluded that the proposed method can be used to assist clinicians in their decision-making process to predict whether a patient will survive with heart failure. The machine learning methods developed and suggested in the study were coded with the Phyton programming language using Google Colaboratory (Colab notebook) which is Google Cloud Computing service.

KEYWORDS - Cloud Computing, Data Science, Google Colaboratory, Machine Learning, Voting Classifier

A NOVEL PERMUTATION BASED SOLUTION REPRESENTATION TECHNIQUE FOR VEHICLE ROUTING PROBLEMS ON GPUS

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ABSTRACT

In this study, the vehicle routing problem (VRP) which is a well-known NP-hard combinatorial optimization problem is handled on graphic processing units (GPUs). Solving any kind of VRP is extremely hard when the instance size is large. For this reason, researchers tend to solve the VRP with meta-heuristics. Although, many well-designed meta-heuristics produce near-optimal solutions in reasonable time, still a challenge to solve large scale instances. To accomplish this issue, researchers need novel, fast and wisely designed parallel operators for the proposed algorithms. Furthermore, the success of these operators directly depends on the way the solution is represented. This paper offers a new permutation based solution representation technique (π+) for vehicle routing problems on GPUs. Results show that proposed technique can be used many algorithms to accelerate computations.

KEYWORDS - Vehicle Routing Problems, Cuda, Parallel Programming, Metaheuristics

A NOVEL APPROACH AND APPLICATION OF TIME SERIES TO IMAGE TRANSFORMATION METHODS ON CLASSIFICATION OF UNDERWATER OBJECTS

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ABSTRACT

Sonar is used to determine the size, distance, direction, and other object features using sound waves. It is widely used in submarine mining, oil exploration, submarine mapping, tracking fish shoals, and mine detection. The advanced engineering technology has led to the development of underwater platforms such as developing manned and unmanned platforms for anti-mine action operations in the military field and increased efficiency of submarine oil and mineral exploration. In addition to mines, other objects that are very similar in shape and structure to mines can be observed in the submarine. Recently detecting, identifying, and classifying sonar signals are topics that are studied widely. Feature extraction, feature selection, selection of the most appropriate algorithms, and hyper-parameter optimization studies of these algorithms, which should be used to identify and classify sonar signals, are seen as scientific problems studied for many years. In this study, instead of commonly used machine learning algorithms and feature extraction processes, it is suggested to use mathematical conversions with an innovative approach. The performances of deep learning methods are compared in this problem. With an innovative approach applied on a data set containing 208 signal information in time-series format; Time series data has been transformed from one-dimensional data to two-dimensional format by using conversion methods with specific features to image format. The conversion methods' performance was measured by the classification results mines and rocks using deep learning algorithms on the pictures obtained. Moreover, the performance results obtained with deep learning algorithms and comparing the results obtained with classical algorithms are analyzed in detail. Compared with other studies in the literature, it has been recognized that the proposed time series data-to-image approach eliminates the need for feature extraction and obtains sufficiently good results.

KEYWORDS - Image Transformation, Time-Series, Sonar, Underwater Objects, MTF, GAF, Deep Learning, Support Vektor Machine, Machine Learning, CNN

A RESEARCH ON DEEP LEARNING MODELS USED IN TURKISH TEXT ANALYSIS

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ABSTRACT

Deep learning approach in the fields of machine learning and artificial intelligence has facilitated the solution of many problems and has started to be used frequently. In today's technology, sharing opinions on various topics on social networking platforms, comments made on products on web blogs or e-commerce sites have made the issue of analysis of Turkish texts even more important. The transfer of users' thoughts and experiences through these platforms has helped companies to have an idea about their consumers. For this reason, the classification of short texts such as sentiment analysis, product reviews, movie reviews and tweets has become a focus. In this study, the deep learning approach used for Turkish text analysis will be mentioned and the models with effective results using this approach will be compared. The study is a survey article.

KEYWORDS - Deep Learning, Natural Language Processing, Turkish Text Analysis, Machine Learning, Artificial Neural Networks

GUIDED FEATURE SELECTION AND DIMENSIONALITY REDUCTION METHOD FOR IDS IMPROVEMENT IN DDOS ATTACKS

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ABSTRACT

With the rapid development of computer technologies, network security has become one of the essential issues today. Distributed denial of service (DDoS) attacks are getting more and more important security threats as the improvements on network speeds create new challenges for traditional intrusion detection systems (IDS) to overcome. Moreover, the IDS systems have to deal with a huge set of data from systems and networks to be monitored and managed effectively in real-time, which imposes an important problem due to the large-scale data with many redundant and non-useful features. In this paper, we present an effective procedure composed of feature selection and dimensionality reduction (FSDR). In the selected subset of features, we applied mutual information (MI) for scoring the whole feature space with the use of empirical cumulative density function (ECDF) to select a subset of features that depend on the uncertainty value in MI. After that, we improved the singular value decomposing (SVD) algorithm to reduce the dimensions of the new space of the features selected in MI and we implemented with the back-propagation neural network algorithm to detect various types of DDoS attacks. Primary experiments are implemented in MATLAB environment. The experimental results show us that our method can select the optimal number of features of two datasets. First, the benchmark of NSL-KDD dataset has reduced the dimensions from 41 to 4 and in addition to a modern dataset of DDoS attacks created by Alkasasbeh [1] and its features are reduced from 27 to 6 with highest classification accuracy is still obtained, after carrying out with 5-folds cross-validation. Our suggested method [2] can efficiently minimize dimensions and diminish their computational overhead without jeopardizing on classification accuracy of attacks.

KEYWORDS - Distributed Denial of Service, DDOS, Intrusion Detection System IDS, Mutual Information, Empirical Cumula- tive Density Function, Singular Value Decomposing, Dimensional Reduction, Feature Selection, MATLAB

INVESTIGATION OF NEUROLOGICAL REHABILITATION EXERCISE SYSTEM WITH VIRTUAL REALITY METHOD

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ABSTRACT

As the average age of the world population increases, the number of people in need of rehabilitation treatment is also increasing. People with neurological diseases such as stroke, Parkinson's and Cerebral have difficulty performing daily activities such as walking, running and grasping. These neurological diseases are tried to be treated with various rehabilitation techniques. Some of these are traditional treatment methods. In the researches; it has been observed that these methods generally fail to restore the motor functions of the patient. With Virtual reality applications, that have been used in recent years, it has led to the development of alternative treatment methods in the field of rehabilitation. With an exercise program that will provide continuity in physical therapy and rehabilitation, it can be predicted that the motor and functional development of the patients can accelerate the treatment process. In this way, moving the rehabilitation to non-hospital environments such as home environment will give the opportunity to reach more patients at a lower cost. In this study, the effect of virtual reality applications on neurological rehabilitation exercise systems were examined. These are: Smart gloves application for hand rehabilitation systems, Measurement and Exercise Systems using Kinect Sensors for Neurological Rehabilitation such as various studies about neurological rehabilitation exercise system with virtual reality method were examined and collected in a single article. In the content of this study, basic information and important features of these neurological rehabilitation exercise system are mentioned. In the last part of the study, the results of some studies on these neurological rehabilitation exercise systems were given. As a result of the studies, the virtual rehabilitation system can be applied more easily than other applications and at the same time, it allows patients to work at home more comfortably from other neurological rehabilitation exercise system as a performance. In addition, the stands out with its trained models. This article is hoped to help designers who will design neurological rehabilitation exercise system applications.

KEYWORDS - Virtual Reality, Neurological Rehabilitation, Exercise System, Physical Therapy.

THE IMPACT OF COVID 19 ON INFORMATION SECURITY

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ABSTRACT

COVID-19, like many pandemics in the past, has affected the whole world and made it necessary to live with new rules. The changes brought by this transition have many advantages and disadvantages when viewed from different angles. All of the measures taken during the pandemic period aim to protect human health with minimal interaction, while at the ensuring that all works and services continue uninterruptedly. In this study, the impact of the COVID-19 pandemic in the field of information security in our country and in the world were examined with its negative and positive aspects. The threats that the new functioning that has entered our lives with the measures taken against the pandemic, when viewed from individual and enterprise perspectives, has recently created or caused an increase has been determined and evaluated. As a result of this evaluation, it was determined what could be safer and more reliable approaches by offering solutions in terms of information security for situations where work should be carried out remotely with minimum contact, such as during pandemic times.

KEYWORDS - Information Security, Covid-19, Countermeasures

A REVIEW ON TECHNIQUES USED IN INTELLIGENT ANTIVIRUS SYSTEMS

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ABSTRACT

Viruses, the oldest known malware, are programs that change the way a computer operates when infected. Its most basic feature is that it can affect even application and system files by replicating itself. Antivirus software are programs that protect the computer against viruses. Today, antivirus programs are produced as systems that provide protection not only against viruses but also against other types of malicious software. The strongest feature of antiviruses is their ability to detect and protect against known and recognized viruses. On the subject of detection of new viruses that antivirus systems do not recognize, many successful studies have been made and continue to be done by using artificial intelligence techniques. In this work, antivirus software using artificial intelligence techniques have been examined. The techniques used in the reviewed studies are classified and aimed to guide future studies. In this work, antivirus software using artificial intelligence techniques have been examined. The techniques used in the reviewed studies are classified and aimed to guide future studies.

KEYWORDS - Artificial Intelligence, Antivirus, Computer Security, Information Security

MODELLING OF FINANCIAL SUPPORTS FOR SMES AND EVALUATION OF ALTERNATIVE POLICIES WITH SYSTEM DYNAMICS APPROACH

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ABSTRACT

In this study, the financial support payments for SMEs and developing alternative policies with the approach of "system dynamics" is discussed. The system dynamics approach is based on the examining complex systems as a whole and focusing on the dynamics of the system itself. For this aim, it is proposed that performing the impact analysis studies on how successful the public source used for supported firms to reach the determined targets and strategies not only through the outputs but also handling entirely the industrial systems and taking into account the complexity and feedback of the system through the system dynamics approach. In this context, the general structure of firms is modelled in terms of their internal dynamics and the interactions of these internal dynamics are revealed and the effect of financial support on this system is observed.

KEYWORDS - System Dynamics, Modelling, Government supports, Impact analysis

PERFORMING THE TEMPLATE BASED THINNING ALGORITHM AS HARDWARE

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ABSTRACT

Thinning algorithm, one of the basic morphology processes in image processing, has an important place. It is frequently used in the fields of health, engineering, forensic and security. The Thin algorithm is desired to work more flexible and faster, and it has been found that many different algorithms have been developed in the literature for this reason. Parallel Thin Algorithm (PTA) developed by researchers in recent years is generally preferred in character or handwriting recognition. In this study, a flexible original design was realized by using the PTA hardware as FPGA chips. It has been compared with the different PCs used today in terms of working speed and performance, and it has been confirmed with the data obtained that it works at an average of 7% faster. In the study, new templates were produced and compared with the study published in the past, an increase in accuracy was shown. It has been determined that the edges of the shapes will be determined more accurately by determining the boundaries by using the proposed templates in edge detection algorithms. Therefore, it is understood that it will be more useful for different algorithms in the future. It is aimed to obtain faster results by using the developed algorithm in image processing.

KEYWORDS - Image Processing, Thin Algorithm, FPGA, PTA

A FULLY AUTOMATED MULTI PLATFORM SOFTWARE SAMPLE THAT CAN SUGGEST PERSONALIZED DAILY ACTIVITIES FOR A HEALTHY LIFE

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ABSTRACT

- The life style of the human being in the past has changed a lot today. This change has both advantages and disadvantages. It is known that today's people move less than people in the past. Health problems are spreading rapidly due to less movement and unconscious eating habits. Many methods have been developed for people to live healthily. In today's technology, it has emerged that a planned life should be implemented in order to be healthier. Most of the applications developed for planned life are not suitable for working on different platforms at the same time. In general, it offers all types of diseases to its users at the same time. The software named Controlled Life (Coli) that we have made recommends personalized diagnosis of disease and diet habits and exercise exercises suitable for the patient diagnosis. The application has been tested on approximately two hundred people. The answers received from users using the application were analyzed and concluded in a table. In addition, the rate of change in the rate of movement and eating habits given to the users was discussed. Movement activities of the users change only according to the weather conditions, apart from factors such as disease, weight and age. It has been understood that those who use the Coli software can bring their lives more planned by changing their exercise and nutritional habits. The study found that the study increased their willingness to work, especially as they set a daily goal for retired people over the age of forty.

KEYWORDS - Calorie Calculation, Exercise, Nutritional Values, Software, Management Informatics

DEVELOPING A WEB APPLICATION WITH DJANGO ARCHITECTURE AN EXAMPLE OF STUDENT INFORMATION SYSTEM

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ABSTRACT

Software developers who want to develop web applications need auxiliary software to make their work easier. At this point, Django architecture built on Python language can be used. Django is an open source web interface that uses the MVT (Model, View, Template) architectural structure. Complex web applications can be developed easily with the advantages of Django architecture. It provides convenience to users in terms of modularity, dynamism, flexibility, security, detailed error reports, database management, management panel usage and working on every platform. In this study, using Django architecture built on Python language, a web application was made targeting an educational institution at high school level and the student information system was successfully concluded by running the designed web application.

KEYWORDS - Django, Web Application, Python, Student Information System

DETECTION OF AUTOMOBILE FAILURES BY SOUND PROCESSING AND DRIVER GUIDANCE SYSTEM DESIGN

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ABSTRACT

Voice recognition and processing; in today's world, realistic authentication has become a leading technique in the matters such as detection of faults, access to control techniques, and finding solutions to problems. The presence of malfunctions in vehicles leads to difficulties in system integrity. Car-key, engine, wrong pin, wrong codes or other authentication errors, violation can be detected by stolen or hacked/lost or by transferring data to computer. In addition, these unsolicited statuses may cause access to this protected system to be stopped. However, voice segmentation can provide a complete solution to this kind of dilemma through automotive technologies. The system, which is applied as voice segmentation, consists of two steps: recognition and verification. The recognition is defined as multiple, i.e., comparison of a recorded data for a database with the whole system, while verification is defined as a one-to-one, i.e. comparison of a pair to determine whether they are caused by the same error.

KEYWORDS - Artificial Intelligence, Embedded System, Voice Recognition, Voice Processing, Car Fault Detection.

WORST CASE RISK ANALYSIS OF A TRANSSHIPMENT NETWORK

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ABSTRACT

Networks are all around our daily life and a failure in these networks can have huge effects on our lives. It is getting more and more important to figure out possible outcomes of a disruption in a network and take necessary precautions in advance. In this study we examine the risk of a transshipment network using a bi-level model and network interdiction approach. In this regard, we assume that our transshipment network is liable to a deliberate attack under some specific constraints. With some limited attack resources, an opponent tries to destroy some certain arcs with an intent to give the highest damage to the transshipment network and to make the transportation as much costly as possible for the network user. We first build a bi-level mathematical model to maximize the minimum transportation cost in the network. Then using duality and integer programming techniques we turn the bi-level model into a standard mixed integer programming (MIP) model solvable through standard off-the-shelf optimization software packages. Using GAMS/CPLEX for computational part of our study, we put forward which arcs are most detrimental to achieve the objective of network user in case of a failure. The developed model can be used to expose the riskiest segments of a transshipment network as well as how much effect the breakdown of arcs has on the network user`s objective function, the minimum transportation cost. The decision makers can get use of the model to determine their strategy to make a transshipment network more secure and take preventive measures to avoid worst case costs in case of a possible breakdown in the network.

KEYWORDS - Network Modeling, Network Interdiction, Bi-Level Modeling, Integer programming, Transshipment Networks, Risk Analysis

COMPARATIVE STUDIES ON DESIGNING SIMULATION EXPERIMENTS

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ABSTRACT

Simulation is a widely accepted technique to estimate accurately the key output performance measures of complex systems. However, the execution time of a simulation is usually slow and can only evaluate one scenario at a time (except parallel simulations). Moreover, these kinds of complex systems typically involve large number of input parameters which potentially affect the system's output performance. In order to overcome these difficulties an experimental design can be utilized to reduce the number of input parameters with eliminating the unimportant ones. As a result, a smaller set of input parameters can be examined in a more efficient and effective way and the interactions between these parameters can also be identified. Due to the fact that simulation responses typically have a random component, the input parameter strategy should have error control for misclassification of factors, which includes the probability of classifying a factor as important when it is not (Type I Error) and the probability of classifying a factor unimportant when it is important (Type II Error). In this research work we conducted a survey and analysis of a set of papers related to the field of designing simulation experiments and presented the results of comparative studies on an actual simulation model.

KEYWORDS - Designing Simulation Experiments, Full Factorial Design, Fractional Factorial Design, Central Composite Design, Taguchi Ortagonal Array.

A NOVEL LOGARITHMIC AMPLIFIER WITH SECOND GENERATION CURRENT CONVEYORS

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ABSTRACT

This study presents the design and the complete analysis of a novel logarithmic amplifier using second-generation current conveyors. The circuit utilizes exponential current-voltage characteristics of a pn-diode to obtain the logarithm of the input signal. Unlike the opamp-based logarithmic amplifiers, the proposed design does not suffer from instability since the active component in the feedback loop. The simulation results show that the logarithmic behaviour of the design could be used in various applications.

KEYWORDS - Logarithmic Amplifier, Current Conveyors, Pn-Diode

COMPARISON OF SISO AND I METRA MIMO CHANNEL CAPACITIES UNDER RAYLEIGH FADING CHANNEL

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ABSTRACT

In today's wireless communication systems, the increase in the size of the data has revealed the importance of the transmission capacity of the communication channels capacity. The use of multiple antennas to the transceiver and receiver has emerged as a solution to the transmission capacity. In this study, it is aimed to compare the channel capacities of MIMO and SISO communication channels. In addition, For MIMO systems, the theoretical analysis of the channel capacitance for different antenna numbers has been made and supported by the simulation studies

KEYWORDS - Communication Channel, Fading Channels, MIMO, OFDM, Rayleigh Probability Density Function

A RAIL TO RAIL LOW VOLTAGE OPERATIONAL AMPLIFIER IN 0 18 UM CMOS TECHNOLOGY

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ABSTRACT

A two-stage opamp operating at 0.9 V and consuming 5 µA has been proposed in a TSMC 0.18 µm CMOS technology. Rail to rail operation at the input stage is achieved by complementary transistor pairs with transconductance control. The rail to rail output stage is designed in class AB. All design and simulations are performed on the Cadence environment. The simulated gain of the opamp is 67 dB, and the unity gain frequency is 1.7 MHz with a 3 pF, 100 kΩ parallel load.

KEYWORDS - Rail To Rail Opamp, CMOS, TSMC 0.18um Technology

A 50 GHZ FREQUENCY SELECTIVE SURFACE DESIGN ON DOUBLE LAYER STRUCTURE FOR U BAND APPLICATIONS

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ABSTRACT

Frequency Selective Surfaces (FSS), depending on their structure and properties, passes electromagnetic waves at some frequencies while stopping the others at some frequencies. Due to these characteristics, FSSs act as a two-dimensional filter. This filter feature may have band pass, band stop, low pass or high pass characteristics. In this study, a band-pass Frequency Selective Surface was designed for a 50 GHz U Band Applications. The FSS, designed in a two-layer structure. First layer, consist of a double square ring placed in front of the structure. A Jerusalem Cross structure is used on the back layer. The dimensions of the unit cell structure designed for band pass characteristic in the U band were determined using parameter sweep. Then, a 10x10 array was created and the transmission and reflection responses were determined. According to the -3 dB transmission limit, the proposed two-layer U Band FSS is Band-pass between BW = 46.5-53.4 GHz.

KEYWORDS - Frequency Selective Surface, U Band FSS, 50 GHz FSS, Double Layer FSS.

PERFORMANCE VOLTAGE GAIN ANALYSIS OF QUADRATIC BOOST CONVERTER WITH A CAPACITOR INDUCTOR DIODE CELL FOR RENEWABLE ENERGY APPLICATIONS

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ABSTRACT

In this paper, a quadratic boost converter with a voltage multiplier (capacitor-inductor-diode or CLD) cell is designed, tested, and compared. The designed converter is high efficiency and high gain converter, and it is also applicable for renewable energy applications owing to these properties. This converter obtains higher output voltages using the same input voltage value compared to the conventional boost, cascade boost (two-level) and conventional quadratic dc-dc converters. In this study, the quadratic boost converter's working operation with a CLD is expressed in detail. Then, an analytical analysis of the converter is given and explained for smooth voltage conversion. In the performance section, the quadratic boost converter with a CLD cell is designed and tested by using Simulink program. The parameter values of the converter are selected as 24 V input and 720 W power rating. Voltage gain analysis is also presented for conventional converters and quadratic boost converter with a CLD cell. In the performance results section, input/output voltages, inductor current, output current, and output power are also given.

KEYWORDS - Quadratic Boost Converter With CLD Cell, High Gain, High Efficiency, DC-DC Converters.

ADJUSTMENT OF PHASE ARRAY RADARS USING TYPE 2 FUZZY LOGIC

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ABSTRACT

Today, radar technology is becoming increasingly important in both civilian and military fields. With the development of the defense industry, studies on radars are increasing and the importance of radar systems becomes more prominent. The national radar development project for our country is also one of the important studies emphasizing this importance for air defense systems and radar technologies. In this thesis study, the enemy aircraft entering the airspace under the conditions of the field are detected and identified with the help of type-2 fuzzy logic and the target's distance, speed, altitude, acceleration and radar cross section area are used. It is aimed to prioritize and optimize the time sharing of the radar, which is necessary for the air threats for the efficient operation of the radars. In order to make this optimization, the determined parameters will be processed using type-2 fuzzy logic and the output value will be taken. In this study, the advantages of type-2 fuzzy logic over type-1 fuzzy logic and its success in time management are examined. Thanks to this thesis study, it is thought that the efficiency of the radars produced / planned with the resources of our country will be increased in the defense industry in the coming years.

KEYWORDS - Fuzzy Logic, Phase Array Radar, Radar Technologies, Defense Industry, Classification, Type-2 Fuzzy Logic

AN EYE SHAPED PATCH ANTENNA OPERABLE AT SUB 6 GHZ FREQUENCY BANDS FOR FIFTH GENERATION WIRELESS COMMUNICATION SYSTEMS

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ABSTRACT

In this paper, an antenna is designed that is aimed to be able to operate at all three sub-6 GHz frequency bands (2.5 GHz band, 3.5 GHz band and 3.7-4.2 GHz band) specifically allocated for fifth generation (5G) communication. The proposed patch antenna has an eye shaped radiator and it is fed by a microstrip transmission line. The size of the radiator element, the width of the transmission line and the length of the ground plane are determined precisely in order to cover the abovementioned three frequency bands. A substrate material with a relative permittivity of 2.2 is preferred with a copper thickness of 0.035 mm. The presented antenna has an operating bandwidth (S11 ≤ -10 dB) from 2.195 GHz through 5.095 GHz. It corresponds to a fractional bandwidth of 80%. Besides its wideband property, the antenna has a radiation efficiency that varies between 87% to 96% throughout the operating frequency band. Furthermore, the proposed antenna has a size of 50 mm × 43 mm and a maximum realized gain of 3.2 dBi. It has an omni-directional radiation pattern at the resonance frequency of 4.2 GHz. Finally, the multi-input multi-output (MIMO) design (4×4) of the antenna is also analyzed and great isolation is observed between the two elements which are positioned perpendicular to each other. As a result of all these analyzes, one can say that this antenna is convenient to be used for sub-6GHz bands of 5G applications.

KEYWORDS - Fifth Generation (5G), Sub-6 Ghz, Multi-Input Multi-Output (MIMO) Antenna

CAPTURE DATE ESTIMATION OF HISTORICAL IMAGES BY USING DEEP LEARNING

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ABSTRACT

The issue of automatic estimation of the capture date of historical photographs have seldom been discussed in the past. This paper implements a deep learning-based automatic prediction method. For the training of deep learning model, we created an historical image dataset which consists of photographs which were captured from different cities of TURKEY. This dataset 's date interval is from the 1880s to the 2010s. Instead of extracting specific feature sets like traditional methods do, we employ a CNN model which can extract hidden and distinguishing features from raw images. Results show that our proposed model is superior to human visual inspection.

KEYWORDS - Convolutional Neural Network, Culture, Fashion, Urbanization, Historical Photos.

A PASSIVE SENSOR DESIGN FOR STRUCTURAL HEALTH MONITORING BY USING FREQUENCY SELECTIVE SURFACES

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ABSTRACT

Structural health monitoring (SHM) aims to ensure detection and prevention of damage such as tilting, crack, movement, etc. in civil structures. Bridges, buildings, highways, tunnels, power plants, and dams are among the application areas of SHM. In this work, a novel frequency selective surface (FSS) geometry which acts as a passive sensor for tilt angle detection at civil structures is presented. FSSs are periodic conductive geometries which act as spatial filters. The proposed FSS sensor can be mounted on the exterior and interior surfaces of the buildings. The tilt angle of civil buildings can be detected from 10 to 60 degrees by using proposed FSS sensor.

KEYWORDS - Structural Health Monitoring, Periodic Structures, Frequency Selective Surface, FSS

ENERGY STORAGE DEVICES FOR PLUG IN ELECTRIC VEHICLES

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ABSTRACT

In addition to the rising energy demand day by day, increasing fuel consumption based on carbon-emitting gases causes environmental concerns. Growing concerns have pushed the community to seek alternatives to petroleum-derived fuels. Electric vehicles, which have become even more practicable with the developing technology, can be seen as a good alternative. The biggest weaknesses of today's electric vehicles emerge as charging times and travel range. These two weaknesses make the energy storage devices the most important part of the electric vehicle. While energy storage systems provide power to the vehicle during acceleration (discharge), they also draw power (charge) when the vehicle is braking or slowing down. Batteries, are among the primary energy storage devices used for electric vehicles, have structurally different types. The biggest disadvantage of batteries is the space they occupy in the vehicle and their cost. Ultracapacitors appear as an alternative energy storage device with high power densities. Mentioned energy storage devices are also used in combination to increase the efficiency. In this study, first each energy storage device are discussed separately, and then, hybrid energy storage systems which can increase energy efficiency, will be discussed.

KEYWORDS - Electric Vehicle; Energy Storage System; Hybrid System

DETERMINATION OF MORPHOLOGICAL FEATURES OF MOVING OBJECTS IN VIDEO

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ABSTRACT

Identifying moving objects in video and calculating their morphological features are important parameters for industrial applications. Especially, obtaining the morphological features of an object passing over a band facilitates quality analysis. In this study, the morphological characteristics of chickpea grains flowing over a silo to the spreader and then moving on an inclined fixed band were obtained. For this process, a video was recorded using the experimental setup which consists of camera, lens system and background illumination platform. Python software and OpenCV library were used for the image processing applications. Different image processing algorithms were used to separate the moving objects from the background and convert them into binary format. Among these algorithms, the MOG2 background subtraction method gave the best results. The moments and contours of moving objects were found in the video converted into a binary format, and morphological features such as area, radius, centroid, width and length, straight bounding rectangle, rotated rectangle, minimum enclosing circle, and perimeter. As soon as the objects pass over a virtual line, an identity was assigned and morphological features were obtained along this process. Thus, one-time properties of each object were obtained throughout the entire video. For this study, a video was recorded while 100 chickpea grains were passing over the band and the morphological characteristics of each chickpea were successfully obtained.

KEYWORDS - Video, Image Processing, Camera, OpenCV, Morphological Features

ALTITUDE ESTIMATION OF AN UNMANNED AERIAL VEHICLE

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ABSTRACT

Unmanned aerial vehicles (UAV) have been employed in many areas such as search and rescue, surveillance, meteorological analysis as well as military applications. The main advantages of UAVs can be listed as, the capability of remote and autonomous control, payload carrying, no direct human intervention such as in risky tasks, short runways or no runways at all, vertical take – off and landing capabilities for some vehicles and so on. These advantages make the UAVs an interesting research field. However, since there is no human presence in UAVs, the reliability of the systems must be ensured autonomously. Some autonomous systems and subsystems are flight controllers, navigation and guidance computers, and sensor avionics. In order to increase the situational awareness of a UAV, its position and attitude must be sensed within a limited range of time. But, since sensors are prone to noise sources, it is an essential task to eliminate the real signal from the sensor errors. To overcome this issue, an estimation scheme for the altitude measurement of a UAV is presented. According to the statistical analysis, the estimation method manages to observe the real signal out of sensor noise with a low error ratio.

KEYWORDS - UAV, Altitude, Estimation

A COMPARISON ON THE CONTROL OF A QUADROTOR

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ABSTRACT

Quadrotors are underactuated unmanned aerial vehicles that have four upward oriented rotors on a rigid frame in three – dimensional space. Quadrotors do not have any servo based flight control surfaces which make them easy to produce. The advantages of the quadrotors are hovering, low – speed flight, maneuverability, low – cost production and vertical take – off and landing capacity. On the other hand, quadrotors have open – loop unstable dynamics, coupled states and are prone to internal and external disturbances such as modeling errors or wind gusts. Control of a quadrotor is still one of the major study fields for the researchers. In this study, the attitude control of a quadrotor is considered to address the raised issue above. Several control designs are employed so as to achieve the best tracking responses. The performance of the controllers is statistically analyzed with the aid of different error metrics, respectively.

KEYWORDS - Quadrotor, Control, Attitude

EXPERIMENT SETUP FOR DETERMINING OPTIMUM TILT AND ORIENTATION ANGLES OF PHOTOVOLTAIC PANELS

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ABSTRACT

In TURKEY, where annual solar energy potential is 380GWh, the amount of electrical energy that can be obtained by placing PV panels with optimum tilt angle is around 1.239kwh / 1kwp. One of the most effective methods of obtaining maximum level of electrical energy from PV panels is determining the optimum tilt angles and orientation angles of PV panels. In order to obtain the highest possible amount of electrical energy from PV panels for Konya province, two experimental setups, one of them is fixed and the other one is mobile, were established to determine the most appropriate Azimuth and Tilt angles. While the tilt of the panels can be changed from 00 to 600 with 15 degrees intervals, the azimuth angle can be changed by 10 degrees intervals. In order to calculate the electrical energy produced by the panels, current and voltage data is instantaneously collected from the experimental setup via invertors. Relationships between power outputs of PV panels according to the tilt and azimuth angle can be examined. In addition, the global radiation value is measured with the Pyranometer installed on the contraption. Moreover, ambient and panel temperatures are recorded simultaneously. The measurements are recorded with the help of a Data Acquisition card.

KEYWORDS - PV Panel, Inclination Angle, Azimuth Angle, Optimum Position

TEMPOROMANDIBULAR JOINT SOUND ANALYSIS WITH LSTM NETWORKS

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ABSTRACT

Temporomandibular Disorder (TMD) is the problems arising from or related to disorder of Temporomandibular Joint (TMJ) which is commonly known as jaw bone joint. It is a common problem among the population, more than two third of population have different levels of TMD. TMD is mostly diagnosed by listening TMJ sounds. The procedure is an easy and cheap method used by clinic dentists. In this study features extracted from Fourier transformation of TMJ sounds. After reducing the size of feature vector using PCA, vectors are applied to Long-Short Term Memory (LSTM) neural networks to be trained and tested. Over 95% training accuracy and around 65 to 70% testing accuracy is achieved.

KEYWORDS - TMJ, TMD, Sound Classification, Recurrent Neural Networks, LSTM Networks

MEMRISTOR BASED PD CONTROLLER DESIGN AND APPLICATION ON A BALL AND BEAM CONTROL SYSTEM

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ABSTRACT

In this study, a memristor based PD controller is designed and the performance of the controller is tested in the simulation model of the beam and ball (Ball and Beam) control system. In the proposed control structure, the position of the ball in the primary part called the outer loop is controlled by changing the angle of the beam. In the secondary part, called the inner loop, voltage is generated that will determine the proper position angle of the servo motor to adjust the position of the beam. In addition, the use of Memristor, which has attracted increasing attention in recent years, in the field of control systems has been tested. The simulation results show that the designed controller successfully performed reference tracking.

KEYWORDS - PD Control, Memristor, Ball and Beam, MemPD

ON THE STUDY AND VISUALIZATION OF DIELECTRIC AND CONDUCTING MEDIUM INTERACTION OF ELECTROMAGNETIC WAVES VIA COMPUTABLE DOCUMENT FORMAT

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ABSTRACT

Study of dielectric medium and conductor interaction of electromagnetic waves involve head-on and oblique reflections where visualization of the physical system corresponding to the mathematical description of the problem and its solution plays an important role. In this work, we present our design to visualize the physical system with user selected parameters via the Computable Document Format (CDF) of Mathematica which can be freely run once the CDF file has been created via the codes presented hereby.

KEYWORDS - Visualization of Electromagnetic waves, Electromagnetic wave propagation, Electromagnetic wave reflection through conducting medium, Head-on and oblique reflection, Computable Document Format (CDF), Standing waves

A SHORT REVIEW OF SUPERCONDUCTIVITY AND FUNDAMENTAL CHARACTERIZATION METHODS IN THE HIGH TC EXPERIMENTAL SUPERCONDUCTIVITY

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ABSTRACT

Since the first discovery of superconductivity phenomenon in 1911, we see that today's high Tc superconductivity research has come to contribute today's modern engineering applications and takes part in today's modern science and engineering curriculum. Superconductivity means more than transport of electrical energy with zero loss and it involves an extraordinary state of material referred to as "superconducting state" or "Meissner state" where perfect diamagnetism and hence many other extraordinary physical properties are exhibited. Superconductivity can be thought as equivalent to what transistors mean with respect to the existing vacuum tube technology of the time in this respect. Superconductivity can be classified in two groups, namely, "type-I superconductivity" and "type-II superconductivity", regarding their structural and electrodynamic properties in nature. Today's high Tc superconductivity involves complex nanostructures and they can be synthesized in today's experimental superconductivity laboratories. They exhibit tpe-II behavior and involve modern experimental characterization techniques for structural and electrodynamic analyses in today's modern experimental superconductivity laboratories, too. In this work, we review general outcomes of the superconductivity phenomenon in both types and study the experimental high Tc superconductivity via fundamental modern structural and electrical characterization methods.

KEYWORDS - Superconductivity, High Tc Superconductivity, YBCO, BSCCO, Characterization Techniques, Engineering Applications

INVESTIGATION OF IMAGE COMPRESSION PERFORMANCE ON MEDICAL IMAGES BY USING DISCRETE ORTHONORMAL STOCKWELL TRANSFORM AND SINGULAR VALUE DECOMPOSITION METHODS

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ABSTRACT

Image compression in medical images is a key step and the only applicable technique to prevent the consuming maximum storage, is to reduce the data size and utilize the maximum bandwidth of image transmission. Currently, there has been abundant research on image compression for medical images. In this study, Singular Value Decomposition (SVD) and Discrete Orthonormal Stockwell transform (DOST) techniques, which are recommended to be used frequently in the existing studies, are performed in order to achieve the best image compression without any loss of information for computed tomography (CT) scan slice of the brain and CT abdomen images and their performances are compared. Mean Square Error and mean absolute error- the used quality parameters- are computed to assess the performance of this study. The obtained results indicate that the usage of SVD for the compression of medical images is the best method in order to obtain the image closer to the original one.

KEYWORDS - Image Compression, Medical Image, Singular Value Decomposition, Discrete Orthonormal Stockwell Transform.

NEW TECHNOLOGIES OF SAVING POWER CONSUMPTION FOR OLED DISPLAYS

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ABSTRACT

The novel technology of Organic Light Emitting Diode (OLED) that is related to displays and showing the contents like images and videos had got big attention in the last few years. Some industries started to use it in their new devices like TVs, laptops, mobile devices, and much more. In terms of power consumption, some new techniques were done to decrease the power consumed while displaying images and videos on OLED displays, and at the same time, preserve the images and videos quality, which was done by merging artificial intelligence and using deep learning algorithms. In this paper, a review of some new techniques was explained with their results. Some factors that are affecting the power consumption are brightness, saturation, luminance, and contrast. Some studies also were made on mobile devices by using dark mode which is turning some pixels off by making it in black color instead of other colors. In other studies, focused on web browsing by changing the color design of web pages when using some power-saving modes which are offered by the chameleon web browser.

KEYWORDS - OLED Displays, Power Consumption, Deep Learning Method, Chameleon Web browser, Reducing Power.

AMOLED DISPLAYS AND THEIR CHALLENGES

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ABSTRACT

Active matrix organic light emitting diode (AMOLED) displays appear to face two big obstacles. First one is this, in terms of production, simple broad panels are being used, and short time lives due to picture sticking. The second one is this, the low yield problem is induced by the analogue drive mechanism and by the active emission of the signal. These reasons of situations are OLED's structure. But despite this, the AMOLEDs can be quickly placed into TVs and vehicle screens, and have a longer service life in the high picture quality of them. A lifetime extension approach for Adaptive Contrast Management displays is suggested for simultaneous emission conductivity. The suggested driving system expands pollution duration separately by moving even and unusual row lines. The prolonged emissions time increases deterioration of the organic light emitting diode (OLED), as the total OLED density declines with increasing exposure periods. And also here, it is suggested alternate approaches in the manufacture of HDTVs with AMOLEDs, for example, LITI for OLED modelling and non-ELA crystallization methods in the manufacture of poly-Si TFT. In this study was also noticed, in particular, that the manufacture of big mother lenses may be achieved through non-laser technologies such as the SGS crystallization method. Besides Large size 17 "UXGA AMOLED displays that offer a strong degree of brightness were displayed.

KEYWORDS - AMOLED Displays, Stacking Images, Large Size Displays, Life Time, Compensation Method.

AN ELECTRONICALLY TUNABLE MEMCAPACITOR BASED ON FLOATING CURRENT SOURCE

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ABSTRACT

In this work, an electronically tunable memcapacitor emulator circuit has been proposed. The memcapacitor consists of one Floating Current Source (FCS), two capacitors, one MOS transistor and one dependent voltage source. In emulator circuit, a MOS transistor is utilized in order to make the memcapacitor electronically tunable. Different values of voltage are applied to the gate terminal of the MOS transistor to show the property of electronically tunability of the memcapacitor emulator. The FCS circuit includes only four MOS transistors. In addition, memcapacitor emulator circuit does not require any mutator for the purpose of converting the emulator structure from memristor to memcapacitor. The characteristics of the electronically tunable memcapacitor are presented using LTspice simulation software and 0.13µm IBM CMOS technology parameters are used in circuit design.

KEYWORDS - Memcapacitor, Electronically Tunable, Floating Current Source (FCS)

A SURVEY ON KALMAN FILTERING FOR UNMANNED AERIAL VEHICLES RECENT TRENDS APPLICATIONS AND CHALLENGES

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ABSTRACT

This study presents recent trends, challenges, and application examples of design methodologies for complementary filters and Kalman filters which become cornerstones for the application of unmanned vehicles. The elaborated filters are range from Kalman to its improved modifications. The inertial measurement unit, which is the core for the unmanned system applications, can be designed with different filtering strategies. The elaborated methods are also widely used in control theory and this aspect of the study makes it a beneficial guide to a large number of readers. The performance comparison is presented via several illustrations and numerical measures, with complementary comments on the advantages and drawbacks of each strategy. The structure of filters is discussed in terms of several performance criteria in the presence of noisy measurements.

KEYWORDS - Kalman Filters, State Estimation, Inertial Measurement Design, Unmanned Systems

PERFORMANCE EVALUATION OF AVERAGE AND MEDIAN FILTERS FOR GAUSSIAN NOISE IN CERAMIC TILE IMAGES

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ABSTRACT

Today, the ceramic tile industry is a very important sector. After the ceramic tiles are produced, quality control is carried out to prevent defective products from reaching the customer. One of the methods used for quality control is the image processing application. Noise reduction algorithms in the image processing application are used to reduce noise in the image. In this paper, we analyze the effects of the average and median filters on the ceramic tile images with Gaussian noise. First, noisy images with different noise levels are obtained. Then, the filters with different properties are applied to noisy images. The filtered images are analyzed using the quality metric. The results show that the median filter performs better performance than the average filter for both low and high noisy images.

KEYWORDS - Image Denoising, Gaussian Noise, Median Filter, Average Filter, Ceramic Tile

PID CONTROL DESIGN OF AN ACTIVE SUSPENSION SYSTEM BIG BANG BIG CRUNCH APPROACH

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ABSTRACT

Automotive suspension systems are units that control the interaction between wheels and the road. Suspension systems can be handled in two main parts, passive and active. In a vehicle with passive suspension, the vertical motion of chassis is provided only depending on the road surface. However, in a vehicle with active suspension, vertical motion is determined by the control force as well as the force on the road. Active suspension systems have been preferred in recent years in order to minimize the loss of comfort and increase road holding while braking, cornering and driving. In this study, an active suspension model is implemented considering the quarter car model to facilitate the computational complexity. This model consists of an actuator which is used to provide up or down movement of vehicle chassis. A PID controller is designed to control the force acting on the actuator. A meta-heuristic optimization approach, Big Bang – Big Crunch, is used to optimize parameters of PID controller. In order to test the performance of active suspension system, a test path with different size of bits and bumps is defined. The active suspension model and controller is designed in MATLAB environment. Results show that the Big Bang – Big Crunch algorithm is effective for finding controller parameters and proposed system is well-defined.

KEYWORDS - Active Suspension, Big Bang Big Crunch, Parameter Optimization

DESIGN AND FABRICATION OF AMORPHOUS SILICON BASED BOTTOM GATE THIN FILM TRANSISTORS AND PERFORMANCE DEPENDENCE ON POST ANNEALING TEMPERATURE

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ABSTRACT

In this letter, we report the deposition of high quality a-Si:H, SiNx thin films by modified PECVD system, micro-fabrication development of a-Si:H based high performance thin film transistors for the use of AMOLED displays. State of the art quality a-Si:H thin films were grown and optimized the micro-fabrication processes such as annealing temperature and the etching processes etc. We also report the annealing temperature effect on the electrical characteristics of TFTs. We developed the microfabricaiton of bottom gate a-Si:H based TFTs with 5micron channel length and about 0.1cm^2/V-s field effect mobility. This work is one of the first smallest TFTs from design to microfabrication done in Turkey.

KEYWORDS - Thin Film Transistos, Amorphous Silicon, Microfabrication, Mobility, Temperature Effect, Fielf Effect, Pecvd Growth, Photolithography

A FAST ALTERNATING DIRECTION METHOD OF MULTIPLIERS APPROACH FOR 1 BIT COMPRESSED WIDEBAND SAR IMAGING

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ABSTRACT

Compressed Sensing (CS) theory emerged in recent years provide important benefits in Synthetic Aperture Radar (SAR) Imaging. Recent studies have shown that CS also provides good results in obtaining SAR images from 1-bit quantized measurements. In this paper, a new fast Alternating Direction Method of Multipliers (ADMM)-based algorithm is proposed for 1-bit CS SAR imaging. This proposed method is compared to ADMM-based algorithms previously used in this problem to demonstrate its effectiveness for 1-bit compressed SAR imaging

KEYWORDS - SAR Imaging From 1-Bit Data, Compressed Sensing, Alternating Direction Method Of Multipliers (ADMM).

PRODUCTION OF VANADIUM CARBIDE VIA MAGNESIOTHERMIC REDUCTION

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ABSTRACT

Vanadium carbide is important for industrial applications because of its high temperature resistance, high chemical and thermal stability. It is generally obtained from the reaction between V and C powders at a high temperature ranging from 1100 to 1500◦C. Investigations on these high strength, high abrasion resistant, hard materials have been intensified in recent years and consequently significant improvements have been achieved. In this study, VC alloys produced by high cost processes will be produced by reducing the oxides of their components by Self Propagating High Temperature Synthesis methods. V2O5 will be used as oxidized Vanadium source, Cblack as carbon source, magnesium as reductant will be used. Furthermore, the effect of different stoichiometric charge components will be realized by XRD, XRF, AAS and optical microscope analyzes for different reductants.

KEYWORDS - SHS, Ball Mill, VC, Carbides.

EFFECT OF DOPANTS ON AKERMANITE HYDROXYAPATITE BIOCERAMIC POWDERS

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ABSTRACT

This work reports about iron oxide and zinc oxide doped akermanite/hydroxyapatite composite powders produced by mixing in an aqueous solution of oxide precursor powders. Iron oxide and zinc oxide were used as dopants in different concentrations between 1-7%. The effect of dopants on the powders was investigated utilizing the structural and morphological characterization techniques such as X-ray diffraction (XRD) analysis, scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDS), particle size analysis (PSA). The XRD patterns showed that akermanite was successfully obtained in the predominant crystal phase. The iron oxide and zinc oxide additions showed a slight influence on the powder morphology. Furthermore, the morphologies of the composite powders were affected by the amount of dopant.

KEYWORDS - Akermanite, Hydroxyapatite, Iron Oxide, Zinc Oxide

EFFECTS OF SMELTING RAFINATION AND HIGH PRESSURE DIE CASTING PARAMETERS ON POROSITY FORMATION IN ALUMINIUM CASTING PARTS

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ABSTRACT

Aluminium alloys have high usage rate, especially in the aviation, defence and automotive industries, where weight reduction is extremely important. Pressure die casting technology is a widely used method of casting aluminium alloys in terms of its suitability for mass production. Aluminium-silicon alloy parts, which are produced by the high pressure die casting method (HPDC), generally contain porosity in different proportions and sizes due to the discharge problems of gases trapped during the rapid injection of molten metal into the mold cavity. Because of increase in expectations and customer specifications in the casting industry, it is desired to reduce gas porosity levels to certain critical levels. Proper mold design and optimization of casting process parameters play an important role in reducing gas porosity by facilitating the evacuation of air from the mold cavity. In this study, the porosity structures of AlSi9Cu3, AlSi12Cu1Fe and AlSi12Fe aluminium alloys were investigated by solidifying under atmospheric conditions and vacuum before and after degassing. The porosity diameters and depths of the pieces were measured by computed tomography (CT). In addition, pore diameters and quantities were examined by means of a stereo microscope method and the results were compared with the results which were obtained from the CT method.

KEYWORDS - Aluminium, Computed Tomography, Porosity, Stereo Microscopy

DEVELOPMENT OF CORE MATERIALS FOR USE IN THE MANUFACTURING OF HIGH TEMPERATURE INSULATION PERFORMANCE VACUUM INSULATION PANEL

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ABSTRACT

People have tried to provide suitable temperatures and comfort conditions for their lives by reducing the temperature differences in their living spaces and shelter environments from antiquity to the present day to maintain their lives in a healthy way. Recent studies have shown that the continuation and control of the created suitable comfort conditions can only be achieved by using thermal insulation materials with low thermal conductivity coefficient in living spaces, which are part of a well-regulated system. The primary way to reduce the energy consumption of air conditioning, combi boilers or central heating and cooling systems used in heating and cooling buildings or spaces used by people for housing, workplace and social activities is to make them work less. What needs to be done to ensure that the systems are used less is possible by using the energy produced in the most beneficial and efficient way and by reducing energy losses and leaks. One of the ways to use energy efficiently and economically in heating and cooling systems and devices is to make suitable and quality thermal insulation. Vacuum insulation panels (VIPs) with high thermal insulation performance, which will be used to minimize energy losses in transporting the heat energy to be used for heating or cooling, will also make great contributions to the efficient use of energy. This scope of this study; aerogel production using sol-gel method and bacterial cellulose filled shell-core nanofiber mattress production with electrospinning method and then the core for vacuum insulation panels (VIPs), which will be used as high-performance thermal insulation material.

KEYWORDS - Electrospinning, Vacuum Insulation Panels, Aerogel

PRODUCTION OF MODIFIED SILICA AEROGEL AS A NEW GENERATION INSULATION MATERIAL

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ABSTRACT

Today, the development of technology has increased the energy spent and parallel to this, there has been an increase in environmental impacts. These negative effects are generally related to the use of fossil fuels and the toxic content of some insulation materials. In addition, the thinning of insulation materials is one of the most important issues in recent years. This thinning is of great importance for both buildings and appliances we use in daily life such as white goods. The growing interest in thermal insulation materials in recent years has caused many different materials to be used in this area. One of the most striking materials in this field is polymers. Polymers are used in many different areas such as heat and sound insulation, energy storage, tissue engineering. One of the most important features that cause polymers to be used in these areas is their porous structure. Porous and especially microporous materials provide better performance in both mechanical strength and insulation. Within the scope of this study, thermal insulation material with high thermal insulation performance and mechanical properties was produced by sol-gel and electrospinning method by using Biopolymer / Silica aerogel.

KEYWORDS - Electrospinning, Biopolymer, Aerogel

ENHANCEMENT OF WHITE LIGHT FROM A NEW SYSTEM DOPED WITH TRIPLE RARE EARTH RE CATIONS IN RESI2N2O RE EU CE PR AND EU CE TB SYSTEMS

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ABSTRACT

Sinoite, called as silicon oxynitride-Si2N2O, can be considered as promising novel optical material revealing a white-light emission between 400-700 nm of electromagnetic spectrum, considering our group's previous experiments. Here the core goal of this research is to produce stable white light consisted of characteristic narrow emissions through the combination of oxidation state transitions for used rare-earth (Re) dopants. To achieve this, the triple-cation doping approach was used here. Therefore, ReSi2N2O:Re=Eu-Ce-Pr and Eu-Ce-Tb specimens were produced by electrical-field assisted sintering route. The X-ray diffraction (XRD) analysis data of bulk samples revealed that Si2N2O was determined over the ~90% with other minor α- and β-Si3N4 phases. Based on the optical results with photoluminescence (PL) and scanning electron microscopy cathodoluminescence (SEM-CL), a quite narrow PL spectrum was obtained at different maxima by combination of triple-cation doping. The effect of heat-treatment at 1000oC for 2 h in 98.5% N2 and 1.5% H2 gas atmosphere was also evaluated. Consequently, unique extracted emission from Re-cation doped Si2N2O-based phosphors can be easily designed to achieve the stable white-light achievements through triple-cation incorporation. This research was supported by TUBITAK with the project number: 217M667.

KEYWORDS - Sinoite, Si_2N_2O, White Light-Emitting Diodes (Wleds), Rare-Earths (Res), Electrical-Field Assised Sintering

SOL GEL BASED ANTI REFLECTIVE COATINGS FOR GLASSES USED IN PHOTOVOLTAIC SYSTEMS

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ABSTRACT

The depletion of fossil fuel resources has led to increasing demand in renewable energy sources such as wind energy, solar energy, and biomass energy. Solar energy is especially getting more attention among these renewable sources since the sun has an unlimited energy resource. Photovoltaic systems, also known as solar panels that convert sunlight into electricity, have been developed to increase the benefit of solar energy. Photovoltaic systems are made of multiple layers, and the upper layer of the system generally consists of glass panes. However, these glass panes decrease the overall solar energy efficiency due to their high refractive index and low transmission in the visible range. Therefore, anti-reflective coatings are usually applied to the upper glass panes to ensure the highest possible solar energy efficiency from a photovoltaic system. The porous structure of anti-reflective coatings provide higher light transmittance, so the reflection of the sunlight is minimized, and the transparency characteristics of the glass is improved. In this work, we aim to develop novel anti-reflective coatings to reduce the refractive index and increase the transmittance of glasses used in photovoltaic systems. Therefore, a facile sol-gel method is applied by using high purity precursors, i.e., TEOS, EtOH, H2O, and NH4OH. The anti-reflective coatings are deposited on soda-lime glasses provided from Şişecam by the dip-coating method with a 100 mm/min drawing rate. Phase characterizations are performed by thin-film XRD technique. The morphology of the anti-reflective coatings is observed by SEM analysis. Finally, the optical transmittance of thin films is investigated using UV-Vis spectrophotometer, and refractive indices are measured via ellipsometry. In this study, the transmittance of glasses are increased from 91% up to 98%. This shows that anti-reflective coatings have the potential to increase the total solar energy efficiency of photovoltaic systems by improving the optical properties of glasses.

KEYWORDS - Glass, Anti-Reflective Coating, Photovoltaic Systems, Sol-Gel

ENGINEERED FABRICATION OF THE SIO2 NANOPARTICLES BY TAILORED STOEBER PROCESS

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ABSTRACT

As one of the most prominent SiO2 nanoparticle synthesis method, Stoeber technique was modified and investigated for a better understanding of the nanoparticle formation and surface analysis. For this synthetic method, tetraethoxysilane presursor was utilized by minor modifications in the fabrication route. Especially concentration effect was studied thoroughly. By keeping the pH value and other parameters same, different concentrations of the tetraethoxysilane precursor provided diverged results about size and surface characteristics. As sol-gel reaction mechanism implies, basic catalysis and temperature plays an important role for the synthesis of SiO2 nanoparticles. This modified methodology also allows us to imply a surface and particle size control for the various applications of SiO2 nanoparticles. Size distribution and EDX analysis unveiled that a regular size control is possible with high sensitivity and there is no other impurities or atomic entities in the obtained nanoparticles. According to the Fourier Transformed Infrared spectroscopy, surface contains –OH groups and particles carry water molecules which is a sign for SiO2 particles that they can be effective for surface humidity adsorption in different applications. Monodispersed, spherically shaped and agglomeration free/low agglomerated particles were obtained and statistically investigated for possible applications such as sensors, theranostics, humidity adsorption and chemical delivery.

KEYWORDS - SiO2 nanoparticles, Stoeber method,Nanostructure ,sol-gel

CHEMICAL MODIFICATION OF STARCH FOR FOOD NANOMATERIAL APPLICATIONS

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ABSTRACT

Starch is a common food ingredient which composed of amylose chains formed by the combination of approximately 200 glucose units linked by a linear α-1,4 bond. In addition to that starch contains amylopectin structures consisting of approximately 20 glucose units with α-1,6 branching in amylose chains. Chemical modification of the starch is realized for many different applications in nutritional purposes, surface adsorption and water regulation. The -OH groups of glucose monomers in the starch structure play an important role for the hydrogen bonding, covalent modification and hydrolysis condensation reactions. From this perspective, Si quantum dots which were synthesized by sol-gel technique, was interacted with starch molecules. During the synthesis of Si quantum dots hydrolysis and condensations reactions take place forming a surface modified Si quantum dots emitting a well defined visible light detected by photoluminescence measurements. Chemically modified starch shows visible light emission which was confirmed by photoluminescence peaks and Fourier transformed infrared spectrums. Obtained fluorescence materials can be utilized for food nanomaterial applications such as food barcods, fluorescence sensors and exceptional starch based applications.

KEYWORDS - Modified Starch, Fluorescence, Quantum Particle, Food Nanomaterial

ENHANCED CATALYTIC ACTIVITY OF SURFACTANT ASSISTED NI B CATALYSIS FOR HYDROGEN GENERATION

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ABSTRACT

The aim of this study is to prepare Ni-B catalysts with different amount of surfactant and investigation of surfactant effect on the catalytic activity for hydrolysis reaction of sodium borohydride (NaBH4). The catalytic activity of both catalysts is tested for hydrogen generation through hydrolysis of alkaline sodium borohydride solution. The effect of surfactant as stabilizer agents on size, morphology and catalytic activity were investigated. For the characterization of catalysts, UV-Vis, XRD, SEM and particle size techniques were used. According to UV-Vis spectrum, it was observed that the addition of surfactant cause formation various complex structures. The addition 25 µlt surfactant-stabilized into Ni-B catalyst shows the best catalytic activity at 338 K because of prevention of agglomeration. Moreover, the maximum HGR from NaBH4 hydrolysis using a surfactant was found as a 6337.85 ml.dak-1.g-1cat. In addition, SEM images and particles sizes results clearly show that addition of surfactant hinders particle agglomeration and therefore, higher surface area obtained. In addition, the effects of the concentration of NaBH4, NaOH and the reaction temperature on catalytic activity of Ni-B have been studied for the hydrogen generation rate. It has been also found that the activation energy of the hydrolysis for surfactant-stabilized Ni-B catalysts is lower than the Ni-B catalyst.

KEYWORDS - Hydrogen, Sodium borohydride, Surfactant, Hydrolysis

FABRICATION OF COPPER CENTERED METAL ORGANIC FRAMEWORK AND NITROGEN SULFUR DUAL DOPED GRAPHENE OXIDE COMPOSITE AS A NOVEL ELECTROCATALYST FOR OXYGEN REDUCTION REACTION

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ABSTRACT

Today, the most common catalyst used for Oxygen Reduction Reaction (ORR) at the cathode side of fuel cells, is the rare and expensive platinum metal. The main focus of this study is to synthesize a free – platinum electrocatalyst for ORR applications. For this purpose, the Copper - centered Metal Organic Framework (Cu - MOF) is selected as electrocatalyst. The electron conductivity of MOFs is low. So, in order to enhance the ORR kinetics and conductivity, for the first time, Nitrogen and Sulfur Dual-Doped Reduced Graphene Oxide (NS - RGO) with different concentrations are incorporated into the Cu – MOF structure. For evaluating the structural properties and morphology of synthesized electrocatalysts, six important characterization techniques are employed. Also, in order to assess the durability and ORR activity, the electrochemical measurements are performed. The electrochemical tests are implemented by using the Rotary Disk Electrode (RDE) device. The best ORR activity is related to the 8% NS – RGO - Cu – MOF. The onset potential and electron transferred number (n) of this catalyst are obtained to be -0.06 V vs Ag/AgCl and 3.53, respectively. In other words, it tends to favor the 4e- pathway for oxygen reduction reaction. Finally, the electrochemistry activity of synthesized electrocatalysts is compared to the previous investigations and commercial 20 wt% Pt/C. It can be concluded that the incorporation of carbon-based materials and MOFs has an outstanding ORR performance, and can be replaced with the platinum-based catalysts.

KEYWORDS - Oxygen Reduction Reaction; MOF; Reduced Graphene Oxide; Fuel Cell; Electrocatalyst

CARBON DERIVATIVE SUPPORTED TRIPLE METAL ELECTRO SENSOR FOR CITRIC ACID DETECTION IN FOOD SAMPLES

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ABSTRACT

A PdRuCr-based sensor that detects the citric acid (CA) preservative in different foods has been developed. Carbon nanotube (CNT) based PdRuCr catalysts were synthesized by sodium boron hydride (NaBH4) method. The activities of the electrocatalysts were carried out using electrochemical measurements such as cyclic voltammetry (CV) and differential pulse voltammetry (DPV) methods. It was studied by adding Cr in different proportions to the structure for PdRuCr / CNT, which is a three metal catalyst. The ratio of adding Cr to the three metal catalyst was determined to be 7%. The concentration study was carried out between 0 and 10 mM. The optimum concentration for citric acid was determined as 5 mM. Scan rate was carried out to determine the reaction mechanism. Analytical characterization of the electrocatalyst was determined using the differential pulse voltammetry technique for the specification limit and sensitivity values of each preservative. The lowest limit ranges (LOD) and senstivity were determined for citric acid (CA), the specification limit values of the sensors in ppm were calculated as 2.16 mgL-1 and 3392,958 µA/mM.cm2, respectively. Analyzes were performed on different foods for CA preservative. These different foods: grape vinegar, grape vinegar and orange soda.

KEYWORDS - Citric Acid, Electro-Sensor, Food Sensor

EFFECTS OF ACTIVATED CARBON SUPPORTED PD RU CATALYSTS ON HYDROGEN PRODUCTION

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ABSTRACT

Because of the growing concerns over the depletion of fossil fuel supplies,environmental pollution and global warming caused by a steep increase in carbondioxide and other greenhouse gases in the atmosphere, much attention has been givento the development of renewable energy sources that are the only long-term solutionto the energy requirements of the world's population, on the way towards a sustainable energy future. Hydrogen has been considered as a clean andenvironmentally benign new energy carrier for heating, transportation, mechanicalpower and electricity generation. However, the lack of effective, safe, and low-costhydrogen storage materials for mobile, portable, and stationary applications is one of the major hurdles to be overcome for the implementation of hydrogen economy. The purpose of this study is to produce hydrogen by using activated carbon (AC) supported palladium, ruthenium and cobalt nanoparticle (PdRu@AC) catalysts were prepared by in situ reduction of sodium borohydride (NaBH4). In this study uses defferent catalyst, because they do have more accuracy to get more production in the same time to get enough production in the minimum time however try to increase more effeciancy which make a good value for the economy and try to use different style.

KEYWORDS - Ammonia Borane, Palladium, Ruthanium, Activated carbon, Hydrolysis

PHOTOLUMINESCENCE PROPERTIES OF TETRANUCLEAR CUBANE LIKE NI II COMPLEXES

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ABSTRACT

Purpose: Ni(II) compounds have attractive properties as efficient electron transport and light emission, higher thermal stability, and ease of sublimation. So, these compounds have attracted much attention for optoelectronic applications such as organic light-emitting diodes (OLED), lasers, transistors, and fluorescent sensors. So far, several compounds in M4O4 motifs (M = Mn, Co, Cu, Zn) have also been investigated their structural, magnetic and photoluminescence properties. But, a study on the photoluminescence properties of cubane-like Ni(II) compounds has not been found in the literature. This deficiency led us to our current research. In this work, we have been synthesized new cubane-like Ni(II) complexes (1 and 2) with the solvothermal method. Structural, spectroscopic and photoluminescence properties of both Ni(II) complexes have been determined. Methods: The Schiff base ligand H2L1, [2-((E)-(2-hydroxyethylimino) methyl)-4-chlorophenol], was synthesized by mixing 5-Chlorosalicyaldehyde and ethanolamine according to the method used previously. H2L2, N-(2-hydroxyethyl)-5-metoxysalicylaldimine), was prepared in a similar way using 2-hydroxy-5-methoxybenzaldehyde. Complex 1 and 2 were prepared using Ni(II) acetate monohydrate (0.248 g, 1 mmol) in 30 cm3 of hot methanol to the suitable ligand (H2L1 and H2L2) (1 mmol) in 40 cm3 of hot methanol. The resulting solutions were then added 0.5 mmol Et3N. The green mixture was stirred for 20 min at 65 °C and allowed to stand at room temperature for a couple of weeks. After two weeks, green crystals of 1 and 2 were obtained. Results and Conclusion: In this paper, two cubane-like nickel (II) complexes (1-2) were prepared by solvothermal method using tridentate Schiff base ligands and the photoluminescence properties of 1 and 2 were investigated in solid form at room temperature. The solid-state emission spectra of the ligands (H2L1, H2L2) and their cubane-like Ni (II) complexes (1, 2) were compared. When the H2L1 is excited at 349 nm, it showed an emission maximum at 506 nm, which is shifted to 483 nm upon binding to nickel ions. The ligand H2L2 exhibited an emission maximum at 531 nm, which is shifted to 514 nm upon binding to nickel ions. This decrease in the excitation intensity of the ligand is due to the formation of the coordination complexes of the O and N atom in the ligands with the nickel ions. These emission bands are assigned to the $n\rightarrow\pi^*$ or $\pi\rightarrow\pi^*$ electronic transition (ILCT). While both ligands show a different toned green emission peak, this peak in complexes is shifted to blue compared to their free ligands which are mainly due to originating from the influence of the coordination of the metal to the ligand. In the visible regions, intense mint-green emission for 1 and neon-green emission for 2 have been exhibited under the excitation of UV light at λex= 349 nm. Also, the photoluminescent properties of 1 and 2 can be shown as a hopeful green light-emitting diode for flat panel displays applications in developing optical and electronic materials.

KEYWORDS - Cubane-Like Ni(II) Complexes, Photoluminescence Properties

FABRICATION OF LUMINESCENT DY PVP AND HO PVP COMPOSITE NANOFIBERS BY ELECTROSPINNING

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ABSTRACT

Purpose: Luminescence characteristic of lanthanide-based complexes is a well-known phenomenon which originated from their 4f orbitals, resulting in high quantum efficiency, strongly sharp emission bands, high luminescence intensity, good color purity, line-like emissions in the visible and near-infrared region and long luminescence. The incorporating of rare earth complexes in the polymer matrix allows a number of new materials to be obtained, making them applicable in a wide variety of new technologies. However, polyvinylpyrrolidone (PVP) with strong affinity of the pyridine group to metals and ability to undergo hydrogen bonding with polar species is known as one of the most attractive polymers. In order to contribute to material science and nanofiber production technology within the scope of this study, polymer-based Dy- and Ho-Polyvinylpyrrolidone nanofibers (Dy@PVP, Ho@PVP) were produced by using electrospinning production method. Methods: {[Ln(2-stp)2(H2O)6].2(4,4'-bipy).5(H2O)} materials were produced via a hydrothermal method. Inside a 45 mL Parr acid reactor we mixed 1 mmol of 4,4'-bipy, 1 mmol of 2-NaH2stp and 1 mmol of Dy(NO3)3.xH2O or HoCl3.6H2O and H2O (ca. 20 mL). The reactor was then placed inside a MEMMERT micro temperature-control oven. The desired reaction took place at 120 °C for 5 days. Dy(III) (orange) and Ho(III) (pink) single crystals were collected and washed with distilled water. In order to contribute to material science and nanofiber production technology within the scope of this study, polymer-based Dy- and Ho-Polyvinylpyrrolidone nanofibers (Dy@PVP, Ho@PVP) were produced by using electrospinning production method. The electrospun Ln@PVP (Ln=Dy and Ho) nanofibers were prepared from suspensions of 10 wt.%, 15 wt.%, and 20 wt.% {[Ln(2-stp)2(H2O)6].2(4,4'-bipy).5(H2O)} materials and their mixtures in 15% (wt/wt) Etoh solutions of PVP, under constant stirring for 12 hours at room temperature. The suspensions were sonicated for 30 minutes and transferred to 5 ml syringe with an inner diameter of 0.37 mm. A high voltage (13 kV) was applied to the end of stainless-steel needles and the nanofibers were collected onto aluminum foil fixed on the metal anode plate at a distance of 19.0 cm. Results and Conclusion: Two series of new luminescence composite nanofibers of {[Dy(2-stp)2(H2O)6].2(4,4'-bipy).5(H2O)}@PVP (Dy@PVP) and {[Ho(2-stp)2(H2O)6].2(4,4'-bipy).5(H2O)}@PVP (Ho@PVP) at different concentrations has been successfully obtained by electrospinning. Morphology and photoluminescence properties of the composite nanofibers have been reported. The average diameters are in the range of 160 to 250 nm for Dy@PVP nanofibers and 700-950 nm for Ho@PVP nanofibers, respectively. Because of the modification of the PVP matrix, the thermal and photo stability of the composite nanofibers became much better than those of the pure complexes. Dy/Ho@PVP nanofibers show potential applications in light-emitting material design, as good morphology, enhancing photoluminescence emission and color tunability from orangish-yellow/yellow in bulks to near-white luminescence in nanofibers has been achieved. Acknowledgement: This work was supported by the Scientific Research Projects Coordination Unit of Balikesir University (BAP–2020/008).

KEYWORDS - Electrospinning; Luminescent nanofibers

BALL MILLED SILICON CARBIDE HYDROXYAPATITE COMPOSITES FOR TETRACYCLINE ADSORPTION

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ABSTRACT

The aim of this study is to examine the effects of SiC HA composites synthesized by mechanical alloying method on tetracycline absorption. According to XRD studies, it has been observed that the composite containing 40% hydroxyapatite and 60% silicon carbide successfully absorbs tetracycline. The effects of hydroxyapatite loading amount, solution pH and contact time were investigated by batch experiments. The data obtained are explained with isotherms and kinetic models.

KEYWORDS - SiC-HA, Tetracycline Adsorption, Ball Milling, XRD.

A GAS SENSOR DESIGN AND SIMULATION WITH ZNO AND TIO2 SENSING LAYERS

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ABSTRACT

Micro Electro-Mechanical System (MEMS) based devices offer innovative approaches in sensor technologies with the advantages of high efficiency and miniaturization. The most important stage in the development of new generation MEMS-based devices is the design and optimization stage. However, device design and optimization processes are developed in a laboratory by empirical approaches. This causes time loss and creates an unnecessary waste of resources. In this study, it is aimed to design and analyze two gas sensors based on ZnO and TiO2 sensing layers. Electro-thermal analysis of the sensor structure was carried out at room temperature and high temperature (294,15K-573,15K) and heat transfer parameters were compared. According to the simulation results, it is obtained that, as the applied temperature increases to the sensor, the temperature over the sensing layer increases linearly. It is compatible with the literature. The temperature on the ZnO surface increases to three times the TiO2 surface temperature. The heat transfer results obtained will be used as a guide for device design and optimization in future works. In this way, as a result of numerical analysis, a MEMS-based device will be produced with high accuracy. Thus, time and resources will be saved.

KEYWORDS - Gas Sensor; Sensing Layer; Finite Element Method (FEM); Heat Transfer

DEVELOPMENT OF A MICROPROCESSOR CONTROLLED AUTOMATIC TIMER DEVICE FOR THE VERTICAL FLAME PROPAGATION TEST CABINET OF ELECTRICAL CABLES

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ABSTRACT

In this study, a temperature-triggered microprocessor controlled timer device has been developed for the test cabinet in which the vertical flame propagation rate of electrical cables is tested within the scope of the IEC 60332-1-1 standard. During the vertical flame propagation test for cables in the IEC 60332-1-1 standard, it is necessary to measure whether the flame temperature for the cabinet reaches from 100 ± 5 ° C to 700 ± 3 ° C in 46 ± 6 seconds. The time measurement in the existing test cabin is made by the operator, which is not suitable for ISO / IEC 17025 laboratory accreditation. Enda EM4401 model timer and Enda EM 4420 model PID temperature control device are used for time control in the developed device. As a result, with the developed microprocessor controlled automatic time counting device, the vertical flame propagation speed can be measured with automatic digital indicators in the test cabin within the company. The device to be developed will facilitate and refine the verification process that needs to be done before the experiments. Thus, human errors are prevented at low cost, and the tests in the vertical flame resistance test cabin have been made acceptable by accreditation bodies.

KEYWORDS - Power Cable, Vertical Flame Propagation Test Cabinet, Microprocessor Pid Control, IEC 60332-1-1, ISO / IEC 17025

TYPE 2 FUZZY INITIAL VALUE PROBLEMS AND ITS APPLICATION TO MECHANICAL VIBRATIONS

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ABSTRACT

In this study, we have firstly given the definition of perfect triangular type-2 fuzzy number and its (alpha, beta)-cuts as defined in [1, 2]. By using this (alpha, beta)-cut definition we have defined the basic algebraic operations for perfect triangular type-2 fuzzy numbers by using interval arithmetics. And then we have introduced our proposed algorithm in [1] to find the solution of the second order initial value problem with type-2 fuzzy environment by using Zadeh''s extension principle. Finally we have applied the algorithm to type-2 fuzzy initial value problems modelling mass-spring systems in free vibration, damped mass-spring systems in free vibration and forced mass-spring systems.

KEYWORDS - Second Order Differential Equations, Type-2 Fuzzy Sets, Zadeh's Extension Principle, Mechanical Vibration

INVESTIGATION OF EFFECTS OF BORON ADDITIVES ON THE PERFORMANCE OF CAM MECHANISMS

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ABSTRACT

The use of additives in the contacting surfaces is essential for the formation of a thin lubricant film, which separates the moving surfaces from each other. Boron compounds, in particular, are very helpful for the sliding surfaces. The aim of the investigation is to clarify how the boron additives influence the lubricating ability of the engine oil using in the sliding contact of the cam-follower. In this study, the considerable results in the tests of engine oil with boron compounds and with base oil are obtained. And also, the influences of the minimize interface friction has been observed under different test conditions.

KEYWORDS - Oil Additives, Internal Combustion Engine, Lubricant, Boron Compounds; Friction Coefficient, Boric Acid, Boron Nitride

INVESTIGATION OF EFFECTS OF WAVY LEADING EDGE ON FLOW AROUND A NACA 0020 AIRFOIL

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ABSTRACT

An experimental study is carried out to investigate the effects of leading-edge tubercles on NACA 0020 airfoil at Re = 63000. Force measurements are carried out with the help of a load cell at different angles of attack between 0-30 degrees. Tubercle parameters are selected as a = 0.05c and λ = 0.5c for M1 and a = 0.025c and λ = 0.5c for M2. M2 and M1 tubercle models produce 143% and 110% more lift than the baseline model at α = 10°, respectively. They also postpone the stall with the help of tubercle geometry and change the common stall characteristics of the baseline model. The airfoil with leading-edge tubercle showed better lift performance as compared to the baseline airfoil at the post-stall region.

KEYWORDS - NACA 0020, Lift Coefficent, Drag Coefficient, Tubercle

EFFECTS OF CAMELINA BIODIESEL BLENDS WITH EURODIESEL ON VEHICLE PERFORMANCE

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ABSTRACT

Most of the world's energy needs are met from fossil sources. However, gases released by the gradual decline of fossil resources and the burning of fuels from these sources have negative aspects such as environmental pollution, acid rains or global warming. Due to such negative effects, studies are being carried out on alternative energy sources. Eurodiesel fuel used in diesel engines is the main source of energy for transportation and freight transportation. Biodiesel made from oils are important alternative fuels for diesel engines. In this study, camelina oil was used as a biodiesel raw material. Biodiesel production has been done by transesterification method. Biodiesel fuel obtained from camelina oil was mixed with diesel oil at the rate of 7% (B2), 20% (B20) and 50% (B50). Biodiesel-eurodiesel blends, four-stroke, four-cylinder, common-rail fuel system turbo-diesel engine, engine performance values were investigated on the chassis dynamometer. Looking at the results of the experiments, the highest engine moment among all fuels was obtained in B7 fuel at 80 km / h and engine power value at 160 km / h. The test results were compared with 100% eurodiesel fuel and interpreted, considering the performance values under different operating conditions.

KEYWORDS - Biodiesel, Camelina, eurodiesel, chassis dynamometer, vehicle performance

A LOW COST SOLUTION FOR PLASMA GENERATION AND SURFACE TREATMENT

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ABSTRACT

In this work, practical and low-cost surface plasma treatment strategies are investigated. First, a consumer grade microwave is modified to obtain plasma in vacuum. Second, a high voltage generator is made into a hand-held device to form a portable and functional plasma generation source. The second approach is evaluated in terms of surface modification capability by treating different surfaces. Then, the surface treatment capacity is tested using contact angle measurements. It is found that, surface chemistry of various polymeric and ceramic surfaces can be changed based-on the changing contact angles which indicates a superhydrophobic to hydrophilic transition after plasma treatment.

KEYWORDS - Surface Treatment, Surface Modification, PDMS Bonding, Contact Angle, Plasma Generation

FREE VIBRATION ANALYSIS OF ASYMMETRIC SANDWICH STRUCTURE WITH ANSYS

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ABSTRACT

Asymmetric sandwich structure is a new construction method in which face sheet is no longer made from same materials. Thanks to this configuration, it gives more choice to designer to obtain desired properties in sandwich structures by changing or mixing the face sheet materials. This study presents the free vibration analysis of asymmetric sandwich structures comparatively. Sandwich structures were constructed and solved by using commercially available software ANSYS. Free vibration behavior of asymmetric sandwich structure was evaluated by comparing it with symmetric sandwich structures. Finite element method was used to analysis the free vibration analysis of sandwich structure. The first six modes of sandwich structures were obtained. It was obtained from analysis that as the face sheet changes the natural frequencies also change. The analysis showed that asymmetry has effect on natural frequencies of sandwich structure.

KEYWORDS - Sandwich Structures, Low Density Sandwich Structures, Asymmetric Sandwich Structures, Vibration Analysis

HEAT CONVECTION ANALYSIS OF NANO FLUID IN AN ANNULUS CAVITY WITH HEATING FROM DIFFERENT ANGLES

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ABSTRACT

Natural heat convection of nanofluid in a horizontal annulus cavity exists in several Engineering applications. Nowadays, development in direct absorption solar collectors requires further realize of heat transfer occurs in annulus cavity when it is subjected to heating from different angles. Since the cavity is horizontal, two-dimensional model for the cavity is numerically analyzed by using Fluent-Ansys. The external wall of the cavity is equally divided into six elements to simulate heating from isothermal walls set in different angles. The internal wall works as the heat sink with isothermal temperature since practically forced fluid pass through it to gain the useful heat targeted from this system. Isothermal heated wall position is selected in different cases by heating different elements named according to their positions. The cases include upper, lower, right-upper, right-lower, upper & right-upper, lower & right-lower, upper-half, and lower-half positions to investigate heating effectiveness according to element position. It is found that heating from lower element or from right-lower is six time better than heating from upper element. In addition, heating improves in the case of heating of right-lower compared with that of lower heating. Heating from two or three elements of upper half shows less effectiveness compared with heating of two or three elements from the lower half. Expanding of heating area does not reflect multiplication of heat transfer amount, the motion of fluid from two sides upward may result in clash between the two streams and reduce the free convection affect. In conclusion, selecting the appropriate angle of heating in annulus cavity more effective than increasing area of convection.

KEYWORDS - Direct Absorption Solar Collector, Annulus Cavity, Nano-Fluid, Natural Convection

EFFECT OF HYDROTHERMAL PRETREATMENT ON FUEL PROPERTIES OF COAL BIOMASS BLEND

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ABSTRACT

Hydrothermal pretreatment is an effective method used to improve the fuel properties of both lignocellulosic biomass sources and low-quality coals. In the present study, firstly, hydrothermal pretreatment was applied to wood sawdust and Soma lignite individually, and the optimum conditions (reaction temperature and reaction period) were determined. Then, hydrothermal pretreatment was applied to blend consisting of 50% Soma lignite and wood sawdust by weight under the determined optimum conditions (90 min, 230 °C). After hydrothermal pretreatment, the heating value increased both in the raw samples (Soma lignite and wood sawdust) and in the blend. Based on results, the highest increase in heating value was 22.7% (90 min, 230 °C) for wood sawdust and 13.2% (90 min, 220 °C) for lignite. While only dehydration was observed during hydrothermal treatment of raw samples, decarboxylation was also seen along with dehydration in the Soma lignite-wood sawdust blend. After hydrothermal pretreatment, while ash, volatile matter, hydrogen and oxygen content decreased, carbon content increased in all samples. The hydrothermally pretreated lignite-wood sawdust mixture (50% by weight) had 13.20% higher heating value and 19.65% less ash compared to the mixture of individually hydrothermally treated wood sawdust and lignite (50% by weight). It was found that the ignition temperature and the burn-out temperature of the hydrothermally treated lignite-wood sawdust blend were between the respective temperatures of the raw materials forming the blend. The ignition temperature of the hydrothermally pretreated lignite-wood sawdust blend increased by 7 °C compared to the raw blend and the burn-out temperature decreased by 10 °C compared to the raw blend.

KEYWORDS - Hydrothermal Treatment, Low-Quality Lignite, Coal-Biomass Blends, Combustion Characteristics

MECHANICAL ANALYSIS OF NANO BORON NITRIDE DOPED ADHESIVE JOINTS

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ABSTRACT

The new generation nano-composite materials enhanced with using nanoparticle has started been used in many areas due to increase in mercantile value of the material and it's versatile and long-lived texture. Boron-containing products follows an increasing course in the space and aviation industry by increasing up to the durability of the materials by extending the lifetime of the materials. The boron nitride (BN) nano particles called white graphene has superior chemical, electrical and thermal properties. In this research; Mechanical properties of adhesively bonded joints were investigated using two different adhesive material modified with hexagonal BN nanoparticles. In this context; nano adhesives have been produced by adding BN nanoparticles in different proportions (%0.5, %1, %2, %3, %4 and %5) in adhesives (Araldite 2011 and Hexion MGS-L285). With these adhesives, single lap joints aluminum AA2024-T3 were produced according to the ASTM D1002 standard and their mechanical properties under tensile load were examined experimentally. It has been observed that with addition of the BN into the adhesive material, the damage load of the bonding joints increases depending on the contribution rate. Also; distribution of the boron nitride nanoparticles in the adhesive material was investigated with using a scanning electron microscope (SEM-EDS).

KEYWORDS - Boron Nitride, Epoxy, Nanoparticle, Polymer, Adhesive Bonding Joints

INVESTIGATION OF STRUCTURAL PROPERTIES OF BORON CARBIDE REINFORCED EPOXY ADHESIVES

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ABSTRACT

Research, conducted in recent years, has shown that boron compounds, in particular, can be an important type of reinforcement in improving the mechanical and thermal properties of polymer materials. Within the scope of this study presented, the effect of nanoparticle reinforcement ratio in adhesives, new adhesive samples were prepared by adding different proportions (0%, 0.5%, 1%, 2%, 3%, 4% and 5%) of nano hexagonal boron nitride particles into two different epoxy adhesives. The prepared samples were characterized by Fourier Transform Infrared Spectroscopy (FT-IR) and Scanning Electron Microscopy Energy Disperison X-Ray Sepctroscopy (SEM-EDS) techniques. SEM-EDS images show that the nano-reinforcement material is dispersed in the polymer matrix, but as the reinforcement ratio increases, it cannot sufficiently adhere to the polymer network. Structural analysis based on FT-IR spectra show that the permeability values decrease in peak intensities due to the increase in the reinforcement ratio. As a result of the obtained findings, it is recommended to make modifications to nano h-B4C particles for adhering to polymer network

KEYWORDS - Adhesive, Boron Carbide, Epoxy, Nanoparticle, SEM-EDS

NUMERICAL INVESTIGATION OF THE EFFECT OF CHANGE OF OVERLAP TIP GEOMETRY ON STRENGTH IN TUBULAR ADHESIVE JOINTS WITH STRESS AND FAILURE ANALYSIS

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ABSTRACT

The use of adhesive joints is increasing due to the significant advantages it provides. One of the important advantages of adhesive joints is that it does not require any drilling in the parts to be joined and can easily combine different materials. It is possible to increase the strength of the bonding connections, especially with the design changes to be made in the bonding area. In this study, using ANSYS finite element software, pipe bonding joints models with different overlap end shapes were created. Then, stress and damage analyzes were made to investigate the effect of different overlap end shapes on the bond strength. The maximum stress theory defined in the ANSYS program was used to find the finite element failure loads of the modeled bonding bonds. As a result of the analyzes, significant strength increases were calculated according to the reference model. The strength increase in Mod-3(inside taper) and Mod-4 (inside recessing) was found to be 36% and 41 %, respectively, relative to the reference model.

KEYWORDS - Tubular Adhesive Joints; Overlap Tip Geometry; Stress Analysis; Failure Analysis

DYNAMIC SIMULATION OF PARABOLIC TROUGH COLLECTOR INTEGRATED WITH TWO STAGE ORGANIC RANKINE CYCLE BY EES AND TRNSYS SOFTWARES

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ABSTRACT

The organic Rankine cycles (ORC) are known as the reliable and low-temperature cycles. Also, solar energy is broadly considered one of the most exciting renewable energy for the future. So, the combination of the ORC and solar energy for producing electricity can lead to reducing fossil fuel consumption and diminish CO2 emissions. Since the intensity of the solar radiation is different during a day, for precisely examining the performance of the system, the simulation should be done dynamically. In this regard, in this paper, the transient performance of the parabolic trough collector (PTC) cycle, which is combined with the two-stage ORC, is assessed. The main components of the system are PTC, a thermal storage system, ORC, auxiliary heater, and a controller, which shuts off the pump of the solar cycle when the radiation is low. Engineering Equation Solver (EES) and Trnsys software have been used to model the proposed system. The desired unit has been simulated during one year for a building which is located in Tehran. The results show that the energy efficiency of the whole cycle, which is used R245fa and R134a as the organic fluid, is 13.18%. Also, the highest energy efficiency and the solar fraction of the cycle occur in Jun with 13.28% and 73.46%, respectively, for the base case. The effect of the collector area, the storage tank volume, and the setpoint temperature of the auxiliary heater has been investigated on the performance of the system.

KEYWORDS - Solar Energy, Solar Collector, Power Generation Cycles, Organic Rankine Cycle

A RESEARCH ON THE DOOR LOCK SYSTEM OF ARMORED MILITARY VEHICLES USING HYDRAULIC AND PNEUMATIC COMPONENTS TO WORK COUPLED WITH HIGH STRENGTH STEELS

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ABSTRACT

In this study, a research has been carried out on a locking system that minimizes external vibrations and impacts in 4x4, 6x6, 8x8 armored vehicles in the automotive and defense industry. The parts used in the system are supported by high-strength steels and a new lock mechanism design is envisaged where the hydraulic piston and pneumatic piston are used at the same time. Static and dynamic parameters that may occur under external forces that the vehicles are exposed to will be foreseen. Static structural analysis will be performed using ANSYS software. The results and design suitability will be compared with the studies in the literature.

KEYWORDS - Lock Mechanism, Military Vehicle, Hydraulic And Pneumatic Component, Static Analysis, Design Parameters

INVESTIGATION OF EFFECTS OF SURFACE ROUGHNESS ON THE PERFORMANCE OF CAM MECHANISMS

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ABSTRACT

The surface roughness of two contacting surfaces significantly influences the tribological performance of the mechanical elements. Their impression is more pronounced under the mixed elasto-hydrodynamic lubrication condition. The cam and flat follower mechanism is a typical sample in which adverse tribological conditions, including direct boundary interactions occurs. In this study, effects of surface roughness on the friction force and friction coefficient are investigated using engine oil at different test conditions in a cam follower mechanism. It is seen that decreasing roughness of the contact surfaces has a more desirable tribological performance, and decrease friction coefficient, therefore increase wear resistance.

KEYWORDS - Surface Roughness, Friction Coefficient, Combustion Engine Oil, Friction Force, Cam, Follower

3D NUMERICAL ANALYSIS OF DIRECT ABSORPTION AND NATURAL CONVECTION OF NANO FLUID IN AN ANNULUS CAVITY

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ABSTRACT

Natural convection of still nano-fluid heated by direct absorption from solar radiation in a concentric annuls cavity is analyzed for radius ratio (Rout/Rin) equal 2.0. The model simulates absorption of solar arrays incident from different angles on the annuli tube through semi-transparent external wall. Radiation arrays cross model boundaries from different angles; 90o, 45o, 0.0o, -45o, and -90o. Isothermal cold wall works as heat sink in the internal side of the annulus. Oil-based nano-fluid with volume fraction of 0.05% is selected to simulate high absorptivity and normal thermal conductivity medium. Numerical simulation results arranged in term of isotherms, velocity contours, and quantitative tables and discussed adequately. Comparative investigations for Nusselt number, average temperature, heat sinking, and maximum velocities conducted and interpreted according to pattern of flows of different cases. Radiation incident horizontally shows smooth pattern of flow, better distribution of temperature, and more effective heat transfer. Cavity filled with oil fluid is also tested for previous conditions to understand the role of existing of nanoparticles on flow patterns.

KEYWORDS - Direct Absorption, Solar Collectors, Annulus Cavity, Natural Convection, Nano-Fluid.

INFLUENCES OF DEFECTS AND TEMPERATURE ON THERMAL CONDUCTIVITY OF MOS2

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ABSTRACT

In recent years, two-dimensional nanomaterials have received remerkable attention due to their high physical properties. In this study, the thermal properties of molybdenum disulfide (MoS2) structure are examined in detail, using molecular dynamics (MD) simulations. According to the results of MD simulations, this structure has high thermal conductivity. The thermal conductivity of MoS2 structure are also investigated at four various temperatures between 300 K and 900 K. MD simulations results indicate that the thermal conductivity of this structure gradually decrease with increasing temperatures due to greater phonon population and correspondingly greater phonon-phonon scattering rates. Various types of structural defects occurs during the production process and so these defects affect the physical properties of these structures adversely. Accordingly, the effects of two different S atom types vacancy defect on the thermal conductivity of MoS2 structure were investigated. The existence of vacancy defects in MoS2 structure decrese the thermal conductivity significantly by increasing the concentrations of defects. The type of S atom bi vacancy defect exerts more influence on the thermal conductivity than the type of S atom single vacancy defect do with increasing concentrations.

KEYWORDS - MoS2 Structure, Molecular Dynamics, Thermal Properties, Defects

A NOVEL ROLLFORM DESIGN STUDY WITH AHSS FOR RUPD ACCORDING TO ECE R58 REGULATION

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ABSTRACT

Under-riding of passenger vehicles is too much significant to evaluate and develop the design of a truck chassis due to that when there is a collision, the smaller vehicle easily slides under the truck. Rear Underride Protection Device (RUPD) plays an important role on avoiding under-running of vehicles from front side of a truck. An explicit finite element software has been used for RUPD analysis to investigate impact loading according to ECE R58 Regulation. The deformation of RUPD bar and plastic strains in RUPD components are determined in the impact analysis for predicting failure of the system to meet the compliance requirements for regulation. Additionally, failure analysis of the RUPD attachment points with chassis is determined.

KEYWORDS - Rollform Design, Rear Underride Protection Device, Chassis Design, Impact Loading, Advanced High Strength Steels

VERIFICATION OF OXYGEN FREE HIGH PURITY COPPER BAR COMPUTATIONAL IMPACT ANALYSIS WITH HAWKYARD ENERGY APPROACH

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ABSTRACT

A finite length cylindrical bar of an oxygen free high purity copper cylindrical bar impact on a rigid anvil is studied by using finite element method. Johnson-Cook plasticity is employed in terms of the material model. Simulation time is based on the time when the kinetic energy reaches zero. Mesh gradation is performed in order to represent the accuracy of the studied model. Computational cost in terms of CPU time and wall clock time with respect to corresponding time steps are evaluated accordingly. Comparison of the final profiles of cylindrical bar including mushrooming effect is realized by referring the previously published studies as well. The average error, which considers final length, final diameter, and final bulge width of the bar, is computed regarding the test values. Analytical deformation analysis is performed using Hawkyard's energy approach rather than Taylor's approach. Use of the global energy balance instead of the local momentum balance at the plastic front and use of true strain rather than engineering strain brought notable improvements in large deformation cases.

KEYWORDS - Computational Analysis, Finite Element Method, Impact Mechanics

EXPERIMENTAL DESIGN OF TWISTED TAPES TO INCREASE HEAT TRANSFER IN TURBULENT FLOWS IN PIPES

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ABSTRACT

Enhancing heat transfer surfaces are utilized in various engineering applications such as heat exchanger, air conditioning, chemical reactor, and refrigeration frameworks. Henceforth numerous methods have been explored on the improvement of heat transfer rate and decline the size and cost of including equipment particularly in heat exchangers. These methods are classified as active and passive methods. The active procedure necessarily used external power while the passive procedure does not require any external power. The passive strategies are significant compared with the active strategies due to the twisted insert tapes manufacturing process is simple and can be easily employed in an existing heat exchanger. In this study, the effect of twisted tapes with rectangular jagged that placed (TT-RJ) in the center of the pipe on heat transfer and flow characteristic in turbulent flow in pipes were investigated experimentally in the range of Reynolds number (Re) 5800-20500 (based on the inner diameter, D). First, all experiments were accomplished under forced convection and constant heat flux operating conditions. The positive and negative effects on the heat transfer of the surface formed by the twisted tapes with rectangular jagged (TT-RJ) that is located in the circular axis and the turbulence of the surface have been observed. The data obtained from the experimental study; Variations of Nusselt Number (Nu) and friction coefficient (f) related to Reynolds Number (Re) were interpreted using empirical connections and tables. 9 different pieces of twisted tapes were used in this experiment. The wing-depth ratio (jugged depth ratio) (d/W) was varied from 0.1 to 0.3 while the tape twist ratio was kept constant at y/W = 5.0. The tube with twisted tape with rectangular jagged strip elements and the plane tube were also tested for assessment. The obtained results demonstrate that the utilization of the tubes with rectangular jugged strip element leads to the increases of both Nusselt number and friction contrasted with the plain tube. As a result, the TT-RJ with d/W = 0.3 yields the highest Nusselt number which is around 99% higher than that of the plain tube, relating to the thermal performance factor of 1.37 at steady pumping power.

KEYWORDS - Friction Coefficient, Heat Transfer Enhancement, In-Pipe Turbulent Flow, Twisted Tape With Rectangular Jagged

A FINITE ELEMENT BASED METHODOLOGY FOR FRICTIONAL ROLLING CONTACT PROBLEMS

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ABSTRACT

In this study, we develop a finite element (FE) based methodology to solve the frictional rolling contact problem between a rolling cylinder and a half-space. The developed methodology can be applied to solve the frictional rolling contact problems for cylindrical roller bearing problem. A three-dimensional (3D) explicit FE model is developed to simulate the rolling contact problem, and the contact stresses and contact widths are determined. It is assumed the half-plane is linearly elastic and static and kinematic coefficients of friction are constant throughout the analysis. The FE study focuses on determination of the contact stresses as a function of the value of external load and coefficient of friction. The results regarding the contact stresses, the in-plane component of the surface stresses and stick/slip distributions are presented. Various stick/slip distributions depending on different tractions applied to the rolling cylinder are determined though FE analyses. The FEA results are validated through analytical formulations. Finally, the roller-raceway interaction in the cylindrical roller bearing problems, and the wheel-rail interaction problems are used to demonstrate the developed methodology. This study provides a basis for more realistic 3D solutions to the cylindrical bearing problems.

KEYWORDS - cylindrical bearing, finite element method, normal contact solution, rolling contact, tangential contact solution

A REVIEW OF HYDROGEN PRODUCTION BY PHOTOCATALYTIC HYDROLYSIS OF AMMONIA BORANE

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ABSTRACT

Effective hydrogen production and storage constitute basis of the hydrogen economy. Ammonia borane features low molecular weight, high hydrogen capacity, nice stability, and ready availability, making them a promising candidate for chemical hydrogen storage. By using photocatalyst, it is possible to produce controlled and high efficiency hydrogen production in the hydrolysis of ammonia borane at room temperature in different condition (UV, daylight, indoor, and dark) environment. In this review paper, information about hydrolysis catalysts used as a photocatalyst in ammonia borane studies, and its photocatalytic hydrolysis mechanism is given. Although the hydrolysis studies of ammonia borane in UV environment have just started, it has attracted the attention of the researchers due to the results obtained.

KEYWORDS - Hydrolysis, Photocatalysis, Ammonia Borane, Hydrogen Production,Reaction mechanism

INTEGRATION OF EXERGY ANALYSIS AND TECHNO ECONOMIC OPTIMIZATION TOOL FOR THE EVALUATION OF HYBRID RENEWABLE SYSTEMS

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ABSTRACT

The main goal of this project is to propose a powerful decision-making process to evaluate the hybrid renewable configurations in various applications. To this end, for the first time, the two methodologies of HOMER Pro software and exergy analysis are integrated. In this study, techno-economic analysis for the rural electrification purpose is investigated. Accordingly, several combined energy systems consist of Photovoltaic panels (PV), Wind Turbines (WT), Battery banks (Bat), and Diesel Generator (DG) are techno-economically investigated. Also, to improve technical evaluation of suggested hybrid renewable systems, the detailed exergy analysis is conducted for each component and the whole system. The results illustrated that the cost of energy and net present cost of best scenario are 0.17 $/kWh and 168378 $, respectively. The overall exergy efficiency and exergy destruction rate of optimum configuration (PV/WT/DG/Bat) are accounted for 25.96% and 303206.86 kWh/year, respectively. Also, it was found that 88.68% of the overall exergy wasting occurred in the PV modules. Correspondingly, to diminish the exergy wasting of the system, utilization of different common solar tracker is examined. To investigate the cost-effectiveness of each proposed tracking system, the Cost-Effective Index (CEI) is defined. The more the CEI, the more the cost-effectiveness of energy configuration. The vertical tracking system with a capacity of 20.1 kW PV has the greatest value of CEI (13.49), as a result, this system is the most cost-effective option. By employing this configuration, the overall exergy efficiency increases to 32.14%, and the overall irreversibility rate reduces to 224054.14 kWh/year. Finally, the parametric sensitivity analyses regarding the economic factors, exergy parameters, and renewable resources are conducted to generalize the outcomes of this project to other rural areas.

KEYWORDS - Rural Electrification; Hybrid Renewable System; Exergy Analysis; Economic Analysis; Solar Tracking

IMPROVING THE NEUTRALIZATION PROCESS NANO NEUTRALIZATION

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ABSTRACT

The refining process is applied to most of the vegetable oils before they are offered for consumption. Neutralization is the first step in this process. Conventional neutralization is performed by applying an acid to the crude oil followed by the addition of diluted caustic. The purpose of the acid application is to convert the non-hydratable phospholipids in the oil into hydratable phospholipids. These acid and free fatty acids are neutralized thanks to the addition of caustic. The nano neutralization system using nano reactor for these processes is recently popular as a new technology. In this system, the crude oil is pumped into the nano reactor after acid treatment and caustic solution addition. Hydrodynamic cavitation occurs as a result of pressure changes in the nano reactor. The shock waves created by this cavitation break the weak bonds of non-hydratable phospholipids within milliseconds. It also ensures that the acid and caustic solution are mixed thoroughly. Acid usage is drastically reduced (up to %90) owing to the nano neutralization system. The significant reduction in acid consumption consequently enables savings in caustic usage (over %30). So, employing a nano reactor in vegetable oil refinery provides higher oil yield and quality compared to the standard neutralization.

KEYWORDS - Nano Neutralization, Nano Reactor, Oil Refining.

AN APPLICATION A JOB SCHEDULING PROBLEM FOR THE ASSIGNMENT OF ENGINEERS AT THE R D DEPARTMENT OF AN AUTOMOTIVE INDUSTRY COMPANY

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ABSTRACT

In this study, a parallel machine scheduling model is developed to minimize the total lateness and total completion time for the necessary modifications on the products according to the customer orders in an automotive industry company. In the model, the work schedule of engineers in the Research and Development (R & D) Department is considered to be able to respond to the rapidly changing customer demands flexibly. An Analytical Hierarchy Process (AHP) model is built up to determine the weighted values of total delay and total completion times in the developed mixed-integer programming model. For the application, a real data set is used, and the problem is solved by using the GAMS CPLEX software. In this assignment problem, 94%, 91%, and 98% improvement in the time of total completion, maximum tardiness, and the number of delayed jobs respectively are achieved by the use of the proposed model.

KEYWORDS - Parallel Machine Scheduling, Optimization, Mixed Integer Programming, Analytical Hierarchy Process.

EXPERIMENTAL STUDY ON PENETRATION AND PERFORATION BEHAVIOUR OF ALUMINUM HONEYCOMB SANDWICH STRUCTURES USING ENERGY PROFILING METHOD

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ABSTRACT

The honeycomb sandwich panels are being used in aerospace, automotive, railway and marine industries due to their high flexural strength, lightweight and energy absorbing capacity. This study aimed to investigate the penetration properties of the sandwich panels using low velocity impact tests conducted according to ASTM D7136 standard. The honeycomb core and skin of sandwich panels were fabricated from Aluminum alloy series 3005 H19 and 5754, respectively. The dimension of sandwich panel specimen is 100x100x20 mm and clamped from their 75x75 mm area. The projectile has 24 mm semispherical tip and mass of 20 kg. Sandwich panels was impacted at 25, 50, 75, 100, 125 and 150 J energy levels. Force-time data obtained from the tests and used for evaluating energy absorption capacity of sandwich panels. Energy profiling method was conducted to determine the penetration and perforation thresholds of sandwich panels under low velocity impact. Front and rear side view near the impact area in tests were investigated. It is found that 150 J energy level is the perforation threshold of sandwich panels. The study results show how the energy levels affect the penetration and perforation and provides useful knowledge for its applications in engineering.

KEYWORDS - Honeycomb Core; Energy Profile Method; Sandwich Panel

AN INVESTIGATION OF FACTORS AFFECTING MACHINABILITY OF MILLING TOOLOX 44 HOT WORK TOOL STEEL BY TAGUCHI METHOD

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ABSTRACT

In the study, the machinability of the Toolox 44 (44 HRc) hot work tool steel material, which is used in military land vehicles and produced as pre-hardened (with four different feed rates, four different cutting speeds and two different depth of cut parameters) was investigated using milling method. According to the Taguchi L32(42x21) experimental design, physical tests were carried out in which response values of cutting force and surface roughness were obtained. In the chip removal process, a single type TiAlNi coated carbide cutting tool was used, and the cutting forces were measured with a Kistler 9257B type dynamometer and the surface roughness was measured with a Mahr (Marsurf PS1) table type roughness device. Statistical analysis was made depending on the "lowest and best" objective function through the Minitab 18 package program. It was concluded that the optimum processing parameters obtained as a result of the experimental study were 180 m/min cutting speed, 0.4 mm chip depth of cut and 0.4 mm/tooth feed rate. In addition, the lowest surface roughness value was obtained as 0.533 µm and the highest surface roughness value was obtained as 3,126 µm. In cutting forces, the highest value was obtained as 410.7 N and the lowest cutting force value as 16.3 N. In addition, according to the results of ANOVA analysis applied, it was observed that the most effective factor on Fz was the amount of feed rate, while the most effective factor on Ra was the cutting speed.

KEYWORDS - TOOLOX 44, Milling, TAGUCHI Method, Surface Roughness, Cutting Force

DETERMINING THE EFFECT OF BIRD PARAMETERS ON BIRD STRIKES TO COMMERCIAL PASSENGER AIRCRAFT USING THE CENTRAL COMPOSITE DESIGN METHOD

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ABSTRACT

Today, bird strike is one of the most threatening problems to flight safety. A bird strike damage in flight can result in serious structural damage or even fatal accidents. A bird strike model requires high computational power for model preparation and nonlinear explicit analysis because of composite materials, contact definitions and other complex analysis parameters. Investigating the effects of design parameters on bird strike is a costly and time-consuming practice. The influence of various parameters such as bird velocity and impact angle has been also evaluated on a composite target in this research. Investigation of the effects of bird parameters on a composite target provides a clearer definition of the strength limits and energy transfer of composite materials exposed to bird strikes. Real bird strike tests are in good agreement with Ls-Dyna analysis results in this study. The unique aspect of this research is that the Central Composite Design (CCD) method, one of the Experimental Design (DOE) methods, is one of the first applications in the bird strike problem. Bird strike simulations were performed in different analysis parameters based on the Central Composite Design (CCD) method and the effects of the parameters on bird strike were found with the regression equations obtained from Minitab.

KEYWORDS - Bird Strike, Impact Test ,Smooth Particle Hydrodynamics (SPH), Design of Experiment (DOE), Central Composite Design (CCD)

EFFECTS OF NOZZLE THROAT INSERT GEOMETRY ON STRESSES

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ABSTRACT

One of the most important issues in solid fuel rocket motor design is that the designed nozzle can function under thermomechanical effects. Throat insert cracking often occurs due to thermal stresses and can cause local material loss around the crack. Any shape change on the inner surface of the nozzle directly affects motor performance negatively. Numerous studies have been conducted on the thermomechanical response of solid fuel rocket motor nozzles. In these studies, many factors related to the geometrical properties and material properties of rocket motor nozzles were taken into consideration. In this paper, the boundary conditions required for thermomechanical analysis were obtained by using a one-dimensional nozzle flow solver code. The obtained thermal and structural boundary conditions were applied to the structural analysis model created using ANSYS software, and the effects of various geometrical properties of the nozzle throat insert on the stresses on the nozzle throat insert were investigated. It is found that allowing radial gap between the insert and the insulation material is important to reduce compression stresses. Additionally, 10mm more thinner insert design showed an improvement in the critical minimum principle stress value for this geometry. However, when the insert thickness value is decreased further, this time a sudden increase in the maximum principle stress value is observed. This paper provides insights into the effects of nozzle throat insert geometry in solid propellant rocket motor nozzles on stresses and provides an approach to obtain more reliable design.

KEYWORDS - Nozzle Throat Insert Design, Thermomechanical Analysis,Solid Propellant Rocket Motors

COMPUTER AIDED DESIGN OF RUBBER BASED COVER GAGE STRICTNESS A SIMULATION OPTIMIZATION OF BALL BEARING COVER STRICTNESS

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ABSTRACT

Rubber-based ball bearing seals (cover) are widely used in the bearing industry. These seals effect the performance of the bearings, therefore affect the bearings life as well. Influence of ball bearing seal interference values on bearing performance was investigated numerically in this study. Bearing seals which have four different seal interferences were modeled by using finite element method. The contact reaction force between the region of inner ring and rubber seal inner lip was modelled by means of finite element method, calculated statically by means of finite element method and designed in ANSYS Workbench. The bearing seal interferences which are compared in numerical analysis are given respectively; 200 μm, 160 μm, 105 μm, 45 μm,. Also bearings with contactless shields were used in study. The numerical results obtained from simulation are evaluated. 3 criteria is considered to make a FEA model of an elastomer material; model must be not linear, mechanical behaviour must be not linear and contact type that used in FEA software must be not linear. It is decided to choose non-linear Hyperelastic Model. Solve Curve Fit Method embedded in ANSYS Workbench is applied for the model to evaluate results

KEYWORDS - Ball Bearing Cover Gage, Rubber Seal, Simulation, Finite Element Analysis, Ansys Workbench.

STATIC GRASP ANALYSIS FOR OBJECTS WITH IRREGULAR GEOMETRY

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ABSTRACT

The static equilibrium for the grippers has a vital significance beside the degrees of freedom of finger mechanism for a robotic gripper. Although the issue of grasping has a history goes back to the end of the nintheenth century, there are still veiled problems. One of the problems is prehension of an object with irregular geometry in three dimensional space. This paper presents a static analysis for an object with irregular geometry such as unshaped stone. An unshaped stone has random surfaces. Therefore, the static equilibrium of the object is not definite. We wanted to determine the definite conditions of a stable grasp for an object with irregular geometry in space. Thus, we scrutinized the contact of the fingertip of the gripper. We evaluated the reaction forces normal to the contact surface which are declined with various angles. Consequently, we recommended selection of mechanism type and fingertip for a gripper finger.

KEYWORDS - Robotic Gripper, Static Analysis, Grasping, Mechanism, Stability

A DENSITY FUNCTIONAL CALCULATIONS ON THE GEOMETRICAL ELECTRONIC AND NONLINEAR OPTICAL PROPERTIES OF HEXAMETHYLENEDIAMINE

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ABSTRACT

In our study, the molecular structure, bond angles, bond lengths, dipole moments and vibrational frequencies of Hexamethylenediamine (1,6-hexanediamine) have been calculated by density functional theory (DFT) with B3LYP method and 6-311++G(d,p) level of theory. Hexamethylenediamine molecule was drawn in three dimensions using the molecular drawing program GaussView 3.0. The calculated results of the optimized geometric structure are consistent with the crystal structure and show that the theoretical results are in good agreement with the experimental values. In addition, the energy range between E(HOMO) and E(LUMO), molecular electrostatic potential (MEP), the highest occupied molecular orbital energy (E(HOMO)), the lowest unoccupied molecular orbital energy (E(LUMO)), dipole moment and electronegativity are calculated and discussed for Hexamethylenediamine.

KEYWORDS - Hexamethylenediamine, HOMO, LUMO, MEP

INVESTIGATION OF SOLAR CELL BASIC PRINCIPLES AND TECHNOLOGIES

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ABSTRACT

Energy is in a very important position all over the world today, thanks to the constantly developing technology and the exponentially increasing population. In the globalizing world, annual increases in energy consumption bring environmental problems and increase the energy need in general. It is an excellent approach to use sustainable and renewable energies to reduce climate changes and meet the energy demand of future generations. Studies and researches for the production, storage or conversion of energy, which is frequently used in industrial revolutions and human activities, are very valuable. The use of solar energy in energy production, which is one of the safe, environmentally friendly and efficient energy sources for a healthy society, is a popular subject applied in many areas. In this study, the importance, working principles, and types of solar panels, which are preferred to be used in many areas for energy production and are increasingly important, are focused.

KEYWORDS - Solar Cell, Solar PV Systems, Renewable Energy, Solar Energy Production, Types Of Solar Systems

ENERGY AND EXERGY ANALYSES OF A COMBINED POWER SYSTEM UTILIZING COLD ENERGY OF LNG

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ABSTRACT

In this study, a combined power system is aimed to utilize the cold energy of LNG. The combined power system consists of a 2-stage ORC (Organic Rankine Cycle) and a direct expansion LNG cycle. A mathematical model was created for the analysis of the system. Key parameters for energy and exergy analysis were determined as propane mass ($\dot{m}_{pro}$), pressure ratio (Pr), and heat exchanger-3 outlet temperature (T8), and the effect of these parameters on system performance was investigated for certain intervals. It was observed that as $\dot{m}_{pro}$, Pr and T8 increased, the thermal and exergy efficiency of the combined power system increased.

KEYWORDS - LNG Cold Energy, ORC Cycle, Energy, Exergy

STOCHASTIC OPTIMIZATION OF PROCESS PARAMETERS FOR PURE TITANIUM USING WIRE ELECTRIC DISCHARGE MACHINING WEDM PROCESS

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ABSTRACT

The main purpose of this study is to model and find the most suitable solutions for cutting parameters during wire electrical discharge machining (WEDM) so that pure titanium plate (Grade-2) has a smooth cutting process. In this study, the effects of cutting parameters such as peak current, pulse closing time, pulse time, spark gap voltage, wire feeding and wire voltage on surface roughness (SR) are investigated using Wolfram Mathematica. Different multiple nonlinear regression models were used to define the cut parameters of the WEDM. Coefficient of determinations and the adjusted coefficient of determinations of each model were calculated to see how well models identify the cutting parameters. In addition, the stability of the models was determined to measure the ability of the WEDM to realize the cutting parameters. The stability results showed that the selected model was suitable for the phenomena. After the stability calculations done optimum values of surface roughness determined by using one of the stochastic optimization methods, which is Simulated Annealing. By using multiple nonlinear regression analysis and optimization process, optimum value of surface roughness (SR) was obtained. This study is proved the importance of mathematical modeling of engineering problems for real-life applications.

KEYWORDS - Stochastic Optimization, Multiple Nonlinear Regression Analysis, Wire EDM, Stability, Surface Roughness.

SELECTION OF PROCESS PARAMETERS ON WIRE ARC ADDITIVE MANUFACTURING WAAM OF TI6AL4V

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ABSTRACT

In recent years, Wire Arc Additive Manufacturing (WAAM) has remarkable development due to low equipment cost and high deposition rate. In this study, Ti6Al4V material which is widely used in the aviation industry, was deposited by Wire Arc Additive Manufacturing. Plazma arc welding machine has been used because of its high heat input which is more suitable method for titanium alloys. Investigations were carry out by changing wire feed speed, travel speed and ampere values. Graphs and tables were created by measuring layer width and layer height from single layer samples. Using these values, suitable parameters for Ti6Al4V were tried to be determined.

KEYWORDS - Additive Manufacturing, Wire Arc Additive Manufacturing (WAAM), Titanium

THE EFFECTS OF LEADING EDGE TUBERCULES ON FLOW AROUND A SEMI SPAN NACA 0020 AIRFOIL

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ABSTRACT

In this study, effect of sinusoial leading edge on the semi-span models having different wavelength have been investigated experimentally in order to search aerodynamic characteristics. The experiments were carried out in the suction type wind tunnel for Reynolds number of 1.0x105. Semi-span NACA 0020 airfoil models having constant amplitude (0.025c) and two wavelength (0.25c, 0.5c). Force measurements have been performed by using a load cell at angles of attack of 0 to 30 degrees. Three different leading edge tubercles and one baseline semi-span NACA 0020 airfoil is used in this study and airfoil models with leading-edge tubercles was compared to the without tubercles model. Airfoil models with leading-edge tubercles showed better performance to delay stall by providing higher lift at higher angles compared to the baseline model.

KEYWORDS - Leading Edge, Drag Coefficeint, Lift Coefficient, NACA 0020

AN APPROACHING FOR THE PRODUCTION OF SPECIAL PROFILES RIFLING S WITH PLASTIC DEFORMATION

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ABSTRACT

In firearm barrels, several manufacturing methods have been used for increasing precision of shot with generating rifling marks to internal face of barrel and providing longer barrel life. Flow forming (tube spinning) is a preferred approach for producing cylindrical parts which enables improved surface finish and surface hardening because of cold forming (flow forming is performed at 25°C). In this study, a design providing the manufacturing of both rifling marks and barrel with plastic deformation using a mandrel possessing male form of rifling for the purpose of generate internal form of barrel is presented. On the contrary to traditional spinning wall thickness is reduced deliberately with ironing, this process is occurred with increased deformation despite less consumed force. The design aims to determine metal flowing rate and ensures the dimensional accuracy with avoiding expansion in barrel hole after shaping and thanks to this disconnect the mandrel with hole easier. Besides, compared to rifling forms shaped with machining operations, it is aimed that to obtain both faster and a surface possessing high strength and wear resistance in consequence of plastic deformation. Grinding with rollers provides extraction of rifling form to internal surface of barrel which enhances the dimensional precision. With this method, high strength and robust structure is obtained which provides longer barrel life and going out of bullet faster from barrel which increases the accuracy of shot is purposed

KEYWORDS - Rifling production, Plastic Deformation, Flow Forming, Tube Spinning

NUMERICAL STUDY AND MODELLING OF TURBULENT FLOW OVER BACKWARD FACING STEPS

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ABSTRACT

This original research paper presents the results of an extensive investigation of numerical study and modelling of steady, incompressible, two-dimensional, separating and reattaching turbulent flow over backward-facing steps at three different Reynolds numbers. Employing the finite-volume method with a hybrid scheme, a computer program based on the SIMPLE (Semi-Implicit Method for Pressure Linked Equations) algorithm has been developed. Numerical solution of conservation equations of mass and momentum, together with the standard k-epsilon turbulence model, are obtained using an iterative numerical solution technique. Near the solid boundaries, wall-functions are employed. Numerical predictions for local streamwise velocity, turbulence kinetic energy, turbulence kinetic energy dissipation rate, effective viscosity profiles, locus of flow reversal, bottom wall static-pressure coefficient, wall-shear stress and friction coefficient distributions along top and bottom walls of the backward-facing step flow configurations are presented and compared with experimental measurements. The results of numerical study are generally in good agreement with experimental data.

KEYWORDS - Turbulent Flow, k-Epsilon Turbulence Model, Predictions.

INVESTIGATION ON EFFECT OF SHRINKAGE ALLOWANCE TO THE FATIGUE LIFE OF COMPOUND CYLINDERS OPERATING AT HIGH PRESSURE

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ABSTRACT

In this study, the fatigue life of a shrink-fitted two-layer cylinder operating under high pressure is estimated by using Finite Element Method (FEM). The cylinders material used in this investigation is AISI 4140 steel. In this context, the fatigue life of the inner and outer cylinders was determined under 3000-bar pressure depending on the one-sided shrinkage tolerance. In the study, 11 different shrinkage allowance were used. The optimum shrinkage allowance were determined according to the fatigue life of the two cylinders. Accordingly when the shrinkage allowance increased the life of the inner cylinder increased up to 189.7 times, while the life of the outer cylinder decreased by 98.3%. In addition, the fatigue life values of the two-layer cylinders were compared with the fatigue life of the single-layer cylinder with the same geometric dimensions. While the life value was obtained as 5586 in the single layer cylinder, This value was calculated as 9530 even in the double layer cylinder with a shrinkage allowance of 0.01 mm. As a result, it has been found that using shrink-fitted two-layer cylinders are more advantageous in terms of fatigue life than single-layer cylinders.

KEYWORDS - Fatigue Life, Finite Element Method, Shrinkage Allowance, Two-Layer Cylinder

TECHNICAL AND ECONOMICAL ASSESSMENT OF LIQUID PETROLEUM GAS MODIFICATION CONVERSION ON A GASOLINE ENGINE IN TURKEY FOR TIME INTERVAL BETWEEN 2016 2020

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ABSTRACT

A Renault Symbol 1.2 liter gasoline engine system was modified in 2016 and Liquid Petroleum Gas (LPG) fuel system was added. After modification, fuel consumption of the engine, prices per liter for gasoline and LPG have been recorded alongside kilometers. Data is processed for derivation of performance and economy indicators. Literature and web have been reviewed in order to find related works. This particular example clearly emphasizes benefits of LPG utilization. Approximately 12 to 15 times of the initial investment cost is returned by the LPG system. Also slightly less CO2, i.e. 6%, has been emitted by the utilization of the system. Time resolution of the data is provided by graphics and integral data is also given.

KEYWORDS - Combustion, Consumption, Conversion, Emission, Fuel, Gasoline, LPG, Internal Combustion Engine

LEAN PRODUCTION IN INDUSTRY 4 0 ERA

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ABSTRACT

Lean production techniques are the most effective, profitable and guiding production methods based on sustainable principles that are accepted all over the world due to their competitive advantages. The lean production philosophy aims to ensure continuous improvement and human-machine integration at the optimum level, and provides reduction of waste and non-value- added activity with improving overall system efficiency. With the emergence of Industry 4.0, production systems using the latest automation-based technology such as smart machine, smart network management, autonomous robots and cyber security and processing of big data are expected to be instantly adapted to manufacturing systems. The aim of this study is to reveal the harmonious integration of this latest technological development in production systems by establishing a relationship between the industry 4.0 approach and lean production methods, and thus to emphasize how industry 4.0 technologies contribute to lean production techniques. The obtained results will provide strong support to the stakeholders of the manufacturing companies in order to promote system-wide efficiency through a reasonable adaptation of two effective key methods.

KEYWORDS - Lean Production, Industry 4.0

INVESTIGATION OF TEMPERATURE DISTRIBUTION IN A COOKING CHAMBER OF AN INDUSTRIAL OVEN

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ABSTRACT

It is demanded that and the final product should be delicious and the quality should be at a proper consistency when cooked in an industrial oven. Thus the temperature distribution needed to be diffuse homogeneously in the cooking chamber. According to these a food cooking oven selected, used for research and development in a business corporation, coded ESTONE 120*80. The temperature distributions are investigated experimentally by using a test setup. An experimental set-up is used for investigating the temperature distribution. The thermocouples are placed at 16 points for taking data during the cooking operation. It is also seen that the temperature distribution is almost homogeneous in the cooking chamber. By this, it is concluded that the temperature distribution can be investigated truly by this kind of an experiential set-up.

KEYWORDS - Cooking, Heat Transfer, Industrial Oven, Temperature Distribution, Thermocouple

SIMULATION AND OPTIMIZATION OF AN AUTOMOTIVE PEM FUEL CELL SYSTEM BY USING EES SOFTWARE AND GENETIC ALGORITHM

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ABSTRACT

Fuel cells are electrochemical energy conversion devices that offer a high-efficiency and low-emission alternative to internal combustion engines (ICE) in vehicle applications. In among the types of fuel cells, the polymer electrolyte membrane (PEM) fuel cells are particularly suitable for use in passenger vehicles, such as cars and buses due to their fast startup time, low operating temperatures, and favorable power-to-weight ratio. In this study, a PEM fuel cell has been modeled by using Engineering Equation Solver (EES) software and then has been optimized using the Genetic algorithm-based optimization method. In order to maximize the energy efficiency, the influences of the electrode area (cross sectional) of PEM, the thickness of PEM, the cell width, the number of cells in series per stack, the total current of stack, and operating temperature as independent variables on the energy efficiency as the objective function have been investigated. The results showed the energy efficiency increases by increasing the electrode area (cross sectional) of PEM and the number of cells in series per stack and decreases by increasing the thickness of PEM, cell width, and the total current of stack. Moreover, at optimal values of independent variables, the energy efficiency can be reached about 54%.

KEYWORDS - Fuel Cells, PEM Fuel Cells, Fuel Cell Vehicles, Optimization, Genetic Algorithm

A THEORETICAL STUDY ON POROUS FUNCTIONALLY GRADED MATERIAL BEAMS

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ABSTRACT

This study presents the static bending analysis of porous functionally graded material (FGM) beams. The Young's modulus and mass density of composite are assumed to be graded in the thickness direction according to two different distribution patterns. The classical beam theory is employed to derive the governing equations. The Ritz method is employed to obtain the transverse bending deflections. The results are compared with the beam made of porous material and reported in the literature.

KEYWORDS - Porosity, Functionally Graded Material, Beam, Variational Methods, Static Analysis

THE EFFECTS OF IMPERFECTION TO THE BEHAVIOR OF ALL STEEL BUCKLING RESTRAINED BRACES

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ABSTRACT

Buckling restrained braces (BRBs) which generally compose of a steel core and an encasing are utilized to resist lateral forces in high seismic regions since BRBs exhibit high energy dissipation, ductility and stiffness. The steel core carries both compressive and tensile forces. During the compression, the core starts to buckling and the encasing tries to prevent this buckling. However, due to gap between the encasing and steel core, steel core eventually buckles. Buckling phenomenon is associated with the initial imperfection. In this study, the effects of initial imperfection of steel core to the behavior of BRBs are investigated. Pursuant to this goal, numerical analyses using ABAQUS were conducted. In this study, the effects of initial imperfection of steel core to the behavior of BRBs are investigated. Pursuant to this goal, numerical analyses using ABAQUS were conducted. The results revealed that initial imperfection does not affect load carrying capacity. However, the fluctuations in load increase as scale of mode shape increase.

KEYWORDS - Buckling Restrained Braces, ABAQUS, Buckling, Imperfection, Steel Core

ANALYSIS OF FOUNDATIONS CONSTRUCTED ON DIFFERENT SOIL CLASSES BY CONSIDERING DIFFERENT SOIL MODELS

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ABSTRACT

During the design of the foundations, many parameters such as soil class, soil properties, drainage conditions, type of structure should be taken into consideration. In case these parameters are not examined sufficiently, uneconomical, overdesigned foundations are constructed. For this purpose, different soil models such as Linear Elastic (LE), Mohr-Coulomb (MC), Hardening Soil (HS), Soft Soil (SS) have been developed in the evaluation of geotechnical engineering. On the other hand, various soil mechanic theories were developed to define the bearing capacity of the soils (Terzaghi, Meyerhof, Hansen, Vesic, etc.). In this study, five projects constructed on different soil classes were analyzed with Plaxis. Moreover, the bearing capacities of the different soil classes were calculated with extensively used bearing capacity theories. By comparing the analysis outputs with the bearing capacity theories, more consistent and reasonable results were determined.

KEYWORDS - soil models,Bearing capacity theories,finite element method

COMMERCIAL APPLICATIONS OF DRONE TECHNOLOGY IN THE FIELD OF TRANSPORTATION

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ABSTRACT

Drone is a remotely controlled or completely autonomous aircraft. Nowadays, it appears as a very important way of transportation. We use drones in many different areas. Drones have been widely used in recent years for commercial use, as well as for military and civilian uses. Compared to airplanes, it is very advantageous in terms of cost due to it's lack of pilots. It is also advantageous over the satellite as it provides clearer and higher resolution images than satellite images. Drones are the sophisticated observers of today, and by significantly reducing certain risks, they can eliminate the need for people to be physically in dangerous environments. In this work I evaluated the use of drones as a means of transportation, and the benefits of the developing drone technology.

KEYWORDS - UAV, Drone Transportation, Drone Usage Areas, Drone Commercial Applications

TRANSPORTATION SYSTEMS OF KONYA AND HISTORICAL DEVELOPMENT OF TRANSPORTATION SYSTEMS

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ABSTRACT

Transportation is directly proportional to the development of a city and a country. When we examine the countries with high welfare level, we see that the transportation systems are seriously developed in these countries. When the transportation history of our country is analyzed, until the World War II, improvement has been achieved only in railway transportation. In this period, the necessary importance was not given to road transportation, railways and airlines. In this study, the city of Konya is considered as a field of study. Historical development of transportation in Konya and transportation systems of today are evaluated. In chapter 1 of this study, transportation systems in the world and in Turkey as railway, road, seaway, airway transportation seperately, have been examined according to chronological developments. In the second part, the transportation systems of Konya are explained in detail as intercity transportation and domestic transportation. As a result of the study, suggestions were made to make transportation more convenient.

KEYWORDS - Intercity Transportation, Transportation Systems in Konya, Turkey's Transportation History

THE IMPORTANCE OF LANDSCAPE IN THE CORONAVIRUS COVID 19 PERIOD

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ABSTRACT

In Turkey in March Covidien 19 to refrain from entering into the crowd accompanied by the appearance of the epidemic, people with the agenda of the ban, the garden for both spending time both enjoyable to drive an isolated life have turned to private homes. Especially families with children have come to prefer calm areas with beautiful landscapes to spend free time outdoors. In this period, people started to use ornamental plants instead of fruits and vegetables in hobby gardens. In addition to these, the demands for rural areas with beautiful landscapes have intensified day by day. The aim of this study is to determine the increase in the rate of ornamental plant growers and sellers in Niğde and its surroundings compared to other years. It will be determined what the effect of the importance given to the landscape with the determined ratio. Covid 19, Koronavirüs, Müstakil ev, Niğde, Peyzaj

KEYWORDS - Covid 19, Niğde, Landscape,Detached house,coronavirus

INVESTIGATION OF THE RELATIONSHIP BETWEEN ROAD AND LANDSCAPE IN TERMS OF LANDSCAPE PLANNING CRITERIA

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ABSTRACT

Adverse effects of rapidly developing technology and environmental pressures created by improper use of land on natural resources are among the important problems on the world agenda. Highways are of great importance in terms of tourism, cultural and socio-economic structure in developing countries. Roads should be in harmony with modern traffic and in an order that can serve the needs without disturbing the natural structure of the area they pass through. Care should be taken to make the road planning at the road route selection stage, not after the construction phase is completed and opened to traffic. During the road construction phase, the project speed of the road, the route of the road, parallelism, excavation and fillings, and landscape planning principles should be complied with in planting works. In this study, the aforementioned criteria have been discussed, and suggestions have been made to establish a relationship between road and landscape.

KEYWORDS - Landscape, Landscape Planning, Niğde, Road Afforestation

SMOOTHED PARTICLE HYDRODYNAMICS AND ITS APPLICATION TO PIPE FLOWS

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ABSTRACT

Pipelines are used in different industrial areas such as water supply systems, hydro and nuclear power plants, etc. Damage in pipe system may be observed due to the unsteady pipe flows with large pressure variations. In the present study, pipe flow is simulated with a Lagrangian particle method called smoothed particle hydrodynamics (SPH). SPH was firstly introduced for astrophysical problems, then applied to different areas such as fluid mechanics, solid mechanics, biomechanics, and fluid-structure interaction problems. An SPH code which is appropriate to simulate both unsteady pipe flows and slug flows is derived. The latest improvements in SPH field is implemented in the code. The simulation results are validated with the experimental data. It can be concluded that SPH is successful to simulate pipe flows.

KEYWORDS - Smoothed Particle Hydrodynamics, SPH, Unsteady Pipe Flows, Computational Fluid Dynamics

INVESTIGATION OF ELASTIC STRUCTURES UNDER WATER

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ABSTRACT

Fluid-structure interaction is not a new but a developing phenomenon by combination of different analysis methods. Thus, new techniques are developing by these combinations. Combination of smoothed particle hydrodynamics and finite element method is one of them in which a meshless and mesh-based method are used. In this research, a highly elastic structure is investigated under water. Structural part of the problem is modelled by finite element method and fluid part of the problem is modelled by smoothed particle hydrodynamics method. A coupling is developed accordingly. A model consisting an elastic structure placed in a water tank is investigated by this method. The model is excited from the ground and motion of either fluid and structure is investigated.

KEYWORDS - Submerved Structures, FSI, SPH, FEM

INVESTIGATION OF ELEMENT TYPE ON THE VIBRATION PROBLEMS OF BEAMS FOR THE FINITE ELEMENT METHOD

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ABSTRACT

Beams are widely used in many engineering applications as a structural member therefore understanding their vibration behaviors is an important case. The finite-element is one of the most common methods in the analysis of vibration problems of beams. In this study, the finite-element method is used for the vibration problems of a homogeneous isotropic beam. The natural frequencies for the pinned-pinned beam are determined for different element types and elasto-dynamic behaviors are also investigated considering various loading cases. The finite-element software packages (ANSYS and SAP2000) are used in the analyses and the effect of element type on the free and forced vibration characteristics of isotropic beam are discussed.

KEYWORDS - Free Vibration, Forced Vibration, Beam; Finite-Element Method, Natural frequency

INVESTIGATION OF THE PERFORMANCE OF GALILEO ONLY PRECISE POINT POSITIONING

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ABSTRACT

In recent years, the number of Global Navigation Satellite Systems (GNSS) reached total of 4, after launching GALILEO (Europe's Global Navigation Satellite System) and BEIDOU (China's Global Navigation Satellite System). Unlike others, GALILEO is a civilian-based global navigation system and managed by the European Space Agency (ESA). GALILEO will be the fourth satellite-based global positioning service after completing the full operational capability (FOC) mission. First GALILEO satellite launched in 2005 with an experimental test satellite and continued periodically until today. In 2016, GALILEO had 4 in-orbit validation (IOV) satellites and 14 FOC satellites. By the end of 2018, GALILEO is considerably developed with the launch of 8 new FOC satellites and planning to complete the FOC mission in late 2020. Nowadays, 4 IOV satellites and 22 FOC satellites can be used globally. In this study, GALILEO-only precise point positioning (PPP) performance is examined with the latest improvements. For this purpose, the data of 3 IGS (International GNSS Service) stations for a one-week period in 2020 are processed. The coordinates obtained are transformed to the topocentric system (north, east, up), using IGS weekly solutions as the reference. The results are analyzed in terms of accuracy and precision by considering the statistical values (max, min RMSE).

KEYWORDS - ESA, GALILEO, GNSS, IGS, PPP

THE KINEMATIC RESULTS OF THE FIRST OPEN SOURCE PRECISE POINT POSITIONING AMBIGUITY RESOLUTION SOFTWARE

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ABSTRACT

Today, traditional precise point positioning (PPP) is an essential technique for most scientific studies such as geodesy and plate tectonics. In recent years, the scientific community is mostly concerned about the PPP with the ambiguity resolution (PPP-AR) approach. Hereby, Analysis Centers (ACs) started to produce phase bias products which are necessary for ambiguity resolved PPP. Furthermore, different software packages have been developed to apply AR (ambiguity resolution). PRIDE-PPPAR software is the first open-source and free PPP-AR software, developed by Wuhan University GNSS Research Center. The software works with CODE's (Center of Orbit Determination) precise ephemeris and clock corrections, suitable with WHU's (Wuhan Analysis Center) phase bias products. In this study, the kinematic PPP performance of PRIDE-PPPAR software is examined. Daily data of 5 IGS (International GNSS Service) stations for a one-week period in 2020 processed under different (7° and 30°) cut-off angles. Coordinate values are estimated using two PPP modes (ambiguity-float and ambiguity-fixed) to find out the contribution of AR. The results are examined regarding to the accuracy and precision considering the statistical parameters (max, min, RMSE). Also, wrong fixing percentages are calculated to investigate the success of AR.

KEYWORDS - AR, GNSS, IGS, PPP, PRIDE-PPPAR

EXPERIMENTAL STUDY ON EFFECTIVENESS OF VARIOUS STEEL APPLICATIONS IN HISTORICAL DOMES

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ABSTRACT

Domes, which are generally demi globe shaped structures and are used for clothing the upper side of the architectural structures, have served many societies during the history. The forms of dome have showed variation and improvement to over time meet the needs of the people. Another issue about domes that they have detriments on their structures, which are derived from three sources: structural, environmental and humanistic. Various steel applications are used to repair and strengthen the damages in historical domes. The most common steel applications used in the repair and strengthening of historic domes today are clamp and ring methods. The aim of this study is to investigate the experimental applicability, practicality and use of four steel for steel applications in historic masonry domes. In this context, the domes that were damaged due to various reasons were repaired and strengthened using ring and clamp methods. Five masonry domes, one reference with no steel application, one repaired using clamp and tree repaired using various ring connection details, were tested under compressive load. In this study, the results of the dome experiment are presented and these results are analyzed comparatively. In addition, recommendations are offered to solve the problems of steel applications encountered in repair and strengthen works.

KEYWORDS - Historical Domes, Repair and Strengthening Methods, Experimental Methods.

ANALYSIS OF RETAINING STRUCTURES WITH DIFFERENT ENGINEERING CHARACTERISTICS USED IN DEEP EXCAVATIONS

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ABSTRACT

Nowadays, deep excavations are frequently used as a result of increasing urbanization and decreasing construction areas. In this paper, deep excavations and the design and selection criteria of these elements are discussed. Within the scope of the study, based on five different projects, 36 retaining structure system models with different features were created. The numerical analysis software PLAXIS 2D (version 2016.01), which is frequently used in the solution of geotechnical engineering problems and uses the finite elements method is used for the analysis of these models. With the 36 models created, the effects of vertical retaining element selection, material model selection and soil engineering properties on the performance of the retaining system were examined. As a result, it has been determined that while similar force and moment values are obtained in different vertical retaining elements, soil engineering properties and especially the choice of material model have serious effects on the results.

KEYWORDS - Bored Pile, Diaphragm Wall, Retaining Structures, Steel Sheet Pile, Performance Analysis.

THE EFFECT OF GRAFITE IN BITUMINOUS HOT MIXTURE

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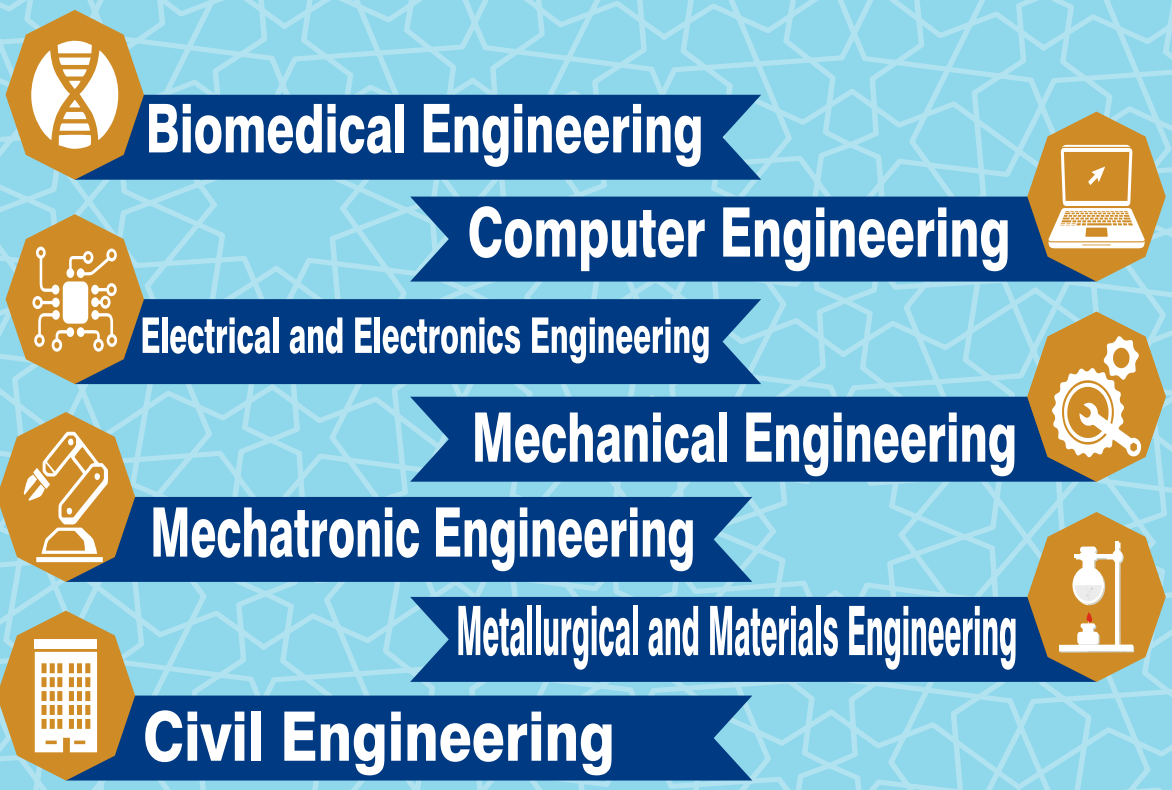
ABSTRACT

Road pavements are divided into two groups as flexible and rigid. The type of superstructure in which bituminous material is used as the binder is called flexible road superstructure. The superstructure design is aimed to be comfortable, economical, safe and high quality. In this direction, in order to extend the life of the road superstructure, various additives are added to the hot bituminous mixture to increase the strength of the road superstructure. The main factor that provides long superstructure life is the quality of the materials used in the superstructure, the compatibility of the mixture materials with each other, and the strength of the base materials or the base floor is structurally able to meet the superstructure. On the other hand, there are many factors that cause body deformations. These; the carrying capacity of the foundation is not sufficient, however, the materials used in the foundation are not of sufficient thickness, hardness and quality, due to the increase in traffic load in the superstructure of the wheel track seating, climate conditions and temperature changes are not taken into account to the extent necessary. There is a need to improve the resistance of bituminous hot mixtures to permanent deformations and thermal cracking, in particular wheel marks. In order to improve the performance of bituminous hot mixture, it is aimed to improve the properties of bituminous hot mixture by adding various additives to our bituminous mixture in our country and various countries. In this study, in order to increase the performance of bituminous hot mixture, the performance of graphite material with superior properties in bituminous hot mixture was investigated. For this purpose, stone mastic asphalt mixture, which is one of the bituminous hot mixture types, was studied. Here, instead of the filler in the bituminous hot mixture, the modification was investigated using Graphite material in different proportions.

KEYWORDS - Bituminous Hot Mix, Stone Mastic Asphalt, Graphite



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