SELCUK UNIVERSITY
FACULTY OF TECHNOLOGY

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December 07-09, 2017

Konya/TURKEY

ABSTRACT BOOK

Editor
Ismail SARITAS

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International Conference on Engineering Technologies

International Conference, ICENTE
Konya, Turkey, December 07-09, 2017

Abstracts

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PREFACE

International Conference on Engineering Technologies (ICENTE'17) has been organized in Konya, Turkey on 07-09 December, 2017.

The main objective of ICENTE'17 is to present the latest research and results of scientists related to Electrical and Electronics, Biomedical, Computer, Mechanical, Mechatronics, Metallurgical and Materials Engineerings. This conference provides opportunities for the different areas delegates to exchange new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration.

All full 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 Journal of Selcuk Technic.

At this conference, there are 617 paper submissions from 10 different countries and 94 universities. Each paper proposal was evaluated by two reviewers. And finally, 363 papers will be presented at our conference.

In particular we would like to thank Prof. Dr. Mustafa SAHIN, Rector of Selcuk University; Prof.Dr. Omer Faruk BAY, Gazi University; Assist. Prof. Dr. Lilia GEORGIEVA, Heriot-Watt University; Journal of Selcuk Technic. They have made a crucial contribution towards the success of this conference. Our thanks also go to the section editors and colleagues in our conference office.

Ismail SARITAS
Editor

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CONTENTS

METABOLISM DETERMINATION USING SOFT COMPUTING ANALYSIS OF BREATH MOLECULES

SEDAT METLEK[1] , HATICE AKMAN[2] , ISMAIL BAYRAKLI[3] , GUL FATMA TURKER[4]

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ABSTRACT

The breath analysis is a non-invasive risk-free and painless method used to diagnose diseases. Since the breath analysis method is a newer study field than the other methods, there are many unsettled standards and unknown parameters and also there are many parameters in human metabolism that are not explained yet. In our study, breath of 19 healthy people has been analyzed. The TD / GC-MS method, which is an analytical method of breath analysis, has been used to detect molecules in the breaths. Using soft computing methods to the results of the 19 breath samples, butanol which occurs from lipid peroxidation and acetone and hexanal which occurs from lipid metabolism has been associated. Preliminary studies are indicated to predict unknown metabolisms more with algorithms and estimations.

KEYWORDS - acetone, breath analysis, butanol, artificial intelligence

MODELING OF GYNECOLOGICAL CANCERS BY USING ALL RISK FACTORS

***BASAK BAHCIVANCI*[1] , *VILDA PURUTCUOGLU*[2]**

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ABSTRACT

The gynecological cancers, which cover the cervix, endometrial and ovarian cancer, are one of the most common cancer types in women both in Turkey and in the world. The challenge in mathematical modeling of these cancers is the high number of risk factors which may be caused by the environmental and genomic effects, and variant range of measurements which can be categorical, binary or continuous. In this study, as the novelty, we aim to construct alternative mathematical models for these illness by using all the risk factors simultaneously. For this purpose, we combine the genomic knowledge gathered from microarray data with the other risk factors such as age, obesity, and smoking. In the analyses, we implement various gynecological cancer datasets taken from the ArrayExpress database. Hereby, we initially normalize the gene expressions from different microarray studies and then, categorize them with respect to their other risk factors. Later, we present them via various complex modeling approaches and validate our findings with the biological literature. From the analyses, we obtain a consensus method for mathematical modeling and construct a (quasi) disease network including all effects of gynecological cancers. Acknowledgement: The authors thank the DAP project (no: BAP-08-11-2017-035) of the Middle East Technical University for its support.

KEYWORDS - Gynecological cancers, steady-state activation, mathematical models, biological network, bioinformatics.

PHYSIOTHERAPHY SOCK WITH ARTIFICIAL MUSCLE TEMPERATURE CONTROL

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ABSTRACT

Foot stretching using physiotherapy is a necessary exercise to be done by the elderly, the paralyzed and the weak. The contraction of the foot muscles is reduced by the patients' constantly performing their foot movements. Nowadays, this movement is taking a foot with a cloth or with the help of other people. In this study, the foot stretching movement, which is the frequent movement of physically treated patients, was performed with artificial muscle. As artificial muscle, it is characterized by lengthening with temperature, fishing line is used. The fishing line was placed in a sock knit. As the system is energized, the system can perform the foot stretching movement at certain intervals. It has been developed as a wearable sock so that the patient can sit in motion. The artificial muscle is placed in a double-layered insulated form into the sock of the patient, allowing the patient to comfortably wear it out. In this system EMG (Electromyography) and artificial muscle are evaluated together. The EMG in the system will provide information about muscle tone and how much the foot muscles can contract. The data from EMG with Arduino will be processed to determine when the foot should be strained and loosened. A cost-effective, easy-to-use and aesthetic design for the patient has been developed that can contribute to artificial muscle applications.

KEYWORDS - Ardunio, Artifical muscle, Physiotheraphy, Temperature control.

PORTABLE HEART MASSAGE DEVICE

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ABSTRACT

This study has been conducted to minimize the sudden cardiac arrest or drowning deaths, minimize the pressure imbalance that the health care workers have applied to the heart due to energy loss during the cardiac massage, and to help the health professionals to recover from fatigue during cardiac massage or CPR (Cardiopulmonary Resuscitation). In this study, a portable heart massage device was designed. It can be easily used by medical personnel or through educated civilians during sudden cardiac arrest or drowning. The device is placed in the body of the patient and applies cardiac massage to the near-to-heart region at specific time intervals. It is planned that the device will be in a portable structure which is not too heavy for convenience in case of patient intervention. In addition, many of the peripherals can be easily used thanks to the portable feature of the device. This system has been understood by discussing with the relevant doctors that it contributes to the field of health and is important for the breadth and comfort of its usage area.

KEYWORDS - CPR, ECG, Heart Massage, Portable Device

ASSEMBLING MAGNETIC BEAD BASED ELECTROCHEMICAL IMMUNOSENSORS FOR CLINICAL AND ENVIRONMENTAL MONITORING COMBINING WITH SPES

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ABSTRACT

Biosensors for the reliable detection of panels of biomarker proteins facilitated by magnetic bead-based technologies, have the potential to greatly improve future clinical and environmental monitoring. Magnetic beads (MBs) are particles constituted from a dispersion of magnetic material (Fe2O3 and Fe3O4) and then covered with a thin shell of polymer. They can be easily functionalized with different linkage group such as streptavidin, biotin, tosyl groups, amino groups, antibodies or proteins. Magnetic beads have been used in ELISA formats. MBs conjugated with primary antibodies can be held onto a sensor surface by a magnetic field. Target antigens can then be captured onto the magnetic beads followed by adding enzyme-labeled secondary antibodies. A current proportional to analyte concentration can be generated by injecting a solution containing a substrate for the enzyme label and using a potential to electrolyze the enzyme product, or by using a mediator that exchanges electrons with the enzyme (HRP, AP, AChE). In the case of the electrochemical assay, it is essential that the enzymatic product is electroactive so that it can be easily measured through voltammetric or amperometric technique. Coupling the versatility of the design offered by the screen printed technology and the benefit of the MBs gives us rapid and sensitive immunodetection. Using this strategy, finding the optimum conditions for the immunoassay on the magnetic beads and for electrochemical detection on multiplex screen printed electrodes (SPEs) is much easier than in the usual surface modification methods. This configuration is an attractive alternative, especially for the automation of analytical biosystems.

KEYWORDS - Magnetic Beads, Amperometry, Immunosensors, Environment, Medical diagnosis

SYNTHESIS OF UN DOPED AND ZN DOPED CUO THIN FILM BASED BIOSENSORS AND THEIR APPLICATION FOR HYDRATION LEVEL MONITORING

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ABSTRACT

In recent decades, nanostructured metal-oxide semiconductors have been researched for their biosensing capabilities. In particular, Copper oxide (CuO) nanostructures have drawn a significant interest thanks to their wide applicability in different sensor technology. Total body water (TBW) is the principal chemical component of the human body and corresponds to 50% to 70% of body mass for the average young adult male. Human bodies use sweat to calibrate the body temperature via evaporative heat loss. Sweat consists chiefly electrolytes such as Cl-, Na+ and K+. Extended exercise in warm conditions can lead to excessive loss of electrolytes and an increased risk of heat-related illness. Hence, exact and immediate determination of dehydration level in the body is vital because any change from normal levels of electrolytes may induce health problems. Nowadays, hydration level detection using a metaloxide materials has become a new approach for healthy assessment. Thus, in this work, the hydration level sensing properties of un-doped and Zn-doped CuO nanostructures prepared by SILAR method are investigated. This research reports a new method for hydration level detection by using nanostructured CuO-based films.

KEYWORDS - Hydration level, CuO, Biosensing

HEALTHCARE ENGINEERING MANAGEMENT TECHNOLOGY INTEGRATION OF SIMULATION AND DESIGN OF EXPERIMENT TO OPTIMIZE THE RESOURCES OF HEALTHCARE

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ABSTRACT

Worldwide, the healthcare sector is developing rapidly both economically and technologically. People's desire to live more is revolving this area into a business. Health Engineering Management is prevalent as the most important need in the area of healthcare. There are many troubles in the field of health engineering management. Poor quality services, duplications, improper treatment, high waiting time, and medication errors, etc. are caused by these problems. As in many studies, high waiting time is calculated as cost. The main reason for this is the inefficient use of resources as effectively as they are causes high costs belonging to health institutions. Managing healthcare resources in real life is very difficult because it takes a lot of time and is costly. With this study, patient waiting time is reduced by ensuring that the hospital resources' utilization is maximized in a short time with a low cost. A good forecasting is needed to use some technologies and implement future changes to manage the resources of healthcare properly. The objective of this study is to find the best solutions by integrating simulation technology and design of experiment approach from the leading technologies of healthcare engineering management in order to improve quality in healthcare area. Keywords - Healthcare Engineering Management, Healthcare Resources, Simulation Technology, Design of Experiment

KEYWORDS - Healthcare Engineering Management, Healthcare Resources, Simulation Technology, Design of Experiment

MATERIAL SELECTION BY USING ELECTRE METHOD FOR FDM

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ABSTRACT

Fused Deposition Modelling (FDM) has become one of the most widely-used rapid prototyping methods for various applications. Materials most commonly used in FDM is ABS, PC, PLA, PPSF, ULTEM9085 and mixtures thereof. This study focused on material ranking and selection for FDM technology. ABS, PLA, NYLON/PC, CPE, TPUG95 and PP are alternative materials. The selection is carried out by considering a number of criteria such as the tensile strength, the bending strength, the elastic modulus, the unit price and the ease of printing. A total of 9 sub-criteria have been determined under the 3 main criteria heading in line with the opinions of experts. The Analytic Hierarchy Process (AHP) method is used to determine the importance of these criteria. Material ranking and selection is established by using ELECTRE (ELimination Et Choix Traduisant la REalité – Elimination and Choice Expressing the REality) method, a multi-criteria decision making tool. As a result of AHP, the unit price, the tensile strength and the bending strength criteria are more important than the heat resistance and the table heating requirement criteria in the selection of material for FDM technology. By using ELECTRE III, the most suitable material is ABS, followed by PLA.

KEYWORDS - 3D printing, FDM, AHP, ELECTRE

A HYBRID MULTI CRITERIA DECISION MAKING MODEL FOR TURNING TOOL INSERT SELECTION

***BARIS OZKAN*[1] *, HASAN BAS*[2] *, FATIH YAPICI*[3]

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ABSTRACT

In this study, a carbide insert was selected for a casting part to be machined on CNC turning. For the study, a casting part which is continuously machined by a foundry operating in the Samsun Organized Industry is discussed. There are many carbide insert types and brands for turning. These inserts are consumed in large quantities. The efficiency and cost analysis of carbide insert selection should be done very well. Therefore, carbide insert selection is a very important problem for CNC turning. Selection of the appropriate carbide insert and its brand is a difficult problem because of many criteria such as cycle, feed, depth of cut, energy consumption and workmanship in the turning process. The firm has a carbide insert that is already used for the casting. This insert is a SNMG 190612 type carbide insert. The firm wants to try a different brand in order to reduce the cost and increase its productivity. For this purpose, the company wants to compare the 5 brands (A, B, C, D, E) including the branded carbide insert brand and choose the most suitable brand. Analytic Hierarchy Process (AHP) and Technique for Order of Preference (TOPSIS) were used to select the most suitable carbide insert. 10 sub-criteria under two main criteria, working conditions and cost, are determined and weighted by taking the opinions of the experts who are experts in machining. The AHP method was used to weight the criteria. TOPSIS method is used for selecting the best alternative carbide insert. As a result, depth of cut and unit price criteria are the most important criteria while cooling criterion is the lowest criterion. Subsequently, the alternative carbide inserts are ranked according to these levels of importance.

KEYWORDS – AHP, TOPSIS, Turning Tool Insert Selection;

A NEW APPROACH FOR EXTRACTING PRIORITY RULES FOR DYNAMIC MULTI OBJECTIVE JOB SHOP SCHEDULING WITH LIMITED BUFFER SPACES

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ABSTRACT

In this work, Gene Expression Programming, simulation, and multi-objective techniques are used for extracting new composite priority rules to solve the dynamic multi-objective job shop scheduling problem with limited buffer spaces. This problem is a more generalized job shop scheduling problem, which is modeled as a multi-objective problem, where the priority rules are used to find Pareto solutions. A new operator, based on the conic scalarization method is proposed to achieve better quality solutions. This operator can be used for all evolutionary algorithms. The used benchmarks are selected from the literature with some modifications as considering different release times of jobs and stochastic breakdowns of machines. The evolved composite priority rules are practical scheduling methods that can be applied to real life scheduling problems. Comparison between the extracted priority rules and some classic rules selected from the literature shows that the new rules are more efficient than the classical rules.

KEYWORDS - Dynamic Job Shop Scheduling, Multi-Objective Optimization, Conic Scalarization Method, Priority Rules, Limited Buffer Space, Simulation, GEP

SYNTHESIS CHARACTERIZATION AND USING SOME OF SCHIFF BASE LIGANDS DERIVED FROM 4 AMINOANTIPYRINE AS AN INHIBITOR

BESIR DAG[1] , FEVZI YASAR[2] , HAKAN KIZILKAYA[3]

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ABSTRACT

Schiff bases and their complexes are widely studied because of the increasing recognition of their role in biological systems. In azo methine derivatives, the C=N linkage is essential for biological activity; several azomethines were reported to possess remarkable antibacterial and antifungal, anticancer. With the increasing incidence of deep mycosis, there has been increasing emphasis on the screening of new and more effective antimicrobial drugs with low toxicity. These compounds were recently found to have significant antitumor and biological activity. Antipyrine derivatives are reported to exhibit analgesic and anti-inflammatory effects, antiviral, antibacterial, and herbicidal activities, and have also been used as hair color additives and to potentiate the local anesthetic effect of Lidocaine. Transition metal complexes with ligands derived from 4-aminoantipyrine have significant biological activity. This prompted us to synthesize a new series of heterocyclic Schiff bases containing the antipyrinyl moiety. The present study reports synthesis and charaterization of Schiff bases derived from 1-phenyl-2,3-dimethyl-4-(N-2 hydroxybenzylidene)-3-pyrazolin-5-one and 1-phenyl-2,3-dimethyl-4-(N-2-hydroxynaphthylidene)-3-pyrazolin-5-one with 5-aminoisophtlalic acid [1-2]. These compounds were synthesized in high yield and characterized by SEM, FT–IR, 1H NMR and 13C NMR.

KEYWORDS - : Schiff base, 4-aminoantipyrine

SYNTHESIS OF NEW VANILLIN DERIVATIVES AND THEIR POTENTIAL ANTIBACTERIAL APPLICATIONS

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ABSTRACT

Vanillin is a nutraceutical molecule which possesses anti-oxidant, anti-tumor, anti-bacterial, anti-cancer, anti-mutagenic etc. effects and these effects are due to the phenolic nature of this compound according to the literature. The derivatives of vanillin have been studied in many research paper for these reasons. In this study, we successfully synthesized and characterized several new vanillin derivatives and their antibacterial effects on a group of bacteria which consist of E. coli (ATCC 35218), E. faecalis (ATCC 51299), S. aureus (ATCC 25923), Klebsiella pneumoniae (ATCC 700603), Bacillus subtilis (ATCC NRRL B-478), Listeria monocytogenes (ATCC 7644) and Pseudomonas aeruginosa (ATCC 27853) were tested (MIC values range between 200-400µg/ml) and chloramphenicol was used as a positive control. Synthesized compounds have potential applications on pharmaceutical, medical device coating, food preservative, dye, raw material etc.

KEYWORDS - Vanillin, Antibacterial

COMPARISON OF DATA HIDING METHODS ON HEVC H 265

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ABSTRACT

This paper compare several proposed data hiding techniques in the High Efficiency Video Coding (HEVC/H.265). HEVC is the newest video coding/compression standard. The main advantage of HEVC is to reduce bit rate 50% for same video quality when compared with previous video coding format H.264/AVC. Data hiding (also known as steganography) is art of secret communication. There are many data hiding algorithms for previous video coding formats such as H.264/AVC, MPEG4. HEVC data hiding methods were recently proposed. These algorithms' applied places are: before block prediction, during intra prediction, after quantization process, before entropy coding and during entropy coding. The reviewed algorithms used various data hiding approaches such as least significant bit replacement, even-odd criteria, mapping tables, (n,k) standard array decoding table, matrix coding and designing codeword etc. to manipulate HEVC video for secret communication. This paper briefly review and compare all these data hiding algorithms along data hiding capacity, video quality, computationally complexity, bitstream size, payload, etc. Additionally current steganalysis techniques for videos also presented

KEYWORDS - Data hiding, HEVC, Steganography algorithms, Video compression standard

A DISCRETE VARIANT OF TREE SEED ALGORITHM

SEDAT KORKMAZ [1] ***, AHMET CEVAHIR CINAR*** [2] ***, GOKHAN SEYFI*** [3] ***, MUSTAFA SERVET KIRAN*** [4]

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ABSTRACT

Tree-Seed Algorithm (TSA) is a nature inspired metaheuristic optimization algorithm. The artificial agents in the basic TSA works on continuous search space. According to the literature review, it is seen that there is no TSA variant which works on the discrete search space. In this study, TSA has been redesigned to work on discrete search space. Traveling Salesman Problem (TSP) is one of the most studied combinatorial discrete optimization problems and it is a NP-Hard problem. In this work, TSA is integrated with neighborhood operators and its performance is analyzed on Berlin52 TSP instance. The neighborhood operators consist of two groups; subsequences operators and point to point. Point to point operators are random swap (RS), random insertion (RI) and subsequence operators are random swap of subsequences (RSS), random insertion of subsequence (RIS), random reversing of subsequence (RRS), random reversing swap of subsequences (RRSS), random reversing insertion of subsequence (RRIS). Experimental results show that TSA produces promising results on Berlin52 TSP instance.

KEYWORDS - Tree-seed algorithm, Traveling salesman problem, Discretization, Neighborhood operators

DESIGN A MODEL FOR DISTRIBUTED SYSTEMS USING WEB SERVICES

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ABSTRACT

The boost in amount and variety of data has accelerated data sharing across institutions and studies on intersystem integration; the design studies for offering central access have increased. Meeting the rising demand for fast and reliable system has been eased by extensive use of web services. In this study, a new system model was designed for use in distributed systems with regards to fast, exact, and reliable information access. The designed model is hybrid structure-based and maintains the interoperability principles by involving multiple systems; and enables multi-directional data flow by ensuring the integration among these systems through web services. The system prototype was designed adopting SOA (Service Oriented Architecture), OOA (Object Oriented Architecture) architectures, and REST (Representational State Transfer) approach.

KEYWORDS - API, Data, Database, Integration, PHP, REST, SOA, SAOP, Web Services

REAL TIME HUMAN FACE DETECTION CONTROL SYSTEM USING RASPBERRY PI

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ABSTRACT

Abstract Nowadays, as a result of increasing terrorist incidents and individual crimes, serious security problems have begun to be experienced. For this reason, security for corporations, corporations and people has become important. With regard to security measures, identification of persons who want to enter sensitive areas has become mandatory. In this study, it is aimed to make a real-time identification of a person coming to the control point with a biometric recognition system which is a safer way to identify human identity. For this purpose, a high-resolution camera which takes the image of the face of the person coming to the control point is used and the received image is transferred to the microprocessor (Raspberry Pi) through an interface program. The facial image of the Raspberry Pi microprocessor was compared with images previously loaded on the SD card of the RasPerry Pi, and identification of the persons was performed by face recognition method. As the face detection method, the first step is to obtain the image, the second step is to determine the face position (segmentation), the third step to the face to a certain size (Strecthing), the fourth step is to extract the features to be used in the face recognition, Calculation of resemblance rates and determination of the most similar face have been carried out. According to the result obtained, the person at the control point is allowed to switch or the information in the database is provided to inform the security forces in real time to the security forces via Ethernet line and Wi-fi. This ensures that the security point created is securely secured and that criminals are identified.

KEYWORDS - Face detection, Raspberry Pi, Control

A FLEXIBLE QUESTION STORAGE HIERARCHY FOR COMPUTER BASED ASSESSMENT SYSTEMS

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ABSTRACT

Computer Based Assessment (CBA) is the practice of giving tests on the computer environment instead of using pencil and paper (P&P). Robust CBA systems should: (i) allow more than one instructor may work on the same question bank; (ii) keep questions in a secure and robust database for re-use and verification; (iii) include a smart shuffling mechanism for fair mixing of questions. (iv) have the capability to easily integrate current information systems of the institutes (student information system, academic staff information system etc.). While developing CBA system the main challenge is the creation of flexible question storage schema. When we review existing CBA systems, we notice that few systems support arrival of questions in groups, which is essential in serial questions including paragraphs. Aim of this study is therefore to create a flexible question storage and retrieval system with shuffling in mind that handles such complex requirement. Our database schema consists of six basic entities: (i) QuestionBank, (ii) UserGroup, (iii) Module, (iv) Topic, (v) Question, (vi) Answer. After the schema creation, our reference CBA system was implemented using Java Spring Framework technologies and deployed on a Tomcat 8 application server is located Akdeniz University. We are currently collecting data through web based testing to measure the examination performance of the proposed system.

KEYWORDS - Computer based assessment, Database application, Web technologies

TRAINING ARTIFICIAL NEURAL NETWORK BY USING DIFFERENTIAL SEARCH ALGORITHM

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ABSTRACT

The differential search algorithm is proposed for solving real-valued numerical optimization problems. This evolutionary algorithm was inspired by migration superorganisms using the concept of "Brownian-like random-walk" motion. In this study, differential search algorithm has been adapted to train artificial neural networks which have more than one input and single target feature. The proposed approach has been tested on the datasets available in Matlab. Test results have been compared with another heuristic particle swarm optimization algorithm based training method.

KEYWORDS - Artificial neural network, Differential search algorithm, Optimum training.

A REAL TIME WIRELESS SENSOR NETWORK APPLICATION USING IRIS MOTES

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ABSTRACT

The studies in literature focusing on Wireless Sensor Networks (WSNs) usually gain results from simulations and theoretical analysis. However, these results are needed to be validated in testbeds, which are used to gather information of WSNs on a real hardware and environmental context. In this study, 8 IRIS Motes are used to create a real time small scale WSN environment. Seven of these motes are assigned to sense environmental data, including light and temperature. The remainder mote acts as a base station and positioned in the neighborhood of the geometrical center of the sensor nodes. Each sensor node transmits data in a packet with a size of 14 byte once in a second to base station, regularly. A data packet has 6 parts called ID, key, data of light, data of temperature, battery level and packet number. ID is a unique number assigned to each sensor node. Key is a numeric value used to verify data packets of sensor nodes and is identical for every node in the system. Data of temperature refers to the temperature in terms of centigrade of the room in which the sensor node is positioned, while data of light is the numerical representation of the light in terms of luxury in the sensed environment. Battery level is the amount of remaining energy in terms of Volt in the cell batteries of sensor nodes. Finally, packet number means the sequence number of data packet created by a sensor node. On the purpose of evaluating the loss of data in the system, the power of the signal transmitted to base station is recorded. The IRIS Mote used as the base station communicates with a Raspberry PI 3. Data received via USB port is stored in database with intent of conducting instantaneous analysis rapidly. The implemented WSN system is operated for 30 hours and approximately 725.000 data packets are collected at the base station. Since there is not any synchronization between the nodes and due to the nature of wireless medium, collisions between packets occurs at intervals. As a result of these collisions a data loss with a rate of 1% for nearby sensor nodes, and a rate of 20% for remote sensor nodes is observed in the system. Moreover, at the end of the operation period of the network, it is observed that the batteries of the sensor nodes are decreased by 10%. This study presents a single hop transmission between the sensor nodes and the base station, and tracking the data at the base station. The results show that larger amount of data losses occurs for the sensor nodes that are positioned far away from the base station. In future work, initially data loss will be reduced to an allowable level and multi-hop communication between the sensor nodes and base station will be constructed.

KEYWORDS - Wireless sensor networks, Testbed, Real time application, IRIS Mote, Performance evaluation

WEB SERVICES KEYS FOR E VOTING

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ABSTRACT

Technically, every e-voting does not have to be carried out online. Currently, the stamp and ballot papers that are still used have been replaced by barcode readers, kiosk etc. In this study, current voting for election, e-voting process that carried out and proposed e-voting processes, technical structures which are applied or be able to be applied in the future have been discussed. Besides, assessments, analyses have been made in terms of its impacts on society. Voting and voting systems are regarded as distributed systems and updated solutions have been introduced. In the proposed system design, web service structures have been applied and a prototype application has been prepared. Hardware design of the system, adaptation process and cost have been excluded from the scope of the study.

KEYWORDS - Electronic Voting, Evote, Data, Data Integration

HARDWARE BASED FACE RECOGNITION SYSTEM

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ABSTRACT

Biometric systems develop very fast and are used in our daily life.When we examine the biometric systems;Within the physiological characters category is the human face, which is easy to use and close to the ideal of reliability. In the proposed study, a hardware based face recognition system was developed. Local Binary Pattern method is used in this developed system. It was realized on the arduino platform for the design of the hardware part. Due to the flexibility of the platform, new algorithms to be added at a later time can be included in the system without difficulty. The algorithm to be added to the system must be compatible with the selected hardware. To test the developed system; It has been taken from the (40X10) ORL dataset obtained by taking 10 different exposures of 40 different human faces. Analyzes were prepared using face images of 10 different people selected from the data set. In this study, the images were compared with the images on the moving floors except for the fixed images.It has been found that the percentage of correct recognition rate decreases in images on the moving picture. This is thought to be an increase in the percentage of recognition using basic morphological processes. The availability of facial recognition systems, which are used to recognize people in public institutions and commercial enterprises, is expected to be high enough to be used directly without a computer, by increasing productivity in such areas as cost, space, time and human power. It is thought that it is easy to use in terms of security forces and that the correct amount of recognition will be beneficial because it is close to the ideal and the use of real life will be high.

KEYWORDS - Face Recognition, Hardware, Arduinio

COMPARISON OF PATH LOSS MODELS FOR INDOOR LOCALIZATION USING WI FI RSSI VALUES

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ABSTRACT

Indoor localization has come into prominence with the rapid growth of Internet of Things conception. The basis of this paper is to compare the performance of different path loss models which have been built up in order to obtain the distance between transmitter and receiver using Wi-Fi received signal strength indicator (RSSI). In addition to distance calculation studies, localization using calculated distances between transmitter and receiver is going to be discussed. During this study, experiments have been conducted in order to collect Wi-Fi RSSI values. An ESP8266 chip has been programmed to transmit Wi-Fi signals and a mobile application has been developed to receive this signals. The measurements collected by this application processed on MATLAB to compare authenticity of the propagation models.

KEYWORDS - Indoor localization, Propagation models,Wi-Fi Signals, RSSI, ESP8266

DETERMINING SHEAR CAPACITIES OF PRESTRESSED REINFORCED CONCRETE BEAMS

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ABSTRACT

A smart system-based analytical study was performed to determine shear capacities of prestressed reinforced concrete (RC) beams. Artificial Neural Network (ANN) was chosen as the smart system in the study. The study first addressed theoretical calculations about shear capacities of prestressed RC beams. Secondly, the experimental studies on this subject were compiled and descriptions and classifications of these experiments were made. It was discussed how shear capacity changes based on a parameter according to existing experimental data. Although the effect of numerous parameters on the determination of shear capacity made these interpretations difficult, a significant experimental and analytical background was created for determining shear capacity of prestressed RC beams with ANN modeling. Despite that relevant experimental data are very comprehensive; a database that can be used in SI unit system was generated in this study. Graphs were evaluated individually based on several parameters with a separation according to that prestressed concrete beams are confined or not. It was seen at the end of the study that especially the proximity of loads to brace is shorter in beams with two point loads (shear span is less) and shear crack formation mechanism can be changed on the basis of single loading. Lastly, it was found out if shear mechanism which plays an important role in the success of ANN is achieved through reaching the shear capacity or flexural capacity. The study was concluded that ANN estimates the shear capacity with a higher success ratio according to current terms of legislation.

KEYWORDS - Prestressed concrete beam, Beam shear capacity, Artificial neural networks.

IMAGE AUGMENTATION METHODS FOR DEEP LEARNING

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ABSTRACT

Deep learning is one of the most popular machine learning methods that have become very popular in recent years and have achieved very successful results in many areas. To obtain a successful result with deep learning, a large amount of training data is needed. However, creating the data set for the identified problem is a time-consuming and quite laborious task. Existing data sets are often insufficient for training. Specially, to build a powerful image classifier from little training data, image augmentation methods are very useful. Image augmentation methods reproduce training images applying different processes such as random rotation, shifts, shear, flips etc. In this review article, different image augmentation methods are used to improve a convolutional neural network's accuracy rate.Keras wrapper library and Python programing language used for image augmentation. Experiments results showed that image augmentation is improving accuracy of the convolutional neural network.

KEYWORDS - Deep Learning, Machine Learning, CNN, Keras, Python

ANALYSIS OF A METAHEURISTIC OPTIMIZATION ALGORITHM FOR DATA CLASSIFICATION

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ABSTRACT

Optimization is finding the best value for a given problem. Some specific problems have a single solution, but most others may have more than one solutions. Therefore "the best" solution in optimization is not the exact best solution but rather the overall best in solution space. New optimization algorithms constantly being proposed to get even closer to optimal solution. Many of the newly developed algorithms are meta-heuristic algorithms inspired by nature. Examining and applying these algorithms on optimization problems in various fields is very important. Increases in the amount of data make it difficult to analyze data. Classifying large amounts of data makes it especially easier to solve problems. It may be necessary to subject the data to various algorithms for analyzing and gathering useful and meaningful information. The success of classification methods is ensured by correctly selecting method-specific parameters. Optimization methods are widely used to determine these parameters besides mathematical methods. This requires the selection of the successful methods in optimization before they are used in conjunction with classification methods. In this study, whale optimization algorithm is examined. The Whale Optimization Algorithm imitates the social behaviors of humpback whales. This method is inspired by the bubble-net hunting strategy. The bubble-net strategy was only observed in humpback whales. Humpback whales feed on small fish that are close to the ocean surface. Before hunting, they entrap small fish herds into a spiral web of bubbles rising from deep to the surface. In this study, the performance of the algorithm over various data sets is monitored. The studies and analyzes show that the whale optimization is on a level that can compete with successful meta-heuristic methods.

KEYWORDS - Meta-Heuristic Optimization, Whale Optimization Algorithm, Classification

IMPLEMENTATION OF FPGA BASED DISTANCE MEASUREMENT ALGORITHM FOR BIOMETRIC SYSTEMS

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ABSTRACT

With the development of security systems, the use of biometric systems is increasing. Physiological characters (face, fingerprints, iris, palms, ears, veins, footprints, etc.) are commonly used to identify people. It is an important process to make features from physiological characters and to match the extracted features. Image processing also results in faster results when many processes are performed at the same time. Algorithms involving the same operations on conventional computers are slow to work. In the work we have done, it has been designed with Field Programmable Gate Arrays (FPGAs) to make the common euclidean distance measurement algorithm faster in distance measurement algorithms that can be used in matching process. In order to realize the design, the language of VHDL (Very High Speed Integrated Circuit Hardware Description) is used. The human face image of 10 randomly selected ORL data sets was tested using data. The performance of the euclidean distance algorithm has been improved since both the faces of the contacts have been characterized and the ability to perform the same operation in the extraction process has been improved. The operating speeds of the hardware modules designed with the classical computer were compared.

KEYWORDS - FPGA, Euclide, Hausdorff distance

STATISTICAL EVALUATION OF CLUSTER NUMBERS OF K MEANS ALGORITHM

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ABSTRACT

One of most important issue in data mining is clustering. there are many clustering algorithms but common problem in these algorithms is determining of cluster numbers. In this study, it is discoursed cluster numbers of k-means algorithm which is widely used on real world data. The effect of k value on data distributions is observed according to some statistical criteria. Thus, it is obtained helpful information to select k value in k-means clustering algorithm. Two real world data sets are used for experimental results.

KEYWORDS - Cluster Number, Evaluation of Clustering, K-Means

PREDICTION OF MELANOMA DISEASE USING ARTIFICIAL NEURAL NETWORK

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ABSTRACT

Melanoma is a terminal disease arises from pigment producing epicutaneous cell. Melanoma causes %75 of all skin cancer related deaths. Expert dermatologists can diagnose this disease by interpreting dermoscopic images using ABCD rule. Even though expert dermatologists make use of dermoscopic images, their correct diagnosis rate is still in between 75-84%. This study aims to provide a decision support system for dermatologists by classifying skin lesions in 3 groups as common nevus, atypical nevus and melanoma using machine learning. The objective of this study is skin lesions based on dermoscopic images PH2 datasets using Artificial Neural Network (ANN). In this study that done for the prediction of melanoma disease with ANN, were correctly classified 100% common nevus according to data from the data set PH2. Additionally, for the atypical nevus detection, accuracy=91.25% for the melanoma detection, accuracy=80.00%. Obtained findings shows that this medical decision support system can truly help dermatologists prediction melanoma disease.

KEYWORDS - Melanoma Disease, Prediction, Medical Decision Support System, ANN.

IMPLEMENTATION AND COMPARISON OF TEXT COMPRESSION ALGORITHMS IN IMAGE STEGANOGRAPHY

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ABSTRACT

Steganography is a science that is used in the field of information security and aims to conceal the existence of a confidential message. In this study, the effects of text compression algorithms on image steganography were examined. Three different text files on different sizes were compressed using 4 different compression algorithms namely LZW, MTF, Arithmetic and Deflate. These compression algorithms were embedded together with LSB substitution method to 3 different images. When the results were examined, it has seen that the Deflate algorithm had a higher compression ratio than the other algorithms. In this way, a significant increase in embedding capacities has been achieved and the distortion in the image has been reduced.

KEYWORDS - Image steganography, LSb, LZW, MTF, Deflate

IMPROVEMENT OF INCORRECT VELOCITY VECTORS IN PARTICLE IMAGE VELOCIMETRY USING ORDER STATISTICAL METHOD

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ABSTRACT

Particle Image Velocimetry (PIV) is widely used in fluid mechanics in the investigation of air and water flows. PIV provides instantaneous velocity vectors of the entire flow field by imaging a specific section of the field. Image pairs with very short time differences are obtained in PIV. These image pairs are compared with image processing techniques to calculate the displacements of the particles added into the flow, and as a result the flow map is revealed. The displacement of the particles is determined according to the correlation between the windows with certain size selected on the image pairs. In the literature, Fast Fourier Transform (FFT) based correlation is the most commonly used method because it is efficient. In the FFT method, if the window is selected small, a local and more realistic displacement is detected. When the window is large, the displacement vector represents the average displacement of a wider flow area. However, in correlation analysis using a small area window, more vectors which are faulty in direction and / or size are generated. In this study, it is aimed to improve the incorrect vectors which occur during displacement estimation in FFT-based correlation method using small area windows. For this reason, the order statistics method which reduces noise in image processing is used. In the order statistic method, each pixel value of the image is determined by reordering the neighboring pixel values of this pixel from small to large and then selecting the middle value. In this study, the order statistic method selected local flow-compatible vectors instead of velocity vectors that differ significantly from neighbors. Software has been developed in MATLAB to estimate the velocity vectors and to correct the wrong velocity vectors in accordance with the flow direction. This software has been tested with synthetic PIV images. As a result, the FFT-based correlation analysis using the order statistic method has shown that velocity vectors which are incorrect with the local flow direction are effectively reduced.

KEYWORDS - Particle image velocimetry, Fast Fourier transform, Correlation, Velocity vector, Order statistic

A CONCISE REVIEW OF DEEP LEARNING METHODS USED IN INTRUSION DETECTION SYSTEMS

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ABSTRACT

Intrusion Detection Systems is an active research area due to the increasing number of attacks and attack types on networks. There are many studies in the literature to detect attacks or intrusion using artificial neural networks. Deep learning-based methods, which are a powerful set of techniques for learning in neural networks, became very popular because they provide high accuracy, efficiency and flexibility to the researchers. Therefore, it has attracted the interest of researchers working on the research area of network-level intrusion detection. In this study, we present a concise review of recently published intrusion detection systems developed using deep learning methods such as Deep Belief Networks, AutoEncoders and Recurrent Neural Networks.

KEYWORDS - Deep learning, Intrusion Detection, Network Security

FORMATION OF PRODUCTION CELLS USING A DATA MINING ALGORITHM

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ABSTRACT

Most of cell formation method in literature ignore the real-life factor such as operation sequence, production volume, batch size, alternative process routing, cells size and path coefficient of material flow. In this study uncertain association rule mining algorithm which is one of the data mining algorithms and doesn't‟t ignore all this real-life factor was used for cell formation. The aim of this study is applying the cellular manufacturing system in a press workshop to reduce transfer cost and amount of work in process. The uncertain association rule mining algorithm was coded in Excel VBA for solving cell formation problem in the workshop and results examined.

KEYWORDS - Cellular Manufacturing Systems, Data mining, Uncertain Association Rule Mining Algorithm

EMBEDDING PATIENT INFORMATION INTO REGION OF NON INTERESTS FOR MEDICAL IMAGES USING DNA ENCRYPTION

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ABSTRACT

Digital Imaging and Communications in Medicine (DICOM) is a file standard for medical images into a picture archiving and communication system (PACS). DICOM includes pixel data of image, and a file header which contains patient's personal data (name, surname, identification number, address, birth date, weight etc.), study, series and image properties. Patient personal data in DICOM file header has to be secured for the attacks according to the health standards. For this reason, this study proposes a histogram statistics based steganography method for medical images which determine the region of non-interests (RONIs) to embed patient's personal data. RONIs are obtained with respect to the mean, and the variance (or standard deviation) of gray levels in an image. The embedding message composed of patient's personal data in the header of DICOM files is encrypted by DNA encoding, and it is compressed by Huffman against steganalysis. The performance comparison between cover and stego DICOM images is measured by peak signal-to-noise ratio (PSNR), structural similarity (SSIM), and Wavelet based Visual Signal-to-Noise Ratio (WSNR). The proposed method has high performance results, and the stego DICOM images has also high transparency against steganalysis.

KEYWORDS - Medical data security, DICOM, Region of non-interest, DNA encryption, Histogram statistics.

ANDROID BASED APPLICATION FOR FAMILIES WITH BABIES

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ABSTRACT

It has not been foreseen in recent times that such a large increase in the use of mobile phones will reach a wide range of competitors that can compete with today's applications. However, we can understand that most of the adults in mobile apps should not be getting more attention from mobile handsets; it clearly shows how mobile phones penetrate people's lives and become an integral part of today's society. Ever since the development of smartphones, people are more and more interested in getting new applications and games every day. Android is an open source mobile operating system that is becoming more and more common. As people's interest in mobile phones continues to increase, the number of applications written for mobile operational systems increases accordingly. With this study, info pregnancy come up and android-based application through which mothers and prospective mothers can share information, has been developed. With this application, and android-based software platform has been created for mothers to follow the required shots for the children aged 0 to 2, for prospective mothers to learn what they are curious about their babies that will be born and in turn can receive answers.

KEYWORDS - Android based application

MATHEMATICAL PROGRAMMING IN DATA MINING

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ABSTRACT

The importance of data mining and machine learning is increasing day by day due to its wide range of applications. Numerous researchers from mathematics, statistics and computer science have been working intensively on this area to solve problems more successfully. It is known that mathematical programming based methods give very good results. In this study, especially mathematical programming based methods which are used to solve classification problems will be introduced and various evaluations will be made on some literature test problems.

KEYWORDS - Data mining, Mathematical programming, Machine learning

AN ANALYSIS OF THE PERFORMANCE OF METAHEURISTIC ALGORITHMS ON EXAM SCHEDULING PROBLEM

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ABSTRACT

The aim of examination scheduling problem is to assign the exams to number of time periods (time slots) by taking into account some hard or soft constraints. This is a time consuming, complicated and hard task, and this problem is categorized as NP-hard. Mostly, the examination timetables are manually made in the real world. This process is time consuming and can cause some faults and obtained results are not satisfactory in general. In this study, we propose three methods to solve this problem by utilizing genetic algorithm (GA), particle swarm optimization (PSO) algorithm and artificial bee colony (ABC) algorithm. This paper investigates and compares the performances of GA, PSO and ABC algorithms for an optimal solution of a timetable problem. The test set is taken from courses of Computer Engineering Department at Selcuk University. The obtained results show that the proposed algorithms can be used for solving this problem and obtained solutions by these methods are better than manually prepared timetables in terms of solution quality and constraints satisfaction.

KEYWORDS - Particle swarm optimization, Artificial bee colony, Genetic algorithm, Examination timetable

FACE AND EYE DETECTION USING RASPBERRY PI AND PYTHON PROGRAM

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ABSTRACT

- With progressing technology, face and eye recognition systems become an integral part of security systems. As an explicit result of this fact we are able to apply face and eye detection to gain admission to something instead of password. Adding to this eye recognition system could be used in driver drowsiness detection. Raspberry pi is one of the popular devices in the last few years which could be defined as a miniature computer. One of the benefits of the raspberry pi is feasibility in manufacturing with different configuration. It is capable to be applied different kind of programing languages such as C++, python, java and etc. Describing Python as high-level programming language for general-purpose programming is possible. Programming with Python is simple and easy to learn syntax elaborate readability. In this paper we attempt to recognize face and eye by using embedded technology. Therefore; raspberry Pi 3 B model and Raspberry Pi camera module have been used. Also Raspbian Jessie Lite operating system has been employed. Raspberry Pi 3 includes 1.2 GHz 64-bit 4 core ARM Cortex-A53 microprocessor. Working with RGB image is difficult and time consuming. Haar-cascade algorithm is used to overcome this issue. In window detection, this algorithm applies neighboring rectangular regions at a particular situation. In each region Pixels intensities adding to each other then difference between these sums is calculated. Through these differences the image can be divided into sub-parts. Recognizing object have been done by moving window over the image. Each region identifies as a positive or negative. If region is defined as a positive window moves to the next region while in negative algorithm moves to the next stage. In this paper after changing RGB image to gray scale we utilize Haar cascade algorithm for detecting face and eye. The results that analyzing and testing of frontal face detection algorithms was successful but , classifier could be developed using more examples.

KEYWORDS - Raspberry Pi, Image recognition, Haar-cascade

REAL TIME CONTROL OF THE INVERTER USING TM320F28335 DSP WITH MATLAB SIMULINK

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ABSTRACT

Recently, Space Vector Pulse Width Modulation (SVPWM) technique has been widely used to control the inverter. Because the SVPWM technique is more suitable for digital control and provides low harmonic content, it has made this technique advantageous for inverter control. On the other hand, software for control applications of power electronic systems can be time consuming and challenging. Thanks to the automatic code generation feature of the new generation Digital Signal Processor (DSP) development tools, the software is out of the problem. One of the most known and used software development tools is the MATLAB/Simulink program. If the model of the system in the simulation stage of MATLAB/Simulink is designed for discrete-time and real-time operation, the C code can be obtained in this model. The code written in the programming languages or the automatic codes generated from the MATLAB/Simulink can be loaded to DSP by the Code Composer Studio (CCS) program. In this study, a three-phase inverter which is controlled by SVPWM method is designed, and in real-time it is realized practically by using floating point TMS320F28335 DSP. Firstly, the system is simulated as discrete time in MATLAB/Simulink, and then the TMS320F28335 is programmed thanks to the feature of automatic code capability of MATLAB/Simulink. Finally, the suitable PWM signals generated by the DSP drive the inverter. The obtained simulation and experimental results show that the inverter output voltages are balanced, and prove that the THD values of the generated voltages at the inverter output are very low by means of SVPWM technique.

KEYWORDS - DSP programming, Inverter, MATLAB/Simulink, SVPWM, TMS320F28335

REVIEW OF NATURAL LANGUAGE PROCESSING APPLICATIONS IN BIOMEDICAL FIELD

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ABSTRACT

The generation of new knowledge is continuous in biomedical domains, thus biomedical literature is becoming harder to understand and interpret. Interpretations of biomedical equipments' outputs, early detections of some disease, to transform health record information, extracting meaningful information from clinic records are some of the applications of Natural Language Processing (NLP) in biomedical field. Having done in this study recent studies related with application of NLP in Biomedical Field is analyzed and summarized.

KEYWORDS - NLP, Health record, Biomedical field, Interpretations, Clinic record

V F CONTROL OF ASYNCHRONOUS MOTOR SIMULATION USING MATLAB

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ABSTRACT

Three phase asynchronous motors which have low cost, low maintenance, high durability, are commonly used in most of industrial applications. This usage is occurred some challenges as the control of those motors. Therefore, various motor control methods are suggested to control these types induction motors. V/f (Voltage/Frequency) scalar control been one of this methods is based on the rate of proportional changed output voltage and frequency of the inverter. Variable voltage and frequency supply to ac drives is invariably obtained from a three-phase voltage source inverter. The output voltage is obtained by using SPWM (Sinusoidal Pulse Width Modulation) switching method. Among the various PWM techniques, the sinusoidal PWM is good enough and most popular that provides smooth changeover of V/F. It is aimed that V/f scalar control method is applied for three phase asynchronous motor by using its mathematical model. The mathematical model created for GAMAK 90W-380V induction motor is controlled with SPWM inverter composed MOSFETs in SIMULINK. The graphics of current and voltage of this motor are successfully obtained. It is shown that SPWM inverter-powered motor drives are more variable and present in a wide range better efficiency and higher. The simulated design is tested using MATLAB 2014a.

KEYWORDS - Asynchronous motors, V/f Control, MATLAB, Simulation

DETECTING AGGRESSIVE DRIVER THROUGH ONBOARD DIAGNOSTIC

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ABSTRACT

Nowadays, an increasing number of traffic accidents due to vehicles in the world is increasing. It has been determined that the majority of the accidents that occurred in the researches originated from the driver. Audible and visual warning of drivers to possible situations in traffic will reduce the risk of errors and accidents. However, it is observed that the stimulant traffic signs used today are inadequate when the driver is not careful. Therefore Intelligent Transport Systems (ITS) in stimulating electronic systems are being developed for drivers. For this purpose, in order to evaluate the driving behaviors of the driver in this study, speed and rpm (RPM) information was instantly evaluated by providing access to the Electronic Control Unite (ECU) of the vehicle. In practice, access to the CAN Bus is provided by means of the OPCOM diagnostic device. In this designed system, 4 different types of drivers have been identified. Different warning lights work for each type of drive. In this way the driver will be able to determine his own driving pattern. It will continue to investigate how aggressive driver behavior can be detected and affect traffic flow. Thus, it is predicted that some of the driver-induced accidents can be prevented.

KEYWORDS - Aggressive driver, CAN Bus, Diagnostic, OBD, RPM

IMPLEMENTATION OF FIELD WEAKENING APPLICATION ON DSP BASED BLDC MOTOR DRIVER FOR ELECTRIC VEHICLES

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ABSTRACT

BLDC Motor, PMSM seems to be preferred because of its high efficiency in electric vehicle operation. High-speed gearboxes are available for internal combustion engine vehicles. Electric vehicles have direct drive systems, but gearboxes are needed for systems that are not directly driven. In electrical machines, field weakening is achieved by electromagnetic methods at high speeds, thereby removing mechanical losses from the gearbox [1], [2]. BLDC and PMSM type engines have restrictions on field weakening. The main reason for this is that the longitudinal inductances are the same, the phase inductance values are low due to the low magnetic permeability of the magnets, and the motor characteristic current is high. The voltage induced in BLDC motors is trapezoidal wave shape due to the magnetic design of the motor. Likewise, the current waveform is not sinusoidal. A vector control method is applied to brushless synchronous motors in which the current and voltage waveforms are sinusoidal [3]. Brushless DC motors can not be applied according to this method [3]. The impossibility of vector control introduces some difficulties in the processing of the field weakening control. Field weakening is achieved by applying vector control to the permanent magnet synchronous motors, reducing the component of the current that affects the field. In the brushless DC motors, the motor is made by passing the hall sensor signals which determine the commutation sequence of the switches according to the desired speed value at the nominal speed, delayed by the software after detection and transferred by a certain waiting time. The field weakening (attenuation) method results in a decrease in motor torque and an increase in speed of 3-5 times [4]. A special algorithm for phase shift current method is required. In this study, by adding a special algorithm to the BLDC Motor drive controller software implemented with Texas Instruments' TMS320F28069 DSP Board, field weakening has been experimentally performed.

KEYWORDS - Brushless DC (BLDC) Motor, Electric Vehicles (EVs), Embedded System, Field Weakening

BRUSHLESS DIRECT CURRENT MOTOR DRIVER DESIGN AND ADAPTIVE CONTROL

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ABSTRACT

This study focused on a new type Digital Signal Processor (DSP) based Brushless DC (BLDC) motor drive system and adaptive control. In the study, as a first step, the system simulation model is obtained, and then carried out the practical application of the motor drive system. A processor is used for the adaptive control algorithm and another processor is used for the control algorithm of the drive system. The flexibility of the system is increased by using two DSPs. The proposed drive system control algorithm produces the ignition pulses needed to drive the IGBTs of the three-phase fully controlled bridge converter. The PWM signals for driving the power inverter bridge for BLDC motor have been successfully implemented using a ATmega328 DSP. In this study, the drivers and software of sensors used for adaptive control in the BLDC Motor driver program algorithm caused a fault even though the interrupts in the motor driver program were very well structured. The application of this system on an electric vehicle reveals the necessity of taking no risks for safety reasons. For this, it is more effective to construct a higher control unit. In this study, the upper control unit was designed and Raspberry PI-III was used as the processor of this unit. The Raspberry PI-III is a floating point microcontroller with 4 cores each of which is manufactured by Broadcom and has a processor speed of 1.2 GHz each. It is a very functional DSP processor that can run Android, Linux operating system on it. Sensors suitable for the control parameters for the adaptive control structure have been selected. The sensors are used in the design of the upper control unit. The Raspberian, Linux-based operating system has been installed on this Raspberry PI-III. The C codes of the driver programs of the sensors are run through Linux and the sensors work. The HC-SR04 Ultrasonic Range Sensor is used to measure the distance between the vehicle and the vehicle in front. The MPU 6050 sensor is used to measure the slope of the road where the vehicle is located. The BMP180 pressure sensor positioned within the vehicle tire has been selected to measure the weight of the vehicle. Load Cell and strain gage sensors could be used for this. However, in this study, a pressure sensor is preferred to make a design different from other applications and to increase the sensitivity. The data for these three parameters are processed with Raspberry PI III. This upper control unit continuously communicates with the ATmega328 motor drive circuit via USB and the data is sent and processed in real time. The variables in the BLDC motor driver software are optimized according to the value ranges of the parameter data. As a result of the optimization process, the electric vehicle automatically reduces the PWM duty cycle value, which changes both the speed of the motor and the speed of the vehicle adaptively according to the speed of the vehicle, and avoids possible collision if the distance between the vehicle and the preceding vehicle falls below 3 meters. Secondly, with the MPU 6050 Gyro-Accelometer Sensor, the slope of the vehicle and the acceleration of the vehicle are measured. According to the optimized range of values, the reduction of power of the vehicle is prevented by adaptive control. For this, the PWM

duty cycle value, which changes the speed of the motor, is automatically increased and possible slowdown is prevented. Thirdly, the weight of the vehicle is measured by the BMP180 pressure sensor located inside the vehicle tire. For the vehicle's unladed weight, the power that the electric motor must produce increases with the amount of increased load. Even though the reference values are increased from the gas pedal for this, more efficient operation has been achieved by shifting the working region of the motor with the optimized parameter ranges. Sudden heating problems have been avoided. As the weight of the vehicle increases, the motor PWM value is increased linearly according to the no load weight, thus improving the driving comfort of the electric vehicle and providing an adaptive control. With these three parameters, the adaptive control of the electric vehicle has been carried out very efficiently.

KEYWORDS - Brushless DC (BLDC) motor, Electric vehicles (EVs), DSP, Real-Time, Embedded System, Adaptive Control, Sensors.

MULTI OBJECTIVE OPTIMIZATION OF PI CONTROLLER COEFFICIENTS FOR SPEED CONTROL OF BRUSHLESS DC MOTOR BY USING ELMAN NEURAL NETWORK AND PARETO FRONT

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ABSTRACT

The aim of this study is to find optimum coefficients (Proportional gain Kp and Integral gain Ki) of PI controller by using Elman Neural Network (ENN) and Pareto based multi-objective optimization method. Kp and Ki are selected as tuning parameters while settling time Ts and maximum overshoot Mo are chosen as objective functions. Firstly, experiments have been carried out to obtain training and test data for ENN. Then, ENN has been trained to construct the mathematical model of the brushless DC (BLDC) motor speed control system. The accuracy and the reliability of the ENN model is tested by using the test data. Finally, Pareto based multi-objective optimization method has been used to find optimum values for PI coefficients to minimize Ts and Mo values. In Pareto solution set, three different optimal conditions have been found and these conditions are applied on experimental setup to test the ENN model correction. The results show that ENN is well modelled for BLDC motor and Pareto solution set allows making a selection according to desired Ts and Mo values.

KEYWORDS - BLDC motor, PI control, Elman neural network, Pareto front, Multi-objective optimization

MOS C FIRST ORDER ALL PASS FILTER DESIGN USING SINGLE CURRENT OPERATIONAL AMPLIFIER

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ABSTRACT

All-pass (AP) filters play an essential role in analog signal processing and telecommunication circuits. Especially, first order all-pass filters find wide range application in audio and video systems where the simple circuitry and low power consumption are desired features. They add phase shift to the response of the circuit and the phase changes as a function of frequency. The first order all-pass filter's pole provides a phase shift of 90° at central frequency. All-pass filters may also be used to implement high Q band-pass filters and oscillators. This paper presents a new voltage-mode first order MOS-C all-pass filter using single active element named current operational amplifier (COA), two resistors and one capacitor. Through the MOS-C implementation, the proposed circuit is compatible for integration and the frequency is electronically tunable. To demonstrate the workability and performance of the proposed circuit, PSPICE simulation has been carried out using the MOSIS 0.35 micron CMOS process parameters. It is seen that the simulation results verify the theoretical analysis. The theoretical central frequency is calculated as f0=1.06 MHz and the simulated value is measured as f0≈1.01 MHz. For a sinusoidal input signal with 1 mV amplitude at central frequency, total harmonic distortion (THD) of the output signal is measured to be 4.2 %. Phase error is 2 % and total power dissipation of the circuit is 1.66 mW. The simple circuitry, high accuracy working, low distortion performance, low power consumption, low phase error and MOS-C implementation are the remarkable features of the proposed circuit.

KEYWORDS - All-pass filter, Current operational amplifier, MOS-C, Voltage-mode

A DEPTH COMPLEXITY MEASUREMENT ALGORITHM FOR STEREOSCOPIC VIDEO

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ABSTRACT

Human beings are equipped with two eyes which provide two separate views. Each eye picks up a view of the same object from a slightly different angle. These two views are united into one view by the brain, and the result is stereoscopic view. With the help of stereoscopic view, the objects can be seen with 3 Dimensions (3D) (i.e., width, height, and depth). The added depth dimension to the 2 Dimensional (2D) view provides great precision to perceive where the objects are placed referencing the eyes. This perception becomes more discrete when the objects are moving and away from the eyes in the depth dimension [1]. Owing to the fact that advances in stereoscopic video is still its infant period, the factors influencing 3D video perception should be deciphered to grow it up [2][3]. After envisaging that the 3D video perception is greatly increased by the z-direction complexity of the depth map sequences, an algorithm is developed to predict it. There are many representation forms of stereoscopic video in the literature. Due to its flexibility and compatibility with the existing coding, transmission and storage technologies, color plus depth stereoscopic video representation form [4] is used while developing the algorithm. Correlation Coefficient (CC) and Root Mean Square Error (RMSE) [5] results computed considering Video Quality Metric (VQM) [6] and the proposed algorithm prove the effectiveness of it.

KEYWORDS - 3D Video, Stereoscopic video

FAULT TOLERANT CONTROL OF COUPLED TANKS SYSTEM WITH ELMAN NEURAL NETWORK AND RESPONSE SURFACE

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ABSTRACT

Conventional feedback control systems have some weakness during the faulty case such as unsatisfactory performance. Fault Tolerant Control is utilized to overcome the weaknesses and to increase controller performance. In this study, liquid level control of faulty coupled tanks system is handled. Elman Neural Network (ENN) is proposed for direct fault tolerant control. There is no need to detect and diagnosis of the fault in this method. PI type controller is used to control the system. ENN model is occurred as off-line training by using faulty and un-faulty data. Optimum values of PI controller coefficients (Kp and Ki) are obtained by using Response Surface Method for faulty and un-faulty cases. Liquid levels of tanks and PI coefficients are used as inputs and outputs to obtain ENN model, respectively. Thus, an intelligent control system is established. While the system is running, coefficients of controller are adjusted online by ENN. Simulation results show that proposed method has good performance for faulty cases.

KEYWORDS - Coupled tanks system, Fault tolerant control, PI control, Elman neural network, Response surface

SINGLE DIGIT RECOGNIZER SYSTEM

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ABSTRACT

Handwriting number recognition is a popular problem in recent years because of usage of handwriting number has important areas as car plates or bank checks. This process is discussed in many artificial intelligence applications. In addition to recognizing different types of writing with high accuracy, handwriting recognition systems are also use in applications requiring speed. In order to be able to make the recognition with the machine learning methods, it is necessary to obtain different distinguishing features in the images of the numbers. In this study, the digits were classified by using four different edges' features these are the horizontal, vertical, right and left oblique edges of the digits. With the obtained edge features, classification was done with both Artificial Neural Network and multi class Support Vector Machine. One against all Support Vector Machine method is used in this paper. Thus, 10 classes can be allocated at the same time. In order to make the best classification with these machine learning methods, it has been tried to reach the optimum parameters of the methods. Different 5000 handwriting digit images which are 20x20 pixel black and white images were used for training and testing. The same images were not used for testing and training. Artificial neural networks have reached 94% accuracy in training and tests where four different edge features are presented as input to the systems. On the other hand, SVM has reached 100% accuracy with different numbers of learners (50, 100, etc.). As a result for this data set Support Vector Machine is better results than Artificial Neural Networks.

KEYWORDS - Neural network, Digit recognition, Segmentation, Edge detection

DESIGN AND IMPLEMENTATION OF REAL TIME CLOCK RTC CIRCUIT FOR INDUSTRIAL AUTOMATION

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ABSTRACT

Abstract-This work describes the Real Time Clock (RTC) circuit designed to be used in industrial automation where the date and time data are important. The DS3231 Real-Time Clock module is used for this circuit. The DS3231 has an internal oscillator(TCXO-Temperature Compensated Crystal Oscillators) that is not affected by external factors such as temperature. This ensures that it produces very accurate results and that it can be successfully used in critical applications where date and time are important. Also, thanks to this feature, a very low cost RTC circuit is realized. Compared to other RTC circuits that bring serious delays in the long run, the most accurate result and the lowest cost circuit was achieved with this module. It shows the date and time with only 1 minute error margin per year. The RTC circuit can keep the date / time even if the power is cut off with the CR2032 battery, which can be plugged into the RTC circuit. The RTC circuit used in this study records its date and time data to its own static RAM and a microcontroller reads this date and time data from this static RAM via the I2C communication protocol. This work was performed using both Pic16F628 microcontroller and Arduino UNO R3. Date and time settings can be set with the adjustment buttons placed on the designed RTC circuit.

KEYWORDS - RTC, Microcontroller, TCXO, CR2032

DC MOTOR CONTROL UNDER DELAYED FEEDBACK

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ABSTRACT

Feedback control systems operates in the presence of delays which arise due to the time it takes to acquire the information needed for decision-making, to create the control signals, and to apply these signals. In general, those delays (also expressed as dead-time or time lag) may have a side effect on the achievable performance of the controlled system. Furthermore, delays in the feedback loop may cause to instability of the overall system. In this case, it is crucial to consider the delays in controller design algorithms. In this study, stability analysis of a DC motor control system which has delayed feedback is considered. Then, a wide literature review on the stabilizing controller design for time-delay system is given. Finally, for illustration, a stabilizing controller is designed for the position control of a DC motor system with discrete and known time-delay.

KEYWORDS - Time-delay systems, Stability, DC motor control, Optimization, Controller design

DETERMINATION OF PROCESS PARAMETERS OF HAZELNUT DRYING WITH RADIO FREQUENCY TREATMENT

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ABSTRACT

Radio frequency (RF) heat treatment is used in various fields in food processing including drying, thawing and sterilizing. Determination of drying parameters of RF treatment is hot topic in food drying processes. The goal of this study was to determine the process parameters for an RF oven used for hazelnut specimens. In this sense the hazelnut specimens were treated in a 13,56 MHz, 5 kW RF system under three different electrode gap. Experiments were carried out in three periods by setting the power of the system to two different values. The hazelnut specimens were weighed with a precision scale before and after each treatment and the amount of moisture removed at the end of the treatment was determined. Besides, thermal images of the specimens were taken before and after each treatment for the determination of the surface temperature distribution. According to the results, heating rate and the amount of moisture removed from the hazelnut specimens were observed. Based on these results the optimum drying process parameters for hazelnuts in RF oven were concluded.

KEYWORDS - Radio frequency heating, Heating rate, Misture content

APPLICATION OF NFC FEATURE PHONES TO LIGHTNING SYSTEMS

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ABSTRACT

In this study, it is aimed to develop a system using near field communication (NFC) for lighting systems. Various lighting systems are used in parks or walkways in cities. Saving energy in lighting used in these areas can prevent to spend money in significant quantities. NFC technology has become a widely used tool in recent years and today. This technology is being used in the phone as its own feature especially in smart phones which are used in everyday life. For this reason, it is considered to provide lighting system control with smartphones. The software was implemented in Raspberry Pi 2. The appropriate NFC reader is selected and connected to the system via Raspberry Pi 2. As a result of the installation of the system, all phones with NFC feature are able to perform the lighting control process. The main purpose of using the NFC device is to perform contactless data exchange between two electronic devices. As a result, lightning control is provided by contactless data communication instead of a lighting switch.

KEYWORDS - NFC, Smartphone, Lightning systems

HESITANT FUZZY TOPSIS METHOD FOR SELECTING THE BEST LOCATION FOR A SOLID WASTE ENERGY PRODUCTION PLANT

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ABSTRACT

Increasing population, urbanization and industrialization increase the amount of solid waste generated rapidly and it is becoming a bigger problem for cities of developing countries. Because of the complexity of waste streams and the large increases in the amount of waste, management of waste has become a critical importance issue (Achillas et al, 2013). The aim of this work is to provide a new perspective to help the decision makers for the location problem of the solid waste energy production plant. There are a significant number of parameters related to potential site locations, treatment methods and potential incomes for each waste-energy plant decision. In this paper; a fuzzy multi criteria decision making approach employed for evaluation of the solid waste energy production site selection problem that is addressed for Turkey. We integrate the analytic hierarchy process (AHP), the fuzzy technique for order performance by similarity to ideal solution (Fuzzy TOPSIS) and Hesitant Fuzzy sets. Alternative plant locations and criteria are defined from the expert opinions and literature and finally the best location for solid waste management energy production plant is selected.

KEYWORDS - Solid waste energy plant, Hesitant fuzzy sets, Hesitant fuzzy topsis method, AHP

OPTIMAL SITE SELECTION FOR RENEWABLE POWER PLANTS USING HESITANT FUZZY TOPSIS

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ABSTRACT

The optimal power plant location consists of the complicated and multidimensional decision-making process. Determining the most appropriate site of the renewable power plant has a key role in controlling all energy management framework for many energy planners and energy policymakers due to its strategic importance. Such complex strategic decisions consist of different criteria of different decision makers from different fields, and so it demonstrates a vague, unstructured and complicated form. In this paper, we propose a new multi-criteria decision-making process which combines hesitant fuzzy sets (HFSs) to Technique for order preference by similarity to an ideal solution (TOPSIS) approach for selecting an optimal site selection for the renewable power plant under linguistic environments. The HFS easily overcome uncertainty and it provides more accurate results. The method is implemented to select an appropriate site selection for the new power plant in Istanbul.

KEYWORDS - Site selection, Plant location, Hesitant fuzzy set (HFS), TOPSIS, Renewable energy

VISION BASED FEEDBACK CONTROL

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ABSTRACT

The importance of robotic systems is increasing day by day due to its wide range of applications such as manufacturing, robotic surgery, transportation etc. Since vision is a versatile sensor and mimics the human sense of vision, vision-based control systems have received interest in recent years. In general, vision sensors are quite useful to obtain a position information. Although, the image-based position signal would not be accrued as the sensor-based signal, the accuracy can be improved by applying advanced image processing techniques. On the other hand, due to the acquisition and processing of the current image, the feedback loop has time-delay which cause poor performance and even instability. In this work, in order to illustrate the detrimental effect of time-delay, a vision-based position control of DC motor system is considered.

KEYWORDS - Feedback control, Image-processing, Time-delay systems, DC-motor system

INDOOR SPECTRUM OCCUPANCY MEASUREMENTS FOR SPECIFIC FREQUENCY BANDS

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ABSTRACT

With the development of communication technology, the value of RF spectrum is increasing day by day. Studies on dynamic spectrum access (DSA) for more efficient use of spectrum take place around the world. It is important to know the current spectrum usage for these studies. This paper presents spectrum occupancy measurements for specific frequency bands in two different indoor environments. The results are introduced in terms of average power spectral density, instantaneous spectrum and average duty cycle graphs for both environments. It is also concluded that the spectrum occupancy depends on the measurement location.

KEYWORDS - Cognitive radio, Spectrum occupancy, Spectrum utilization, Duty cycle, Measurement campaign

FORECASTING OF TURKEY S ELECTRICITY DEMAND USING IMPROVED GREY PREDICTION MODELS

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ABSTRACT

Energy forecasting practices, particularly in emerging economies like Turkey, remain at the top level of attention among scholars and practitioners for maintaining energy security and uninterrupted energy flow for the future. Parallel growth of population, industrialization, and urbanization leads to more energy consumption. The limited amount of domestic resources will lead to energy imports, which brings economic, social and political concerns to the forefront. Therefore, it is strategically important that energy demand projections should be implemented accurately and optimally [1, 2]. Turkey's geopolitical position makes it a significant energy player among the neighbors surrounding it. Turkey is a noticeable energy corridor between East and West countries and aims to allow a well-balanced energy flow depend on mutual benefits and reliable energy trade agreements. By the end of December of 2016, with building new plants and adding some capacity expansion activities, the total installed electricity power increased to 78.497 MW (megawatt). According to Ministry of Energy and Natural Resources (MENR) of Turkey, electricity production in Turkey has been obtained as 274 TWh (terawatt-hour) and electricity consumption is emerged as 279 TWh by the end of December 2016 [3]. It is obvious that the energy gap between electricity production and electricity consumption should be rapidly compensated with improving new energy investments at the country level. In recently, grey prediction model takes much attention among scholars in energy prediction studies due to high prediction accuracy. Grey prediction model was developed by Deng [4], and commonly used variation of the grey prediction has emerged as GM (1, 1). Grey prediction shows a good performance under scarce knowledge and a small size of data. In this study, two grey prediction models, based on genetic algorithm (GA) and particle swarm optimization (PSO) algorithm, respectively, are proposed for an accurate energy demand forecasting in Turkey. The main reason for employing the grey model is its ability to ensure computational efficiency and to provide enough information for the time series using several data points in the future [5]. Furthermore, the meta-heuristics, namely GA and PSO, provide numerous advantages for the proposed algorithm due to the quick convergence nature and the ability to find optimal solutions in a reasonable time period. We aim to combine best sides of each method to tackle with some variations and complex patterns (trend, seasonality, and nonlinearity) of data which can be seen in energy forecasting models. In order to optimize the parameters of GM (1, 1) model, GA and PSO have been separately utilized to increase the precision of electricity demand prediction. Even though there are a number of studies where grey prediction, GA, and PSO are used individually or in some combination in the literature, to the best of authors' knowledge, the developed hybrid methods are utilized the first time in Turkey's energy demand forecasting study. The results of the study indicate that presented integrated models can significantly improve the accuracy of the forecasting model of Turkey's energy demand.

KEYWORDS - Forecasting, Grey modelling, Genetic algorithm, Particle swarm optimization

ANALYTICAL INVESTIGATION OF PERMANENT MAGNET SYNCHRONOUS MOTOR

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ABSTRACT

Permanent magnet synchronous motors (PMSMs) have used high magnetic flux magnets instead of excitation coils. Therefore, Rotor copper losses are removed from motor. PMSMs are attracting more and more attention due to their ability to produce high torque, high flux density and high efficiency. In this study, the design parameters of 9.5 kW distributed radial PMSM which can produce 60 Nm torque were investigated analytically. In addition, the effects of these parameters on the efficiency of the motor are discussed. As the solutions are linear in analytical design, a more realistic magnetic analysis can be realized with FEM programs. The design parameters of PMSM were then verified by inserting it into the Finite Elements Method (FEM) analysis via the Rmxprt/Maxwell. When the efficiency obtained from the analytical and FEM analysis results are compared, there is a margin of error of 3%. Also other important parameters such as inductance, magnetic flux density, losses were compared and the results were evaluated.

KEYWORDS - Design Parameters, Analitical Design of Permanent-magnet synchronous motor, Radial flux, FEM.

INFLUENCE OF DESIGN PARAMETERS ON THE PERFORMANCE OF THE PERMANENT MAGNET GENERATOR

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ABSTRACT

There has been much interest and studies in high efficiency wind generators with permanent magnet excitation due to the increasing availability of permanent magnet materials, especially NdFeB. Therefore, the importance of permanent magnet synchronous generators is increasing day by day. But the working principles of the these machines is non-linear. So it is difficult to get a definitive design analysis. Because in the machine design many components such as magnetic saturation, magnetic behavior and temperature are interconnected. For this reason analytical designs are realized using empirical assumptions. In order to solve these non-linear problems, magnetic analysis programs which can use the finite element method (FEM) are needed. The most important matters in this area are cost and efficiency. In this study the analytical design of the 0.55 kW radial-flux synchronous generator are discussed. Then the physical effect of three dimensions of magnets and package size were investigated by Maxwell/Rmxprt in order to obtain optimum efficiency. As a result, the best design was obtained after comparing the analytical and Maxwell/Rmxprt.

KEYWORDS - Design of permanent-magnet synchronous generator, Radial flux, FEM

ADSORPTION OF BASIC DYE BY PANI COCONUT WASTE COMPOSITES

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ABSTRACT

Adsorption of basic dye methylene blue (MB) onto three PANI and coconut waste (CW) based adsorbents: 1) %97 PANI/%3 CW composite, 2) %70 PANI/%30 CW composite, and 3) %40 PANI/%60 CW composite are presented in this paper and adsorption probability are compared. Batch adsorption studies were carried out to examine the influence of various parameters, such as initial pH, adsorbent dosage, initial metal ion concentration and time on uptake. Sorption capacity of the composites for the MB were investigated in aqueous media containing different amounts of these ions (10–250 mgL-1) and at different pH values (2.0–10.0). It was found that the sorption % is highest at pH value of 8-10. Adsorption behavior of MB could be modelled using both the Langmuir and Freundlich isotherms. The sorption process was fast at the 30 min and equilibrium was reached after about 120-240 min of contact. The results obtained from the adsorption capacity experiments for MB changed in the range of 15.94-88.33 mg/g. The affinity order of composites for MB was observed as follows: %70 PANI/%30 CW composite > %40 PANI/%60 CW > %70 PANI/%30 CW composite. Adsorption analysis results obtained at various concentrations showed that the adsorption pattern on the adsorbents mainly followed Langmuir isotherm.

KEYWORDS **-** PANI, Coconut waste, Methylene blue, Adsorption

ADSORPTION REMOVAL OF THE BASIC BLUE 3 FROM AQUEOUS SOLUTION BY POLYURETHANE WASTES

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ABSTRACT

The removal of Basic Blue 3 from the synthetic wastewater using polyurethane wastes were investigated in terms of initial basic blue 3 concentration, initial pH, contact time and temperature. In the batch system, the optimum pH was found at acidic range, pH 7. For equilibrium studies, three isotherm models were used in this study, which is Freundlich, Langmuir and Dubinin–Radushkevich for different temperatures and it is found that Langmuir fitted experimental data very well. The maximum monolayer coverage (Qo) from Langmuir isotherm model was determined to be 180.82 - 192.31 mg/g. In the kinetics study, pseudo-first order, pseudo-second order and the intra-particle diffusion were tested; the latter equation showed the best represent the experimental data. Calculated activation energy value (Ea) was 30.54 kJ/mol and indicates that physical bio-sorption mechanisms occurred. The change in entropy (ΔSo) and enthalpy (ΔHo) for an adsorption of the dye were estimated 0.18 kj/mol.K and 29.40 kJ/mol respectively. According to these parameters were observed by adsorption removal of the basic blue 3.

KEYWORDS - Adsorption, Basic blue 3, Polyurethane wastes, Isotherm, Kinetic models

ENHANCED EFFICIENCY OF DYE SENSITIZED SOLAR CELLS BY MODIFIED PHOTOANODE WITH EUROPIUM DOPING

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ABSTRACT

This paper reports the influence of europium (Eu) doping at different levels (0.5 and 1.0%) on the properties of TiO_2 film. This film properties were then correlated to the performance parameters of dye–sensitized solar cells (DSSCs) utilizing those films as photoanode layer. The experimental results obtained by several methods (XRD, Absorption, SEM, BET, Raman, etc.) showed that critical properties such as crystal size, absorption coefficient, and surface area of TiO_2 can be controlled through both Eu dopants and doping level. The particle size significantly reduce by doping while absorption coefficient and surface area dramatically increase with increasing doping level, leading to higher dye–loading capability. The photovoltaic performance of the DSSCs were evaluated by I–V, EQE, and EIS measurements. The maximum efficiency of 11.31% (Jsc = 9.98 mA.cm–2, Voc = 672 mV, FF = 0.51) was achieved at 1.0% of Eu that is ~21% and ~27% higher with respect to the DSSCs with 0.5% Eu doped and bare TiO_2, respectively. EIS measurements confirmed the superior electron–transfer kinetics at the modified photoanode/electrolyte interface. The charge transfer resistance could decrease to as low as 9.64 Ω in the 1.0% of Eu cell, which is almost half of the bare TiO_2 (18.81 Ω). In this regard, Eu doped TiO_2 should be considered as a potential photoanode for high–performance DSSCs.

KEYWORDS - Europium, Photoanode modification, DSSC, Eu doped TiO_2

GROUND STATE PROPERTIES OF TWO DIMENSIONAL QUANTUM DOT CONTAINING N ELECTRONS CONFINED IN A GAUSSIAN POTENTIAL

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ABSTRACT

In last two decades, quantum dots received great attention [1] and modern fabrication technology has allowed experimentalists to fabricate these structures to controll size, number of confined electrons, shape and other physical properties by applying well-controlled gate voltages. These systems have interesting electronic properties and potential use in future applications in novel electronic and optoelectronic devices [1-3]. In this work, we analyzed the ground-state physical properties of a two-dimensional quantum dot with N interacting electrons confined in a Gaussian confining potential (V_o e^(-∝r^2),where V_o and∝are const.) [4]. An iterative numerical procedure were used to solve Thomas-Fermi equation and some properties like electron density and chemical potential were determined by for both interacting and non-interacting systems. It was shown that the results of the calculations were in excellent agreement with those given in the literature for non-interacting system. Results were also compared with ones given for the harmonic oscillator as Gaussian potential could be approximated by ~r^2 (for r << 1) [5-6]. They indicated that interactions and the shape of the confinement had significant effect on the density and hence the ground-state properties of the electrons significantly.

KEYWORDS - Quantum dot, Thomas-Fermi approximation, Gaussian potential

EFFECT OF GRAIN SIZE ON MICROHARDNESS OF SUPERPLASTIC $ZN_{22}AL$ ALLOY

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ABSTRACT

Zn-Al alloys are preferred in the industry due to their excellent mechanical properties, castability, and machinability [1,2]. Eutectoid Zn-$_{22}$Al alloy belongs to the Zn-Al alloy family, and known as a model superplastic material. It is also a suitable material for forming operations but has limited use due to low hardness and an adverse relation between formability and hardness. [1,2]. This study aims to determine the effect of grain size on microhardness behavior of Zn-$_{22}$Al alloy at room temperature. To this goal, two-step equal channel angular extrusion/pressing (ECAE/P) and subsequent heat treatments at 250 ºC for different time periods were applied to the alloy to obtain various grain sizes in the microstructure. Scanning electron microscopy (SEM) technique was used for microstructural examinations. Microhardness measurements were also performed on ECAP-processed and heat-treated samples to assess the effect of grain size on microhardness behavior. The measurements were obtained by means of Struers (Duramin-3) microhardness tester with a load of 100 g for 10 seconds. The surfaces of the samples were polished before the tests, and at least 10 measurements were acquired for each condition and the averages of these measurements were calculated to report an average value. After the ECAP process, the average grain size was measured to be 200 nm [3]. Application of heat treatment resulted in a grain growth and grain size of the alloy increased up to 2.60 μm after heat treatment of 192 h [4]. It was observed that the grain growth up to 1.80 μm increased microhardness values from 40 HV1 (for the ECAP-processed alloy) to 83.5 HV1. Nonetheless, further grain growth up to 2.40 μm and 2.60 μm led to decrease in hardness values to 79 HV1. These results suggest that, superplastic Zn-$_{22}$Al alloy has a critical grain size which below and above critical grain size results in increase and decrease in the microhardness hardness values of the alloy, respectively. In another word, if the Zn_{22}Al alloy has ultra-fine grained (UFG) microstructure which is smaller than the critical grain size (1.8 μm), alloy exhibits anneal-hardening behavior. However, if the grain size of alloy is bigger than the critical value, anneal-softening behavior occurs [5].

KEYWORDS - Microhardness, Grain growth, Zn-22Al, ECAE

SYNTHESIS OF NANO TITANIUM DIOXIDE PARTICLES FOR PHOTOCATALYTIC APPLICATIONS

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ABSTRACT

Nanoscale titanium dioxide (TiO2) is used in many industrial applications such as paint, cosmetic, glass, drug, textile, food because of its many unique properties [1-5]. Also, TiO2-based photocatalysts have attracted extensive attention in photocatalytic degradation of toxic organics [6-7]. In this study; synthesis of nanosize titanium dioxide (TiO2) particles were achieved in the presence of three different additives. Polyvinyl butyral (PVB), alginate (alginic acid) and polyethylene glycol (PEG), in different concentrations, were selected as additives to explore their effectiveness in particle size and photocatalytic activity. Simple Flame Transport method was used to produce nano size particles. Scanning Electron Microscopy (SEM), X-ray diffraction (XRD) and FT-IR measurements were used for characterizing morphological and significate properties of synthesized TiO2. XRD spectra of particles showed peak characteristics for rutile phase. The photocatalytic activities of the samples were measured by methylene blue (MB) degradation in solution under UV-light. Experimental studies revealed that these particles exhibit strong photocatalytic activities against MB.The results indicated that the additives and temperature were effective on the size and photocatalitic properties of TiO2 particles.

KEYWORDS - Nanoscale titanium dioxide (TiO2), Additives, Photocatalytic activity, Simple Flame Transport method.

SYNTHESIS OF E 2 1 3 METHYL 3 PHENYLCYCLOBUTYL 2 MORPHOLINOETHYLIDENE HYDRAZINE CARBOTHIOAMIDE AND APPLICATION OF CR III IONS

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ABSTRACT

In this present study, an efficient, alternative and low cost adsorbent is synthesized to remove heavy metal ions from industrial wastewater [1]. The new adsorbent material has been prepared by immobilizing a conjugated system (E)-2-(1-(3-methyl-3-phenylcyclobutyl)-2-morpholinoethylidene)hydrazine carbothioamide on silica gel previously doped with 3-chloropropyl-trimetoxysilane[1].The newly synthesized surface (SiCl-PMH) was characterized with FT-IR spectroscopy, scanning electron microscope (SEM). The sorption of Cr (III) ion was evaluated with using batch methods. The amount of adsorption of Cr (III) ions in aquous solution and industrial wastewater was detected by an atomic absorption spectrometer (AAS) [3].. The maximum adsorption capacities and isotherm parameters were calculated from the Langmuir, Freundlich and Dubinin-Radushkevich (D-R) isotherm equations. Thermodynamic parameters such as free energy (ΔGo), entropy (ΔSo) and enthalpy (ΔHo) were also calculated from the sorption results. Si-Cl-PMH can be used to removal of Cr(III) ions from industrial wastewaters [4].

KEYWORDS - Silica Gel, Immobilization, Adsorption, Adsorption Isotherm, Cr(III)

MAGNETIC PROPERTIES OF THE YBCO HIGH TC SUPERCONDUCTOR

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ABSTRACT

We modeled and investigated magnetic properties of the YBCO ($YBa_2Cu_3O_{7-\delta}$) high-Tc superconductor within the effective field theory. We obtained the magnetizations of the YBCO and its all components versus temperature and external magnetic field. We find that the YBCO and its all components exhibit ferromagnetic behaviors for the spin up orientations of all atoms. But, the Y-Ba core, Yttrium and Barium atoms of the YBCO exhibit superconductivity behaviors for the spin down orientations of Ba and Y. Therefore, Y-Ba core, Yttrium and Barium atoms have the superconducting phase diagram and they have Meissner, vortex and normal states. From these results, we suggest that superconductivity properties of the YBCO originate from the spin down orientations of the Yttrium and Barium atoms in the core of the YBCO. *This work was supported by the Scientific and Technical Research Council of Turkey (TUBITAK) under Grant No: 116R071.

KEYWORDS - YBCO, Magnetizations, Hysteresis, Phase diagram, Effective field theory

PHYSICAL CHARACTERISTICS OF INGAN TERNARY SEMICONDUCTING THIN FILMS UNDER THE INFLUENCE OF N_2 REACTIVE GAS

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ABSTRACT

In this study; InGaN compound, which has an important role in the production of optoelectronic devices in our daily life, was produced by the method of radio frequency magnetron sputtering (RFMS). Appropriate growth conditions were determined for the InGaN thin films produced by this method. InGaN semiconducting thin films were grown on the quartz substrate at different nitrogen gas flows rates. The parameter changed in this study is only gas flow rate of N_2. The purpose of this research is to investigate the effect of N_2 gas flow rate and some physical properties of InGaN thin films. After growing the InGaN semiconducting thin films, their absorption characteristics were investigated with a spectrometer with a wavelength range of 200-800 nm. Energy band gaps of deposited films were found from the absorption data. These samples were then examined by X-ray diffractometer with a wavelength of 1.54 Å. Crystallographic properties of films obtained from diffraction patterns were investigated to determine the particle size and lattice parameters of InGaN thin films. Surface morphology properties of the InGaN thin films were investigated by both SEM and AFM measurements.

KEYWORDS - InGaN ternary compound, Sputtering, Physical Characteristics, N_2 gas flow

THE PRODUCTION OF VINASSE AND MODELLING OF RHEOLOGICAL PROPERTIES

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ABSTRACT

Vinasse is defined as the residual liquid of alcohol production. This industrial waste is a smelly, brownish liquid containing organic and inorganic substances and is among the hazardous wastes. Vinasse has caused great dangers in situations where it is given directly to the environment. It has even caused some sugar factories in Turkey to stop the production of alcohol plants. In this study, rheological behaviors of vinasse were examined and evaluated as polymeric raw material. Also in this study, polymeric polyurethane was produced by using high molecular weight alcohols contained in vinasse.

KEYWORDS - Vinasse, polyurethane, rheological properties, modelling.

SYNTHESIS AND SURFACE MODIFICATION OF NANOSTRUCTURED CDO FILMS VIA SURFACTANT TEA

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ABSTRACT

In this study, the influence of surfactant Triethanolamine (TEA) concentrations on the structural and morphological properties of nanostructured CdO films has been investigated. Four series of nanostructured CdO films without TEA and with TEA concentrations of 0.25-1.0 M% of the growth solution were synthesized by the Successive Ionic Layer Adsorption and Reaction method on glass substrates. The structural and morphalogical properties of TEA added CdO films are investigated by XRD, SEM, MM and AFM analysis. From the SEM, MM and AFM micrographs, it was seen that the surface morphology of the films are remarkably enhanced by the increasing TEA concentration. X-ray diffraction (XRD) patterns reveal that the improvement in crystallinity quality of CdO for TEA assisted films.

KEYWORDS - CdO, TEA, Surface Properties, SILAR

MULTIFUNCTIONAL NANOSTRUCTURED COMPOSITE BASED ON EPOXY RESIN FOR USE AS A RADAR ABSORBING MATERIAL

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ABSTRACT

In materials science, synthesizing of new materials with different properties takes place very important role. For that purpose, polymer nanocomposites are generated by introducing nanoparticulates into a polymer matrices. Polymer nanocomposites have opened up new perspectives for multifunctional materials with various properties. These type of materials are capable of responding to environmental stimulants upon exhibiting particular changes in some of their properties. Due to the increasing importance in the military applications, radar absorbing materials have attracted a great attention. In order to generate a new material having desired properties with multifunctionality, different fillers can be combined with polymer matrices. In the present work, it is aimed to develop multifunctional nanocomposites having three different properties such as radar absorption, flame retardant and self-healing. For this purpose, epoxy resin as a polymer matrice; APP, Ca(OH)2 and nanoclay as fire retardant additives; Ni-Zn Ferrite nanoparticles as a microwave absorber material, chitosan as a self-healing agent were selected and formulated to serve as multifunctional nanocomposites in civilian and military sectors. Different composite materials were produced upon incorporation of various fillers with different loading level into epoxy resin. The generated nanocomposites were characterized by flame retardant tests, radar absorbing tests and self-healing tests besides FTIR analysis. The microwave absorption properties of composites analyzed in X-band region of 8–12 GHz. At the end of the characterization and functional tests, it was found that the nanocomposite which includes 4% Ni-Zn Ferrite nanoparticles was the best radar absorber. Moreover, the composite containing 6% nanoclay showed very good flame retardant property. It can be concluded that these fillers exhibited synergetic effects. Consequently, the results discussed in this work show that after optimizing all parameters, it is possible to generate prototype applications of these materials for using as promising candidates in this field. Keywords: Radar absorbing materials, epoxy, nanocomposite, flame retardant, self-healing.

KEYWORDS - Radar absorbing materials, Epoxy, nanocomposite, Flame retardant, Self-healing.

ELECTROCHEMICAL IMPEDANCE RESPONSE OF C|LiCoO2 BATTERIES IN ABUSED CONDITIONS

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ABSTRACT

Safety concerns arise when batteries are abused or used outside their normal operation modes. The failure modes of rechargeable batteries mostly include overcharge, over-discharge, elevated or low ambient temperature [1]. In this study, the impedance response was demonstrated to be very sensitive to the history of a lithium-ion coin cell, C|LiCoO2. The impedance increases dramatically when the battery is either overcharged or over-discharged. When the battery is held at open circuit, the cell returns to a potential within the nominal normal operating range. When the battery had been overcharged, the impedance remains much larger than it was originally. When the battery had been over-discharged, the impedance is essentially the same as it was originally. In other words, the impedance analysis showed that the electrochemical characteristic was changed for a coin cell subject to overcharge and returned to normal cell potentials; whereas, the electrochemical characteristics returned quickly to normal for a coin cell subject to over-discharge and returned to normal cell potentials. To explore this further, the impedance was measured at different points in time during the open-circuit relaxation of cell potential following overcharge and over-discharge. Electrochemical methods were also used to determine the capacity of the battery before and after overcharge and over-discharge [2]. A temperature-controlled chamber was used to allow the cells to equilibrate at elevated and low temperature. The temperatures were selected to be the values at which failure is expected to compare with the normal operation ones. Once the cell was equilibrated, the impedance was measured within the state-of-charge conditions. The results show that the impedance grows sharply at extreme temperature conditions [3]. This work supports the use of impedance spectroscopy as a diagnostic tool to detect failures and imbalances for individual cells in a battery stack.

KEYWORDS - Lithium-ion batteries, failure modes, impedance spectroscopy, battery capacity

PRODUCT QUALITY IMPROVEMENT IN PATENTING PROCESS WITH RESPONSE SURFACE METHODOLOGY

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ABSTRACT

There are many ways to reduce product quality faults and improve quality levels in production processes. Response Surface Methodology is an Experimental Design Method, is also an important tool for predicting response variables. In this study, a quality fault is considered as a response variable. The patenting process is a high added value production process in which zinc and phosphate coated steel wire productions are made. Quality faults were recorded in steel wires and priorities were given by Pareto analysis method. It was observed that 53% of the total faults occurred due to the wire tensile strengths. In this study, it was aimed to reduce the tensile strengths faults to a minimum. Within the scope of the study, 5 independent variables which can be measured at the level that can affect the response variable were evaluated. These variables were determined as the diameter of the raw material used for the wire, the amount of carbon, the amount of manganese, the uncoated wire diameter and the final product wire diameter. From the investigated independent variables, two formulation was obtained for two different patent wire groups with the aid of the full quadritic Response Surface Methodology model. The processes were monitored for some time by the resulting formulations. Also it was seen that the independent variables explained the response variable by 93%(R2). Tensile strength faults have been reduced by 62%. In addition to this, with the help of these theoretical models, more accurate and efficient use of the raw materials has been achieved.

KEYWORDS - Keywords: Experimental Design, Response Surface Methodology, Steel wires.

RHEOLOGICAL PROPERTIES OF ULEXITE ADDED DRILLING FLUIDS

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ABSTRACT

Drilling fluid (Mud) is one key fluid for any oil and gas earth excavation process. Mud assists the drilling process by stabilizing the well bore, transmitting the hydraulic power, lifting the cuttings and providing lubrication etc. In other words, drilling mud is a vital material with the following functions, to remove cuttings from wellbore, to cool and lubricate drill string, to prevent migration and cavitation, to form and impermeable cake, to control high pressure formations, to assist for weighning pipes, to protect drilling pipes against corosion. Failure of any of these leads to time and cost losses at huge proportions and in some cases even causes the abandonment of the well. Therefore; drilling mud needs to be adjusted very well for the rheological properties such as plastic viscosity (PV), apparent viscosity (AV), yield limit and gel strength as well as density, pH, liquid loss and sand content. It has been found that different chemical additives are added to the drilling muds and partly improve the properties of the mud. However, it has been observed that the studies carried out have not been successful enough. There have been also no studies available for the addition of 1, 2, 3, 4, 5 (% w / v) boron derivatives, that we have the world's largest reserves, such as ulexite to drilling muds. In this study; water based drilling muds used in drilling operations were prepared and added to these drilling muds at different concentrations (% w / v) of ulexite. The rheological properties of the obtained drilling mud such as viscosity, density, plastic viscosity, visible viscosity, gel strength, water loss and drilling mud cake thickness are measured using Fann Viscometer and American Petroleum Institute (API) liquid loss test equipment,acidity constant (pH) property is measured with pH meter. As a result of this study; it was found that the added ulexite drilling fluid has better rheological properties when compared to the results of the water-based bentonite drilling fluid and the ulexite-added drilling fluids.

KEYWORDS - Ulexite, Drilling Muds, Plastic Viscosity, Apparent Viscosity, Gel Strengths.

EXPERIMENTAL STUDY ON STRENGTHENING A REINFORCED CONCRETE STRUCTURE WITH SOFT STOREY IRREGULARITY

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ABSTRACT

Turkey is one of the earthquake-prone countries. Our country is located on Alpine-Himalayan seismic belt. Turkey transformed into a natural laboratory, since nearly twenty thousand eartquakes have occured every year. Especially, after the 1999 Eartquake, many strengthening applications have started to be implemented in our country. Because these applications are concerned about how they will perform during a possible earthquake, retrofitting applications to be built need to be well projected and implemented correctly. In the design of earthquake resistant reinforced concrete structural systems, the necessity of being regular of the structure is one of the main principles. The negativities of the irregularities in buildings generally come out with the effect of seismic load. It is crucial that the irregularities of structural systems should be prohibited in convenient way with respect to the conditions that are established by the seismic codes. In this study; It is aimed to propose some strengthening methods to eliminate the adverse effects of soft storey formation in reinforced concrete structures with low earthquake resistance with soft storey irregularity according to Turkish Seismic Code-2007. Two-story single-span reinforced concrete test specimen with 1/3 scale were tested in the study. The type of strengthening application is used as K diagonal shape (<>). As a result of the work, the sample reached a maximum load of 108.3 kN and brittle failure occured. The amount of displacement formed at this load value is 51.70 mm. And also the study will be compared with 2 reference samples. First reference sample has filler wall at 2 storeys and the second reference sample has its first storey blanked and the second storey with filler wall.

KEYWORDS - Soft Storey, Strengthening, Experiment, RC Structure, Seismic

PRODUCTION OF AA7075 ALLOY VIA HOT PRESSING METHOD AND DETERMINING OPTIMUM SINTERING PARAMETERS

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ABSTRACT

Aluminum matrix are generally used in structural and functional applications fields including aerospace, defense, automotive industries. Especially, 7075 aluminium alloy (AA7075) have specific properties such as tensile strength, corrosions resistance, higher toughness. In this study, AA7075 powders were produced by means of gas atomization method. Then, the average particle size of these powders was determined. After that, the AA7075 powders were sintered in the die produced for tensile test by hot press method at different temperatures, pressures and dwell times. Optimum production parameters were investigated. According to the experiment result; It has been observed that the pressure does not affect the sintering properties after passing a specific value. As expected, the sample was not sintered at low sintering temperature values. Consequently, the optimum sintering temperature was lower than the conventional sintering temperature due to hot-press sintering method.

KEYWORDS - Aluminium, Hot Press, Powder Metallurgy, Sintering Parameters

TEMPERATURE EFFECT ON SURFACE PROPERTIES OF TETRADECYL TRIMETHYL AMMONIUM BROMIDE AND POLYOXYETHYLENE 23 LAURYL ETHER

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ABSTRACT

In this study, conductivity and contact angle measurements of the prepared solutions were performed at for different temperatures at different concentrations of TTAB, a cationic surfactant and Brij 35, a nonionic surfactant. Aluminum, Copper, Zinc and Stainless steel are used as the surface. In the work we did, we studied the changes in the temperature of the systems being worked on and especially the contact angle measured at different surfaces. From the graphs we have drawn with the help of measured conductivity and contact angle values for surfactant concentrations for these surfactants, for TTAB, on Stainless Steel, Aluminum, Copper and Zinc surfaces, as the surface changes, conductivity increased with increasing order of temperature in all systems where the contact angle is increasingly higher. In the case of Brij 35, on stainless steel, Aluminum, Zinc and Copper surfaces, as the surface is changed, the conductivity increased with increasing order, as the temperature increases in all systems with increasing contact angle. When these two surfactants were examined, it was determined that Brij 35 had higher contact angle values on different surfaces than TTAB. It was found that for the contact angle measurements carried out on different metal surfaces, the contact angle values on the same surface had higher contact angles for nonionic surfactants than for cationic surfactants.

KEYWORDS - Contact angle, cationic surfactant, anionic surfactant and conductivity.

CHARACTERIZATION OF POLYURETHANE MOF NANOCOMPOSITE FILMS USING VEGETABLE OIL BASED POLYOL BLENDS

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ABSTRACT

Polyurethanes are versatile polymeric materials and are usually synthesized by isocyanate reactions with polyols. Due to the variety of isocyanates and polyols, particularly polyols, polyurethanes can be easily tailored for wide applications, such as rigid and flexible foams, coatings, adhesives, and elastomers. Considerable efforts have been recently devoted to developing bio-based substitutes for petroleum-based polyurethanes due to increasing concerns over the depletion of petroleum resources, environment, and sustainability. Polyester polyols based on aliphatic and aromatic dicarboxylic acids are one of the most important materials in polymer technologies. Large volume of plants oils are used as renewable resources to produce various chemicals which are industrially important to make soaps, cosmetic products, surfactants, lubricants, diluents, plasticizers, inks, agrochemicals, composite materials, food industry. Vegetable oils are one of the most important classes of bio-resources for producing polymeric materials [1]. Over the past several years, increasing attention has been given to the use of vegetable oils as feedstocks for polymeric materials, because they tend to be very inexpensive and available in large quantities. Vegetable oils can also be converted to polyols, which can further react with diisocyanates to afford polyurethanes. The wide range of vegetable oil-based monomers leads to a wide variety of polyurethane materials, from flexible foams to ductile and rigid plastics [2]. The thermal and mechanical properties of these vegetable oil-based polyurethanes are often comparable to or even better than those prepared from petroleum and are suitable for applications in various industries. Soy bean oils are considered the renewable raw materials with a good functionality, the most abundant and the cheapest, to produce the polyurethane [3]. Several biorenewable vegetable oil-based polyols with different molecular weights and various hydroxyl functionalities were successfully prepared by ring-opening epoxidized soybean oil. This study introduces synthesis and properties of bio-based polyols and polyurethane. A comparison of bio-based polyol properties with their petroleum-based analogues were investigated. In this study, the epoxidized soybean oil based polyols with a range of hydroxyl numbers were prepared using commercial epoxidized soybean oil by ring opening reactions with different substituents in the presence of a catalyst. Flexible PU films were prepared via mixing of poly(tetramethylene glycol) (PTMG1000) and ESBO polyols by reacting them with 4,4-dicyclohexylmethane diisocyanate (H12MDI). Also, in this work, PU/MOF nanocomposite films were prepared using Cu and Zn based metal organic frameworks. MOFs were synthesized by combining an organic ligand and metal salt using a room temperature solvo-thermal synthesis route. MOFs were characterized in terms of structure, N2 adsorption isotherms and surface area by BET, SEM, FTIR analyses. Synthesized ESBO based polyols and PU films were characterized by FTIR spectroscopy.

Mechanical properties of PU and PU/MOF nanocomposite films which are elongation at break, tensile strength and tear strength were measured.

KEYWORDS - Vegetable oil-based polyol, Polytetramethylene ether glycol, Epoxidized soybean oil, Metal Organic Frameworks, Bio-based polyurethane film

EFFECT OF PH ON THE PROPERTIES OF NANOSTRUCTURED CADMIUM OXIDE FILMS PREPARED BY THE SILAR TECHNIQUE

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ABSTRACT

In this work, nanocrystalline cadmium oxide (CdO) films were deposited on glass substrates for various pH values ranging from 11.3 to 12.5 by Successive Ionic Layer Adsorption and Reaction (SILAR) technique. To obtain good film stoichiometry, the heating of films in static air at a temperature of 623 K for 1 hour was carried out. The comparison of structural, morphological and optical properties of CdO films at different pH of the solution has been studied. The effects of pH on the crystal structures, orientation of crystallization and crystallite sizes i.e. structural properties of the films were analyzed with X-ray diffraction (XRD). X-ray diffraction analysis revealed the polycrystalline nature of the CdO films with cubic structure and show preferential orientation along (111) and (200) planes. The surface morphology of the prepared films having different pH values was investigated by scanning electron microscope (SEM). The optical band gap of nanocrystalline CdO films at different pH has been measured using UV-Vis spectroscopy. The optical properties showed that a significant reduction in the optical band gap is observed from 3.26 to 2.35 eV by increasing the pH value of the solutions from 11.3 to 12.5, respectively. By UV-Vis analysis, it is found that increasing pH value has a decreasing effect on band gap energy. The investigations showed that the pH value has a significant effect on the physical properties of SILAR produced CdO films.

KEYWORDS - CdO film,pH value,SILAR

FORMALDEHYDE EMISSION PROBLEMS AND SOLUTION RECOMMENDATIONS FOR WOOD COMPOSITE PANELS

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ABSTRACT

Wood composite panels are widely used in building construction, decorations, bridges, pier construction, transportation sector and furniture production in the world. Formaldehyde is mostly found in formaldehyde containing adhesive bonded wood composite panels. It is also known that the formaldehyde emission from wood products containing formaldehyde above the standard amounts has a negative impact on the environment and human health. Formaldehyde emission causes severe allergic reactions in the skin, eye and respiratory system, weakens the immune system, and causes cancer like health problems depending on the concentration in the environment, exposure time and shape. In this context, it is concluded that legal arrangements should be prepared for formaldehyde usage, which is used in the production of formaldehyde-containing adhesives, especially wood composite panels, and necessary controls should be made whether the adhesives are prepared within the standard limits.

KEYWORDS - Wood based panel, wood composite, formaldehyde, emission

THE EFFECT OF SIO2 ADDITIONS ON THE MECHANICAL STRENGTH OF AL2TIO5 SINTERED AT 1450 C

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ABSTRACT

Aluminum Titanate (Al2TiO5) is a ceramic material which exhibits high temperature refractory properties due to its high melting point, low thermal conductivity, and high thermal shock resistance. Micro-crack formation and instability of Al2TiO5 phase make this material noncommercial. Some additives are used to overcome these problems. The present work investigates the effect of SiO2 additions on mechanical strength, bulk density, and phase composition of Al2TiO5. Al2TiO5 was synthesized using reaction sintering at 1450°C for 3 h with equimolar mixtures of Al2O3 and TiO2, and SiO2 with additions 1.25, 2.5, 5 and 10 (by wt. %). The densities of the samples were determined by Archimedes method, mechanical strengths by three-point bending test, phase contents by XRD, and microstructure by SEM. The experimental results showed that SiO2 addition leads the secondary phase formation of mullite and also limited grain growth. Undoped Al2TiO5 showed a mechanical strength of only 6 MPa while the 10 wt. % SiO2 addition showed the mechanical strength of 38 MPa.

KEYWORDS - Al2TiO5, SiO2, Refractory Ceramics, Sintering, Mechanical Properties

OPTIMIZATION OF PROPERTIES OF CARBON FIBER REINFORCED CONCRETE

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ABSTRACT

Carbon based materials such as graphite, carbon black, graphene oxide, carbon nanotubes, graphene and carbon fiber are often used to form conductive concretes. Conductive concretes enable easier monitoring of the concrete structures. In this study, it is aimed to reveal the electrical, mechanical, thermal and fluidity properties of carbon fiber reinforced concrete composites. The mechanical properties of carbon fiber reinforced concrete composites 3, 7 and 28 days compressive strength, 28 day tensile strength, fluidity slump flow, thermal conductivity and electrical conductivity was investigated. It was observed that thermal conductivity increased %9.86, electrical resistance decreased %9.66, tensile strength increased %37; 3, 7 and 28 days compressive strength increased %336, %180, %149 in order. No meaningful change observed at slump flow.

KEYWORDS - Composites,thermal conductivity,electrical resistivity,mechanical properties,optimization

INVESTIGATION OF THE EFFECT OF BORAX ON THE RHEOLOGICAL AND CHEMICAL PROPERTIES OF DRILLING MUD

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ABSTRACT

Drilling mud is an indispensable element of drilling activities and is defined as a circulating fluid that is used to meet some or all of the functions required for the drilling operation. In other words, drilling fluid plays an important role in drilling process as it affects the rate of penetration of bit, caving shale, pipe sticking, loss of circulation as well as formation evaluation and the subsequent productivity of well. Failure of any of these activities leads to time and cost losses at huge proportions and in some cases even causes the abandonment of the well. Therefore; drilling mud needs to be adjusted very well for the rheological properties, density, pH, liquid loss and sand content. In order to improve physical properties of drilling fluid and to meet its functional requirement of rheology that satisfies the drilling process and reservoir conditions, different additives such as chemicals, polymers, and nanoparticles were used. However, it has been observed that the studies carried out have not been successful enough. There have been also no studies available for the addition of 1, 2, 3, 4, 5 (% w / v) boron derivatives, that we have the world's largest reserves, such as tinx (borax) to drilling muds. Therefore, in this study; water based drilling muds used in drilling operations were prepared and added to these drilling muds at different concentrations (% w / v) of borax. The rheological properties of the obtained drilling mud such as viscosity, density, plastic viscosity, visible viscosity, gel strength, water loss and drilling mud cake thickness are measured using Fann Viscometer and American Petroleum Institute (API) liquid loss test equipment and acidity constant (pH) property is measured with pH meter. The results showed that plastic viscosity, apparent viscosity, yield point and gel strengths are increased when added the borax. The best result is obtained from 5% borax additive mud.

KEYWORDS - Borax, Drilling Muds, Plastic Viscosity, Apparent Viscosity, Gel Strengths.

EFFECTS OF CERIUM IRON COPPER MANGANESE INCORPORATION ON THE STRUCTURAL AND CATALYTIC PROPERTIES OF TI PILLARED BENTONITES

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ABSTRACT

Ti-pillared bentonite (Ti-PB) using bentonite from the Middle Anatolia region (Hançılı) was synthesized. Iron or copper was impregnated to Ti-PB from the solution and subsequent cerium incorporation was done by wet impregnation. Different combinations of cerium, manganese or copper were impregnated through the Ti-PB under evaporation. The hydrothermal synthesis also were carried out with a Cu/(Cu+Ti) ratios of 0.1 and 0.2. A considerable increase in the basal spacing value was obtained with a decrease in its intensity by the pillaring with titanium. The anatase phase of titanium dioxide was found for all of the samples. The Ti-PB calcined at 500 °C gave a basal spacing value of 4.41 nm, a specific BET surface area of 348 m2 g-1, and a micropore volume of 0.093 cm3g-1. The post incorporation of copper and iron resulted in a decrease in the micropore properties, the hydrothermally synthesized copper titanium samples reflected the similar behavior with Ti-PB. EDS analyses indicated that TiO2 content of all PBs was near 40 mass % and metal incorporation to Ti-PB was succesfully performed by the impregnation method. Ti-PB exhibited both the Lewis and Brønsted acidities. The copper impregnation resulted in an increase in the Lewis acidity. The hydrotermally synthesised copper containing sample and cerium-iron and cerium-copper impregnated samples yielded an increase in the Brønsted acidity. The titanium in all of the samples was in the TiO2 form (Ti+4) with 2p3/2 and 2p1/2 orbitals respectively. The 2p3/2 and 2p1 orbitals of copper resulting from CuO (Cu2+) was observed for the sample in which the metal loaded by the post synthesis. The 2p3/2, 2p1/2 and 2s orbitals of iron from bentonite and by impregnation were also observed showing the presence of Fe2O3 (Fe+3). The 2p3 and 2p1 orbitals of manganese resulting from Mn3O4 and the 3d3/2 orbital of cerium corresponding to CeO2 (Ce+4) were observed for cerium manganese containing Ti-PB, while the cerium orbital was not observed for the iron including one. Approximately 90 % phenol conversion at 30 °C in an hour was achived with the cerium and iron containing sample and the completion of catalytic oxidation was reached at 2 hours. An increase of temperature rised the conversion of phenol, and the iron containing sample resulted in approximately 100 % conversion at an hour at 50 °C.

KEYWORDS - Ti-pillared bentonite, structural properties, surface acidity, chemical compositon, catalytic wet peroxide oxidation

USABILITY OF THE MIDDLE BLACK SEA REGION BASALTIC PUMICE IN PORCELAIN TILES PRODUCTION AND CHARACTERIZATION

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ABSTRACT

Basalts are metamorphic and igneous natural rocks that are used conventional outdoor implementations (i.e. pavements, aggregates, concretes). The current studies have been focused on developing new ceramic compositions by the use of industrial wastes and/or local raw materials, The aim of this study was to investigate the potential use of basalt as an alternative raw material in ceramic porcelain body compositions. For this purpose, different amounts of basaltic raw material (0.5, 1 and 3%) collected from the Middle Black Sea region (Turkey), were incorporated and the developed bodies were fired in industrial firing regime up to 1200° C (35 min.). Analyses of the fired bodies were carried out by X-ray diffraction (XRD) and Scanning Electron Microscope (SEM) fitted with EDX. The neoformed phases obtained were quartz and mullite. The final properties of the developed bodies were evaluated by measuring the linear shrinkage, water absorption, flexural strength. As a result, the incorporation of basalt in porcelain tile bodies led to improved technological properties due to the promoted sintering process and therefore promising an alternative raw material for the porcelain tile manufacturing industry.

KEYWORDS - Basalt, Ceramic body, Glass-ceramic, Tile

SINTERED GLASS CERAMICS COMPOSITES FROM LOW COST MATERIALS

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ABSTRACT

Glass-ceramics composites have been obtained by melting of a mixture of mining tailings such as from the mining of boron-rich minerals and basalt rock and recycling glasses, such as soda-lime glass and pharmaceutical borosilicate glass (MG=mixture glass). Borosilicate glass, Lcd glass and Alumina platelet were added to the MG in order to conceived as reinforce for glass powders and proved to positively influence the homogeneity of fast sintered glass ceramics. Dense and strong glass-ceramics composites developed at 1000oC with a holding time of only 30 min. The developed composite samples were characterised by means of X-ray diffraction (XRD) and Scanning Electron Microscope (SEM). The measured bending strength and the microhardness values were ~85 MPa and 6.5 GPa, respectively. In conclusion, borosilicate glass and alumina platelet can be used as a secondary glasses in amounts (25% or less) with tolerable modifications of technological behavior and performances in glass-ceramic production.

KEYWORDS - Glass-ceramics, Composites, Sintering, Mechanical properties.

IMPROVEMENTS IN HEAT INSULATION OF CONCRETE COVER PLATES TO DECREASE HEATING COST OF LIVING SPACES

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ABSTRACT

Heat insulation has been a research area for engineers and material scientists. Increase in cost of energy, in either form, directs householders to consider heat insulation applications. When the heat lost levels from living environments in houses or apartments are decreased, heating costs are also decreased in certain percentages. Common heat insulating materials can be recrystallized rock mineral (rock-wool) types, organic poly-carbon plates or using heat resistant materials directly (wood, tuff plates, bricks etc.). In this research, concrete plates which can be attached on walls or they can be produced as wall-plates for living space separations at houses and apartments were studied. Concrete plates (Fig.1) in industry have been produced by using different mined raw materials. The study presented here covers the usage of heat resistant rock minerals in concrete mixture. Raw materials like tuffitic rock aggregates (acidic and basic tuffs) and perlite were also used here together with ordinary concrete aggregates (river sands, limestone aggregates, etc.) to form test plates, (Fig.2). Test plates were prepared with 15x15x2 cm in dimension. Some of these concrete plates were molded like standard concrete that means, aggregate (mixture of all solid materials), water and cement proportions were keep similar to standard concrete. Some others were pressed to Figure 1. Concrete, especial, plates have been used to cover this building in Konya, Turkey, (Plate attachment stage during construction). Figure 2. Concrete test plates, prepared as insulation panels by using different mined raw materials. form their volumetric shapes. These second groups' raw materials prepared like the first group of the test but water and merging agent (cementation) had been used in very low ratio. Heat transfer level through the concrete test plates prepared was then evaluated one by one by facilitating high temperature and low temperature volume to force heat transferring action in prepared test samples. To reach this aim heat sources (Fig. 3); high temperature laboratory oven (LO), and heated-hole oven (HHO) were used in this work. Figure 3. Heat sources for insulation plate performance tests. Especially designed electrically heated-hole oven's (HHO) open top side was covered by concrete test plates and their heat transferring characteristics had been evaluated. Insulating concrete plates were used one by one to cover open front door of the oven to obtain insulation during the test performed with high temperature electrically operated laboratory oven, (LO). Heat transferred from this plate was then evaluated to realize its heat insulation characteristics. High temperature closed room, volume, was formed in LO and HHO by closing their open-air connections, doors, with concrete test plates. That means, concrete test plates were used one by one (one for each test) to close one side of these high temperature rooms. After obtaining closed room, volume, in the test oven, temperatures inside the room had been increased gradually up to certain levels (200 degree Celcius, oC) and keep the selected inner temperature levels stand still during the tests. Since the tests were performed in laboratory, outside temperature of the test rooms was around 20oC. Temperature differences between inner and outside of the heated test rooms cause heat transferring through tested concrete plates. Temperature changes inside the closed oven

rooms and outside face temperature of concrete test plates were recorded during the tests to evaluate heat resistance characteristics of the pre-prepared test plates. This paper summarizes, in graphical manner, heat transfer conditions of the prepared concrete test plates to differentiate their heat conductivity properties. Preliminary tests of this study were started to perform earlier at Selcuk University, Mining Engineering laboratory in Spring-2017 together with 4th year students. These tests produced heat-transfer evaluation graphs as illustrated in Fig. 4. Test samples named as; n6, n15 and n17 were concrete plates and they had 15x15x2 cm in dimension. Closed oven room temperature had been increased from 20oC to 300 oC degree during the tests. Figure 4 illustrates outside face temperature changes of concrete test plates numbered n6, n15 and n17. Figure 4. Outside face temperature of the tested concrete plates during earlier heat transfer tests performed at Mining Eng. Department of Selcuk University. As it can be seen in Fig. 4, tests were started at nearly 20 oC, standard room temperature. When temperatures were reached upto 300 oC in "high temperature room", outside face temperature recording of the tested concrete plates were terminated. Figure 4 shows recorded outside face temperature changes of the tested plates (n6, n15 and n17) during these tests. Outside face temperature of the tested plates ended with the following temperature levels while the inner temperature of the closed oven rooms were 300 oC; n6=87.8 oC, n15=80.2 oC, n17=80.2 oC. Heat transfer behaviors of n6, n15 and n17 test samples were determined different as their graphs curve can be seen in Fig. 4. Assessment of similar heat transfer graphics for different concrete test samples could then be determined and facilitate to understand insulating characteristics of concrete cover plates.

KEYWORDS - Concrete cover plates, insulation plates, heat insulation,Heat insulation for houses

INTELLIGENT LIGHTING SYSTEM

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ABSTRACT

Electricity consumption increases rapidly depending on the development of technology In Turkey and in the world. According to the data from the Ministry of Energy electricity comsumption range were 198,045 (GWh) in 2013, 207.375 (GWh) in 2014, 217.312(GWh) in 2015 and simultaneously electricity production range were 240,154 (GWh) in 2013, 251.963 (GWh) in 2014 and in 2015 261.783(GWh). These datas show that energy consuption have been increased. Therefore, studies about efficient electricity production via consumption have been conducted by researchers. Lighting has an important ratio in energy consumption among other electricity consuming devices. There are many studies and researches about energy efficiency using daylight. Some of researchers have used manual switching, others have studied by using motion sensors in order to open and close lighting systems automaticly. It is considered that these studies adjusted lighting level by measuring the light intensity of the environment can not provide sufficienty. In this study, in order to increase the efficiency of the lighting systems, the light intensity of the environment have been measured and the brightness level have been set autonomously. This system has been programmed using microprocessors and PWM (Pulse Width Modulation). As a result a high efficiency system has been designed and operated via LED lighting products. At the same time eye health and work efficiency have been supported by this system.

KEYWORDS - led,microprocessor,intelligent,pwm,lighting

THE EFFECTS OF OVERHANG LENGTH AND APPROACH ANGLE ON SURFACE ROUGHNESS IN TURNING

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ABSTRACT

In this study, the effect of tool overhang length and tool approach angle on the surface quality in conventional turning process has been experimentally investigated. On study, AA 6013 aluminum alloy and AISI 304 austenitic stainless steel rods have been used as a workpiece. The depth of cut, tool overhang length and tool approach angle values have been changed in a certain interval and average surface roughness values have been measured. Taguchi experimental design method was used in the experimental design and the significance and effectiveness of the parameters determined by using Analysis of Variance method. The individual and relative effects of parameters on the surface quality have been determined. As a result of the study, The increase in tool overhang length, tool approach angle and depth of cut were caused the increasing average surface roughness.

KEYWORDS - Tool overhang length,Tool approach angle,Turning

A REVIEW ON PERFORMANCE TESTS OF COMPOSITE SPUR GEARS PRODUCED INJECTION MOLDING

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ABSTRACT

Gears are one of the most important power transmission organs and are widely used in various industrial fields such as machinery, automotive, aviation. Gear combinations are used in particular as speed regulators in gearboxes. In recent years, gears have been produced and used from polymer materials except from metallic materials. In addition, research works on gears produced from composite materials is continuing. In this study, literature studies reporting performance properties of composite spur gears produced injection-molding were discussed. Effects of different reinforcement materials, which mix with various matrix materials, on the running performance have been investigated from studies in literature. Results obtained compared with each other and developments on composite spur gears performance were reported.

KEYWORDS - Spur gear, composite, performance, injection-molding

ANAEROBIC DIGESTION OF SEWAGE SLUDGE THE EFFECT OF SOLIDS RETENTION TIME

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ABSTRACT

Abstract - The disposal of sludge is a problem of growing importance at municipial wastewater treatment plant (MWTP), corresponding to 50% of the current operating cost of a MWTP. Although various disposal treatment routes are possible for sludge disposal, Anaerobic digestion (AD) is the oldest process that has been used to stabilize sewage sludge produced during MWTP. AD can further transform organic matter into biogas (60-70%vol of methane CH4) and also reduces the amount of final sludge solids. The biogas which is formed has a high calorific value and is considered as renewable energy source. The study was carried out in the mesophilic (35 0C) anaerobic digestion in a continuous stirred tank reactor (CSTR) at lab scale. The analyses of total solids (TS) ,volatile solids (VS) , and the measurement of pH, temperature and biogas production were done in samples taken from inlet and inside of the reactor. At Solids retention time (SRT) 25 and 50 d, pH was stable at 7.05 The average volatile solids removal remained around 61% and %64 total solids 56% and 53% ,the biogas production rate varied from 2.19 to 1.54 L /kgVSS respectively. The digested sludge dry solids removal results showed increasing with increasing SRT. However, the biogas production rate increase with decreasing SRT.

KEYWORDS - Keywords – Anaerobic sludge digestion, Mesophilic, sewage sludge, biogas, renewable energy source

NUMERICAL STUDY OF COMPACT DENSITY NEAR ZERO ACOUSTIC FRESNEL LENSES

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ABSTRACT

Compact ultrathin acoustic Fresnel lenses comprising concentric openings on a circular aluminum plate accompanied by thin aluminum membranes are numerically designed and their operation at a low audible frequency of 2.0 kHz is demonstrated. The thickness of the lens is fixed to 2.0 mm, only a fraction of the operating wavelength in air. The widths of individual openings and the thicknesses of associated membranes are optimized by calculating complex effective mass density across openings via the Finite-Element method by exploiting the azimuthal symmetry. By utilizing the optimized widths resulting in a nearly-zero effective mass density at 2.0 kHz and considering the phase of the acoustic field leaving individual annular openings for the membrane thicknesses of 70, 100, 150 and 200 micrometers, required positions of the openings are calculated to obtain a focal length of 500 mm. As a result, a significantly more compact Fresnel lens in both radius and thickness compared to the conventional Fresnel lenses employing Fabry-Perot resonance across the plate is obtained. The acoustic intensity at the focal point is an order of magnitude larger than the source intensity. The designed Fresnel lens can be utilized in tunable focusing of low-frequency sound in a compact manner. It can also be utilized in ultrasonic imaging instruments.

KEYWORDS - Acoustic Fresnel lens,density-near-zero,focusing,Finite-Element Method

LAND SURFACE TEMPERATURE RETRIEVAL FROM LANDSAT 8 SATELLITE IMAGERY A CASE STUDY OF KONYA TURKEY

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ABSTRACT

The land surface temperature (LST) is a critical climate variable, related to surface energy balance. The new instrument called Thermal Infrared Sensor (TIRS) carried on board of the new generation of Landsat 8 captures the temperature of the Earth's surface in two bands, band 10 and band 11 with spatial resolution of 100m. The main objective of this study was to create spatial distribution of LST using the tool developed by Oguz H (2016), which makes the LST retrieval process quite simple. In this study, a Landsat 8 scene with path/row 177/34 acquired on July 4, 2017 was downloaded from the USGS webpage. The Radiative Transfer Equation (RTE) method has been employed in ArcGIS Model Builder to retrieve LST from Landsat 8 satellite imagery. The user just inputs required bands (Band4, Band5, and Band10) and a couple of parameters then the tool outputs the final LST imagery automatically. The tool first makes the conversions to top of atmosphere (TOA) radiance and reflectance. Then NDVI is calculated based on NIR and RED bands reflectances. Land surface emissivity is calculated based on NDVI Thresholds Method (NDVI-THM) which was developed by Sobrino et al. (2008). Finally the tool calculates land surface temperatures in degrees Celsius.

KEYWORDS - ArcGIS, Model Builder, GIS, LST, NDVI, Emissivity

RIGIDITY WORKSPACE ANALYSIS BASED ON NATURAL FREQUENCY OF A TWO LINK TAPERED FLEXIBLE ROBOT MANIPULATOR

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ABSTRACT

The multi-link manipulator systems have different structural stiffness and natural frequency for different arm positions. The natural frequencies of a robot manipulator system give information about the structural rigidity of the system. The position change affects the natural frequency and rigidity of the manipulator system. In this study, a two-link tapered flexible robot manipulator was studied. The robot manipulator has two degree of freedom and contains two flexible links with varying cross-section. The system works on horizontal plane and the structural position of manipulator changes with the link movements. Eighteen different configurations were defined in the workspace of the robot. Workspace was obtained by revolving these eighteen points about the first axis of the robot. The first arm was kept stationary and the second arm was rotated 170° with the angular increment of 10°. Frequency analyses were calculated to construct the rigidity workspace for these eighteen points. The natural frequencies of the manipulator were calculated for different positions in the workspace by using developed finite element analysis program codes based on Matlab. Also, mode shapes and first three natural frequencies for diffrent configurations was obtained by using Solidworks program. As a result, rigidity workspace graphics were obtained with Matlab codes.

KEYWORDS - Finite element, natural frequency, rigidity workspace, two-link manipulator, tapered flexible beam.

MINIMIZING MAXIMUM LATENESS IN NO WAIT FLOWSHOPS WITH RANDOM SETUP TIMES

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ABSTRACT

Application of no-wait flowshop scheduling problem can be observed in many industries such as chemical, pharmaceutical, metal, and plastic. The two-machine no-wait flowshop scheduling problem has been addressed in the literature with the assumption that setup times are deterministic. Nevertheless, uncertainties exist in some industries which result in random setup times. We address the two-machine scheduling problem with the no-wait constraint to minimize maximum lateness with random setup times. For environments with random setup times, there may not exist a single schedule that remains optimal for all possible realizations of setup times. Therefore, a set of dominating schedules must be obtained. Hence, the objective in such a scheduling environment is to reduce the size of dominating set. Therefore, we establish two theorems, one of which provides a global dominance relation while the other provides a local dominance relation. The established two dominance relations help in reducing the size of dominating set. Illustrative examples are provided which indicate that the established two dominance relations are effective.

KEYWORDS - Scheduling, no-wait flowshop, random setup times, maximum lateness

MINIMIZING HOLDING COST IN NO WAIT FLOWSHOP SCHEDULING PROBLEMS

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ABSTRACT

There exist many real-life manufacturing environments where completed jobs are needed as soon as possible. The natural objective in such a manufacturing environment is to minimize total completion time of all jobs. It is important to note that minimizing total completion time reduces holding cost. Therefore, this objective is substantial when holding cost is of the main concern. Moreover, some manufacturing environments has the no-wait constraint where the manufacturing environments require consecutive operations of a job to be processed without any interruption. The main reason for the occurrence of no-wait constraint is the technology requirement in some manufacturing environments. We consider the two-machine no-wait scheduling problem to minimize total completion time, which is equivalent to minimizing inventory cost. Setup times are treated as random variables. For random setup times, there may not exist a specific schedule that remains optimal for all realizations of setup times. Thus, the objective is to reduce the size of set of dominating schedules. We establish two theorems, providing dominance relations, which help in reducing the size of dominating set. Numerical examples show that the established dominance relations are effective.

KEYWORDS - Scheduling, holding cost, random setup times, total completion time

DESIGN AND ANALYSIS OF EXTERNAL SPUR GEAR PAIRS REGARDING MACRO MICRO PROFILE GENERATION AND SAFETY STANDARTS

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ABSTRACT

Gears experience two kinds of stress mainly; contact stress at tooth surface and bending stress at tooth root. Gears are commonly designed and analyzed in terms of these two stress types based on well accepted gear formulas (such as Lewis, AGMA) and international standards (ISO, AGMA, DIN). Finite element analysis requires macro geometry of gear pairs. So generation of macro geometry of gears is very essential. Because gear tooth profile consists of involute and root (trochoid) portions and transition between these curves effects stress concentration. In this study, spur gear design alternatives are stated based on a predefined center distance back to back test gear box. Then one of alternative design is selected and it is analyzed in terms of tooth root bending stress and contact stress based on ISO by using a homemade software which is capable of designing and analyzing gears based on ISO, AGMA and DIN standards. For macro geometry generation, firstly coordinates of involute and trochoid (root) portions of profile is generated by homemade software and then solid model is created by using Solidworks. FEA is performed by Marc whereas meshing is done by using SimXpert. This gives chance to make comparison between theoretical calculations and finite element analysis results. Dynamic behaviour of gears is important because of its relation with static and dynamic transmission error hence vibration and noise. Transmission error (TE) is considered to be an important excitation mechanism for gear noise and vibration. It is defined as the difference between the actual position of the output gear and the position it would occupy if the gears were perfectly conjugate. Designer needs to construct loaded transmission error curve, this gives him chance to simulate the quasi static behavior of gears at the design stage. It also allows the designer to design a proper tooth profile relief which produces a uniform motion transfer (with minimum TE) between driving and driven gear shafts. In this paper, micro profile of gear tooth is designed to minimize transmission error and TE curves under load are constructed by using TE module of homemade software.

KEYWORDS - gear,design,analysis,macro geometry,micro geometry,trnasmission error,software,bending stress,contact stress,finite element analysis

EXPERIMENTAL VIBRATION ANALYSIS OF A CANTILEVER ALUMINUM PROFILE WITH PAYLOAD

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ABSTRACT

In this study, a cantilever beam made of aluminum profile with payload was analyzed as experimental and simulation. The vibration analyses were carried out with a mass at various locations of the beam. Acceleration meter, strain gauge and laser displacement sensors were used to obtain experimental signals. The structure was excited with an impact hammer. The experimental modal analysis results of the clamped beam were obtained by the strain, laser and acceleration sensors. A Matlab code was developed to analyze the experimental signals. A finite element model based Matlab codes was developed. The natural frequencies was calculated with the payload at different locations of the beam. Also, finite element simulation results was obtained and compared with the experiment results. All obtained results were observed to be compatible with each other.

KEYWORDS - Experimental modal analysis,Flexible beam,Sensors,Signal analysis,Vibration

DROPLET IMPACT ON SLIPPERY AND STICKY SUPERHYDROPHOBIC SURFACE

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ABSTRACT

We examined experimentally the impact behavior of the droplets on an inclined solid surfaces, which have different contact angles and contact angle hysteresis. The inclination of the substrate was adjusted in the range of 0° to 75°. When the droplet impacts on a horizontal slippery superhydrophobic surface, the droplet bounces back. If the impingement occurs on the sticky superhydrophobic surface, the droplet penetrates into the structures on the surface, and then the surface becomes the Wenzel state. Thus, the droplet sticks on the surface. Likewise, the droplet reflects off from the inclined slippery superhydrophobic surface. On the other hand, the droplet gets elongation on the sticky superhydrophobic surface.

KEYWORDS - Superhydrophobic Surfaces,Droplet Impact,Slippery and Sticky Surfaces,Contact angle

A COMPREHENSIVE STUDY ON HEAT TRANSFER CHARACTERISTICS OF SIO2 NANOFLUIDS

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ABSTRACT

In recent years, rapid developments in nanotechnology have led to the emergence of a new generation of cooling materials called nanofluids. Nanoparticles are obtained by mixing nano-sized particles (1-100 nm) into conventional liquid. These particles are usually made of a metal or metal oxide and allow additional heat transfer from the coolant by increasing the conduction and convection coefficients. Nanofluids have been generally favored by many researcher since their fascinating properties with no or low penalty in pressure drop. To date, several studies have been done by scientists to increase heat transfer using nanofluids. However, the choice of suitable nanofluids is very important in terms of the sustainability of the heat transfer systems. For this purpose, a comprehensive summary of a particular nanofluid is considered to be very useful for the literature. This review focuses on the thermal and hydraulic properties of the SiO2 nanofluid, which has very little data in the current literature. The influence of important parameters like nanoparticle size, volume fraction, thermal conductivity and nanofluid temperature has been investigated. According to literature studies SiO2 nanofluid has been compared with the most commonly used nanofluids in the literature such as Al2O3, TiO2, SiC etc. As a result of literature studies it has been proven that the heat transfer enhancement using SiO2 nanofluids are a promising approach. It is hoped that this work, which examines the thermal, hydraulic properties and heat transfer application areas of the Si02 nanofluid in detail, will shed light on future research.

KEYWORDS - Si02 nanofluid, Heat transfer enhancement, Thermal conductivity

COMPUTATIONAL DRAG COEFFICIENT ANALYSIS FOR A BLUFF BODY IMMERSED INTO A STREAM

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ABSTRACT

Bluff bodies or common three dimensional geometries such as spheres, cylinders, etc. have been a crucial part of fluid dynamics. Flow interacting with these blocking elements yields various events that can be used in engineering designs. One of the utilization fields is flow measurement. In order to take benefit from a predetermined geometry in a flow measurement device such as rotameters or vortex flow meters, the flow characteristics related to the geometry should be previously determined. Experimental methods are valid as well as the numerical ones. This work comprises a conducted computational fluid dynamics simulation in order to asses flow characteristics related to a specific geometry. Values of Drag Coefficient were determined for Reynolds number between 10,000 and 500,000. Additionally vortex shedding frequency and Stanton number were analyzed. Results can be used in designing flowmeters and/or for various engineering works as a reference.

KEYWORDS - Bluff body, CFD, Drag, Reynolds, Stanton, Vortex

DUAL CRITERIA NO WAIT FLOWSHOP SCHEDULING PROBLEM WITH SEPARATE SETUP TIME

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ABSTRACT

We consider the m-machine no-wait flowshop scheduling problem with respect to two performance measures; total tardiness and makespan. Our objective is to minimize total tardiness subject to the constraint that the makespan is not larger than a given value. In other words, there is a constraint on the makespan value. We develop dominance relations and propose an algorithm, called algorithm AA, which is a combination of simulated annealing and insertion algorithm. Moreover, we adapt the three best existing algorithms for the unconstrained problem to the constrained problem. We conduct extensive computational experiments to compare the performance of the proposed algorithm AA with the three best existing algorithms for the unconstrained problem and with the three adapted algorithms for the unconstrained problem under the same CPU times. The computational analysis indicates that the error of algorithm AA is 74% smaller than that of the best of the three adapted algorithms for the constrained problem. All the results are statistically verified. Hence, the proposed algorithm AA is the best algorithm for the considered problem.

KEYWORDS - Scheduling, no-wait, flowshop, makespan, total tardiness

MANUFACTURING OF ULTRASONIC FUEL ATOMISER

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ABSTRACT

Fuel atomisation very important in the internal combustion engine for combustion efficiency. Today, fuel injection systems are used by internal combustion engine that they use high pressure for fuel separate. In the thıs study, an ultrasonic atomization system has manufactured for use instead of fuel injection system to a gasoline engine. The purpose of ultrasonic atomization is separate of fuel with the high-frequency sound wave. Firstly, for the creation of high-frequency sound wave, set up a generator circuit which contains 3 frequency circuit, 3 dc-dc converters, 1 control circuit. Secondly, an atomiser cup was set up which it contains 3 piezoelectric sensors that they convert mechanical energy to sound wave. Finally, atomisation quality was measured with the microscopic imaging system and was explained. As a result, the size of the droplet which is generated by ultrasonic atomizer was determined 12µm. this result compared with the latest technology gasoline direct injection, "Ultrasonic atomization method can use instead of pressure injection systems" opinion has created.

KEYWORDS - Ultrasonic Atomizer, Fuel Injection , Piezo Electric Ceramic

NUMERICAL STUDY OF SELF COLLIMATION OF SPOOF SURFACE ACOUSTIC WAVES

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ABSTRACT

In this work, we numerically demonstrated self-collimated propagation of spoof surface acoustic waves via Finite-Element Method simulations. The acoustic surface consists of a thin slab of acrylic decorated with a square array of spherical air holes. Band structure calculations employing a unit cell under Bloch-Floquet boundary conditions reveal that dispersion of the spoof surface acoustic wave band appearing below the air line is strongly dependent on how deep the air holes are embedded into acrylic. When 60% of the air holes are embedded, equifrequency contours of the surface band structure suggest that self collimation can be obtained along the [11] direction between approximately 26 kHz and 28 kHz. Self-collimated propagation of spoof waves over as long as 100 periods is demonstrated via frequency-domain simulations. Since the slab thickness is less than the operating wavelength, the proposed structure can be employed in novel truly two-dimensional acoustic systems.

KEYWORDS - Spoof surface acoustic waves, Self collimation,Finite Element Method

MODELING OF MUSHROOM DRYING IN A CLOSED LOOP HEAT PUMP DRYER

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ABSTRACT

Because of their biodegradable properties, mushroom, which have a certain design in the ecosystem, are known to be an important source of bioactive components, both of which are food and medical values. In terms of nutrition; low calorie content, as well as a rich content of essential amino acids, carbohydrates, fibers, important vitamins and minerals. Mushroom is produced in China USA, Netherlands, Spain, France, Poland Italy, and the cultivation of mushrooms in these countries has become a full industry. Mushrooms are extremely perishable and the self-life of fresh mushroom is only about 24 h at ambient conditions. Therefore, mushroom must be subjected to some form of preservation such as canning, pickling and drying, which can make the product available throughout the year at reasonable cost. Fresh mushrooms are sometimes dried to extend their shelf-life. Dried mushrooms are directly used as ingredients for natural conditions and various soup mixes, or are rehydrated before use. In this study, slices of cultivar (Agaricus bisporus) at different thicknesses (4, 6 and 8 mm) were dried at a temperature of 40 °C in a closed-loop heat pump drying system. In addition, the effect of slice thickness on drying time was investigated. The slice thickness was observed increasing with increase in drying time. The experimental data were fitted to seven thin-layer drying models (Lewis, Henderson & Pabis, Logarithmic, Page, Midilli & Kucuk, Parabolic and Aghbashlo et al.) in the literature and the coefficients in the models were calculated. From all models evaluated, Midilli & Kucuk model was selected as the best model on good fit of experimental data. The effective moisture diffusivity (Deff) was determined by Fick's second law of diffusion, in which their value varied from 1.839 × 10-10 to 5.517×10-10 m2/s. It was observed that Deff values increased with sample thickness increase.

KEYWORDS - Effective moisture diffusivity, drying, mathematical modelling, mushroom slices.

EXTRAORDINARY ACOUSTIC TRANSMISSION THROUGH DENSITY NEAR ZERO METASURFACES

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ABSTRACT

Extraordinary acoustic transmission through ultra-thin acoustic metasurfaces composed of a metallic plate decorated with a regular array of cylindrical holes terminated on one end by a linear elastic membrane is numerically demonstrated. The effective mass densities of individual units are obtained through a retrieval method via Finite-Element Method simulations. The thin membrane-containing plates exhibit sharp transmission resonances around which the effective mass density is nearly zero. It is found out that the resonance frequency increases with increasing membrane thickness, whereas increasing the hole radius results in decreasing resonance frequency. Almost unity transmission of low-frequency sound waves across the metasurface with a square array of holes is demonstrated via three-dimensional frequency-domain Finite-Element Method simulations. The designed metasurface can be utilized in ultra-thin acoustic filters.

KEYWORDS - Metasurface,Membrane,Density near zero,Finite Element Method

NUMERICAL ROTAMETER ANALYSIS

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ABSTRACT

Rotameters are robust and widely used flow measurement devices. They utilize gravitational and drag forces. Drag force is exerted by means of the fluid flow and a length scale. Flow is transferred through a transparent flow setup (mostly) in vertical direction. While gravitational force affects on the bluff body that is placed in the flow setup, a drag force also affects in opposite direction of the gravitational force to the bluff body. When the two force balance each other, the position of the bluff body indicates a flow rate on the length scale. In order to regulate the fluid velocity in the transparent channel, the channel geometry is made conical (sometimes a cylindrical channel with a spring can be used). Due to the flow related fluctuations and irregularities, rotameter designs can be analyzed by experimental and numerical means. This work uses numerical and computational methods (ANSYS CFD) in order to analyze a rotameter having a certain float geometry for two different fluids and six different corresponding Reynolds numbers. Steady and transient solutions were applied. The location of the float, pressure drop across the flowmeter and streamlines of the flow were analyzed by the steady solution while time passed for the steady flow and fluctuations were investigated by the transient solution. Results were compared to commercial data for validation. It is shown that a rotameter (float or variable area flowmeters) can be rescaled by using CFD for different fluids.

KEYWORDS - CFD, drag, float, flow measurement, rotameter, variable area

THE EXPERIMENTAL INVESTIGATION OF THE INFLUENCE OF LOW TIRE INFLATION PRESSURE TO VEHICLE DURING BRAKING

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ABSTRACT

Tire inflation pressure one of the most important parameters in terms of vehicle safety and fuel economy. In the literature, there are many studies on the effect of tire inflation pressure on fuel economy and driving comfort. However, there is no study on the effect of the tire inflation pressure on the vehicle during braking. In this study, the effect of the tire inflation pressure lower than the standard value to vehicle during braking was examined experimentally. The experimental studies were carried out in a laboratory environment by using Brake-Suspension Test Device. The device is designed as a half-vehicle model due to performing vehicle braking tests. Five different tire inflation pressures, from 26 psi to 34 psi standard value, were considered when testing was conducted. The experiments were carried out separately for each tire inflation pressure. From the experimental results, a parabolic curve was obtained which characterizes the effect of pressure variation on the vehicle during braking. Two different equations are tested to define the obtained parabolic curve by nonlinear regression. The nonlinear regression was performed by using a hybrid iterative nonlinear regression algorithm which is obtained by combining the Cubic B-Spline curve fitting method and the Newton Raphson iteration method. According to the comparison of experimental and numerical studies, the curve fitting with R2 = 0.99 was achieved as the highest accuracy by using this new hybrid algorithm.

KEYWORDS - Vehicle Dynamics, Tire Inflation Pressure, Brake Test, Nonlinear Regression.

THE COMPARISON OF GREENERY SYSTEMS IN TERMS OF ENERGY SAVING

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ABSTRACT

The world population and the urbanization are increasing unceasingly. These increments cause not only huge amount of energy resources consumption but the depletion of water and food resources in all over the world. From this point of view; energy, water and food can be considered to be primary source of life in today's world. Depending on a report presented by UNEP, building sectors account for more than one-third of energy consumption and are also responsible for almost 50% of total electricity use. Based on the previous researches, the final energy consumption in residential sector is found to be 289 million tons of oil equivalent. That means the amount is about 26% of total energy consumption in 28 EU members. As a result, the exploitation of energy leads to greenhouse gas emissions (GHGEs). Based on researches related to GHGEs, 43% of carbon emissions in US is attributed to the buildings. For China, the rate is more than 50% of total carbon emissions. buildings account for 36% of total GHGEs in European countries. In order to reduce energy consumption in building sector, the building envelope needs to be improved to decrease hazardous effects on environment. Because, the construction of building envelopes contributes to the energy consumed in buildings in the range 20-60%. This crucial issue can be resolved by retrofitting the greenery systems to the existing buildings. these systems are comprised of green roofs and vertical greenery systems such as green wall and green facades. Green walls are reported to be more efficient than green facades based on the same reference buildings. The energy savings in cooling period are 58.9% and 33.8%, respectively for green wall and green facade. When comparing the green roofs with the bare roofs, it is observed that the reduction in annual energy consumption is found to be 10% by applying the green roof system compared to the bare roof. The aim of this study is to provide an overview about the benefits of greenery systems and to compare the green roofs and vertical greenery systems in terms of energy saving in buildings.

KEYWORDS - Greenery systems, energy consumption, greenhouse gases, energy saving

CATALYTIC HYDROTHERMAL LIQUEFACTION OF AQUATIC WEED CERATOPHYLLUM DEMERSUM FOR PRODUCTION OF BIO OIL A PROMISING ALTERNATIVE FUEL

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ABSTRACT

Hydrothermal liquefaction (HTL) can be utilized for production of bio-oil, a promising alternative energy source from biomass.HTL is a technique for obtaining clean biofuel from biomass under subcritical water conditions (below the water critical point temperature of 374 0C and pressure of 22 Mpa). The process mimics the conversion of biomass into fossil fuels, thought to have occurred naturally in early ages under high pressure and temperature conditions. Biomass in the form of aquatic weeds (macrophytes) is fast becoming popular among new renewable energy sources. This work investigates the HTL of macrophyte Ceratophyllum demersum, obtained from world famous lake, Dal Lake located in Kashmir India under various liquefaction temperatures, holding times, and catalysts. Ceratophyllum demersum, commonly known as hornwort is a species of Ceratophyllum found submerged, free-floating aquatic plant, with a cosmopolitan distribution. A maximum bio-oil yield (wt.%) of 18.20% was obtained at a reaction temperature 300 0C ,residence time 30 min and dilution ratio 1:8 using KOH as a catalyst. The oil has higher heating value(HHV) of 31.90 Mj/kg. The various physical and chemical characteristics of bio-oil obtained are determined, using an Elemental analyzer and Fourier transform-infrared spectroscopic analysis (FT-IR). The bio-oil product has potential to serve as an eco-friendly green biofuel and chemical.

KEYWORDS - Alternate energy,Hydrothermal Liquifaction,bio-fuel,Heating value,macrophyte

INVESTIGATION ON THERMAL MANAGEMENT OF POLYMER ELECTROLYTE MEMBRANE FUEL CELLS

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ABSTRACT

The commercialization and dissemination of fuel cells may be possible by improving fuel cell components, increasing their performance and lifetime, as well as lowering their cost. Proton Electrolyte Membrane Fuel Cells (PEMFC) is the most advanced fuel cell technology applied in many systems with its higher power density, productivity, lightness, compactness, lower cost, low operating temperature and faster starting capacity compared to other fuel cells. In order for PEM type fuel cells to become more widely used, they need to develop in three areas. These are performance, durability and cost. PEM type fuel cells costs must at least be at the same level as internal combustion engine systems for commercialization. In order to achieve desired fuel cell performance, it is necessary to operate at a certain temperature range according to the reaction in the fuel cell. The thermal management methods of fuel cells have a direct impact on the cell components and therefore on the life and efficiency of the fuel cell. This study emphasizes the heat transfer mechanisms in PEMFCs, investigate the current state of the cooling strategies and presents mathematical, computational models and experimental studies of the fuel cell focusing on the thermal management systems. The operating temperature and the amount of power produced, which determine the type of PEM fuel cell, should be considered as a priority when determining the thermal management method. The cooling strategies used for PEMFC stacks include: cooling with increased cathode air source (higher stoichiometry), cooling with separate airflow, edge cooling, liquid cooling and phase change cooling. Problems and solutions for this area are examined. The aim of the study is to review these systems critically, create a deeper understanding of heat transfer in PEMFCs, establish a scientific basis for the development of more effective thermal management strategies.

KEYWORDS - Hydrogen, Polymer Electrolyte Membrane Fuel Cell, Thermal Management.

THERMAL PERFORMANCE ASSESSMENT OF THERMOELECTRIC COOLERS FOR MICRO SPACE COOLING

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ABSTRACT

Thermoelectric devices are one of the promising green energy technologies for our world struggling with environmental disasters such as global warming, air pollution and high carbon emissions. These devices are two types named thermoelectric coolers (TECs) and thermoelectric generators (TEGs) according to their working principles. TEGs convert heat to electricity by Seebeck effect and TECs turn the electricity into heat by the Peltier effect for the purpose of cooling. The thermoelectric cooler consists of two different semiconductors, P-type and N-type, which are connected in electrically series and thermally parallel between two ceramic plates and when the current apply, a temperature difference occur at opposıte sides according to current direction. The three most important parameters to consider when evaluating the efficiency of a thermoelectric cooler are the coefficient of performance (COP), cooling capacity and figure of merit (ZT) and the researches conduct several investigations to increase COP value. High reliability, compact volume, layout flexibility, no compressors and refrigerants, large operating temperature range, easy to control, quiet operation are the main advantages compared to the classic cooling technologies like air cooling and water cooling. Owing to these advantages, they have a wide use in various fields notably on two areas. One is the cooling of electronic devices and the other is space cooling. On the other hand, low COP range is a challenge of TECs, which limits the scope of application areas. In this experimental study, a micro refrigerator based-on thermoelectric cooling is designed. When 6 V voltage and 3.5 A current are applied, the hot side and the cold side temperatures are measured as 23.9 and -7.5 oC respectively. The COP value of the system for the said values is found to be about 0.5, which is in good accordance with literature.

KEYWORDS - Thermoelectric cooling, space cooling, coefficient of performance, green energy

EFFECT OF DIFFERENT DRIVEN TIRE LUG ANGLES ON THE TRACTIVE PERFORMANCE

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ABSTRACT

Tire is an important part of the running gear in off-road vehicles. Studying the behavior of tires has a basis importance. However, there is little work on the optimal design of the tire lug angle and the tractive performance. For this reason, the purpose of this study is to evaluate the traction performance of the wheels with different circumferential lug angle. In this study, traction performance of the rigid wheel with different circumferential lug angles and 280/70 R20 pneumatic tire used for off-road vehicles were investigated for various axle loads and hard soil ground by means of the designed and developed single wheel tester. Controlled variables for the hard soil ground conditions were determined to be significant on the obtained travel reduction values according to the varying drawbar pull values. The average travel reduction was the highest for 0° circumferential lug angle because of the adherence of the rigid wheel with a 0° circumferential lug angle to the soil was insufficient. The maximum tractive efficiency was achieved at a value of 66% on a rigid wheel with a 45 ° circumferential lug angle. This work would be a reference for the manufacturability of tires with suitable lug in order to selecting appropriate tractors and equipment and to minimize energy losses.

KEYWORDS - Lug angle, tire, tractive efficiency, tractive performance, single wheel tester.

DETERMINATION OF THE ROLLING RESISTANCE FOR DIFFERENT CIRCUMFERENTIAL LUG ANGLES

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ABSTRACT

For many decades, the interaction between ground and off-road vehicles, such as agricultural tractors, has been an important field of study. The main work on this subject is concentrated on relating the drag force, or rolling resistance of towed wheels to soil and tire properties. The purpose of this study is to determine the rolling resistance of the wheels with different circumferential lug angles. A single wheel tester in a soil channel was modified for the determination of tire rolling resistance of pneumatic tire and rigid wheels. Experiments were carried out for various axle loads, forward speeds and on clayey loam soil by using rigid wheel with different circumferential lug angles and 280/70 R20 pneumatic tire used for off-road vehicles. While rolling resistance is found to be the highest for 45º circumferential lug angle, it has a medium value for pneumatic tire due to high deflection and has the lowest value for 0º circumferential lug angle of the rigid tire. Axle load increases the rolling resistance while forward speed seems to have insignificant effect on the rolling resistance. Determination of tractive performance and rolling resistance on different ground properties for different tire dimensions, profiles and similar specifications can be proposed for future work.

KEYWORDS - Lug effect, rolling resistance, tire, soil bin.

DESINGING AND SETTING UP SOLAR SIMULATOR

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ABSTRACT

The idea for designing and setting up a new solar simulator is to simulate sun for thermal or photovoltaic collector tests. Four basic steps were followed to set up the solar simulator: Procure aluminium frame, procure equipment, wood works and set up aluminium frame and mount equipment to the frame. 30x30 Aluminium Sigma profile are used for the aluminium frame. Also, some special equipment are used to joined aluminium shapes together such as knurled nuts, special screws, wheels, corner joints, profile covers etc. Some electronic equipment is necessarily used for the solar simulator. Metal halide bulbs simulate the sun and ballast is required for each lamp because of high power of bulbs. Metal Halide bulbs can increase their irradiation at the same level with peak time Sun irradiation which is equal to 1000 W/m2. Thereby, bulbs can rise up to high level temperatures. High temperature extractor fan can extract heat from the bulbs. Moreover, a bulb bracket is required to mount the bulbs to the aluminium frame and connect them to ballasts with IEC connection. Wood plates were used in the system to support aluminium frame, to mount equipment on the wood plates, to support reflector's parabolic shape. Firstly, aluminium shapes were mounted with special joint equipment. Secondly, wood plates were mounted to aluminium's channels with closed fit and digital ballasts were mounted on the wood. Next, reflectors were cut from reflector sheet with cutting press machine. After, high temperature extractor fans are mounted to aluminium shape with special apparatus at the down side. Furthermore, adjustable lamb brackets were mounted in the middle of reflector for uniform irradiation and metal halide bulbs were connected to the brackets. Finally, bulbs were covered at the bottom with high temperature white paper to make irradiation more uniform and also, to secure air circulation.

KEYWORDS - solar simulator, renewable, solar collector test

DESIGN AND INTEGRATION OF PHOTOVOLTAIC POWER PLANT WITH THE SERVICES OF A SMALL BUILDING

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ABSTRACT

Photovoltaic plays an important role in the history of clean energy development. The aim of this paper is to explore the relationship between the simulation with software and real data of solar plant. The small service building is located in Uxbridge, London. The building is used for laboratory and service rooms in a university. The annual electricity consumption of this building is 111,9 MWh/yr. There is a huge roof area and it is suitable to install photovoltaic power plant. This study explores technical, environmental and financial feasibilities of the plant. Using panels on the south facade is very beneficial to use more sun lights in a day. Selected panel area is 1,63 m2 and roof area is 336 m2. So we decided to use PV panels on the south facade and can use 200 PV panels on the roof. Therefore, the PV capacity size is 61kW (200*305W). One of the renewable energy system software has used to simulate photovoltaic power plant. London-Heathrow climate data has used and grid type selected as a central grid & internal load. With the software, photovoltaic electricity production obtained as 50,8 MWh/yr and building electricity requirement from the Grid with PV system has calculated as 61,1 MWh/yr. GHG emission before the PV system application was 59 tonnes CO2. PV Electricity production is 50,8 MWh/yr and this value is nearly half of our electricity requirement. We can achieve 26,2 tonnes CO2 reduction which is equal to 44,4% of GHG emission. Moreover, simple payback period has calculated as 6 years which is investible payback period in UK standards.

KEYWORDS - renewable, solar power, photovoltaic, power plant

TOOL WEAR BASED TOOL CONDITION MONITORING WITH FUZZY LOGIC IN SURFACE MILLING

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ABSTRACT

It is important monitoring of on-line tool condition to determine optimized machining parameters and obtain reduced costs in industrial applications. Tool wear affects surface quality and accuracy of workpiece which stands ultimate aim of a production line. Artificial intelligence methods provide prediction of machining performance with reduced experiments and contribute to enhancing of productivity. In this work, a combined statistical analysis (ANOVA) and fuzzy logic approach is implemented into surface milling operation to obtain minimum tool wear state with minimum experiment. Experiments were performed in dry cutting conditions and cutting speed, feed and depth of cut were chosen as input parameters. A Mamdani-Type fuzzy logic based model was developed and compare with the experimental results. The results showed that the developed model is reliable (R2=0.9) and successfully implemented to similar applications. Finally, the most effective machining parameter (feed rate with 50%) on tool flank wear and optimal milling parameters (v1=113 m/min, f2=250 mm/min, d3=2.5 mm) were determined with statistical analysis using data obtained from experiments. The aim of the study is obtaining of high quality materials with high efficiency and low costs.

KEYWORDS - Tool Wear, Tool Condition Monitoring, Analysis of Variance, Fuzzy Logic, Taguchi Method

ESTIMATION OF IMPACT AIRPORT NOISE USING AREA EQUIVALENT METHOD

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ABSTRACT

Noise pollution of airports mostly occur at the stage of aircraft takeoff and landing. As known, these stages happen at the lowest operation altitude. This noise problem affects negatively the welfare of humans, animals, and the surrounding environment. The problem may become worse as air traffic increases. Therefore, it is important to know how much the surrounding area is affected from airport noise. Aircraft noise is regulated through standards. These standards are set internationally and are applied when an aircraft is acquiring its airworthiness certification. Airport Noise Compatibility Planning (Part 150) prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving those programs. Federal Aviation Administration (FAA) suggests using Integrated Noise Model (INM) to estimate the airport noise. INM is a computer model which uses noise-power-distance (NPD) data to estimate noise accounting. The Area Equivalent Method (AEM) is a screening procedure used to simplify the assessment step in determining the need for further analysis with the INM. With these regulations, we study the noise contours area of the top five busiest airports using AEM. Then we evaluate these results with noise exposure maps of related airports.

KEYWORDS - Noise Pollution, Noise Exposure Map, Area Equivalent Method, Integrated Noise Model

A MATHEMATICAL MODEL FOR A MULTI OBJECTIVE SINGLE MACHINE SCHEDULING PROBLEM WITH SEQUENCE DEPENDENT SETUP TIMES AND DUE DATES

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ABSTRACT

Scheduling problems which have been studied over years, are one of the important issue in the manufacturing systems. This study focuses on multi-objective single machine scheduling problem. The single machine scheduling problem's dimension can be increased by using the features about sequence dependent machine setup times, job release dates and due dates. While minimizing both total tardiness of jobs and total makespan, to determine the machining planning using single machine environment, a multi-objective mixed integer mathematical model is developed. To handle the multi-objective sturucture of this decision problem, scalarization techniques can be used. In this study, the mathematical model is solved with different scalarization techniques which are coded using an optimization software and the solutions are compared with a previous study using the same test problems.

KEYWORDS - Machine scheduling,multi-objective,scalarization

DAMAGE PROGRESS OF GLASS EPOXY FILAMENT WOUND PIPES WITH CONCRETE UNDER AXIAL LOADS

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ABSTRACT

This study aims to investigate macro and micro failures formed in glass/epoxy filament wound composite pipes with concrete under axial loads. Cylindrical tubes were produced with different cement, well vibrated and not vibrated and varied composite concrete mixture tested in this study. Concrete mixture is prepared from six different concrete formations in order to achieve varied 28-day cylindrical compressive strengths. The composite tubes studied in this experimental study are produced with filament winding technique. The winding angle of glass/epoxy filament wound composite pipes are ±550. The glass fibre material used in the production of pipes is Vetrotex 1200 tex E-glass with diameter 17µm and the matrix material is chosen Bisophenol A, Epoxy CY 225. All tube specimens have the length of 160 mm and inner diameter 72 mm. Confining with GFRP tube concrete cylinders developed the ultimate load by meanly 2.85 times and additionally the axial deformation at failure by meanly 5.57 times under axial compression compared to plain concrete. After axial loading tests selected specimens were prepared in order to examine damage progress of pipes under an electron microscope. Macro failure on pipes and concrete inside pipes were examined. Additionally, micro damage mechanisms on pipes were investigated for all steps of debonding, whitening, matrix/transfer cracking, delamination, splitting and final failure respectively.

KEYWORDS - Glass/Epoxy, Filament Wound Pipes, Confinement, Concrete, Damage Progress

CONFINEMENT MECHANISM OF GLASS EPOXY FILAMENT WOUND PIPES WITH CONCRETE

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ABSTRACT

This study aims to investigate the structural behavior and confinemet effect of Glass/Epoxy ±550 Filament Wound Pipes on the capacity and ductility of cylindrical columns exposed to axial compression for different types of concrete core. All GFRP tube composite cylinders are tested under axial compression with the concrete cores having different compression strenghts. The predictions of confined concrete compressive strength from the eleven design guidelines against experimental results of the study are compared. Predictions of confined concrete compressive strength provided from several design methods are close to experimental results.

KEYWORDS **-** Glass/Epoxy, Filament Wound Pipes, Confinement, Concrete

INVESTIGATION OF SPRING STIFFNESS AND DAMPER DAMPING COEFFICIENT ON VEHICLE RIDE COMFORT

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ABSTRACT

Suspension systems are used in vehicles to damp vibrations from the road between the wheels and the vehicle body. The suspension system has two main tasks for this purpose, driving comfort and handling. Handling refers to the performance of the vehicle during cornering, while ride comfort is the effect on the driver and passengers from the oncoming road effects. This report examines ride comfort from these two tasks that affect vehicle performance and comfort. In this study, virtual analyzes are made in Adams / Car program for a selected passenger vehicle and the effects of spring coefficient and damper damping coefficient on ride comfort are examined. In the virtual analysis, only the spring coefficient and the damper damping coefficient were changed when all the features of the passenger vehicle were kept the same. When the ride comfort was examined, the Adams / Car program was compared with the Ride Index values established with the ISO 2631 standards.

KEYWORDS - Ride comfort, ISO 2631, Adams/Car, suspension

MATERIALS AND GEOMETRIC STURUCTURES USED IN IMPACT ATTENUATORS

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ABSTRACT

There are many systems in the vehicles that ensure the safety of driver and the passengers. Some of these systems are actively working while others are working passively. Impact absorbing structures are one of the passive safety systems. These structures are called impact attenuators in Formula SAE vehicles. Formula SAE is one of the most important engineering competitions for university students. In this study, materials and geometric structures using in impact attenuators were investigated. The competition committee has set some rules for impact attenuators that can be used in Formula SAE vehicles. The impact attenuators have to absorb energy in a certain amount and the vehicle should provide a certain deceleration. The choice of materials and geometry should be made by considering these rules. Numerous materials are used for impact attenuators in Formula SAE vehicles. In the impact attenuators, foam materials, aluminum materials, sandwiched materials, composite materials and plastic based materials are used. In addition to material selection, the geometry of the impact attenuator is also an important factor. The geometry of the impact attenuator should not be very strong and should not be too soft. Basic geometric structures as well as complex geometric structures also was used in studies.

KEYWORDS - Impact Attenuator, foam, composite, Formula SAE

CALCULATIONS OF THE CROSS SECTION FOR THE 64 66 68ZN N P 64 66 68CU REACTIONS AT THE ENERGIES NEAR 14 MEV

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ABSTRACT

The zinc alloy is important for the nuclear science and reactor technology. In this paper, the cross sections of 64Zn(n,p)64Cu, 66Zn(n,p)66Cu and 68Zn(n,p)68Cu nuclear reactions produced by neutrons were obtained by using the pre-equilibrium models and cross section systematics. The pre-equilibrium effects for (n,p) nuclear reactions have been investigated using the geometry dependent hybrid model and exciton model. Finally, the results of this paper are compared with the measured values found in the literature.

KEYWORDS - Nuclear reaction, zinc, exciton model, cross section

EXCITATION FUNCTION CALCULATIONS FOR NUCLEAR REACTIONS INDUCED BY NEUTRON AND PROTON PARTICLES ON MANGANESE TARGET

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ABSTRACT

Manganese is an important material due to low activation property for nuclear devices. In this work, the nuclear cross sections for 55Mn(n,4n)52Mn, 55Mn(n,pα)51Ti, 55Mn(p,3n)53Fe and 55Mn(p,4n)52Fe reactions were calculated using different level density models. TALYS 1.8 and ALICE/ASH nuclear codes were used in the nuclear model calculations. The obtained results were compared to the existing experimental data.

KEYWORDS - Cross section, Manganese, TALYS 1.8 code

STUDY OF CARBIDE EVOLUTION DURING HEAT TREATMENT OF AISI D2 TOOL STEEL

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ABSTRACT

The microstructure and microhardness of AISI D2 tool steel with various heat treatments (conventional and cryogenic heat treatment) was examined in the current study to identify the effects of these treatments on microstructure and mechanical behavior properties of the steel. Microstructural changes such as carbides formation and distribution were studied. Using a technique is quantitative metallography which includes OM with etching reagent of Vilella to determine carbide amounts in the structure with digital image analysis. The obtained results infer that, cryogenic heat treatment showed higher percent of carbide and better distribution of carbide. As a result of the microhardness experiments, no obvious difference was obtained after cryogenic heat treatment.

KEYWORDS - AISI D2, Cryogenic heat treatment, Microstructure, Carbide formation.

INVESTIGATION THE EFFECT OF PROCESS PARAMETERS ON DELAMINATION DAMAGES IN DRILLING OF GLASS FIBER REINFORCED POLYMER GFRP COMPOSITE MATERIALS

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ABSTRACT

The purpose of this study is to investigate the delamination damages based on the drilling conditions and workpiece thickness in drilling of Glass Fiber Reinforced Polymer (GFRP) composite materials whose usage is getting widespread in industry. In the experiments, the cutting speed, feed rate and workpiece thickness values were changed in a certain interval and delamination damages were measured according to the chosen conditions. A full factorial experimentation method was used and the individual and relative effects of the working parameters have been investigated. The significant parameters were determined by using Analyse of Variance aproach. Based on the results of study, the increase of the thickness of workpiece caused the decrease in the amount of delamination damages. Although the increase in the feed rate and cutting speed caused the increase in the amount of delamination damages, the most significant parameter is thickness of the workpiece according to ANOVA approach.

KEYWORDS - GFRP,Delamination,Drilling,Composite

INVESTIGATION OF SOME PRETREATMENT TECHNIQUES USED IN BIOGAS PRODUCTION

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ABSTRACT

Biogas is a gas mixture which is colorless, odorless and lighter than the air and can be produced from organic waste. In the composition of biogas, there are methane by 55-70 %, carbon dioxide by 30-45 % and trace amounts of other gases. The amount of biogas produced varies according to the type of the organic waste. It is also possible to increase biogas amount produced from organic waste by using some pretreatment techniques. Pretreatment process provides increase in efficiency by improving the biodeterioration feature by affecting the compounds of organic waste which are hard to disintegrate. In this study, some pretreatment techniques are investigated which can be used to increase efficiency in biogas production. These pretreatment techniques are classified under 4 titles in the literature: Physical, Chemical, Thermal and Biological treatment. As pretreatment processes can be applied separately, more than one pretreatment technique can also be used at once and it has a different effect. In this study, different pretreatment techniques which are applied to different wastes are analyzed and their effects are compared.

KEYWORDS - Biogas, Energy, Organic Waste, Pretreatment.

THE DETERMINATION OF BIOGAS AND ENERGY AMOUNT OBTAINED FROM A DECARE OF BANANA GREENHOUSE WASTE

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ABSTRACT

Banana farming in our country has been widely done between Alanya and Anamur both in greenhouses and on open fields for many years. Until recently, banana production area was limited to Alanya(Antalya)- Anamur(Mersin) line. However recently, banana production has passed to the east of Anamur and reached to Silifke-Erdemli(Mersin) line. Banana is a herbaceous plant which produces more organic waste than the fruit it gives. With the widening of the production area, the amount of organic waste from banana agriculture has increased. By producing biogas from this waste, both energy will be obtained and the waste will be disposed. In this study, the amount of biogas and energy which could be produced by anaerobic digestion of waste got from a 1000-m2-banana-greenhouse over a year is calculated. During calculation, it is considered that 7500 kg waste is produced from a banana greenhouse of 1000 square meters. The VS value of this waste is accepted as 68,72 g/kg, the amount of methane which could be produced from the waste is accepted as 214,6 mLCH4 and the calculations are done according to these values. According to the literature, 1 cubic meter of methane provides 35 MJ energy. When calculations are done taking these values into consideration, it is found that the amount of energy that could be produced from a 1000-square-metre-greenhouse of banana over a year is 1075 kWh. When it is considered that annual electricity expenses of an average house is around 1080 to 1800 kWh, it is seen that the waste of a 1000-m2-banana-greenhouse can meet the electricity expenses of a house in a year.

KEYWORDS - Biogas, Energy, Methane, Banana Waste.

AIR BUBBLE MOTION ON INCLINED AND UPWARD FACING HYDROPHOBIC SURFACES

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ABSTRACT

In this study, the sliding motion of an air bubble on a flat hydrophobic surface has been studied experimentally. The formations and velocities of the bubble in the motion were analyzed at different inclination angles of substrate. A flat hydrophobic surface is completely wetted in water. The bubble formation is determined by the balance between the upward force due to the pressure differences across the bubble meniscus and the downward force due to the surface tension. When the net lateral force overcomes the lateral adhesion force, the bubble starts to move along the surface. The motion of the bubble is governed by the lateral force. When normal forces acting perpendicularly on the bubble overcome the normal adhesion force, the bubble detaches from the surface.

KEYWORDS - Bubble, Adhesion force, Detachment, Hydrophobic

A NEW MATHEMATICAL MODEL FOR TYPE II ASSEMBLY LINE BALANCING WITH TASK PARALLELING

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ABSTRACT

An assembly line is a manufacturing process that consists of a set of workstations connected together by transfer mechanisms such as conveyor systems. The problem of assigning tasks to workstations so that the total time required at each station is nearly the same by considering some constraints about cycle time or precedence relationships is known as the assembly line balancing problem. In this study, task paralleling approach on the Type-II assembly line balancing problems is handled. Task paralleling approach is among the new topics on the line balancing literature. This approach allows some tasks to take place in more than one station under the assumption that tasks cannot be divided. Firstly, a new mathematical programming model is presented to solve the problem. Then, the proposed mathematical model is tested with a comprehensive case study and some computational analysis are conducted to assess the performance of the model.

KEYWORDS - task paralleling, assembly line balancing, mathematical programming, operations research.

STATISTICAL ANALYSIS OF SAPONIFICATION REACTION USING TAGUCHI ORTHOGONAL ARRAYS

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ABSTRACT

Soap is a surfactant used for widely used for washing and cleanin. Soaps are produced by reacting natural oils, fats, or fatty acids with alkalis known as saponification reactions, The most important step in the soap production process is the saponification reaction phase. High costs of raw materials and the import dependance require careful and controlled use of these raw materials. High product yield is aimed for saponification reaction. Experimental design methods and statistical analyzes was applied for this purpose. In the experimental study, three experimental parameters (each has two levels) was used. The experimental parameters was reactor type (Batch-CSTR), reaction temperature (25°C-50°C), ratio of sodium hydroxide and ethyl acetate concentrations (CA/CB 0,5-1). Taguchi 23 L8 orthogonal array was used as experimental plan. The experimental data obtained was analyzed with statistical methods and Taguchi Experimental Design method.

KEYWORDS - Saponification, design of experiments, taguchi design, statistical analysis, soap manufacturing

DETERMINATION OF THE REPRESENTATIONS AND THE TYPE OF ENZYMATIC INHIBITION OF A B LACTAMASE USING STATISTICAL ANALYSIS SOFTWARE

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ABSTRACT

The antibiotic resistance of the β-lactam family in bacteria is mainly due to the production of β-lactamase. we are interested by the characterization of the inhibition of a β-lactamase by flavonoids. We have analyzed all the results obtained with the data processing and statistical analysis software "SIGMAPLOT 10.0" to which the module "Enzyme Kinetics 1.1" has been added. The set of enzymatic representations and inhibitions was carried out with this software. This software allows the adjustment of graphs to analyze and present the data of enzymatic kinetics, quickly and easily. Simply enter the data, select the study type and equation, and use the interactive charts to display the results. It also gives a detailed report with all statistical parameters for each model to allow easy comparison and identify the most suitable for the data. This software proposes three methods of classification: • R2: is the correlation coefficient, R2 close to 1 indicates that the equation is a good description of the relationship between the independent and dependent variables. • AICc: The Akaike Information Criterion (AIC) is useful for comparing unbound kinetic enzymatic equations. • Sy.x.: Uses the residual standard deviation to judge the quality of the data fit.

KEYWORDS - representations, enzymatic inhibition, β-lactamase, software.

PRODUCTION AND APPLICATION OF POLY LACTIC ACID

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ABSTRACT

Biopolymers are polymers produced by living organisms. Biopolymers was usually known as biodegradable polymers, which were polymers capable of breaking down cleanly into simple molecules found in the environment, such as carbon dioxide, water or methane, under the enzymatic action of microorganisms, in a defined period of time. PLA is a linear aliphatic thermoplastic polyester derived from sugar based resources. PLA is a multiple-purpose biodegradable polymer, which can be re-manufacturing into different resin grades for processing into a wide spectrum of products. Lactic acid (2-hydroxypropionic acid) is a simple chiral molecule that exists as two enantiomers, L- and D-lactic acid. Lactic acid bacteria produce either l(+), d(−), or racemic DL lactic acid. Homofermentative method was prefered mostly with strains of Lactobacillus delbrueckii, L. amylophilus, L. bulgaricus, and L. leichmanii. Optimum processing conditions was determined a pH range of 5.4 to 6.4, a temperature range of 38 to 42 °C, and a low oxygen concentration. Lower temperature supports adsorption and higher temperature favours lactic acid production and the optiumum temperature for lactic acid production has found 39ºC.Obtained lactic acid are supposed to polymerization for production of Poly-Lactic Acid (PAL).Polymerization can be done in different ways such as: polycondensation, ring opening polymerization and by direct methods like azeotopic dehydration and enzymatic polymerization. Studies has shown that combination of PLA and antioxidants, additives, bacteriocins such as nisin and pediocin, enzymes such as lysozyme, a chelator like ethylenediaminetetraacetic acid (EDTA), lactoferrin and plant extracts could be used successfully due to its degradability abilities. PLA also can be processed with nano particles to improving packaging performances like its gas, moisture, ultraviolet and volatile barriers, increasing mechanical strength, decreasing weight, and increasing the heat resistance and flame retardancy of the packaging material. Nanoadditives alson can be used in intellegent packacing as using nanosensors to control the mechanisms of neutraceuticals, antibacterial agents release or for observing product conditions during transportation. PLA also can be used in tissue engineering and other medical application such as drug release, scaffolds, coating material of replacements due to its biodegradable properties in human body and generally recognized as safe (GRAS). Studies has shown that coating of medical implant with poly(D-L) lactic acid has supressed the patogens with the effect of antibiotic release and antimicrobial properties of poly (D-L) lactic acid. By using nanotechnological processes PLA can be devoloped and replace with petrolium derived products and with this way PLA could more proper and promising for applications in medical science, packacing, particularly in tissue engineering and other human health care fields.

KEYWORDS - Polylactic acid, Biomaterial, Biodegration polymer, Renewable resources

BIOCOMPATIBILITY AND WATER ABSORBTION PROPERTIES OF BACTERIAL CELLULOSE POLYACRYLIC ACID COMPOSITE

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ABSTRACT

As a result of long-term use, people that practice existing patient diapers and sanitary napkins may experience irritation, itching and even scarring at different intensities depending on the skin type. In addition, most pads do not have very high fluid retention capacities, and the high ones cannot prevent the formation of bad smells, which significantly affects the quality of life of the infants, their relatives and women. The purpose of this study is to develop high water retention BC products that can be used as biocompatible super absorbents with properties of easy modification in situ or ex vivo. Bacterial cellulose (BC) is a biopolymer composed of nanofibers produced by certain microorganisms. In this study, Gluconacetobacter xylinus ATCC 700178 was used to obtain BC. The construction of the structure of nanoscale fibers (50 to 120 nm in diameter) ensures absorption of the nutrient medium up to 100 to1000 times its own weight during production. Most of the water (>99%) contained in BC is trapped physically and very small amount is retained chemically. Therefore, with slight manipulations, water can be freed from the structure, and after that BC can only reuptake 20-30 fold of its own weight after drying. To overcome this problem polyacrylic acid (PAA), a superabsorbent polymer, was added into bacterial cellulose production medium (0.5% w/v). FTIR and XRD analysis showed that PAA and BC successfully incorporated, and the water uptake capacity of BC after drying was up to 130 times of its own weight. In order to determine the ideal structure, five different agitation speeds and five different incubation times were examined, and the optimum time and agitation speeds were determined with the Design Expert program. The effects of different drying methods, viz. air-, heat drying or lyophilisation, were also studied. On the other hand, all BC and BC-PAA complexes were tested for their biocompatibility properties in animal cell culture systems via both direct and indirect cytotoxicity tests. It was found that PAA use by itself resulted in adverse effects on the proliferation rates of the cells, whereas BC and BC-PAA polymers showed high biocompatibility without causing any effects on the morphology or reproduction kinetics of the cells. This work supported by Bilgi Biotechnological Products LLC and Republic of Turkey, Ministry of Science, Industry and Technology, Techno-Initiative Capital Support Program (1533.TGSD-2015)

KEYWORDS - Bacterial cellulose,polyacrylic acid,biocompatibility,high water holding,biopolymer

SYNTHESIS STRUCTURAL AND ANTIGLAUCOMA ACTIVITY STUDIES OF A NOVEL AMINO SALICYLATO SALT AND ITS CU II COMPLEX

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ABSTRACT

A novel amino salicylato salt (1, Fig. 1), and its Cu(II) complex (2, Fig. 2), have been synthesized from free ligands, namely 5-sulfosalicylic acid (H3ssa) and 2-amino-6-methylpyridine (amp). Compounds 1 and 2 have been characterized by elemental, spectral (1H NMR, IR and UV–Vis) and thermal analyses. Additionally, magnetic measurements and the single crystal X-ray diffraction technique have been applied to compound 2. Compound 2 crystallizes in the triclinic P space group. In the symmetric unit, the Cu(II) ion exhibits a distorted square planar configuration, coordinated by two carboxylate oxygen atoms (O2 and O2i), one phenolic oxygen atom (O1) of the ssa3- anion and a water molecule (O1w). The free ligands H3ssa and amp, and the products 1 and 2, and acetazolamide (AAZ) as a control compound have been also evaluated for their in vitro inhibitor effects on human carbonic anhydrase isoenzymes (hCA I and hCA II), purified from the erythrocyte cell by affinity chromatography for their hydratase and esterase activities. In relation to esterase activities, the inhibition equilibrium constants (Ki) have also been determined. A comparison of the inhibition studies of the newly synthesized compounds 1 and 2 with the parent compounds H3ssa and amp, and to AAZ, indicates that 1 and 2 have an effective inhibitory activity on hCA I and II, and can be used as potential inhibitors.

KEYWORDS - 5-Sulfosalicylic acid, 2-Amino-6-methylpyridine, Proton transfer,Inhibition,Cu(II) complex

SYNTHESIS CHARACTERIZATION AND ANTIGLAUCOMA ACTIVITY OF A NOVEL PROTON TRANSFER COMPOUND AND A MIXED LIGAND ZN II COMPLEX

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ABSTRACT

A novel proton transfer compound (1, Fig. 1), and a mixed-ligand Zn(II) complex (2, Fig. 2), have been synthesized from the same free ligands, which are 2,4-dichloro-5-sulfamoylbenzoic acid (Hsba) and 2-aminomethylpyridine (amp). They have been characterized by elemental, spectral (1H-NMR, IR and UV-vis.) and thermal analyses. Additionally, magnetic measurement and single crystal X-ray diffraction technique were applied to compound 2. The free ligands Hsba and amp, and the products 1 and 2, and acetazolamide (AAZ) as the control compound, were also evaluated for their in vitro inhibitor effects on human Carbonic Anhydrase isoenzymes (hCA I and hCA II) purified from erythrocyte cell by affinity chromatography for their hydratase and esterase activities. The comparison of the inhibition studies of newly synthesized compounds 1 and 2 to parent compounds Hsba and amp and to AAZ indicated that 1 and 2 have effective inhibitory activity on hCA I and II, and might be used potential inhibitors

KEYWORDS - 2,4-Dichloro-5-sulfamoylbenzoic acid, 2-Amino-3-methylpyridine, Proton transfer, Zn(II) complex, Glaucoma

BACTERIAL CELLULOSE BASED NATURAL FACIAL MASK

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ABSTRACT

Bacterial cellulose (BC) is a biopolymer, synthesized extracellularly by certain bacteria by linearly binding the glucopyranose sugar monomers as in plant cellulose. It has unique properties, which distinguish BC from its plant analogue. These properties can be summarized as; high tensile strength (2 Gpa versus), high Young's modulus (15 Gpa versus), high water holding capacity (+100 times more of its weight), 200 fold more surface area than cellulose in plants, the possibility of production in desired shape, 100 times thinner structure nanofiber network (<130 nm in diameter) and high biocompatibility. In this study, we made an attempt to develop a BC based facial mask containing taurine as bioactive agent. The production of BC was carried out in our newly developed medium including carob and haricot bean (CHb). The facial mask prepared was characterized by X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM) and Texture Profile Analysis (TPA). Taurine release rate and stability of the product (for 4 months at 25 and 40 °C) were determined with Liquid Chromatography–Mass Spectrometry (LC/MS), and effectiveness of the preservative (Phenostat) was analyzed by challenge and microbial stability tests (for 6 months). Because of the gram-negative origin of the bacterial cellulose, the product was tested for endotoxins revealing high quantities. In order to get over this problem, alkali washing procedures were performed, which decreased the endotoxin amount below the required limits. As a result of six months' stability testing, no change in the properties of the face mask was observed. Additionally, the facial mask exhibited moisturizing feature with high water content (>%99) and antioxidant property with 30±3.5 mg taurine release in 5 minutes. Although we utilized BC as facial mask in this study, it can be exploited with the desired active substances (plant extracts, growth factors, nanoparticles, antioxidants etc.) and used as animal cell culture tissue scaffolds or wound covers. This work was supported by Republic of Turkey, Ministry of Science, Industry and Technology and BioRed Laboratory Products Company, SANTEZ Project Number: 0198-STZ-2013-1, and by Ege University Science and Technology Center (EBİLTEM), 2014/BIL/015.

KEYWORDS - bacterial cellulose,taurine,facial mask,antioxidant,gluconacetobacter xylinus

VARIOUS CONTROL METHODS TO INCREASE THE EFFICIENCY OF CROP CLEANING PROCESS

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ABSTRACT

Cleaning of crops such as cereals, legumes and nuts in industrial facilities is carried out by an aspiration system uses air. In the cleaning process, a certain amount of air is passed through these products and the material such as dust and crust on the products is taken by air. The used main equipments in cleaning process are an aspirator to produce the necessary air, a Jet Pulsed Filter (JPF) with filter bags to separate the dust and air in the dusty air mixture, and a screening machine to sieve the product. For efficiency and stability of the cleaning system, an air flow rate is required at a appropriate to the cleaned product's capacity and specifications. Nowadays, a fan is used which operates at constant speed and provides constant volume flow for aspiration air. During the cleaning process, the efficiency of the cleaning system changes due to variations in parameters such as product capacity, ambient temperature, ambient relative humidity. In this study, various control methods that could be applied to the air used in the aspiration system have been investigated to maintain the effectiveness of the cleaning system. The control methods established to keep parameters such as aspiration air velocity, volumetric flow rate and mass flow rate constant were tested in an industrial packaging plant using a PLC-SCADA based automation system under real operating conditions.

KEYWORDS - automation, cleaning of crop, control of aspiration air, jet pulsed filter

EXPERIMENTAL PREFORMANCE INVESTIGATION OF ELECTRICAL ENERGY PRODUCTION SYSTEM BY USING VERTICAL BARREL OF THREE AND FOUR BLADES FROM WIND ENERGY IN GAZIANTEP CONDITION

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ABSTRACT

By comparing the vertical-axis wind turbines (VAWTs) with the conventional horizontal-axis type, alot of advantages of vertical are presented.An example of these turbines, Savonius turbine since it has a simple design, not costs a lot of money, more over, it can do it's role regardless of the direction and power of wind, these reasons led it to be used at the field of electricity generation. This work is a study of the performance of the Savonius rotor which contains three and four blades made from barrels under the normal weather conditions of Gaziantep. This rotor has the best self-starting at low wind speed, under any load generator. Where begins rotation of 20 RPM at 2 m/s wind velocity. We also find power and the maximum energy coefficient at the tip speed ratio and the amount of voltages generated by the generator at different wind speeds to both types and know which one has the best performance.

KEYWORDS - Savonious turbine,wind power ,electricity generation,VAWTs

PREPARATION OF EPOXY COMPOSITES USING PERLITE AS FILLER

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ABSTRACT

In this study, plasma enhanced chemical vapor deposition (PECVD) treatment method on perlite particles is presented and used to modify the surface of perlite for using it as fillers in composite preparation. Poly(hexafluorobutyl acrylate) (PHFBA) and poly(glycidyl methacrylate) (PGMA) thin films coated perlites were used in 5-20 wt%. The effect of modification of the perlite with two type polymers on the mechanical and water wettability properties of epoxy resin were investigated. The composites were prepared with filler in varied per cent values (5-20 wt%) using the casting technique. Both polymers were found to be highly suitable for perlite surface modification in respect of mechanical properties. PGMA coating of perlite particles by PECVD method had much more positive effect on the mechanical, while PHFBA coating on wettability properties. The tensile strength of neat perlite composites changed in the range of 86-109 MPa. For polymer coated perlite composites tensile strength values were found to be 100-132 MPa and 114-152 MPa for PHFBA and PGMA polymers, respectively. Tensile strength of all composites are higher than that obtained with neat epoxy. Elongation of composites were observed to decrease with the filler content in the composite.

KEYWORDS - epoxy resin, perlite, modiication, composite

A HIRSHFELD SURFACE ANALYSIS VIBRATIONAL STUDY AND CRYSTAL STRUCTURE OF A NEW SALT OF P PHENYLENEDIAMMONIUM DI HYDROGENESULFATE

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ABSTRACT

Organic–inorganic hybrid salts have attracted more attention in the last years due to their interesting features and properties [1]. These materials exhibit remarkable structural diversity which results from various types of non-covalent interactions, such as hydrogen bonding, π-π staking, CH...π Interaction, etc. [2]. The present paper is interested in the structural and Hirschfeld surface analysis study of new hybrid salts of p-phenelenediamine. These new compounds exhibit interesting crystal structures rich with different types of H-bonds. The organic entity in this hybrid compound belongs to the large family known by its wide range of properties [3].

KEYWORDS - Crystal structure, p-phenylenediamine, Hirshfeld surface analysis, vibrational study ,Sulfuric acid.

TORSIONAL ANALYSIS OF BIPYRIMIDINE MOLECULES

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ABSTRACT

Biphenyl-like molecules have received significant attention due to their unusual electrical and optical properties. Bipyrimidine is a biphenyl-like molecule that having two pyrimidine units connected together by a single bond. Bipyrimidines, specifically 2,2'-bipyrimidine and derivatives, have been used as a ligand in inorganic and organometallic materials. The constituting pyrimidines can rotate around the single C-C bond linking them together that produce a torsional potential. It is important to understand the torsional behaviour of energy for the development of new materials. Firstly, the equilibrium geometries of six isomers of title compounds have been obtained through geometry optimization using density functional theory at the B3LYP/ 6-311++G(2d,p) level. The conformational (torsional) analysis of six compounds have been studied as a function of inter-rings C-C dihedral angle varying between 0o and 180o with a step of 15o. The torsional potential of all the molecules studied can be described by the Fourier expansion as V(θ)=V_0+1/2 ∑_n▒〖V_n (1-cos⁡(nθ))〗 All constants of the potential are presented here.

KEYWORDS - bipyrimidine, conformation, torsion

A NOVEL PAPER BASED BIOSENSOR FOR DETECTION OF M CRESOL USING PROTEIN INORGANIC HYBRID NANOFLOWERS

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ABSTRACT

Nanomaterials have offered a novel approaches for progressing biological functions of enzymes and widely applications in areas such as biosensors, bioanalytical devices and industrial biocatalysis. Recently, Zare and co-workers reported an elegant approach for the synthesis of immobilized enzymes in the form of nanoflower with highly enhanced catalytic activity and stability [1]. These flower-like nanoflowers are developed and used for various approaches. m-Cresol compounds have high toxicity to the living organisms and unfortunatelly they are widely distributed as environmental pollutants and these compounds can cause several human health problems such as cancer, nervous and respiratory system problems, abnormal function of thyroid etc [2]. So, sensitive, rapid and on-site detection of these compounds are very important. In this study, protein-inorganic hybrid nanoflowers were synthesized using different concentrations of laccase, and some characteristics of them were determined. And different concentrations of these prepared nanoflowers were incorporated onto a paper and then tested for m-cresol detection as paper-based biosensor. The synthesis of nanoflowers were accomplished using a described method before [3,4]. The structure of the synthesized nanoflowers were confirmed by FT-IR, XRD, and EDX. The catalytic activity of synthesized nanoflowers were evaluated. Then the synthesis of nanoflowers were injected onto the paper, dried in the air at room temperature. In a typical experiment, different concentrations laccase nanoflowers, m-cresol solutions were tested. Finally, we demonstrated a paper-based biosensor for visual detection of m-cresol.

KEYWORDS - Biosensor,m-Cresol,Hybrid Nanoflowers

RAPID DETERMINATION OF AS III AS V BY SPECTROFLUORIMETRIC DETERMINATION IN ENVIRONMENTAL SAMPLES USING A NOVEL REAGENT

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ABSTRACT

Arsenic is a ubiquitous element that is detected at low concentrations in virtually all environmental matrices. The major inorganic forms of arsenic include As(III) and As(V). The organic forms are the methylated metabolites–monomethylarsonic acid, dimethylarsinic acid and trimethylarsine oxide [1]. Because the degrees of toxicity of inorganic As(III) and As(V) are so different, it is not sufficient to determine the total content of arsenic in a given sample in order to estimate its physiological or environmental risks. Rather, ways and means must be designed to allow their individual quantification [2]. A selective fluorimetric method for the rapid determination [3] of trace amounts of As(III)/As(V) in some environmental samples is described. 3',6'-bis(diethylamino)-2-{[(1E)-(4,5-dimethyl-2-furyl) methylene]amino}spiro[isoindole-1,9'-xanthen]-3(2H)-one (DMBD), was synthesized/ characterized (Fig. 1) as a new fluorescence reagent for the speciation of As(III)/As(V) species. As(III) was quantitatively recovered with fluorescence reagent at concentrations between 0.5-1.5 mol L-1 of HNO3, while As(V) was not quantitatively recovered at any pH. The optimum conditions for the speciation of As(III)/As(V) species were investigated on several commonly tested experimental parameters such as acidity and pH of the sample, amount of reagent, effects of temperature, and interfering ions etc. The results of analysis of the certified reference material (INCT-TL-1 tea sample) are in good agreement with the certified value. Acknowledegement: This study was financially supported by Project Coordination Application and Research Center of Bozok University (Project No: 2015 FBE/T-169). Fig. 1. Chemical structure and synthetic route of DMBD

KEYWORDS - Fluorescence reagent; Direct determination; As(III)/As(V); Tea samples.

MAGNETIC DISPERSIVE SOLID PHASE EXTRACTION BASED ON GRAPHENE OXIDE FE3O4 THIOGLYCOLIC ACID NANOCOMPOSITE FOLLOWED BY ZETASIZER FOR AS III MONITORING IN WATER SAMPLES

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ABSTRACT

Grapheneoxide (GO) is considered as a new class of carbon nanocomponent and exhibits special characteristics involving high electrical conductivity, exceptional mechanical among with optical possessions [1]. This nanomaterial provides wealthy functional groups for the strong π-π interaction between GO and many compounds of interest. In addition, this nanomaterial shows a highly hydrophilic manner and can form steady colloidal suspensions in water media [2]. Magnetic graphene oxide nanocomposite has been proposed as promising and sustainable sorbent for the extraction and separation of target analytes from real sample matrices. Sample preparation based on nanocomposite presents several advantages such as desired efficiency, reasonable selectivity and high surface area-to-volume ratio. In this work, thioglycolic acid (TGA) reagent was coated on the surface of GO/Fe3O4 and the new proposed nanocomposite sorbent was applied in magnetic dispersive solid-phase extraction (MDSPE) for preconcentration and isolation of As(III). The predominant experimental factors that affect the extraction performance were studied in detail and optimized. Finally, an efficient and solvent-saving analytical protocol for evaluating the trace levels of As(III) in water samples was established by coupling the extraction method with Zetasizer used for the determination. Acknowledegement: This study was financially supported by Project Coordination Application and Research Center of Bozok University (Project No: 6602c FEF/16-39.

KEYWORDS - Graphene oxide; magnetic disperse solid phase extraction; water samples, As(III).

RELATION BETWEEN THE PROPERTIES AND THE MICROSTRUCTURE OF AN IRON PHOSPHATE GLASS DEDICATED TO NUCLEAR WASTE IMMOBILIZATION

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ABSTRACT

An iron phosphate glass, dedicated to nuclear waste confinement is synthesized by a double melting at 1100°C. It is loaded with 20wt.% of a Ce-rich complex nuclear waste mixture containing: Cs2O, Al2O3, MgO, Na2O, NiO, Nd2O3, SrO, Y2O3, ZrO2, U3O8, ZnO, SnO2, Rb2O, Pr6O11, MoO3, CeO2, BaO, Ag2O. The glass transition temperature, measured by DTA method is higher in the waste loaded glass, compared to that of the waste free glass. The waste-loaded glass has high thermal stability and do not devitrify up to a high temperature. The FTIR analyses results show that phosphate chains length is shortened when the bridging oxygens number increases, as a result of oxides addition. The structure of iron phosphate glasses is known to be based on corner-sharing PO4 tetrahedra which form chains, rings or isolated PO4 groups. With the addition of Fe2O3 to the glass, FTIR analysis reveals that P−O−P bonds are replaced by P−O−Fe bonds, which are stronger than P-O-P bonds; thus increasing the durability of such glasses.

KEYWORDS - Iron phosphate glass, radioactive waste,FTIR spectroscopy,structure

EFFECT OF XANTHAN GUM AND HYDROXYETHYL CELLULOSE ON THE RHEOLOGICAL PROPERTIES OF BENTONITE SUSPENSIONS

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ABSTRACT

The use of viscosifiant polymers to control the stability and flocculation behavior of colloidal suspensions is of great technological importance. They are widely used in various industrial products, such as paints, coatings, ceramics, pesticides, pharmaceuticals, cosmetics, and drilling fluids, to modify the rheology and control the stability of systems. The Xanthan gum and the hydroxyethyl cellulose (HEC) polymers are used as viscosifiers. Their main role is to increase the viscosity of the bentonite suspension. Experimental flow measurements, obtained by coaxial cylinder viscometer covering a wide range of shear rate (0 to 700 s-1). The different rheological measurements on bentonite-polymers blends have revealed clearly the effect of xanthan gum and HEC on the rheological properties of bentonite suspension. Firstly, Herschel-Bulkley law was used for fitting flow curves of various samples of bentonite suspension whose the concentration in solid varies between 3-6 %, the regression coefficient > 0.997 for all studied system. The obtained results showed that the yield stress and the consistency index increase with increasing bentonite concentration, on the other hand, the flow index values decrease. The rheological behavior of bentonite-xanthan solutions is shear-thinning with yield stress. The flow curves are also modeled by Herschel-Bulkley law, all flow curves have been fitted with a correlation coefficient > 0.99. We note that the yield stress (1.048-5.264 Pa) and the consistency index (0.06-0,67) rise with the increase in polymer concentration, when, the flow index (0,68-0,45) decreases slightly. The presence of HEC in the mixtures leads to the increase of the viscosity of bentonite suspension without a great influence on the yield stress.

KEYWORDS - Bentonite, Hydroxyethy cellulose, Xanthan, rheology.

INVESTIGATION OF SANDWICH COMPOSITE MATERIAL PRODUCTION METHODS

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ABSTRACT

This study will be concerned with sandwich composite materials, a type of composite material commonly used in the world. It will be compared with the production methods of sandwich composites, which are generally important in the yacht and maritime sector. These methods are vacuum infusion and hand lay-up. Both production methods shall be prepared and produced under equal variables (room temperature, pressure, pvc type, glass fiber arrangement, etc.). It is necessary to calculate the amount of energy (SERR) that emerges to find the fracture properties of sandwich composites. Single and double cantilever beam (SCB and DCB) test methods were used to calculate the strain energy release rate (SERR) value. modified cracked sandwich beam (MCSB) experiments were performed on composite sand specimens Cracked sandwich beam (CSB) and modified sand sandwich composite specimens which were cracked on. The Mod-I and Mod-II values on the samples were compared. In the tests, the effect of the difference in the production method on the sandwich composite material was investigated. Results related to the preference of production methods were obtained. Finally the mechanical value of the sample produced by the vacuum infusion method is about 1.5 times higher than that of the sample produced by the hand lay-up method.

KEYWORDS - CB test, CSB test, SCB test, MCSB test, VCCT, SANDWICH COMPOSITE,fracture

DETERMINATION OF IRON OXIDE SOLID SOLUBILITY LIMIT IN CORDIERITE BASED MATERIALS

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ABSTRACT

Cordierite has excellent physical properties such as low thermal expansion coefficient, low dielectric constant, high chemical resistant, high thermal shock resistance, high refractoriness and high mechanical strength. For this reason, cordierite has been one of the most potential ceramics used in several industrial applications such as refractory, electronics and automobiles. Modifying the starting composition will change the physical and chemical characteristics of the final product. Most of the studied focus on the stoichiometry of the oxides, particularly on MgO and Al2O3, and the raw materials used. On the other hand, minor oxide ingredients has an important role on the formation of cordierite crystals. In this study, the solid solubility limit of iron oxide (Fe2O3) in cordierite based materials were investigated as well as the effect of iron oxide (Fe2O3) content on the formation of cordierite phase. With the scope of the study, kaolin (Al2O3.2SiO2.2H2O), magnesite (MgCO3) and quartz were used in stoichiometric proportions. In order to determine the effect of the iron oxide content, increasing amount of hematite (Fe2O3) was added to starting mixture (1-2-4-6-8 wt %). After homogenization, the mixtures were pressed and fired at 1275°C for 3h. In order to determine the phase evaluation, iron-free and 1wt % Fe2O3-added samples were fired at 1200°C-1250°C-1275°C for 3 h. at 1200°C, cordierite, sapphirine, mullite, quartz,spinel and enstatite were detected. With increasing the firing temperature, the amount of cordierite phase increased, reaching to a value of 92 wt %, and the other phases disappeared besides quartz and spinel. 1 wt% of Fe2O3 addition had a negative effect on cordierite formation. Considering Fe2O3-related phase formation and the expansion in cordierite lattice parameters, 4-5 wt% of Fe2O3 could be said to make a solid solution in cordierite crystal structure on the basis of the Rietveld refinement of the XRD patterns. Fe3+ cation probably occupied the (1,1,0) position in the unit cell.

KEYWORDS - Cordierite, solid dolution, XRD,rietveld refinement

STRUCTURE AND ELECTRONIC PROPERTIES OF C42H12N6 MOLECULE AND ITS SUBSTRUCTURES

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ABSTRACT

Graphene and graphene-like structures have received substantial research interest, because of numerous interesting properties and expected potential applications, after the experimental isolation of graphene in 2004. Some graphyne structures were proposed by computationally in 1987 for possible electronic, optical and mechanical properties [1]. Some subunits of graphyne and graphyne-like structures have been synthesized by Haley [2]. The new six graphyne derived hypotetical structures, biggest one is C42H12N6 molecule, have been studied first time by computationally. We have studied the structure, electronic and optical properties of proposed structures. All calculations were performed using density functional theory at the B3LYP/6-31+g(d,p) level.

KEYWORDS - C42H12N6 ,B3LYP,electronic properties

PREPARATION OF PAPER BASED BIOSENSOR FOR DETECTION OF PHENOL USING ENZYME INORGANIC HYBRID NANOFLOWERS

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ABSTRACT

Enzymes as macromolecules have wide applications areas such as chemistry, biochemistry, biomedical, industry etc. However, free forms of enzymes have a short life time and this situation limites applications of enzymes in many areas. Also separation of free enzyme and reuse of it is difficult. So, it is necessary to increase the efficiencies, activities, stabilities and recoveries of enzymes in order to use them as biocatalysts. Recently, Zare and co-workers reported an elegant approach for the synthesis of immobilized enzymes in the form of nanoflower with highly enhanced catalytic activity and stability [1]. These flower-like hybrid nano structures are developed and used for various applications. Phenol compounds have high toxicity to environment. These compounds can cause several human health problems such as cancer, nervous and respiratory system problems, abnormal function of thyroid etc [2]. In this study, laccase-Cu2+ hybrid nanoflowers were prepared and incorporated onto a paper and then tested for phenol detection as paper-based biosensor. The synthesis of nanoflowers were accomplished using a described method before [3,4]. The structure of the synthesized nanoflowers were confirmed by FT-IR, XRD and EDX. The catalytic activity of synthesized nanoflowers were also evaluated. Then the synthesized nanoflowers were injected onto the paper, dried in the air at room temperature. In a typical experiment, different concentrations laccase nanoflowers and phenol solutions were tested. Finally, we demonstrated a paper-based biosensor for visual detection of phenol.

KEYWORDS - Phenol,Hybrid Nanoflowers,paper-based biosensor

A NOVEL CELLULOSE SUPPORTED PALLADIUM II CATALYST FOR SONOGASHIRA COUPLING REACTION

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ABSTRACT

The Sonogashira coupling reaction is known as a carbon-carbon (Csp2-Csp) bond-forming process which is obtained reaction of aryl halides with terminal acetylene [1]. Palladium is one of the most important transition metals for cross coupling reactions [2]. Also, support material selection is a very important parameter in catalytic systems to maintain for a long time catalytic activity of catalyst [3]. So, researchers have been tending to natural biopolymer materials which are chemically and mechanically stable support material. One of the most important biopolymers in nature is cellulose which has inexpensive, considerable thermally stable and high metal interaction capacity [4]. These properties of cellulose show that it has great potential for catalytic reactions as a support material. In the study reported that synthesis, characterization and investigation of catalytic activity of a novel cellulose supported palladium catalyst in Sonogashira coupling reactions. The catalyst showed good catalytic performance and reusability against Sonogashira reactions.

KEYWORDS - Cellulose, Sonogashira reaction, Pd(II), TON

INVESTIGATION OF STRUCTURAL OPTICAL ELECTRICAL AND THERMOLUMINECCENCE PROPERTIES OF BORON DOPED AND UNDOPED INDIUM OXIDE FILMS GROWTH BY SPRAY PROLYSIS TECHNIQUE

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ABSTRACT

In study, we investigate the effect of boron doping on structural and optical properties of indium oxide (In2O3) films prepared by spray prolysis method onto cleaned glass substrate. All films doped with 0.1 M boron. All of the samples were grown on glass substrate at 3800C by using spraying pyrolysis method. Boron doped films were deposited by adding boric acid (H3BO3) as a dopant source to the solution. Boric acid presumably exists in the form of borate, BO-3 . presents the chemical content of the spraying solution. X-ray diffraction measurements were carried out for films deposited by varying the molarity of InCl3 (indium cloride) while keeping all other parameters constant. All peaks in the diffraction pattern correspond to the hexagonal structure of mainly In(BO3)(Indium Borate) and InOCI (Indium Oxide Chloride) . Polycrystalline hexagonal and cubic InO of random orientation are known to show many strong X-ray diffraction peaks. All diffractograms of the prepared films clearly indicate the polycrystalline nature of the In(BO3) and InOCI films. The preferential orientations are along (111), (113), (332), (431), (521), (611), (800) and (811) crystal planes. It is also indicated that the intensity of existed peaks are explicitly dependent on the variable InCl3 molar concentration during crystal formation. The crystallization of In(BO3) along (111), (113), (332), (431), (521), (611), (800) and (811) planes requires more energy than that of others lying along the planes. With the InCl3 molar ratio increased up , the growth orientations of (332), (521), and (732) disappear and new peaks like (431), (611), (800) appears. From the above results, we can conclude that chancing of In concentration plays an important role in the crystal orientations of In(BO3) films and effectively modifies the microstructure of the films. The preferred orientation of In(BO3) films is due to the controlled nucleation process associated with the low formation rate of In(BO3). The X-ray reflection peaks at different planes indicate that the films are polycrystalline over the whole studied range of In doping concentration. The intensity of peaks and crystal orientations are influenced by the In doping concentration.

KEYWORDS - In2O3 films; Spray prolysis; physical properties

ADVANTAGES OF NATURAL POLYOLS ON POLYURETHANE MATERIALS

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ABSTRACT

Recently, it has been seen studies in the field of polymer chemistry are focused on renewable raw materials. Renewable and biodegradable raw materials are becoming more preferred than petrochemical-derived raw materials. Polyols and isocyanates are the main raw materials in polyurethane production. In this study, polyols from natural sources such as vegetable oil based polyols were used as alternatives to petrochemical-derived polyols and examined properties of polyurethanes obtained from this green approachs. Polyurethanes, are widely used in automotive, building and medical sectors due to their excellent chemical and mechanical properties. Polyols and isocyanates are the main raw materials in polyurethane production. In this study, as alternatives to petrochemical-derived polyols, natural and vegetable oil based (castor oil, sorbitol, glycerine based) polyols have been used. Toluene diisocyanate (TDI) and methylene diphenyl diisocyanate (MDI) were choosen as isocyanates. According to study recipes, different amount of various isocyanates, and natural and vegetable oil based polyols or/and petrochemical based polyols were mixed homogeneously. Homogeneous mixtures were poured onto mould to produce suitable test specimens and moulded polyurethane samples were cured at 100 °C. Mechanical properties such as strength, elongation and elasticity of obtained polyurethane materials were determined via performing universal tensile tests and results were also compared in order to reach to optimum polyurethane recipes. With using different isocyanates and polyols, various polyurethane materials were prepared successfully. In the term of mechanical properties, it is determined that natural and vegetable oil based (castor oil, sorbitol, glycerine based) polyols in the polyurethane recipe provide an increase trend at the strength values and also elasticity due to functional groups respectively triols and long aliphatic hydrocarbon chains that found in their chemical structures.

KEYWORDS - polyurethane, natural polyols, sorbitol, glycerol, castor oil, renewable raw material.

A COMPUTATIONAL STUDY ON THE ELECTRONIC AND NONLINEAR OPTICAL PROPERTIES OF C118H22 AND ITS HBN DERIVATIVES

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ABSTRACT

After the experimental isolation of graphene in 2004, all 2D carbon allotropes have drawed a great attention in fundamental and applied nanoscience because of their expected wide range of technological applications in various fields. There are many graphyne structures as 2D carbon frameworks that possess sp- and sp2- hybridized carbon atoms with different ratios. One of the proposed graphyne structure is C118H22 molecule illustrated in Figure below. The structure, electronic and nonlinear optical (NLO) properties of C118H22 molecule have been studied by computationally at the B3LYP/6-311g(d,p) level. Later, selected benzene ring(s) replaced by borazine ring(s) of C118H22 structure. The aim of present work is to obtain theoretical data of the structure, electric dipole moment, highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) energies, dipole polarizability, and first hyperpolarizability of C118H22 structure and its some hBN derivatives. It was observed that the replacement of a benzene ring(s) with borazine ring(s) drastically increases the first hyperpolarizability value. For C118H22 structure, the static mean polarizability is about 3150 a.u. and first hyperpolarizability of 14 a.u., respectively. For C70H22B24N24 structure the static mean polarizability is 2726 a.u. and first hyperpolarizability of 8262 a.u., respectively.

KEYWORDS - DFT, graphyne,polarizability

PRODUCTION CHARACTERIZATION AND APPLICATION OF NOVEL PD 0 NANOCATALYST IN THE SYNTHESIS OF BIPHENYL COMPOUNDS

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ABSTRACT

Metallic nanoparticles such as silver, gold and platinum on solid materials have received great attention because of their potential applications in various fields such as microelectronics, therapeutics, sensors and antimicrobials [1]. Especially, one of the most important application area of these materials is the use as catalyst in catalytic systems. In recent years, different nanoparticles were immobilized on different solid supports such as silica, zeolite, carbon and graphene and their applications were investigated in catalytic systems [2]. Carbohydrate polymers are the most important support materials for immobilize metallic particles in catalytic systems [3]. In this paper, we produced a novel palladium nanocatalyst on bio-polymer composite (chitosan/starch). Chemical structure of nanocatalyst was investigated with SEM-EDX, XRD, TGA and ICP techniques and we found that the average dimensions of the palladium nanocatalyst ranged between 16 and 21 nm. We explored catalytic performance and reusability performance of nanocatalyst and these tests revealed that catalyst had excellent catalytic activity in Suzuki reactions.

KEYWORDS - Chitosan, palladium nanocatalyst, reusability

ROBUST BIO POLYMER BASED PALLADIUM CATALYST SYNTHESIS CHARACTERIZATION AND APPLICATION IN SUZUKI REACTION

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ABSTRACT

Palladium-catalyzed carbon–carbon formation reactions are effective processes for synthesis of biaryl compounds via Suzuki coupling reaction and have been widely used in on a academic lab scale and industrial fields [1]. Many researchers have been developed different heterogeneous catalysts derived from biopolymers which are high thermally stable, low cost and eco-friendly [2,3]. Among the natural biopolymers, starch is biocompatible, biodegradable, and non-toxic bio-polymer and also it has not been well investigated in the catalytic reactions as a support material [4]. In this study, we developed robust heterogeneous palladium catalyst derived from starch and chemical characterization of designed palladium catalyst was performed by FT-IR, TGA, XRD, SEM- EDX and ICP analysis. Catalytic performance and reusability of starch based palladium catalyst was studied in Suzuki reactions. These tests showed that palladium catalyst had outstanding catalytic activity and gave super reusability performance. In addition, catalyst produced high TON (turnover number) (25.000) and TOF (turnover frequency) (312.500) values with very short reaction time (5 min). These results showed that developed bio-based palladium catalyst is suitable for Suzuki cross coupling reactions.

KEYWORDS - Starch, palladium catalyst, Suzuki reaction

AN EXPERIMENTAL PRACTICE ON FRP REINFORCED CONCRETE BEAM DESIGN AND TESTING

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ABSTRACT

Consolidation of aged buildings has recently drawn a great deal of attention as the damage of these structures can result in major problems such as traffic accidents and injuries. Carbon fiber reinforced polymer (CFRP) plates are utilised as external reinforcements for concrete beams due to several advantages such as easy application process, corrosion resistance and high specific strength [1]. However externally bonded CFRP plates debond from concrete surface due to two general reasons: stress formations at interface and bending shear cracks [2]. In this study, an experimental solution to debonding problem is presented and the target is to minimize the effects of shear cracks by reducing the load transfered from concrete to CFRP plate. For this purpose, an extra rectangular carbon fiber reinforced polymer (CFRP) strip was embedded into near surface of concrete beam to undertake some part of the load. Three rectangular concrete specimens were prepared for 4- point bending tests to observe the response of CFRP strips. First specimen was prepared without any reinforcements. CFRP plate was attached to the surface of the second specimen and both CFRP strip and CFRP plate were applied to the third specimen. After 4-point bending tests, load carrying capacity of specimens was measured as 11kN, 25,4 kN and 35 kN, respectively. The results show that CFRP plates and strips increase the load carrying performance of concrete beam. In addition to that, embedding the CFRP strips near surface changes the shear crack path and CFRP plate does not debond along the CFRP strip.

KEYWORDS - Debonding; Concrete; CFRP; Tensile load; Shear crack; Bonding

THE PROPERTIES OF MGO DOPED AL2TIO5

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ABSTRACT

Al2TiO5 is a synthetic ceramic material shows low mechanical strength because of initial crack formation during sintering. Some additives are used to increase the low mechanical strength of un-doped Al2TiO5. In this study, the effect of MgO additions on Al2TiO5 ceramics was investigated. In order to increase the bending strength of Al2TiO5, 1.25, 2.5, 5 and 10 by wt. % MgO was added to equimolar mixture of Al2O3 (corundum) and TiO2 (rutile). The powder mixtures were prepared with ball mill in ethanol medium, uniaxially pressed at 60 MPa, and then sintered at 1450 °C for 3 h. The densities of the samples were determined by Archimedes method, mechanical strengths by three-point bending test, phase contents by XRD, and microstructure by SEM. The additions of MgO were formed MgAl2O4 (spinel) at grain boundaries and restrained grain growth. The experimental results showed that compact and surface crack free Al2TiO5 ceramics with MgO ratio of 2.5 wt. % has the maximum bending strength of 19 MPa.

KEYWORDS - Al2TiO5, MgO, Refractory Ceramics, Sintering, Mechanical Properties

FABRICATION AND CHARACTERIZATION OF MAGNETIC CLAY ADSORBENT FOR CONGO RED REMOVAL

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ABSTRACT

The magnetic field-sensitive polyvinyl alcohol /clay/iron particles were successfully prepared and used as the adsorbent for the adsorption of Congo red. Batch adsorption experiments were performed as a function of initial dye concentration (20 mgL-1 - 50 mgL-1), solution pH (5.5-9.5) and temperature (250C -55 0C). The morphological and structural characterization of this material were studied by scanning electron microscopy (SEM), the Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The adsorption kinetic studies were achieved using pseudo-first order and pseudo-second order kinetic models. The kinetics data indicated that congo red adsorption onto the magnetic clay adsorbent was consistent with the pseudo-first order kinetic model. The adsorption isotherms for the adsorption of congo red on the adsorbent were described by Freundlich, Langmuir and Temkin isotherm models. Thermodynamic parameters such as Gibbs free energy (ΔG0), enthalpy (ΔH0) and entropy (ΔS0) changes were evaluated and the results revealed that adsorption process was endothermic and spontaneous. The regeneration studies were performed to represent reusable of the adsorbent prepared in this study. The magnetic field-sensitive polyvinyl alcohol /clay/iron particles were successfully prepared and used as the adsorbent for the adsorption of Congo red. Batch adsorption experiments were performed as a function of initial dye concentration (20 mgL-1 - 50 mgL-1), thvalue e solution pH (5.5-9.5) and temperature (250C -55 0C). The morphological and structural characterization of this material were studied by scanning electron microscopy (SEM), the Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The adsorption kinetic studies were achieved using pseudo-first order and pseudo-second order kinetic models. The kinetics data indicated that congo red adsorption onto the magnetic clay adsorbent was consistent with the pseudo-first order kinetic model. The adsorption isotherms for the adsorption of congo red on the adsorbent were described by Freundlich, Langmuir and Temkin isotherm models. Thermodynamic parameters such as Gibbs free energy (ΔG0), enthalpy (ΔH0) and entropy (ΔS0) changes were evaluated and the results revealed that adsorption process was endothermic and spontaneous. The regeneration studies were performed to represent reusable of the adsorbent prepared in this study.

KEYWORDS - Adsorption, clay, magnetic particle, smart material, kinetic

ELECTRONIC AND OPTICAL PROPERTIES OF MONO AND DI FLUORO PYRROLES

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ABSTRACT

Thiophene, furan and pyrrole are five membered heterocyclic molecules. They have been theoretically and experimentally studied extensively in the literature because of their wide applications in industry. They are widely used in synthesis of pharmaceuticals, medicines, dyes, optoelectronics. Substituents can modify the electronic structure and physical properties of parent molecules. Recently, we study on the physical properties of halogenated five membered heterocyclic molecules using computational methods. In this report, we present and analyse the results of theoretical calculations of electronic, linear and nonlinear optical properties for mono- and di- fluoropyrrole molecules. The calculated properties are electronic energy, HOMO-LUMO (H-L) energies, dipole moments, static polarizability, anisotropy of polarizability, and first hyperpolarizability. Theoretical calculations were performed at M06-2X/aug-cc-pVTZ level. We analyzed the effects of the number and position of fluoro substituents on the electronic and nonlinear optical properties of pyrrole ring. Some conclusions can be drawn as follows. All fluoro pyrroles have planar structures. The difference between the highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO) energies represents energy gap. The average value of the energy gap decrease with fluorination. But there is not position and substituent number dependence. The calculated hyperpolarizability shows that fluorinated pyrroles have large changes compared with unsubstituent pyrrole's value.

KEYWORDS - pyyrole, optical properties, DFT,hyperpolarizability

OPTIMIZATION OF THE HYDRAULIC RETENTION TIME HRT FOR A SUCCESSFUL OPERATION OF BIOHYDROGEN PRODUCTION FROM FRUIT AND VEGETABLE WASTES BY DRY FERMENTATION SYSTEM

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ABSTRACT

The importance of renewable energy production increases because of the advantage of using the wastes with low energy requirements. Biohydrogen production from renewable sources could be important energy systems. In the present study a new approach, a dry fermentation system was used. The dry fermentation system is an anaerobic dark fermentation system consisted of a combination of a 15 L fully controlled bioreactor with a working volume of 10 L used as percolation tank for inoculum growth, and a 2 L custom made glass dry fermentation reactor with loading capacity of 1.5 kg of fruit and vegetable wastes. One of the main important operating parameter of a Dry Fermentation System is the Hydraulic Retention Time (HRT) which is closely related with organic loading capacity of a bioreactor. In this study the optimum HRT condition in percolation tank for a successful operation of biohydrogen production by dry fermentation system was determined. The anaerobic inoculum was taken from an anaerobic bioreactor of a dairy industry factory and subjected to heat pre-treatment at 105°C for 5 min in an autoclave. Wastes were collected from the main dining hall of the Izmir Municipality. The dry fermenter was started with 750 mL inoculum and 750 g chopped (<5 cm) fruit and vegetable wastes. The inoculum from the percolation tank was sprayed over the wastes and the leachate was fed back to percolation tank at different amounts according to HRT values. Total biogas production was observed by micro flow meter, the gas content was observed by Gas Chromatography (GC) with Thermal Conductivity Detector (TCD), Volatile Fatty Acid content was observed by GC with Flame Ionization Detector(FID) pH, Chemical Oxygen Demand (COD) and ammonia (NH4+) amounts were measured according to Standard Methods. The cumulative biohydrogen production for HRT conditions of 2 days, 4 days and 8 days were observed as 2146 mL, 3000 mL and 3500 mL respectively. The hydrogen content was changed between 20-30% in all studies. Except HRT 8 no methane was observed. In an anaerobic fermentation system for biohydrogen production low HRT values may result in domination of methanogens during the process. Because of this reason HRT 4 is decided as the optimum HRT for biohydrogen production from fruit and vegetables wastes by dry fermentation. The authors wish to thank TUBITAK-MAG-2015 M 314 for financial support of this study. We also thank to IZSU for their kind supports. HNA thanks the Xunta de Galicia (Spain) for his postdoctoral fellowship (ED 481B-2016/195-0).

KEYWORDS - biohydrogen, fruit and vegetable wastes, dry fermentation, hydraulic retention time (HRT)

EFFECT OF CHEMICAL PRETREATMENT METHODS FOR BIOHYDROGEN PRODUCTION FROM FRUIT AND VEGETABLE WASTES

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ABSTRACT

Hydrogen is believed to play a potentially key role in the implementation of sustainable energy production, as it is a clean energy carrier and has high energy yield (122 kJ/g). Hydrogen can be produced by several methods such as water electrolysis, thermochemical processing, photochemical processing, photo-catalytic processing, photo-electro-chemical processing and microbiologically photosynthetic and dark hydrogen fermentation. One of the most promising hydrogen production methods seems to be the dark anaerobic fermentation since it is produced from renewable sources and low energy-demanding processes. Hydrolysis step of the anaerobic fermentation process is considered as the rate-limiting step. Therefore, several pretreatment methods have been used to enhance the anaerobic digestion of various wastes by improving the hydrolysis step. In this study, four different chemicals: acid (HCl), base (NaOH), BESA (Bromo-ethanosulfonate) and TCl (Tri-Chloroacetic acid) were applied on fruit and vegetable waste with different concentrations. Acid and base pretreatment was applied at five different pH value as 1, 4, 7, 10, and 13. BESA and TCl pretreatments were applied at five different concentration as 100 mM, 325 mM, 550 mM, 775 mM, and 1000 mM. The effects of four chemicals on vegetable and fruit waste solubilization first evaluated, and then batch experiments were conducted for biohydrogen production using pretreated fruit and vegetable waste as substrate and hydrothermally pretreated anaerobic mix culture as seed. Batch anaerobic studies were conducted in triplicates using 100 mL working volume bottles. Control bottles were also prepared using the fruit and vegetable waste without any pretreatment. BESA pretreatment achieved the highest increase in soluble chemical oxygen demand (SCOD) as %80 at 775 mM concentration. The highest increase in soluble carbohydrate of %500 observed for acid pretreatment at pH 1. Base pretreatment at pH 13 produced the highest hydrogen yield of 4.2 mL H2 /g VS, while lowest hydrogen yield of 0.2 mL H2 /g VS was observed for TCI pretreatment at 1000 mM concentration. Acid pretreatment had the highest final volatile fatty acids (VFAs) concentrations of 15000 mg /L at pH 7 while TCI pretreatment had the lowest final VFAs of 2290 mg/L at 775 mM concentration. The outcome of this study revealed the positive effect of acid, base and BESA pretreatment on enhancing the solubilization of organic material however only acid pretreatment showed the positive effect on biohydrogen production. ACKNOWLEDGMENT The authors wish to thank TUBITAK-MAG- 215 M 314 for financial support of this study.

KEYWORDS - Pretreatment,dark fermentation,biohydrogen,Fruit and vegetable waste

A REVIEW ON WAREHOUSE MANAGEMENT SYSTEMS

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ABSTRACT

When today's changing and constantly increasing competition conditions are considered, warehouses are indispensable components for supply chains. Warehouse management activities play an important role in the success or failure of an enterprise, in terms of customer satisfaction and stock management, also critical for cost effectiveness. In order to achieve more performance from the warehouses, they need to be improved continuously in design and operational aspects. In today using more workforce to solve problems related to warehouse management activities is not considered a very viable solution due to the increase in working fees. In this context, continuous improvement efforts in warehouses seem possible only with adaptation of new management philosophies. It is clear that all these solutions effect on cost directly. Increasing product range and delivery of orders to customers in a short time have forced companies to make improvements in order to carry out effective and result oriented logistics operations. The ability of the logistics network to operate efficiently is directly related to the process in the storage systems. The warehousing process leads in the form of product acceptance, shelving, collection of products in case of order, sorting of collected products by order, packing and shipment of separated orders. The interactions between the in-store processes indicated in turn are quite extensive and affect each other's performance while the process is working. Therefore, it is necessary to take the system as a whole and to improve the performance of the system. It is an inevitable way to keep the systems and methods up-to-date as the developments in technology happen very fast and the sectors follow this developments closely. In the logistics sector, unmanning of systems has become a frequent occurrence in recent times. The unmanning practices for different layers of the process have become to the agenda. If we take a brief look at these layers; it is not surprising to see unmanned systems in processes such as packing, storing, loading and unloading of goods to be transported and inventory control. In this study, labors and applications on unmanned storage systems are examined and the advantages and disadvantages of these methods are compared.

KEYWORDS - warehouse systems, logistics, unmanned storage facilities

STATE OF CHARGE ESTIMATION OF LITHIUM ION BATTERIES FOR BLDC DRIVE APPLICATION

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ABSTRACT

Lithium-ion batteries have very large use area such as portable devices and electric vehicles. Determining the total capacity has big importance in terms of the battery performance and efficient energy utilization of electric vehicles and portable devices. Although the nominal capacity could be found in the manufacturer datasheets, the actual capacity is dependent on the cycling effect, temperature and age of the battery. Thus the behavior of the battery has shown as nonlinear and more complex methods are required for estimating the state of charge rather than measuring the battery voltage. This work presents a lithium-ion battery pack model and BLDC motor model besides the motor driver. State of charge for the modeled battery is determined while driving the motor with constant load and various speeds.

KEYWORDS - State of Charge (SoC), lithium-ion, bldc drive, estimation, battery modeling

NUMERICAL SIMULATION OF STRUCTURAL BEHAVIOR OF SUSPENDED BRIDGE DECK AND CABLES USING ELEMENT FREE GALERKIN METHODS

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ABSTRACT

A numerical analysis of static and dynamic response of major structural components of a suspension bridge is presented in this paper. The major components of bridge are the cables, hangers and deck. The numerical solution of structural equations are performed using Element-free Galerkin (EFG) method and the result are presented. EFG methods, which are based on moving least-square (MLS) approximation, require only nodal data and therefore no element connectivity is needed for large deformations of the slender and long bridge components due to loading. The utilized mathematical model takes into account the geometric nonlinearities of the cables and deck system of a suspension bridge. Numerical results are obtained for major structural components of bridge and comparison with those obtained by finite element method shows a good agreement.

KEYWORDS - Suspension bridge deck and cables, Element-free Galerkin methods, Moving least-square approximation (MLS), Nonlinear structural analysis.

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