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Proceeding

3rd International Conference

of Engineering Sciences and Advances Technologies

COLLEGE OF MATERIALS ENGINEERING- UNIVERSITY OF BABYLON

وقائع

المؤتمر العلمي الدولي الثالث

للعلوم الهندسية والتقنيات المتقدمة

كلية هندسة المواد - جامعة بابل

IRAQ-BABYLON

4-5 June 2021

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برعاية معالي وزير التعليم العالي والبحث العلمي
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وباشراف السيد رئيس جامعة بابل الاستاذ الدكتور
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تقيم كلية هندسة المواد وبالتعاون مع كلية
الهندسة/ المسيب في جامعة بابل ونقابة
الاكاديميين العراقيين - فرع بابل مؤتمرها الدولي
الثالث للعلوم الهندسية والتقنيات المتقدمة
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يهدف المؤتمر إلى توفير بيئة مناسبة للباحثين
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والخبرات، وإطلاع المشاركين على آخر التطورات
في المجالات الهندسة المختلفة وتطبيقاتها
وتوظيفها لصالح العلم والتنمية الصناعية في
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IOP Material Science and Engineering : Conference Series

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Mechanical properties study of polycarbonate and other thermoplastic polymers

Sanaa A Hafad1,2,5,Abdalkhalaq F Hamood 1,3,Hind A AlSalihi 1,2, Slafa I Ibrahim1,2, Awfa A Abdullah1,4, Amera A Radhi1,2,Moafaq K Al-ghezi1,2, Bashar R Alogaidi1,2

Abstract. The polymeric materials in this study underwent mechanical tests (tensile test, impact resistance and hardness), which explained the use of polymeric materials in engineering and industrial applications that need good mechanical properties compared to metals, ceramic materials and woods, and this is a good thing because it is characterized by low cost and high efficiency with application performance In this study, the polycarbonate polymer was characterized by its high tensile strength in the event of breakage, but the elongation values decreased compared with the polypropylene and polyethylene polymers, which were characterized by high elongation at the expense of tensile strength, as the polycarbonate polymer acted as a brittle material as for resistance to shock, which reflected the amount of energy absorbed From the striking hammer, the impact resistance of high-density polyethylene increased compared to other polymers, as well as the hardness whose values were close to the three types of polymers used, which confirms the importance of these types in the application used in engineering.

Keyword: mechanical properties (tensile strength, impact resistance, hardness),thermoplastic polymers (polycarbonate, polypropylene ,high density poly ethylene)

Computer Vision and Image Processing the Challenges and Opportunities for new technologies approach: A paper review

Reem M. Hussien 1*, Karrar Q. Al-Jubouri 2, Mohaimen Al gburi 3, Al Gburi Hussein Qahtan 4, Al Hamami Duaa Jaafar 4

Abstract Digital image processing has numerous applications in many sectors of the world. It expands from initial information registration into methods and thoughts combining pattern recognition, computer vision, and machine learning. The wide utilization has pulled in many researchers to integrate with a range of related specializations. This work gives a study of the latest development and theoretical ideas clarifying an improvement of computer vision particularly with pattern recognition and image processing, utilizing various regions of their field implementation. Digital image processing causes researchers to analyze images to get important data and comprehend information. It utilized a technique of multi-range implementation and huge information analysis. This work aims to focus on the latest studies related to image processing,

pattern recognition, and computer vision. In this paper, Computer vision standard has been categorized into groups. For example, pattern recognition, image processing, and AI. Additionally, we give a short clarification of the forward-thinking data about the methods and their realization. This survey is restricted to computer vision, and more research can include detecting the conduct and properties of the object including people actions.

Effect of Cooling on Thermal Damage in Tissue Subjected to Laser Irradiation

Sudad E. Younis1, Khalid Salem Shibib1, May A. Abduljabbar1

Abstract. This work focuses on the finite element method (FEM) that has been used to study the effect of cooling on damage initialization in skin subjected to CO2 laser. The bio-heat equation was used to simulate the temperature distribution in a skin. The result of this work was compared with the analytical solution of the same problem with good nearby results. From the result of this work, it was observed that increasing the convection heat transfer coefficient of the skin could increase the possible time required to cause damage during subjected the tissue to the laser. Also, it was found that the decrease in the environmental temp. can cause the same effect on the initialization of damage. This observation is very useful in treating skin through various laser medical procedures to avoid thermal damage.

Keyword: bio-heat equation, skin thermal damage, heat transfer coefficient, longwave laser

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Proportioning of green mortar by using different cementitious materials

Eethar Thanon Dawood[1] *, Ansam Meshaal Mizaal 2

Abstract. Pozzolanic materials are used extensively at the present time due to their availability in large quantities, especially materials that are considered waste from construction works and industrial waste. In this research, various pozzolanic materials were used, such as glass powder; ceramic powder, and brick powder, seven mortar mixes (M, M1, M2, M3, M4, M5 and M6). This research has been prepared and focuses on the impact of using these materials in mortars as cement replacement. M1, M2, M3 The cement was replaced as 30, 35, 40% by glass powder and ceramic powder (10% glass with 20, 25 and 30% ceramic powder) by weight of cement. M4, M5, M6 was replaced as 30, 35, 40% by glass powder and brick powder (10% glass with 20, 25, 30% brick powder) the cement by weight. The specimens were cast in a cube of 50 x 50 x 50 mm and the water

curing regime was applied until the testing age. The fineness of the powder used in glass, ceramics and bricks is less than 45µm. Changes in compressive intensity for both samples have been examined. The optimal replacement that provided the better strength was found to be 40 percent replacement (10% glass with 30% brick powder).

Keyword: green mortar, cementitious materials, glass powder, ceramic waste powder, brick waste powder.

Comparative Investigation on Properties of Various Local and Imported Terrazzo Tiles

Sana Taha Abdulhussain

Abstract. The paper aims to study the properties of various local and imported terrazzo tiles manufactured by ten different factories. Five of the terrazzo tile samples are local while the others are imported from Turkey and Iran. Thirty samples have been tested for each factory with total number of 300 tiles. Samples of tiles have been randomly selected from local market and then tested according to the testing methods of terrazzo tiles and ordinary tiles (31, 1989) and compared with Iraqi specification (1042, 1984). Tests result showed that all local samples conform to the specification while imported samples do not conform to Iraqi specification. The Turkish samples were out of tolerances in thickness (-15, -13 mm) for both samples. The Iranian samples were out of limits in total absorption test (10.4, 11.6 %) for both sample. The higher modulus of rupture was 7.22 MPa in a Turkish sample. The best abrasion resistance was 1.87 mm average thickness reduction in an Iranian sample. The best result of SO3 content was 0.274% in local sample Kamalyah factory. Over all, according to the adopted specification all local samples can be classified as conformable to specification limits.

Morphology ,Topography and Wettability of CP-Ti after Anodization Process for Biomedical Applications

A N Najim1, M T Mohammed2 and M A Albozahid3

Abstract. Titanium (Ti) is widely applied for biomedical implants owing to its exceptional properties such as biocompatibility, corrosion behavior and wear resistance. However, these implants may undergo from some unfavorable results coming from the lack of their surface

properties. Therefore, the development of required surface properties of Ti implants is an important issue. In particular, Ti dioxide (TiO2) nanotubes (NTs) have displayed auspicious features to modulate the biological responses of Ti. In this study, the anodization process was carried out onto the surface of commercial pure titanium (CP-Ti) substrate in an electrolyte contains a 0.8M NaF in 1M H3PO4 at constant applied voltage of 10 V for 30, 90, and 150 min. The structure and morphology , topography, along with adhesion strength of both non-anodized and anodized Ti samples have been investigated

Keyword: : Anodization, biomedical applications, oxidation, surface properties, titanium,

Adsorption Desulfurization of Iraqi Light Naphtha Using Modified Activated Carbon Loading With Ni And Zn As Single And Binary Metals

Qusay Ghanim Finish & Dr.Tariq Mohammed Naief

Abstract. The study's aim is evaluation of removal of sulfur content from Iraqi light naphtha produced in Al-Dora refinery by adsorption desulfurization DS technique using modified activated carbon MAC loaded with nickel Ni and copper Zn as single and binary metals. The experiments were carried in a batch unit with various operating parameters were; type MAC dosage , agitation speed and contact time 300 min at constant initial sulfur concentration 155 ppm and temperature .The results show higher DS% by AC/Ni-Zn (63.23)% at 500 rpm and 1 g dosage comparing with DS (29.03)% by activated carbon AC where increasing MAC dosage , agitation speed and contact time lead to increasing DS% values . Adsorption capacity of MAC results were recorded (16 ,12.5 ,and 17.5) mg Sulfur/g MAC for AC/Ni, AC/Zn and ,AC/Ni-Zn respectively . Equilibrium isotherm study results show good fitting with Freundlich isotherm model with R2 value (0.952) for AC/Ni-Zn . The kinetic study results show R2 value (0.974, 0.94,and 0.964) by pseudo first order and (0.96, 0.947 and, 0.982) by pseudo second order for AC/Ni, AC/Zn , and AC/Ni-Zn respectively with calculated qe(cal)(4.423-5.08) mg/g by first order model more nearest to obtained qe(exp) (4.375) mg/g by the experiments where no interparticle diffusion which refers to that more than one process is controlling the adsorption process of adsorption of sulfur compounds by MAC.

Keyword: light naphtha , adsorption, desulfurization, modified activated carbon.

Modern Strategy with Risk Mitigation of Future Renewable Energy in Iraq

Ali Sabri Allw1,a, A.L Wasan Zaki Mohammad1,b, Falah Ibrahim Mustafa Al-Attar3,c*

Abstract. Iraq suffers from electricity shortages, through the local market and government institutions, has preliminary and applied information in the field of renewable energies, represented by solar energy, wind energy and bio-energy, at a simple level and small capacities, and in the near future it will rise to the levels of high energy stations. Note that the National Energy Strategy has set the percentage of renewable energy participation from total electric energy to reach 5%, about 2 Gigawatt by the year 2030. The plan includes several interval times, including the introduction of renewable energy in the agricultural sector to withdraw and pump water in drip irrigation systems, and the use of solar water heaters and heating systems and lighting systems operating with photovoltaic solar energy, as well as manufacturing all solar energy supplies and systems such as batteries, inverters, electric charger, solar heaters and solar panels, the effect of education and rationalization of consumption, increasing the efficiency of the use of electric energy, recycling waste to get rid of environmental pollution and producing biogas by Medium and large entrepreneurial systems in Iraqi cities. As well as the introduction of green building techniques in building homes, buildings and residential complexes to reduce electrical energy consumption with the introduction of solar-powered air conditioning systems. Reducing risks in renewable energy projects depends on several factors, including technology risks, monetary currency, natural resources, electrical grid risks, political risks, and the most dangerous are the risks resulting from terrorism and thefts at present in Iraq and requires an advanced and secure security system. Based on public datasets and reasonable assumptions, the provisional results obtained suggest the following; solar PV zones are located in the western region of Al-Anbar along the Jordanian Border. Despite the large capacities of these clusters, they are located at more than 300 km from Baghdad; wind zones are spread across the north-western area of Al-Anbar and south-eastern region, from Baghdad to Al-Basrah governorates.

Design and implementation of android application to extract text from images by using tesseract for English and Hindi

Brijeshkumar Y. Panchal1, Gaurang Chauhan2

Abstract. The proposed Implementation is on the Android Application to extract using Tesseract OCR in which the following concepts will be used, which are Adaptive Thresholding, Connected Component, Fine Lines, and Recognize Word. Using this Optical Character Recognition (OCR) Technology, an Application generated text which is printed on a clean, B/W or colourful

background can be converted into a computer readable form ASCII. With the help of this Android Application using Tesseract OCR, the system has two ways for Text Extraction. The first one is to capture a photo while the second one uploads an image from the gallery after that system can proceed for as per the user requirement which portion of the image they want to crop or edit. After editing the picture, it converts into the text. This Android Application is for two languages, English and Hindi.

Keyword: Text Extraction, Android Application, OCR, English and Hindi Language, Image Processing, Tesseract 4, Tesseract 3 Tesseract.

Performance Analysis and Comparison of narrowband noise passing through filter types (Elliptic) and (Butterworth)

Ali .S. Mahdi Khafaga 1 , 2*

Abstract. This paper introduces the properties of an elliptical filter and Butterworth filter characteristics when narrowband noise passes through them, which has the same behavior in both, traffic and stop range. The amount of ripple in each band can be adjusted independently as it has a faster gain transition between the pass and stop band, so a compression has been made between elliptical and Butterworth filters response to narrowband noise in order to find a new ways to increase their immunity to noise. MATLAB Simulink Software has been used as a simulations environment.

Keyword:. elliptical filter, Butterworth filter, narrowband noise, signal-to-noise ratio pass band and stop band

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Electrical treeing behavior in XLPE insulation due to content AL2O3 nanoparticles

T J Mohamed 1, S R Faraj 2, ,H K Judran3

Abstract. XLPE is currently commonly used in high voltage underground cables. Several researchers recently chose several nanofillers to improve the electric tree's strength in the polymer matrix. Alumina AL2O3 nanofiller have been utilized to investigate the effects on the electrical treeing in XLPE. The percentage concentration were used as follows with different amounts

"0.3wt." % and "1wt."% from weight of base material. The needle-plane electrodes were used in this investigation and gap selected between needle and plane earth is 3 mm.The growth and morphology of treeing in XLPE insulation have been observed by using charge coupled device camera CCDc and microscope system. Scanning of electron microscopes SEM has been investigated the nanoparticles spread in base material . The outcomes show the tree inception voltage TIV values 12.5, and 14.8 KV "0.3wt." % and "1wt."% ,respectively in XLPE composites that is mean the TIV increase with increase concentration nanofiller, while the tree propagation time at 2mm length increase about 40 min and 2 hours in "0.3wt." % and "1wt."% AL2O3/XLPE , respectively compared with unfilled XLPE ,as well as the breakdown time BDT enhancement by4.347% and 13.043% for 0.3wt% and 1 wt% nano AL2O3 composites compared with unfilled XLPE insulation. And showed pictures taken with a SEM Diffusion and accumulation of nanoparticles in the XLPE material.

Keyword: underground cables XLPE, Nanoparticles, Electrical treeing ,TIV ,BDT.

Study the effect of Crystallization Factors on the Mechanical Properties of Semi - Crystalline Polymers for Transport Applications

Kawthar kareem degheim1, Najm Abdul Ameer saad 2, Asra Ali Hussein 3

Abstract. Polyether ether ketone and which combined with carbon fiber by 20% and 30% as reinforcement which purchased from a company Tangyin Sanyou Engineering Plastic Co. Itd /China. the degree of crystallization An significant role in semi-crystalline thermoplastics is played by (e.g. toughness, stiffness and solvent resistance). Primary aim of this work is to use density,DSC and FTIR to Research into the various induced degrees of crystallinity in PEEK composites Strengthened with carbon fiber (CF). In this research, three sheets were used: virgin poly ether ether ketone (PEEK), (PEEK+20 percent carbon fiber), and (PEEK+30 percent carbon fiber). the samples' mechanical and thermal properties produced ones were examined and compared in this study. The density test findings displayed a rise in crystallinity levels by (35.9, 54.4, 88.2) respectively , But a decrease in the degree of crystallinity when examining by DSC .The mechanical properties such as Tensile strength, Young's module and impact strength It showed an improvement in properties with an increase in the percentage of reinforcement with CF. In addition, FTIR for pure PEEK, (PEEK+ 20 percent CF) and (PEEK+30 percent CF) is found to induce minor shafting in peaks by adding 30 percent of carbon fibers and does not cause new peaks to appear and this suggests that there is no chemical reaction between the fibers and the PEEK matrix.

Keyword: PEEK, Crystallinity, Tensile Test , Impact Test

Analysis and Implementation of Fuzzy Control for the MPPT Based PV Systems

Sarab Al-Chlaihawi 1, Ashwaq N. Hassan 2

Abstract. In a photovoltaic system, electronic transducer control is highly essential for sufficient use of solar systems. The present article suggests to modify the Perturb and Observe MPPT (i.e., Maximum Power Point Tracking) with a fog controller to control a DC-DC impulse converter in a photoelectric system under shade and variable cases of the weather. The present study includes a proposal of a different method to the MPPT from a photovoltaic (PV) system for the purpose of obtaining the maximal power from a photovoltaic system. In the traditional approaches, the capability of the tracking includes the power output fluctuations. The modelling and simulation of the PV system with the suggested algorithm has been performed with the use of the MATLAB / SIMLINK software. The model results of the simulation show that the Per-turb and Observe (P&O) based fuzzy control algorithm has been considered as a fast transient state, with fewer and smooth fluctuations in the power signal generated.

Keyword: Photovoltaic, Maximum Power Point tracking, Fuzzy, Capacitor, Boost converter

The Best Practices in Delay and disruption analysis in Iraq's construction sector

Layth Qasim Shakir, Sawsan Rasheed Mohammed

Abstract. Delay and disturbance analysis (DD) is a significant cause of claims and conflicts in the Iraqi building industry, frequently resulting in time and expense overruns. The extent to which each contracting party is responsible for the postponed job execution and additional expenses incurred is often at the heart of the dispute. Various methodologies have been developed over time to answer this question. This research was undertaken using a mixed-method approach, which involved a detailed examination of the related literature first. Due to programming and record-keeping shortcomings, the primary finding is that DD testing methodologies with major defects in the literature were the most widely found in use. To encourage the use of more efficient methodologies that ensure greater efficiency, a scheme integrating best practice recommendations for promoting better record-keeping and programming practice has been established efficient claims settlement with fewer chances of conflicts.

Environmental assessment and hydrochemical formula of groundwater wells and their various uses for selected areas of Dhi Qar Governorate – southern Iraq for the year 2014

Proof .Dr. Raad Mahmoud Nasif Al-khafaji . college of education for pure sciences / Ibn Al Hat hem . University of Baghdad.

Abstract. The study area in Dhi Qar Governorate, southern Iraq, is considered groundwater of great importance for drinking purposes and other uses in this governorate. Twenty-one groundwater models were studied in the study area to know the quality of water and some physical and chemical variables. The study showed that the groundwater in the study area is acidic in it tends towards light alkalinity. As for the electrical conduction study, there was an increase in some wells. It is believed due to the high rates of salts and impurities in the water and it was highly mineralized excessively and very hard. As for studying dissolved solids, an increase in concentrations was observed. This substance is due to the possibility of human contamination. The length of the groundwater movement distance has changed the water type from bicarbonate to sulfate to chloride. Each of the ions was studied: sodium, calcium, magnesium, potassium and sulfate, chloride, bicarbonate, and nitrates. The presence of high concentrations of some wave and negative ions in some wells is due to the possibility of the presence of human pollutants in the area of the wells with high concentrations. The hydrochemical formula for most groundwater wells was (Ca-Cl), (Na - Cl) and (Mg-Cl) due to the high concentrations of these ions in the water. When comparing the results of the research with international and local standards, it was found that this water is not suitable for human drinking due to its high salinity, while it is suitable for drinking animals because all the elements and dissolved solids fall within the limits of the comparison tables. While it is suitable for construction purposes, because all the elements did not exceed the permissible limits, it was found that this water is not suitable for industrial and irrigation purposes, as it is possible to grow crops that tolerate high salinity

A review on Supercapacitors: types and components

Noor I. Jalal1*, Raheek I. Ibrahim, and Manal K. Oudah

Abstract. The importance of Super-capacitors (SCs) stems from their distinctive properties including long cycle life, high strength and environment friendly, they are sharing similar fundamental equations as the traditional capacitors; for attaining high capacitances SC using electrodes materials with thinner dielectrics and high specific surface area. In this review paper, all types of SCs were covered, depending on the energy storage mechanism; a brief overview of the materials and technologies used for SCs is presented. The major concentration is on materials like the metal oxides, carbon materials, conducting polymers along with their composites. The composites' performance was examined via parameters like capacitance, energy, cyclic performance power and the rate capability also presents details regarding the electrolyte materials.

Keyword: Super-capacitors, metal oxides, Electrolyte, EDLC, Pseudo-capacitors, hybrid super-capacitors

Use of treated cement kiln dust as a nano material partially replaced in cement mortars

Hakim Saeed Muhammed1, Luay Muhammed Ali2 & A H Saeed3

Abstract. Cement kiln dust (CKD) is a by-product material of cement manufacturing. The composition of this material is approximately like the cement composition but it carries high ratio of alkali which is harmful material if it is used in structural construction members. In this study it was used after removing most of alkali by washing, in cement mortars as partial replacement of cement. After washing it was left to be dried. The material was grinded by Los Angeles machine firstly and then milled by a planetary mill in periods of 1,1.5,2,2.5,3,3.5, and 4 hours respectively to reach nano sizes of particles. It was added to cement mortars using five ratios, 0% (without milling as control ratio) and an addition of 5% ,10%, 15%, and 20% ratios compared to cement weight respectively. The properties which were studied include compressive strength of mortar through curing periods 7 ,28, 56 days, physical and chemical properties of the mortars. The results of this work ensure the work of one of the authors in the literature and an improvement in mortar compressive strength reaches 35%. Other physical and chemical properties were also improved. Depending upon the governed results washed CKD can be used safely in cement mortars.

Experimental investigation on the barrelling phenomenon in Turning Process

Zaman waheed salman1* and Adnan A. Ugla 2

Abstract. In the turning process, the quality of the working surface depends on the operating parameters. In this work method was used Taguchi to study the effect of operating transactions on the surface quality of the operator (the barrel). In this study four parameters were used which are sample length (L), sample diameter (D), feed rate (F), and cut depth (T). The objective of this work is to improve the quality of the surface of the machine through the control of the main input parameters for the process of turning aluminum and steel materials. It was selected orthogonal group L9 to study the impact of key factors on the variable response, i.e. barreling. The contribution of key factors and their interaction with the optimal level were determined using ANOVA. The results showed that the cutting depth was 0.5 mm and the feeding rate was 0.5 mm / roll yield minimum barreling. In addition, ANOVA results indicated that among four major factors, the specimen diameter and cut depth significantly contributed to reducing barreling.

Residential load control system based analytical optimization method for real residential data consumption

Mousa J Sultan1, Mohammed A Tawfeeq2 and Haider T Haider3

Abstract. Peak load periods have a great impact for energy demand in smart grid. These times is directly related to the consumption of residential sector, thus utility need to add additional generation capacity during peak time to support the demand required. This paper proposes a demand response system for residential household. Analytical Method (AM) is used to optimize the load consumption based real data of typical residential home. The consumption data are measured using smart plugs that have been designed and implemented to communicate with household's smart devices. The simulation results show the peak load was reduced by 37.64% and the energy consumption cost bill was reduced by 29.52%. The proposed method is compared with other optimization methods such as Bacterial Foraging Optimization (BFO), and Particle Swarm Optimization (PSO) to highlight the finding. The proposed approach indicated a greater saving period to produce the final results

Keyword: BFO, Demand response, Load scheduling, PSO, Smart plug, ToU pricing

FPGA Realization of ANFIS Controller Using a Proposed Digital Design

Abbas H. Issa1*, Sabah A. Gitaffa2, Abdulrahim Thiab Humod 3

Abstract. The design and realization of Adaptive Neuro-Fuzzy Inference System (ANFIS) controller based on Field Programmable Gate Array (FPGA) is presented in this paper. The controller intended to control the temperature of medical oven. A novel design of digital ANFIS is presented here for the implementation process. Different controllers are designed and their results are compared using MATLAB program to show the ANFIS superiority. The designed controllers tested for cell cultures application at 37.5°C. A reduction is made for the designed digital ANFIS due to the used FPGA limitations. The reduced design minimizes the utilized slices from 366% to 3% and LUTs from 364% to 3%. The reduced design reached an optimum size for this controller to utilize a smallest memory size. A real-time FPGA implementation of the proposed digital ANFIS have been done and verified through Xilinx ISE 14.6 using the VHDL language. The VHDL code for the controller is produced, aggregated and downloaded on the FPGA Spartan 3A/AN FPGA kit. A comparison between the simulation and implementation results is made. The matching between these results proves the effectiveness and robustness of the proposed digital ANFIS and the excellent performance of the FPGA based controller.

Keyword: Medical Oven Modeling; PID; NN; ANFIS; Digital ANFIS; FPGA.

Improvement of the PV Module Performance by Cooling Method Through Immersing in a Forced Water Circulation

Sarah Yahya Hattam1, Mahdi Hatf Kadhum Aboaltabooq2, Hazim A. Al-zurfi3

Abstract. Just 15 to 20 percent of the PV modules solar radiation's turned to electrical energy while the rest's transformed into thermal energy, resulting in a decrease in the efficiency of the electrical energy. Thus, to useful from the each electrical and thermal energy generated by the PV module, a hybrid thermal photovoltaic system is the perfect choice. A hollow rectangular box was used as a water flow channel to absorb heat from the photovoltaic's. Then, this heat extracted from photovoltaic's will be used in secondary applications, which leads to improved performance of photovoltaic modules and increased electrical conversion. The hybrid PV/T system consists of two sides of a rectangular channel made of insulating material, which are built-up on the bottom and top side of the PV panel, where the upper material is glass to transmittance the solar radiation and lower material is insulation foam, with a depth 5 mm of each one and through which water flows along the channel. The front side of the thermal collector contains transparent glass that allows solar radiation to pass through it to reach the PV module.3D numerical simulation was performed by COMSOL Multiphysics® software, and is validated at different volume flow rates of 1LPM to

5LPM, by Boundary Conditions investigation to keeping the inlet water and ambient temperature at 27oC and solar irradiation at 1000 W/m2.Hence, the benefit of this work is to evolve the electricity yield of photovoltaic (PV) module, thus increasing the electrical adequacy, also can be obtained the hot water by the heat absorption from the PV module by use heat exchanger. The results of the simulation had shown that the (PV) / T system produced 14.2% Maximum Electrical Efficiency (ηel), while the Maximum Thermal Efficiency(ηth)was 82%,all the result set at the temperature of ambient and inlet water to the thermal collector channel at 27°C, Where the range of the volumetric rate of water flow ranges between (1-5) LPM and solar radiation between (600-1000) (W/m2)

Keyword: PV Module, PV/T System, photovoltaic cells, (Electrical, Thermal) Efficiency

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Mathematical model of the sensor for controling the condition of the track section with an adaptive receiver at the free condition of the controlled section

Ravshan M. Aliev1, Marat M. Aliev2

Abstract. One of the promising areas of improvement of sensors for monitoring the condition of track sections is the development of controlling sensors, which are less dependent on changes in ballast resistance, longitudinal asymmetry and standard value of shunt sensitivity, such a direction is the development of adaptive track circuits [1-5]. The article proposes a control sensor with an adaptive receiver, principle of operation of which is that monitoring the state of the track section depends on the parameters of adjacent monitoring sensors, included in the common controlled zone CZ.Mathematical model and analytical expressions have been developed taking into account the resistance of the rails and the resistance of the insulation being carried out [6]. Proposed the coefficients of a rail fourpole with one of the choke-transformer, powered with one side. The calculated expressions of the fourpole and the criteria for the sensitivity of the rail circuit when one line is broken are presented and derived, and also the minimum transmission resistance [6].

Keyword: rail line, rail circuit, four-pole, transmission resistance, rail circuit sensitivity criterion, rail circuit modes.

The role of energy management system in performance improvement of Iraqi oil companies

Raqeyah Jawad Najy1

Abstract. Oil is one of the important sources of the economy in all countries, and everyone is interested in the slogan of energy conservation and rationalization. Energy saving and energy conservation are also linked to natural issues, particularly those identified with environmental change and high temperatures, and this implies the requirement for a fair response. Despite the distinction in the requirement for energy every once in a while. Research aims to improve performance .Oil companies using energy management systems. Oil companies in Iraq whose work is characterized by a technical nature were searched, and a rigorous and tested questionnaire was used to collect data.Bodies and divisions of the Iraqi Oil Companies, which are directly related to the topic of the research, and a random sample was chosen from the community. The study reached a set of results, the most important of which are (an integration formula between energy management systems can be developed to be used to improve the quality of performance of oil companies).

Laser Transmission Welding is a promising joining technology technique – A Recent Review

Marwa A.Khayoon1*, Kadhim A.Hubeatir2, Mohanned M.AL-Khafaji3

Abstract. Laser transmission welding (LTW) is one of the latest evolutions in joining technology. Simply, it involves joining two similar or dissimilar materials by melting and fusing two parts at their interface using laser radiation. The upper material is transparent in order to allow the laser radiation to pass and heat the second material which is in this case an absorbent material. This technique is also known with other names such as Laser Plastic Welding, Through-Transmission Welding and Laser Assisted Metal to Polymer Joining. The developments occurred in this field have also enabled LTW to approach different Lasers like Diode Laser, CO_2 Laser, Nd: YAG Laser and Fiber Laser. This review aims to explain LTW process, working procedures, effect of Laser types and process parameters on this approach. It especially clarifies using LTW to weld thermoplastics materials together or with metals. It also attempts to help scholars to have an overview on LTW technique and achieve their answers related to this topic.

Keyword: Polymer Welding, Thermoplastics, Polymer-Metal Joining, Lap Joints, Lasers.

Applicaion of Moving Bed Biofilm Reactor (MBBR) for Treatment of Industrial Wastewater: A mini Review

Hatem A Gzar1 , Wisam S. Al-Rekabi2, Zahraa K. shuhaieb3*

Abstract. This research aims at presenting Moving Bed Biofilm Reactor (MBBR) technology as one of the alternatives and efficient methods for treating industrial wastewaters at a variety of conditions. In the last decade, this technology became more popular and widely utilized worldwide, due to the fact that the need for clean water keeps to rapidly increase with the increase in the population of the world grows year by year, which is why a high number of the waste-water treatment facilities are necessary expand, for the purpose of providing additional capacity with the minimal costs. The present study aimed at covering the most significant MBBR processes, like the fundamental process of the treatment, biofilm kinetics, and MBBR operation principles. This review includes as well a large number of the relevant researches that have been performed at the lab and pilot scales, in addition to cover the important procedures on the basic process of the treatment, which affects the influent types as well as the carrier type. None-the-less, this review concluded yet has been compiled herein and reported to be acquiring more sufficient insights and outlook upon the theme with a view to meet the new method. For that purpose, the most feasible technology may be the advanced biological process (i.e., the bio-reactor systems), which include the MBBR system

Keyword: biofilm, industrial wastewater, Moving bed biofilm reactor (MBBR), dyeing wastewaters, nitrification and denitrification.

Improvement the Shear strength of Asphalt Mixture by using crumb tire Rubber

Eman Abd Allateef1*, Abdulhaq Hadi Abedali2

Abstract. Rutting is one of the big problems in hot-mix asphalt (HMA) pavements. The primary mechanism of HMA rutting is shear deformation, often caused by high stress in HMA layers during traffic loading, especially at high temperatures. Current HMA rutting tests are not necessarily designed to capture HMA shear properties such as shear strength, shear strain, and shear module. The present work explores the behavior of the shear strength properties of HMA modified with Crumb Tire Rubber (CTR) and two types of filler (brick and lime dust in comparison with passing sieving No.200 as control filler) by developing a Simple Punching Shear Test (SPST) under control of temperature and loading rate. A series of laboratory sample tests to formulate and set up the SPST protocol and the related test parameters, derive the SPST results analysis sample to capture the

HMA shear parameters from the results and comparatively evaluate the shear properties of HMA mixes. Results have shown that the SPST is relatively receptive to the form of modifier and filler. Using limestone dust as with (5%) CTR content increased higher shear strength, the rate of increase was about (44.44%) and (51.38%). Also 5% to 7% CTR content with lime dust filler lowering shear strain more than for brick dust filler.

Keyword: Shear strength ; Asphalt Mixture, CTR.

Remove Skin Deformities by Using CO2 and Nd:Yag Laser

Sadiq Hassan Lefta1 Ihsan Jaraa2 Ghufran Hadi3

Abstract. The treatment of some skin damage have been studied influence the laser beam CO2 and the Nd:Yag with wavelengths (10600nm and 1064 nm) respectively as foundation of radiation. The current research aims to verify effect of altered laser dosages of the skin in an attempt to recognize how the laser achieves medicinal effects to treat skin lesions. And the aims to establish the correlation between laser dose and biological influence and so after that calculate its low dose with higher medical influence and minimal harm to.The number of cases included four different diseases, ranging between 18-50 years. Areas of the body were exposed to laser beams and different wavelengths by type laser user. The first case, represent the image of a girl suffering from autoimmune disease, Nd:YAG laser was used with Q-swtich Nd: YAG to treat this condition and the wavelength is 1064 nm, second case, image of a person suffering from the impact. Fractional Co2 Laser and wavelength 10600 nm where used and third case: An image of a person suffering from costs, treatment by using Q-switch Nd-YAG laser short pulse has a wavelength of 1064nm.

Enhancement behavior of reinforced concrete beam with transverse holes under combined twisting and bending using steel fiber

1Mustafa Hamid Jasim And 2Asst.prof. Dr. Nabeel Hasan Ali Al-Salim

Abstract. Openings in beams cause load path and stress discontinuities. Several research experiments have been conducted in recent years to improve the area surrounding the opening using various techniques. In this research investigate the effect of hybrid concrete (normal concrete and steel fiber reinforced concrete) on the beams with transfer opening subject to combined loading (torsion and bending). Six specimens of reinforced concrete beams with the same dimension and reinforcement were tested. The variable where distance of hybrid area around opening (150, 225,

450 and 1500) mm. The opening in reference concrete beams was decrease in the ultimate twisting moment (18.28%) with respect to solid one (without opening). The ultimate twisting moment increases by (32-68%) as steel fiber reinforced concrete is used around the opening. Simultaneously, the twist angle was increased by about (27.6- 46.7%). In addition, relative to the control specimen, the first crack was delayed by bout (41.6-75) %.

Keyword: opening , torsion ,steel fiber ,hybrid concrete

A GIS Based Analysis Freight Demand in Jisr Diyala Area

Zainab A. Wazer 1*, Noor M. Asmael 2

Abstract. In determining the economy of the region, freight transportation plays a major role. Usually, efficient freight distribution networks take care of reducing the cost of transporting goods to and from transportation facilities. The purpose of this analysis is to find an alternative route for the Jisr Diyala entrance solution, using aggregate freight data and GIS techniques, and in particular to analyze the travel pattern of intercity truck traffic. Shipping data is obtained through roadside surveys and interviews which represent the primary source of data for this study. Using GIS techniques, various assessments of freight demand are made, and producing this analysis is helpful for decision makers to apply the right decisions

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Variable Speed Drives in Electric Elevator Systems: A Review

Saba A. Othman, Jamal A.-K Mohammed and Farag Mahel Mohammed

Abstract. Due to the industrial development and the growing modernity, the elevator systems have become indispensable in many multi-story buildings. When electrical elevators are employed to transport people, riding comfort becomes a very important issue, especially when high-speed elevators are used in high-rise buildings. The elevator systems should provide a good stop accuracy and excellent levels of ride comfort. Passengers experience some problems that affect their comfort such as vibration and jerk that occur when travelling between elevator floors especially when starting and stopping the cabin. To minimize the effects of these problems, the cabin must be driven in such a way as to ensure smooth operation and smooth starting and stopping. Therefore, there is a need to control the voltage and frequency of the electric motor that drives the elevator cabin.

This paper introduces a look at the different types of variable speed drives and how they're used in electric elevator systems, discussing current systems as well as recent development in the field. Therefore, a variable-speed design that provides smooth movement is needed to include a smooth ride, accurate leveling, and a large number of start and stop operations First, some basic principles in driving systems, such as load curves and driving speed/torque, as well as their relationship to stability, are discussed; reference curve generation; speed curve profiling of the elevator system to achieve smooth transmission. The latest study in this topic reached the implementation of an elevator prototype driven by permanent magnet linear synchronous motor (PMSLM) loaded by 24kg. The motor was controlled by voltage frequency drive (VFD) programmed with offline S-curve to get a smooth start and smooth stop for the elevator cabin and constant travel speed with the least jerk possible, estimated by 88% compared the that without using the driver.

Keyword: variable speed drives, VVVF, motors, jerk, acceleration, vibration.

Fresh Water Generator: A Review

Haneen Q. Muhammed1, Muhannad Z. Khalifa2 & Abdul J. Owaid3

Abstract. This search presents a study for some types of fresh water generators FWGs, giving an overview of each type and comparing them with other types, and knowing the design criteria for different designs, as well as studying their advantages and disadvantages, including thermal desalting which types are vapor compression (VC), multi stage flash distillation (MSF), multiple effect distillation (MED), and multiple effecte evaporator, adsorption desalination, membrane distillation (MD), freezing desalination, and hydrate desalination. Then we studied the non-thermal desalination process, which includes electro-dialysis (ED), ion exchange desalination (IX), extraction desalination process, and additional types of fresh water generators FWGs.

Keyword: thermal desalting , vapour compression, multi stage flash distillation, multiple effect distillation, multiple effect evaporator, adsorption desalination, membrane distillation, freezing desalination, hydrate desalination, non-thermal desalination, electro-dialysis, ion exchange desalination, extraction desalination, Solar steam generation plant.

The Effect of Construction Joint on Behavior of Reinforced Concrete Dapped End Beam

Hussain Ali Hussain1*, Khalid K. Shadhan2

Abstract. This research aims to investigate experimentally the attitude and performance of hybrid reinforced concrete Dapped End Beams. The study consists of testing thirteen specimens, all of which have similar dimensions (1000 * 120 * 250 mm). Three specimens were considered as control specimens (non-hybrid concrete) and the other specimens were strengthened in (nib and D-region) by using two types of concrete (high-strength concrete, steel fiber reinforced concrete) and with construction joint. The experimental results showed that the presence of the construction joint in the reentrant corner of specimens with non-hybrid normal concrete and specimens with non-hybrid high strength concrete leads to a decrease in strength of about (33%) and (6%), respectively and does not lead to a decrease in strength in the concrete specimens reinforced with steel fibers. Also, the presence of the construction joint in the D- region in normal non-hybrid concrete specimens and non-hybrid high strength concrete specimens as well as non-hybrid steel reinforced concrete specimens leads to an increase in the strength of about (0.5%), (10%) and (1%), respectively.

Keyword: Dapped End Beam, Hybrid Concrete, High-Strength Concrete (HSC), Steel-Fiber Reinforced Concrete (SFRC).

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investigation the effect of ICCP and SACP on carbon steelcorrosion in salt solution at different parameters

F. S. Al Masoodi1 and Dr. Falah K. Matloub2,

Abstract. Cathodic protection has wide applications in various structures and is an effective electrochemical technique for mitigating or preventing corrosion of metal structures. To apply this technique, open circuit voltage (ocp) was measured under all conditions. The experiments consisted of samples of carbon steel immersed in solutions of NaCl concentrations (0.5, 1.5, 3) g / L at (20 and 30) ° C, different pH values (4-7-10) and different potentials (-). Application of 700, -900, -1000, -1200 mv in forced current cathodic protection (ICCP). The anodic cathodic protection (SACP) (AL alloy) was also implemented with the same parameters. The density of the protective current increases with increasing temperature and concentration due to the increase in the mobility of ions in the solution, as the conductivity of the solution increases and with the decrease in the pH. The experimental results showed that increasing the DC current leads to an increase in the cathodic protection current. Therefore, the ICCP method is more effective than the SACP method, the higher the DC power supply.

Study of Effective Parameters in Stability and Vibration of Marine Propulsion Shafting Systems

Aqeel Abdul Hussain Aboud 1*, Jaafar Khalaf Ali 2

Abstract. The marine propulsion system is a system that a ship depends on in travelling and maneuvering in the existence of different types of waves, which reduce the efficiency of the system. In this work, different types of vibration such as torsional, lateral and longitudinal and their effect on ship and propulsion system are studied. Vibration seriously threatens the reliability and safety of the ship. The finite element method is established to study vibration at different rotational speeds. In this work vibration, analysis and modeling with simulation for cases of lateral and torsional vibration are performed by using MatLab software. In addition, ANSYS 2019 R3 is used to study some cases of marine propulsion system. In this work, effective parameters that play important role in vibration reduction such as the diameter, stiffness, couple unbalance and mass unbalance are discussed. The results of that analysis provided can help to predict the problems. In general, to achieve better stability and safety, all the conditions of the propulsion system must be taken into account to diagnose the problem. Hence, the data which are provided in diagrams and tables can be used as a guide in the design stage or maintenance stage to treat system problem and then take the proper action.

Keyword: Dapped End Beam, Hybrid Concrete, High-Strength Concrete (HSC), Steel-Fiber Reinforced Concrete (SFRC).

Evaluation of the hospital's wastewater treatment plant in basrah province

Samar A. Al-khafaji[1]*, Wisam S. Al-Rekabi[1]

Abstract. This paper concentrates on evaluating the wastewater properties and performance of the hospital wastewater treatment plant (WWTP) for two hospitals in Basrah province Al-Taaleme hospital, and Al-Fayhaa hospital. Samples were collected from the WWTS influent and effluent then evaluated pollutants containing by using American Public Health Association (APHA) methods and in comparison to standard guidelines. Laboratory tests of wastewater were conducted to investigate ten parameters: chemical oxygen demand (COD), biochemical oxygen demand (BOD), PH, temperature, electric conductivity (E.C), total suspended solids (T.S.S), total dissolved solids (T.D.S), dissolved oxygen (DO) sulfate (SO4), phosphate (PO4), ammonia (NH3) and nitrate (NO3)

which have been chosen to assess the quality of wastewater. The results showed that all pollutants were in compliance with the standard limit in Iraqi standard specification B1 for the year 1998, except for the NH3 results for Al-Fayhaa hospital (B), which were 12 mg/L while the standard was 10 mg/L, and COD effluent was exceeded the Iraqi standards for both hospitals Al-Taalemee hospital (A) and Al-Fayhaa hospital (B), which were 155 mg/L and 150 mg/L respectively while the standard was specified effluent by 100 mg/L, and for SO4 effluent was exceeded the Iraqi standards for both hospitals Al-Taalemee hospital (A) and Al-Fayhaa hospital (B) was 760 mg/L and 650 mg/L respectively while the standards were specified by 400 mg/L.

Comparative Analysis of Two Alloys (GTD-111 and IN-738) used in Blade of Gas Turbine Model MS9001E at South Baghdad Station

Alaa Jasim Abdulah 1*, Muhannad Z. Khalifa 2, Abdul Jabbar Owaid 3

Abstract. Blades are one of the basic components of a gas turbine and its main function is to rotate the shaft associated with the generator motor. Gas turbine model MS9001E used power plants at south Baghdad station, the blades are subjected to harsh working conditions such as high vibration, temperatures and pressures, thus highlighting the importance of studying the materials used in Manufacture of blades that work under harsh operating conditions. In this research, stress, strain and deformation produced by the centrifugal force that the blade is subjected to be studied, as well as studying the natural frequencies of the blades. Three-dimensional was created through the program solidwork 2018 and then exported to the program ansys 2019 for analyzing. Two alloys of materials (GTD-111) and (IN-738) were analyzed and compared between them, and the results showed that alloy (GTD-11) is the best and is suitable for use in the manufacture of blades.

Keyword: Turbine blade alloy, Modal analysis, blade frequency, static analysis, blade stress.

Non-linear behavior of composite two way slab with screws as shear connectors under equivalent uniform distributed repeated load

Naba'a Hakim Abd* and Prof. Dr. Nameer A. Alwash

Abstract. The research studies experimentally behavior of composite two-way slab that consist of flat steel plate and concrete with screws as shear connectors. The screws differ in length and

diameter with distributed of them according to shear stresses [dense distribution nearest from support] and by using the same weight of screws in each slab (819±8) g.

Six composite slabs was cast in this work and tested under equivalent uniform distributed repeated load [EUDRL]. The various parameters were investigated in this work including the diameter of screws (6.3, 4.2, 3.5) mm and length of screw (25 and 12.5) mm.

The results of the present experimental study demonstrated that the composite slab with diameter of screws (4.2mm) and length (12.5mm) is the best among others composite slab in this work. The strength of the best tested composite slab (using screws of (4.2mm diameter and 12.5mm length) is closed to that of reinforced concrete slab (R/C) with difference about (7.1%). On other hand, the ductility of composite slab is better than of (R/C) slab by about (6.7% to 24.74%)

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Medical Image Encryption Based on Hybrid AES with Chaotic Map

Ashwaq T. Hashim1*, Amira K. Jabbar2, Qussay F. Hassan3

Abstract. Patient privacy and image protection is an obligation. Data privacy, data protection, and security must be provided by using encryption to ensure confidentiality. Currently, there are numerous standard traditional encryption algorithms. Most of these are suitable for a text file. It is challenging to employ these algorithms for images or videos directly because of strong adjacent pixels correlations. Decreasing the correlation among the surrounding pixels reduces the detail. An algorithm based on a quadratic map is applied as a preprocessing step to nullify the relationship between pixels and reduce the entropy. The AES image encryption is performed for confusion and diffusion, which are necessary for confidentiality. The security analysis findings indicate that the sensitive encryption and decryption techniques are highly dependent on any improvement in the key. The encryption solution is broad enough to avoid brute-force attacks. Thus, during the transfer of medical images over the network, protection can become an issue..

Evaluation of Quenching and Tempering on Cutting Force and Surface Finishing of Steel Machining

Sattar Hantosh A. Alfatlawi1, Wafa Mahdi Jodia2

Abstract. In this paper, quenching and tempering effects on the machining conditions of medium carbon steel were investigated. The samples were quenched in a saltwater and polymer solution after heated to austenitizing temperature at 870°C, then, the tempering process of the samples were

conducted to reduce internal stresses and hardness. In the tempering process the samples were heated again to 400°C with a soaking time was one hour, so cooled in still air. So the samples were machined by lathe machine with selected cutting conditions. The results appeared the effect of heat treatments on hardness, surface finishing, cutting force and microstructure that were evaluated before and after heat treatment with various cutting conditions.

Keyword: Quenching, Tempering, Cutting force, surface finishing, Medium Carbon Steel.

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Flexural Properties of Functionally Graded Polymer Hybrid Nanocomposite

Mahdi M. S. Shareef1, Ahmed Naif Al-Khazraji2 and Samir Ali Amin3

Abstract. In this present research, layered-functionally graded polymer nanocomposites were made via the silica (SiO2) nanoparticles and alumina (Al2O3) nanoparticles distribution in the epoxy matrix throughout the ultra-sonication by hand lay–up technique. The change in volume fraction (Vf.) of the nanoparticles was given in the thickness direction for reaching the gradation. Layers having (1.2 mm) thickness with different nanoparticles concentrations were consecutively cast in acrylic moulds to fabricate the graded composite sheet having a thickness of (6 mm). To fabricate the functionally graded layers, different concentrations of nanoparticles with different nanoparticles were taken (1.5% SiO2, 1% SiO2, epoxy, 2% Al2O3 and 3% Al2O3) and tested by tensile and compressive test for each isotropic layers of FGM. The mechanical property that was studied for pure epoxy, isotropic and FGM was the flexural resistance. Flexural properties of the FGM, isotropic nanocomposite (1% SiO2 + 2% Al2O3) and pristine epoxy, in order to evaluate their mechanical properties, such as flexural stress–strain criteria and flexural Young's modulus, were obtained by 3-Point Bending test, with loading from the silica and alumina side for the hybrid-FGM and at one side for the isotropic hybrid nanocomposite and pristine epoxy. The mechanical properties of the epoxy resin and nanocomposites (tensile and compression) and the density for each layer were determined and could be useful for the finite element analysis (FEA) of the 3-Point Bending test by using Design Modeler (ANSYS Workbench). The results of experiments were confirmed via building a detailed 3D FE model. Results of the progressive deformation from the finite element model agreed well with the experimental results

Keyword: Polymer nanocomposites; FGM; Tensile properties; Compression properties; Flexural properties

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Study the effect of changing voltages values on MRR in the cutting process of electrical discharge machining

Shukry H Aghdeab1* and Anwer Q Abdulnabi2

Abstract. Electric discharge machining (EDM) is one of thermo-electric, non-conventional machining process. By EDM process can be machining of hard conductive materials which is complicated to machine by traditional machining, complicated shapes, with micro or macro removal rate. Each cutting process was controlled by several parameters, from that's a voltages values. The aim of this work was study the effect of changing these values on material removal rate (MRR) of AISI 444 stainless steel. The EDM parameters were used in this study are voltage (140, 240) V, current Ip (12, 24, 50) A, pulse on time Ton (100, 200, 400) µs, and pulse off time Toff (3, 6.5, 12) µs. For the design of experiments, the full factorial was used to analysis the result on Minilab 19 software. The results show the (MRR) was increasing with increasing in voltage. Maximum (MRR) that be achieved is (144.2308) mm3/min at higher value of voltage, current and pulse on time.

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Estimation the Performance of Gas Turbine Power Station with Air Cooling Fog System

FawziSh.Alnasur1*Mushtaq A. AL-Furaiji2,3 .

Abstract. The purpose of this study is to shed light on the fog system to cool the inside air to the compressor in the gas station to generate electricity. Where it mainly focused on the suitability of the fog system to the hot Iraqi climate throughout the summer period, a simulation analysis of the operation of the gas turbine unit using a fog system at an ambient temperature in the range of 25-55 °C was conducted in the southern Baghdad second station. The fog system proved to be highly effective in raising the effective power, the thermal efficiency and the effective efficiency coefficient of the gas turbine unit as well as a apparent decrease in the specific air flow rate, the specific fuel consumption and the specific heat consumption in the gas turbine unit compared to not using fog system for cooling and for the same operating conditions.

Keyword: fogging system, gas turbine, ambient temperature, power plant.

The effect of first generation biofuel on emission characteristics under variable conditions of engine speeds and loads in diesel engine

Mohammed A. Fayad*1, Miqdam T. Chaichan2, Hayder A. Dhahad3

Abstract. Iraqi sunflower was used in the current study and blended with diesel fuel into different ratios. The results indicated that lowest level of gaseous emissions (CO, HC, and CO2) and PM produced from B100 compared with other fuels tests. Furthermore, the CO and unburnt HC decreased with high conditions of engine loads and speeds. The high concentration of NOX emissions was found from the combustion of B100, B50, and B20 compared with diesel fuel. The emissions of NOX and exhaust gas temperature improved from increasing the operating conditions of engine loads and speeds. The effect of biodiesel blends on the gaseous emissions and particulate matter (PM) was investigated under variable engine operating conditions of loads and speeds. The best reduction was achieved with medium conditions of engine loads and speeds compared with low and high loads and speeds for all fuels tests. The higher oxidation rate of soot particles inside combustion cycle from the burning of B100, B50, and B20 decreased the total concentration of PM.

Keyword: Biodiesel, diesel engine, load, speed, NOX, particulate matter (PM).

A Novel Design Reconfigurable Antenna Based on the Metamaterial for Wearable Applications

Mohaimen Al gburi 1*, Muhammad Ilyas2

Abstract. A novel design of wearable antenna depending on metamaterials inspired-fractal Minkowski-shaped for industrial, scientific, and medical (ISM) applications is presented. The antenna consists of a conventional monopole and a Chebyshev transformer coupled with a unit cell of a fractal Minkowski curve to obtain three bands covering the ISM and Wireless Local Area Network (WLAN) applications. To enhance the antenna performance, the authors proposed the Electromagnetic Band Gap (EBG) layer of 3×4 array is introduced into the design structure. The authors used material FR4 dielectric as a substrate to design the antenna with dimensions of 51mm x 45mm x 1.6mm and fed by a 50 Ω port. The Antenna performance is analyzed numerically using CST Microwave Studio (CSTMWS) depending the Finite Integral Technique (FIT). Various investigation analyses have carried out to verify optimum antenna performance. The proposed

antenna realizes reconfiguration by using the PIN diode. In both cases (switching= ON, OFF) the antenna achieves good bandwidth, |S11|<-10dB, and excellent impedance matching.

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Experimental study: scour interference between vertical-wall abutment and two shape of bridge piers

N A Muhsen1 and S I Khassaf2

Abstract. Local scour considered as one of the main hazard factors that damaging bridges and in order to understand and controlling this problem, numerous researchers investigated its impact around pier or abutment in isolation but few take into account the consequences of pier proximity to abutment. This study aims to show the effect of pier-abutment scour interference. Under clear-water conditions, laboratory experiments were conducted utilizing vertical-wall abutment and two shape of pier (rectangular and ogival) at three different spacing (23.75, 16 and 9cm), and the influence of other parameters on reducing scouring process were also investigated. Approximately all results showed the increasing in pier scour depth with decreasing in abutment scour depth when reducing the spacing between them, where the maximum pier readings of scour depth was recorded at the smallest spacing. Also, scour increased with increasing flow intensity, Froude number and decreasing flow depth. Moreover, the maximum scour depth caused by rectangular shape was more than ogival shape by percentage about 11%.

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Building and validation of a low-cost driving simulator

A M Khadeir1*, Z A Saehood1*, H S Mutar1*, A S Abduljabbar2, A M Al-Dahwi2, R H Abdulameer2 and A A Mohammed2

Abstract. This study presents the design and manufacture of a low-cost driving simulator device that achieves results comparable to advanced simulation devices with a high cost. The aim is to use it in a variety of laboratory studies to understand the behaviour and performance of the driver and vehicle and in designing the elements of the road infrastructure and using it as a driving training device. (51) participants of both genders and of different ages participated in the performance of driving experiences in the city environment scenario, where the experiment lasted (30) minutes for the purpose of evaluating the validity of the manufactured simulator by filling out a questionnaire consisting of (9) questions. The results indicate that all participants (100%) were impressed with the design of the device, the ease of use of the device's controls (steering wheel, gearbox and pedals)

and the realism of the approved driving simulation program, and by (52.9%) the simulated experience was very good. With a percentage of (96.1%), they evaluated the device between the device being (realistic - very realistic) (100%), and the participants evaluated the device on a scale of (0-100). The summary of the results is that the device has a high acceptance.

Influence of Alumina and Zinc OxideNanoparticles on The Tensile, Impact and Hardness Properties of Epoxy Nanocomposites

Raad Obaid. Al-Mansoori 1, 3, Abbas Ali Diwan*1, 2Ahmed A. Taher1,

Abstract. The present work investigates the effect of addition different concentration of nano Alumina (Al2O3) and nano zinc oxide (Zno) by (1% , 3% , 5%) weight fraction with epoxy as the matrix on the tensile, impact and hardness properties. Preparing the samples by using hand lay-up technique, magnatic sterrier, vacuum chamber and ultra-sonication method. The results show that there are increases in tensile strength and impact toughness at 3% Al2O3 nanoparticles (21%) and (189%) respectively compare to pure epoxy. Due to adding 3% Zno nanoparticles there are increase in tensile strength by (21%) and increase impact strength (28%) compare to pure epoxy . In addition, the hardness improved slightly when increase nanoparticles materials of both components .

Keyword: Alumina nanoparticles ; Zinc oxide nanoparticles ; Epoxy nanocomposites;

Effect of friction crush welding parameters on the properties of welded joints of C1020 copper sheet

A S Jomah[1]*, A D Subhi[1] and F A Hashim[2]

Abstract. Challenges in joining sheet metals can be encountered using traditional friction welding and the solution is achieved by friction crush welding. In this work, the influence of flanged edge heights (2, 2.5 and 3 mm) and gaps (0.5 and 1 mm) between Cu sheets of Cu-Cu joints on the microstructure and mechanical properties were investigated. The welding experiments were performed using tool rotational speed of 1500 rpm and feed rate of 150 mm/min. Optical microscope, SEM, hardness and tensile tests were used to evaluate Cu-Cu joints successfully. The results indicated that the significant characteristics of Cu-Cu joints were obtained using 2.5 mm flanged edge height and 0.5 mm gap between Cu sheets. These characteristics were 66 HV hardness

and 118 MPa tensile strength. Fracture surface analysis of FCWed joints indicated the brittle-ductile mixed fracture mechanism.

Modification of Corrosion and Mechanical Behaviour of Cu-Zn-Al Shape Memory Alloy

Ali Hubi Haleem1, Zuheir Talib Khulief2, Israa Nayyef Kadhim3

Abstract. shape memory alloys (SMAs) exhibit an interesting research topic. The currentss limitationss to thes SMAsss is thats the cost of SMAss, mades outs ofs expensive elements such as Ni and Ti .In this work, the influence of different amount of nickel (Ni), boron (B), and boron oxide (B6O) additionss ons the structure, mechanicalss, electrochemical, and tribological behaviourss of Cu - Zn - Alss SMAsss have been investigateds.

Cu–25Zn–4Al SMAs were produced by powder metallurgy technique with and without the addition of 0.5, 0.7, and 1 wt.% of Ni or B. After mixing the powders for 4hr, the alloys were prepared using 675MPa compact pressure. The alloys were subjected to sintering process in vacuum tube furnace with three stepsss. For microstructural and phases characterisation of alloyss withs and withouts the additions of elements (Ni, B), optical microscopy (OM), scanningss electronss microscopyss (SEM), and XRD diffractions analysiss weres carrieds outs. The transformation temperatures of alloys with and without the addition of elements (Ni, B) were measured by differentials scannings calorimetrys (DSC). The shape memory properties of alloyss withs and withouts the additions of elements (Ni, B) were investigated using shape memory effect test (SME). Electrochemical corrosion tests for alloys with and without the addition of elements (Ni, B) were carried out using potentiodynamic polarization technique. XRD and microstructural analysis showed that all alloys compositions consisted of the predominating Cu5Zn8 phase. The results of transformation temperatures showed that the Ni and B additions have strong influences ons the transformations temperaturess of Cu – Zn – Al SMAs.

The results of electrochemical corrosion tests showed that an increased in Ni or B content up to 1wt. % improved the corrosions resistances of the unmodified Cu – Zn – Als SMA in 3.5 NaCls. In the second part, the influence of different amount (1,3, and 5 wt. %) of boron oxide (B6O) additionss ons the mechanicalss and tribology properties of Cu – Zn – Als SMAsss with the addition of 1wt.% Ni or 1wt.% B has been investigated. s Hardness measurements was usedss to assessss the mechanicalss propertiesss of 1, 3, and 5 wt.% B6O modified Cu – Zn – Al – Ni or Cu – Zn – Al– B alloy compositions. Wet sliding wear process was investigated for 1, 3, and 5 wt.% B6O modified Cu – Zn – Al – Nis or Cu – Zn – Als – B alloy compositions in distilled water at 2, 5, and 10 N normal load at room temperature. The resultss of hardness measurements show that an increase in

B6O content up to 3 wt.% improved the hardness of Cu – Zn – Als – Ni and Cu – Zn – Als – B SMAss. The tribological results show that the wear resistance of Cu – Zn – Als – Ni and Cu – Zn – Al – B SMAs exhibiteds the best results with 3 wt. % of B6O addition. Further increase or decreases of B6O contents decreases the wears resistances of the alloys".

Keyword: Shapes Memorys Alloys; Powder Metallurgy; Cu-Zn-Al Alloy; Micro-Hardness ; SMA; Microstructure ;Wear Resistance

Investigation of the Axial Forming Force during Low Frequency Vibration Assisted SPIF

Reham Ali Nema*, Muthanna Hamzah Sadoon *, and Mauwafak Ali Tawfik *

Abstract. Applied low frequency vibration in a single point incremental forming technique has recently been used. Through process of the Single-Point Incremental Forming (SPIF), the precision was affected by forming force and can cause sheet metal fracture. The magnitude of the forming forces is necessary for designing suitable models for the metal forming of the Incremental Layer. Using vibration with various values of frequency (20, 40, 60, 80, 100) Hz with amplitude (0.1mm) can decrease the forming force. It is established that the reduction rate in axial force is about (11.63%) at the frequency of (100 Hz), it is the lowest for the selection of frequencies introduced. The experimental force result has been compared with analytical solution

Keyword: SPIF, Axial forming force, Low frequency vibration

Engine performance and PM concentrations from the combustion of Iraqi sunflower oil biodiesel under variable diesel engine operating conditions

Mohammed A. Fayad*a, Miqdam T. Chaichana, Hayder A. Dhahadb

Abstract. The most desirable alternative fuels are biodiesel among several of alternative fuels to use in diesel engines. The biodiesel used in this study is sunflowers oil which derived from local renewable sources. Also, biodiesel considered a best alternative to conventional diesel because it clean and environment friendly. The experimental results shown that the biodiesel blends (B20,

B50, and B100) increased the brake specific fuel consumption (BSFC) compared with pure diesel fuel. According to the results, it is indicated that the biodiesel blends reduced the brake thermal efficiency (BTE) and exhaust gas temperatures (EGT) during the combustion of B20, B50, and B100 for all engine operating conditions. The exhaust gas temperature and BSFC increased with increase the operating conditions of engine loads and speeds. The data indicated that PM concentrations reduced with biodiesel blends combustion compared with diesel under variable engine loads and speeds. Besides that the concentrations of PM reduced by 16.847, 28, and 43.34% combustion of B20, B50, and B100, when compared with petroleum diesel under the same conditions of engine loads and speeds. The results give insight that the oxygen content in the biodiesel has favourable effect on reducing the PM concentrations.

Keyword: Biodiesel, BSFC, BTE, combustion, exhaust temperatures, PM.

Magnetic and Dielectric Properties of Epoxy Composites Reinforced with Hybrid Nanoparticle iron oxide (Fe3O4) and nickel (Ni)

Ehab Q Kaadhm1*, Khansaa D Salman2, Ahmed H Reja3

Abstract. In this research, the effects of hybrid nanoparticles Fe3O4+Ni on the magnetic and dielectric properties of epoxy resin are investigated. Microstructural characterization was performed by Field Emission scanning electron microscopy FESEM, X-ray diffraction spectra XRD, and Fourier-transform infrared spectroscopy (FTIR). The magnetic properties were investigated by vibrating sample magnetometer (VSM) and the dielectric response was investigated by a precision impedance analyzer (Agilent 4294A) LCR meter at room temperature with different frequencies. The study dealing with hybrid nanocomposite (epoxy/Fe3O4+Ni) consisting of epoxy resin as the matrix material reinforcing by magnetite nanoparticles (Fe3O4) with different weight percentages (3wt.%, 6wt.%, 9wt.%, 12wt.%, 15wt. %) and constant weight percentage 2wt% of nickel (Ni) nanoparticles. The samples were prepared using the casting method. The epoxy with the hardener is weighted and mixing in a 2:1 ratio and then add reinforcement materials Fe3O4+Ni into the epoxy. Microstructural analysis showed that a uniform distribution and homogeneously dispersed in the epoxy matrix. The results of this work exhibit that the Increasing additive weight percentages of Fe3O4 nanoparticles with a constant weight of Ni nanoparticles into epoxy resin led to improvement in the magnetic and electric properties of hybrid nanocomposites compared with pure epoxy.

Keyword: hybrid-nanocomposites, Epoxy matrix, Microstructure, Magnetic properties.

Numerical study on Built-up Steel Columns Behavior

Maan M. Taheir AL-Tai, Prof. Bayar J. Al-Sulayfani,

Abstract. This study investigates the behavior of Built-up steel columns. The effect of shape, distribution, and angle of inclination of the lacing have been studied, Finite element simulations are performed with ANSYS. A brick element with eight nodes and a shell element with eight nodes were adopted, After completing the study of the convergence between the laboratory analysis and the numerical analysis, the parametric study can begin by changing the dimensions of the lacing and the method of distributing the lacing in the structure of the manufactured steel column to make a comparison between the numerical analysis and the Experimental analysis for modeled models and determine the positive and negative points for each type of lacing used.

Keyword: Experimental analysis, Lacing, built-up columns, Numerical analysis, ANSYS 2020 R1 program, Euler buckling, slenderness ratio.

Investigation Electrical and Thermoelectrical properties of Ferrocene in staggered and eclipsed conformations

Thoalfkar Ali Hussein 1 and Mohammed D. Noori 2

Abstract. We present a comparative theoretical study of the electronic and thermoelectric properties of staggered and eclipsed ferrocene sandwiched between gold electrodes. These molecular junctions have been explored in two different configuration trans and cis conformation. In this work, we investigate the spin properties, in addition to thermoelectrical properties for all cases. Our results show that there is a variation in spin properties in staggered ferrocene when move from trans to cis configuration. However, in eclipsed ferrocene case there is no spin effects. Moreover, the room temperature electrical conductance in cis staggered ferrocene case is higher than other cases near the DFT Fermi energy. Furthermore, the thermopower of these junctions are rather high ranging about 150 μV/K. However, the thermoelectric figure of merit ZT of staggered ferrocene in cis configuration has the highest value with 1.06.

Keyword: Molecular junction, Quantum transport, electrical conductance, Seebeck coefficients, figure of merit

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EEG Motor-Imagery BCI System Based on Maximum Overlap Discrete Wavelet Transform (MODWT) and cubic SVM

Samaa S. Abdulwahab *, Hussain K.Khleaf and Manal H.Jassim

Abstract. Communication of the human brain with the surroundings became reality by using Brain-Computer Interface (BCI) based mechanism. Electroencephalography (EEG) being the non-invasive method has become popular for interaction with the brain. Traditionally, the devices were used for clinical applications to detect various brain diseases but with the advancement in technologies, companies like Emotiv, NeuoSky are coming up with low cost , easily portable EEG based consumer graded devices that can be used in various application domains like gaming, education etc as these devices are comfortable to wear also. This paper reviews the fields where the EEG has shown its impact and the way it has proved useful for individuals with severe motor disorder, rehabilitation and has become a means of communication to the real world. This paper investigates the use of Cubic SVM algorithm In the EEG classification. EEG feature extraction is Implemented by maximum overlap discrete wavelet transform (MODWT) to reduce the dimensionality of data. The Sliding Window Technique is used to calculate the mean within each window samples. The feature vectors are loaded into the support vector machine (SVM) and optimize tree.

Experimental Investigation of a Window Solar Air Collector with Circular-Perforated Moveable Absorber Plates

Norhan I Dawood1, Jalal M Jalil 2 and Majida K Ahmed3

Abstract. Window solar air collector is a significant instrument for heating residential buildings in cold regions. This paper presents an experimental investigation of the thermal performance of a window solar air collector with seven moveable absorber plates, as each plate contains 28 circular perforations. The 7 plates opened and closed at different angles in unison manually by a specific mechanical mechanism. The effect of changing the plate angles have been tested, alongside the effect of mass flow rates and the intensity of solar radiation. Experimental results shows that the highest air temperature difference is gained at vertical plates position (angle 0°) at mass flow rate 0.0097 kg/s and irradiance 730 W/m2, and the maximum thermal efficiency were 71% at mass flow rate 0.0224 kg/s. In addition, the temperature difference between inlet and outlet air has increased by 24% in case of angle 0° than in angle 45°. In contrast, a flexibility between sunlight penetrating into the room and hot air from the collector will be gained when the plates set on angle 45°.

Experimental Study of Double Pass water passage in Evacuated Tube with Parabolic Trough Collector

Sarah Bassem1 Jalal M. Jalil2Samer Jaffer Ismael3

Abstract. In this paper, a new design, fabricate and investigate the performance of the parabolic trough systems (PTC) by using double pass water passage in evacuated tube technology. This system can be used for heating water in winter season without assistive devices. The double-pass method utilizing to improve thermal performance for PTC by increasing the path of water flow in the evacuated tube and then increase the rate of the outlet temperature. Besides, the evacuated tube was used to decrease the thermal losses, which is caused an increase in thermal efficiency. The experiments were test and simulate the different solar radiation approximate to winter season and at many flow rates 0.00305, 0.0055 and 0.0083 kg/s. The higher temperature difference was 46 o C at minimum mass flow rate 0.00305 kg/s. The maximum thermal efficiency was 69.7 % at 0.0083 kg/s.

Keyword: parabolic trough collector; double pass; heating water; evacuate tube; thermal efficiency.

Improved Adhesion Bond between Asphalt Binder-Aggregate as Indicator to Reduced Moisture Damage

Ehsan A. Hasan1 , Yasameen Hadi Abed2 and Abdulhaq H. Abedali Al-Haddad3

Abstract. . Improving the adhesion bonding strength between asphalt-aggregate combinations has a significant influence on the field performance and durability of asphalt pavement and minimizing the moisture damage that can appear in form of losing adhesion in asphalt- aggregate system by using modifiers will increase the service life of pavements.

The work of adhesion, de-bonding work, wettability and energy ratios were estimated based on surface free energy theory to evaluate the potential moisture-induced damage of combinations of pure and modified asphalt binders by (Styrene–Butadiene Styrene (SBS), Butyl Rubber (BR), and anti-stripping agent BG plus) with different types of aggregate. The sessile drop method is used to determine the components of the surface energy of different aggregate and asphalt binder types by performing direct contact angle measurements.

The experimental results showed that in general, the addition of SBS and BR modifiers will increase adhesion work and decrease de-bonding work and decrease ER2 and wettability for both types of asphalt binders and aggregates while the addition of an anti-stripping agent (BG plus) caused a reduction in adhesion work and de-bonding work and increase ER2 and wettability between the asphalt binder and aggregate surface and that will provide a better possible aggregate-asphalt binder bond strength and asphalt mixture's resistance to moisture-induced damage.

Highway route selection using GIS and analytical hierarchy process case study Ramadi Heet rural highway

Yasmeen Mohammed Sameer1*, Adil N. Abed1*, Khamis Naba Sayl2*

Abstract. An appropriate road network imposes on planners take into account factors such as land use, slope, soil type, hydrology, and agricultural area. Due to various considerations and desires, the planning process is difficult hence there may be confusion in interest in the decision-making process. The use of a geographic information system (GIS) and Multi-Criteria Decision Analysis (MCDA) assist planners in achieving more detailed and desirable results. Thus, reducing the complexity of the planning process and helping various stakeholders for drawing to general conclusion. The study site was chosen on an area between the cities of Ramadi and Heet in Anbar Province, western Iraq, where it suffers from congestion and traffic accidents. This research aims to integrate a set of evaluation criteria using the Analytical Hierarchy Process (AHP) and a spatial multicriteria model to find the optimal path in the study area. In this study, two alternate paths were proposed and compared with the current path to find the best path. Finally, the results indicated that the first alternative is 36% better. This research succeeded in proving that it is possible to decide a rural highway route between two cities using GIS and MCDA.

Keyword: : spatial analysis; Highway route selection; GIS; MCD; AHP.

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Hybrid pv/t system performance based on the electrical and thermal efficiency in iraq

Asst.Prof. Karema.A.Hamad

Abstract. Nowadays, solar energy is one of the important clean energies through converting the light sun into electricity by photovoltaic solar cells which is a semi-conducting material. Solar radiation is one of the most important factors in determining the amount of produced energy through

absorbing it by the solar cells. On the other hand, heat is one of the sources of energy loss if it rises more than the prescribed limit, thus reducing the amount of electrical energy generated and reducing production efficiency. Therefore, this paper focuses on designing, testing and comparison the photovoltaic panel system (PVS) with and without Active cooling process via water in Baghdad environments. The active cooling system (ACS) was placed behind the solar cell in order to absorb the generated heat that is isolated from the environment. The testing of both models was conducted in April 2021 in Baghdad. As a result, PVS with cooling performed well compared with uncooled, where uncooled model at highest panel temperature produced about 8 % from operation efficiency. While, the ACS worked on increasing the system performance up to 16.5% by decreasing the panel temperature. The efficiency conversion has recorded to be 50% and 52% at two mass flow rates. Water flow rate increased the heat transfer through cover glass which led increasing the efficiency. Finally, ACS for PVS can improve the efficiency by about 12% as an average value. At high temperature environment, cooling system should be employed to get better PVS performance and reducing the payback period.

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Multiple transceivers based wimax mesh network to optimize routing algorithm

Bashar J. Hamza1, Thanaa Hasan Yousif2

Abstract. The Base Station (BS) is a WiMAX (Worldwide Interoperability for Microwave Access) centralized scheduling mesh topology decision maker for scheduling the whole network including allocation of packets between the Subscribers (SSs) in the network through the BS. Hence, the system, which, by interference, especially affects the nodes, close to BS. A network routing algorithm was built for mesh topology named Energy Bit Minimum Routing (EBMR), which is used to optimize the chosen path. all nodes were fitted with a multi-channel and four scenarios were planned: the first scenario is called the Multi-Transceiver fitted both SSs with a multi-transceiver except at the brink without cap the number of parent nodes. Whereas the second scenario was called Closest Multi-Transceiver system no ceiling on the number of parent nodes, in this scenario only the nearest BS is fitted with multi-transceiver SSs. The third scenario used the Multi-Transceiver system but with cap the number of parent nodes by 30% for whole nodes network. The fourth scenario used the closest Multi-Transceiver system but with cap, the number of parent nodes by 30%, for whole nodes network. In scenarios, the system content considers 120 users as maximum. It will improve the network capacity, throughput, channel scheduling range and channel utilization ratio (CUR). WiMAX mesh topology is used to centralize scheduling and improve the performance system by finding the best route to centralizing the mesh network EBMR; consequently, it increases latency, CUR and distance scheduling, avoiding messing, otherwise. Multi-transceiver network is used to

prevent primary interference and multi-channel network used to stop secondary interference. This paper develops two styles of network: the multi-transceiver multi-channel network and the closest multi-transceiver multi-channel device that uses the Time Division Multiple Access (TDMA) algorithm for EBMR-CS3,4 (Energy Bit Minimization Routing and centralized Scheduling). This algorithm is optimizing network efficiency by having higher throughput by preventing interaction with adjacent nodes and the scheduling duration and growing the device's channel utilization ratio (CUR).

Keyword: WiMAX, Routing, and Mesh topology

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The dielectricpropertiesof (PVA-PVP-CdS)Nanocomposites for gamma shielding Application

Araa Hassan Hadi1, Majeed Ali Habeeb2

Abstract. NanocompositesMethod prepared by casting with variousPreventatives' of cadmium sulfide (0,1,2,3, and4) wt%. Dielectric constant increases with increasing frequency and filler concentration . dielectric loss decreases as frequencyincreases, whereas it increases as Cadmium Sulfide concentration increases. The electrical A.C conductance of (PVA- PVP- CdS) Increased composites as the filler and TheFrequency are increased . Electron Scanning microscopy shows morphological The surface of (PVA-PVP- CdS)Numerous composites films or pieces allocated random distribution of particles on the top surface, homogeneous and coherent. in (PVA-PVP) blend and with different wt.% of Cadmium sulfide films have good linear attenuation coefficients for gamma-ray radiation.

Keyword: cadmium sulfide nanoparticles, dielectric properties, gamma shielding..

Performance Comparison of Reactive Power Control Methods of Photovoltaic Micro-inverter

Farah T. Noori1,2*, Turki K. Hassan 1

Abstract. Photovoltaic power generation becomes an important technology in recent year, because of its advantages such as clean energy, pollution reduction, no gas emissions, maintenance and operation requirements are low. So it is a new path for generating electric power. This paper will study the performance comparison of two photovoltaic systems of three-phase grid-connected

micro-inverter and study their design methods of reactive power control. The first design is suggested that the photovoltaic PV system based on an interleaved DC-DC boost type converter with its maximum power point tracking control (MPPT) for each boost converter. A voltage source inverter type (VSI) is used as a three-phase micro-inverter. By controlling the direct and quadrature components of inverter output currents, reactive power controlling is achieved at 90.76% efficiency. The second design is suggested that the photovoltaic panel is connected DC-DC converter of an interleaved flyback type. Each sub-converter is controlled by an individual (MPPT). The circuit of active third-harmonic current injection in recent years have received much interest, this technique contributed to get better quality of current injected into the utility grid and to control the reactive power with good efficiency 95.07%. A line-commutate current source inverter type (CSI) with filter is used. The developed micro-inverter of (1000W) offers an expanded range of reactive power control with balanced three-phase output power. Each system design in this study has proven its effectiveness in obtaining control of reactive power and nearly sinusoidal three-phase output currents. The effectiveness of the suggested systems are clarified by using the MATLAB Simulink program and the results of the simulation show the validity of the suggested micro-inverter system.

Keyword: Photovoltaic micro-inverter; Boost converter; Flyback converter; Third-harmonic injection; Reactive power control

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Mixed convection heat transfer in multi-Lid- driven trapezoidal annulus filled with hybrid nanofluid

Israa Alesbe1 , Sahira Hasan Ibrahim1 , Sattar Aljabair1,*

Abstract. Numerical study of mixed convection heat transfer in multi-Lid driven concentric trapezoidal annulus filled with H2O-Cu-Al2O3 hybrid nanofluid has been investigated. Three cases for multi-Lid driven have been studied: single lid-driven, double lid-driven move in the same direction, double lid-driven move in the opposite direction. The lid-driven walls move with a constant speed with constant cold temperature TC and the other inclined walls are insulated while the inner trapezoidal cylinder heated at constant temperature Th. Finite volume method used to solve the continuity, momentum, and energy equations by SIMPLE algorithm. The results validated by comparing with previous study with a good agreement of accuracy. The working fluids was: water with hybrid nanoparticles (volume fraction φ=0 to 10%). The Richardson numbers changed from 0.01 to 10, to cover all convection heat transfer modes, and aspect ratios were 0.5 and 1. The results show that, the opposing flow produced highest maximum stream function. Moreover, in aiding flow (case 2) produced a heat transfer coefficient on the top and bottom walls of outer cylinder higher than that produced by the opposing flow (case 3). Generally, the skin friction

increases with increase in the volume fraction of nanoparticles due to increasing the viscosity of fluid causes increase in shear stress and leads to increasing the pressure drop. Additionally, the aiding flow produced fiction factor higher than the opposing flow.

Keyword: Mixed convection, Heat transfer, Lid-driven, Trapezoidal cavity, Hybrid Nanofluid.

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Using Recycled Coarse Aggregate in Reinforced Concrete Beams Strengthened for Shear by GFRP bars Using NSM Technique

H M Issa1*, M M Jomaah2 and I A Al-Shaarbaf3

Abstract The NSM technique began to apply as a modern technique to treat defects in structural elements and to increase the shear and flexural strength of structural elements. For this technique to be effective, a series of practical experiments were conducted to characterize the behavior of the element strengthened by the NSM technique for flexure and shear. Shear strengthening with GFRP rods is the focus of this paper for concrete beams that contain 30% coarse aggregate replacement ratio of thermstone (volumetric ratio) obtained from the rubble of demolished buildings. A total of 7 beams were loaded under four-point load test, the parameters examined were the angle of inclination and the distance between the GFRP bars, the presence and absence of stirrups and the thermstone aggregate replacement ratio. The characterization of the tested beams includes failure mode, load-deflection curves, load-strain curves of stirrups, rebars and GFRP rods and the surface concrete strain in the shear zone of beam. The results showed that the use of GFRP rods to strengthen concrete beams was effective, especially in the presence of stirrups, where the gain in shear strength was 29.6% and 22.2% when the distance between the GFRP bars was (200 and 300) mm, respectively with the presence of stirrups. While the gain in shear was just (3.7% and 11.1%) in the absence of stirrups, when the distance between the GFRP bars was (200 and 300) mm, respectively.

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Mixed convection heat transfer in multi-Lid- driven trapezoidal annulus filled with hybrid nanofluid

Israa Alesbe1 , Sahira Hasan Ibrahim1 , Sattar Aljabair1,*

Abstract. Numerical study of mixed convection heat transfer in multi-Lid driven concentric trapezoidal annulus filled with H2O-Cu-Al2O3 hybrid nanofluid has been investigated. Three cases

for multi-Lid driven have been studied: single lid-driven, double lid-driven move in the same direction, double lid-driven move in the opposite direction. The lid-driven walls move with a constant speed with constant cold temperature TC and the other inclined walls are insulated while the inner trapezoidal cylinder heated at constant temperature Th. Finite volume method used to solve the continuity, momentum, and energy equations by SIMPLE algorithm. The results validated by comparing with previous study with a good agreement of accuracy. The working fluids was: water with hybrid nanoparticles (volume fraction φ=0 to 10%). The Richardson numbers changed from 0.01 to 10, to cover all convection heat transfer modes, and aspect ratios were 0.5 and 1. The results show that, the opposing flow produced highest maximum stream function. Moreover, in aiding flow (case 2) produced a heat transfer coefficient on the top and bottom walls of outer cylinder higher than that produced by the opposing flow (case 3). Generally, the skin friction increases with increase in the volume fraction of nanoparticles due to increasing the viscosity of fluid causes increase in shear stress and leads to increasing the pressure drop. Additionally, the aiding flow produced fiction factor higher than the opposing flow.

Keyword: Mixed convection, Heat transfer, Lid-driven, Trapezoidal cavity, Hybrid Nanofluid.

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The breaking point of Kirkuk's drinking water

Estabraq Ali Hmeed1 Rodhan Abdullah Salih2*

Abstract. The break point occurs when sterilizing raw water by chlorination. The formation of free residual chlorine, in addition to the triple relationship between total added chlorine, combined residual chlorine and free residual chlorine were studied. The three stages of the sterilization process were evaluated and studied, which is the first stage in which the oxidation of iron, manganese, nitrates, and sulfates occurs, and the second stage, which is the reaction of the added chlorine with the existing ammonia to form monochloramines, dichloramines, trichloramines and then nitrogen, as well as the emergence of halogenated carcinogens and finally the stage beyond the breaking point is the formation of free residual chlorine. The acidic function and its relationship with the residual free chlorine were studied and how to calculate the expected formation of carcinogens of trichloromethane. Treatment and removal of diffraction obtained in some assessments by two methods of absorption using activated carbon and enhanced coagulation using aluminum chloride polymer PACL. SPSS statistical program was used for the purpose of conducting statistical analysis between TOC after coagulation & Turbidity after coagulation and found a positive correlation significantly(R=0.767).

Keyword: breaking point, drinking water.

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The effect of different number of layers and fiber distribution on the performance of composite laminates

ajjm Abdalla Mulaan 1*, Amjed Saleh Mahmood 2 Suleyman Basturk 3

Abstract. Fiber-reinforced composites are widely used in world industries such as transportation vehicles, sports tools, space crafts, and more. This research investigates the influence of the number of layers and fiber distribution on the mechanical properties of woven fiber-reinforced composites by changing the number of layers or the manufacturing process. Hand lay-up and infusion processes are used to manufacture the composite plates. Three mechanical tests are conducted for all composite plates, such as Interlaminar shear stress (ILSS), ultimate tensile strength (UTS), and ultimate flexural strength (UFS). Furthermore, analyzing the microstructure of the laminates is conducted to evaluate fractal dimension (FD). It is observed that the distribution of the fibers measured by FD had an effective role in improving the mechanical properties. Also, the use of vacuum molds had an additional role in improving the mechanical properties. One could conclude that all the mechanical properties have proportional relationships with FD.

Keyword: composites, glass fiber, polymers matrix composite, woven fiberglass..

Numerical Study on Nonlinear Behavior of RC Continuous Deep Beams

Ahmed Bashar M.Sabre*, Prof. Bayar J. Al-Sulayfani,

Abstract. The aim of the study is to demonstrate the extent of the effect that occurs to continuous reinforced deep beams when performing a parametric study in terms of support settlement and different support conditions for dual span continuous deep beams (CDBs), in terms of failure load and failure mode, using the ANSYS 2020 nonlinear finite element program. As the parametric study relied on the laboratory study conducted by Yang et al. [8]. Six samples were taken from continuous reinforced concrete beams with two spans with the extension of the shear to the depth ratios (0.5, 1). This was done to ensure that the form was handled appropriately. The pre-owned model to research the behavior of deep RC girders under static support conditions with different beam heights. Whereas, it was observed that there is a marked variation in the value of the failure load under the influence of different support conditions and the support settlement that occurs in them. This inspection is characterized by real, conceivable results of support conditions and support settlement in presenting two span continuous reinforced concrete deep beams.

Keyword: continuous deep beams, finite element modeling, different support conditions, support settlement.

Growth Of ZnO Nanostructured Thin Films By Non Conventional Sol-Gel Method And The Effect Of Annealing Temperature On Its Properties

Rawnak A. Kadhim1, Abdulhaleem A. K Mohammed 2, Halah M. Hussein 3

Abstract. The present work demonstrates the growth of Zinc oxide (ZnO) thin films from its powder precursor by using non-conventional sol-gel technique. The structural, morphological and optical properties of obtained thin films were studied under different annealing temperatures. X-ray diffraction (XRD) analysis confirmed hexagonal wurtzite structures for both annealed and pristine thin films. The crystallite size was found between 14 and 16 nm. Field Emission Scanning Electron Microscope (FESEM) images showed that the films have approximately uniform morphologies, consisting in several flower-like aggregates with nanosized multi petals. From the optical properties it was found that with the increase in the annealing temperature there is an increase in the absorption coefficient in the visible wavelength range. It was also noticed that the increase in annealing temperature caused a decrease in bandgap (Eg) and increase in Extinction coefficient. Urbach energy decreased with the increase annealing temperature up to 250°C, afterwards the Urbach energy increased with the increase in the annealing temperature. The causes for these observations are discussed.

Keyword: ZnO, Sol gel, Thin films, Energy band gap, Absorption coefficient, Urbach energy

A Pre-authorization Algorithm for WiMAX Network to Reduce Handover Signaling

Huda H Saheb1, Bashar J Hamza2 and Ahmed F AL-Baghdadi3

Abstract. IEEE 802.16e is a platform capable of meeting those standards in modern wireless networks that demand broad bandwidth and high-speed mobility. One of the most significant problems with IEEE 802.16e is that although the handover technology provides smooth high volume data services at a high speed scale , it only specifies a mechanism without including precise methods or algorithms for handover that can be delegated. Another issue is handover signaling during the re-entry process when a mobile station requests access to the next possible base station. This paper proposes PAA (Pre-Authorization Algorithm) which accepts incoming requests quickly because it

already has the incoming request's information saved. PAA reduces call dropping for high speed users at the edge of cell and mitigates the ping-pong effect. Finally MATLAB was used to present the results that shows reducing in signaling time.

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Microstructure and Properties of Shape Memory NiTi Alloy

Dr.Jassim M.Salman Al-Murshdy 1*, Nareeman Yaseen Ali 22

Abstract. Many years ago, the shape memory alloys properties of Nickel Titanium (NiTi) were first discovered in the early 1960s, as shape memory alloys had many applied applications, in which oxidization problems were not of concern for the most part. However, over the past decades, NiTi alloys have been increasingly considered in external and internal biomedical devices, for example cardiac stent wires, orthodontics, vascular and bone fractures, fixing plates and screws, self-expanding urinary tracts.. The aim of the research is to study the effect of the elements mobidium and zirconium on the shape memory alloys. When adding small amounts of zirconium leads to a smoothing of the granular size, when adding Mobidium improves the hardening process . The alloy was prepared from primary powders of nickel and titanium, using metallic powder technology, under pressure of 800 MPa. Then the sintering method was carried out in a 4-10 tor vacuum at 950 ° C. The results upon XRD analysis revealed that NiTi were completely changed into NiTi (both cubic and mono phases) and Ni3Ti phase. The samples are ground in a dry atmosphere and the samples are polished after sintering .Optical microscopy, x-ray diffraction techniques. hardness test was conducted using Vickers hardness machine. It was observed that as the Zr content is increased, the hardness values, in VPN, increased. For instance, equi at 30% of Ni Ti had a hardness of 127.05 which increased significantly as Zr content was increased to 20 at %. This is mainly observed due to precipitation hardening which occurs due to the presence of multiple phase in alloy D . Increase in hardness also suggests that the workability . It was observed that as the Mo content is increased, the hardness values, in VPN, increased. For instance, Ni Ti had a hardness of 127.05 which increased was increased to 40at%. This is mainly observed due to precipitation hardening which occurs due to the presence of multiple phase in alloy G . Due to molybdenum, Optical microscopy reveals surface characteristics such as open pores and grain borders, as well as the distinction between the phases NiTi and Ni3Ti.

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Impact of Substrate Temperatures On the Properties of V2O5 Thin Films Deposited by Pulsed Laser Deposition

Mansour S. Farhan1, Haider TH. Salim ALRikabi 2, and Faisal Theyab Abed3

Abstract. Vanadium pentoxide (V2O5) thin films were fabricated by pulsed laser deposition (PLD) on fused silica substrate at temperatures (Ts) ranged from ambient temperature up to 300oC. UV-VIS-NIR spectral measurements, X-ray diffraction (XRD) X-ray photoelectron spectroscopy (XPS), and scanning electron microscopy (SEM) were made to understand the influence of substrate temperature on optical, structural, and compositional properties. The substrate temperature displayed a robust effect on the construction and visual characteristics. The photosensitive band gap of PLD V2O5 films was powerfully dependent on the substrate temperature and was reduced from 2.36 eV to 2.08 eV with the growth of substrate temperature from ambient temperature to 300oC. However, the refractive index showed an increase from 2.28 to 2.69 for the same temperature range. V2O5 films grown at Ts = 300oC exhibited a crystalline nature as evidenced by XRD and SEM studies. The chemical composition of V2O5 films has been studied by XPS and the data revealed pure V2O5 compound was formed.

Keyword: Vanadium oxide pulsed laser deposition, substrate temperatures, grain size, structure, compositional and optical properties

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The Heat Transfer from Fined Perforated Pipe Improved due to Nano-Fluid

Ali Sami Sallal 1 ,2*, Ghassan F. Smaisim (2). S.M. Thahab (3)

Abstract. In this research, experimental and numerical investigates were conducted on the effect of adding Nano fluid (α-AL2O3, γ- AL2O3, CuO) with different concentrations (1 %, 3%, and 5%) on the thermal properties of water. The heat exchanger system was designed with fin types with different holes (circular, triangular, elliptical and without holes). Thermal properties such as thermal conductivity, viscosity, specific heat, heat transfer coefficient, Nusselt number, Reynolds number have been studied experimentally and numerically. The results showed that the thermal properties increase with increasing the concentrations of nanomaterials and the Nusselt number increases with the increase of Reynolds number, and that the best type of fin is the fins with triangular holes. Copper oxide is the best at concentration (5%).Numerical simulation carried out on present heat exchange using consul computational fluid dynamic (CFD) the comparison between experimental and numerical results showed good.

Keyword: Nanofluid, finned tubes, AL2O3, CuO

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Influence of GFRP Vertical Stirrups Using NSM Technique on Shear Behavior of Reinforced Concrete Beams with Recycled Coarse Aggregate

H M Issa1*, I A S Al-shaarbaf2 and M M Jomaah3

Abstract. Shear strengthening with GFRP rods is the focus of this paper on concrete beams that contain aggregate replacement ratios of thermstone and bonza (pumice materials), obtained from the rubble of demolished buildings. A total of nine beams (2400×160×300mm dimensions) were loaded under a four-point bending load test. The parameters examined in this research were the replacement ratio of lightweight coarse aggregate (20% and 30% volumetric ratio), type of lightweight aggregate replaced by (thermstone or bonza) and strengthened in shear by GFRP rods using NSM technique. The characterization of the tested beams includes ultimate load, failure mode, load-deflection curve, load strain curves of stirrups, bottom longitudinal rebars, GFRP rods at the shear zone of concrete. The results showed that the use of GFRP rods to strengthen concrete beams was effective. As the failure mode was transformed from a shear failure in the reference beam that was cast using normal concrete to a concrete compression failure in the beams which was occurred when using suitable and sufficient amount of strengthening by GFRP rods for selected used lightweight aggregate replacement ratios.

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Effect of Calcinations Temperature on ZnO:Co Nanostructured Thin Films Prepared By Sol – Gel Method.

Dr. Shaima'a J.Kareem1,Dr. Elham Abd Al-Majeed1,Afnan Salam1

Abstract. Nanostructured ZnO thin films were developed on medical-glass substrates using a sol gel dip coating process and calcinated at various temperatures (350, 450, and 550 C^{o}). The impact of Co doping and effect temperature calcination on the structural, optical and electrical properties of ZnO:Co nanostructured thin films were investigated using XRD, SEM, Hall effect, and UV-Visible spectra measurements. Both nanostructured films have hexagonal-wurtzite crystals composition according to XRD analysis with the average crystallite sizes of ZnO:Co nanostructured thin films are of (26.7-102.1) nm. The FESEM findings show that the undoped ZnO thin film has the smoothest and more regular surface compared to the doped ZnO films, indicating that both films with nanoscale ZnO particles. The average transmittance of all films is about 69–91 % in the visible range and the band gap energy decreased from 3.283 to 3.205 eV with increase of temperature calcination. The Hall impact indicates that all thin films are n-type and the electrical conductivity increase from (12.4-16.2) in the ZnO:Co thin films . This one of the outstanding property of ZnO

thin films, both undoped and doped with cobalt, enables the fabrication of transparent electrodes for flat panel displays, metal-insulator-semiconductor diodes, and solar cells.

Keyword: Nanofluid, finned tubes, AL2O3, CuO

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A modern technique to manage energy profile in Iraq: virtual power plant (VPP)

A A Kalaf1,2, O Sh Alyozbaky2, A I Alghannam2

Abstract A virtual power plant (VPP) comprises decentralized generation integrated with energy storage and intermittent loads. Such a plant is an independently-controlled single production unit for the electrical grid and market. Frequency changes and power supply interruption are among the several scenarios that lead to peak grid loading. Considering the material and financial challenges, it is necessary to determine an optimal resource scheduling solution; VPP can address these challenges. This study evaluated two different domestic-sector situations in Iraq. MATLAB Simulink was used to simulate a VPP test system comprising loads, energy storage technology, and distributed generation. An analysis of the economic aspects concerning the network and involved resources was performed. The outcomes indicated that home electricity bills reduced by up to 50%. Simulations suggest that using VPP is beneficial as against distribution generators (DG) systems relying solely on intermittent renewable power generation.

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Improvement of corrosion resistance and dimensional change of the high copper dental amalgam by Al2O3 additions.

Dr. Haydar H. J.1, Jamal Al-Deen1, Malik Abdul-husien1

Abstract the main goal of this present investigation is to study the effect of the (Al2O3) addition on corrosion resistance and dimensional change of the high copper dental amalgam. One alloy has been prepared via casting composed of silver (47%), tin (30%), copper (22%), and zinc (1%). (Al2O3) addition is added in distinct percentages of the (0.5, 1, 1.5, 2) wt.%. Specimens were prepared according to ADA specification No. 1. The specimens have been stored at 37±1 Cº using a chamber prepared for this purpose. corrosion resistance improved with addition from 0.5% to 2% (Al2O3) and observed that dimensional change of amalgam improved after (Al2O3) additions.

a single-branch impedance compression network (icn) optimized by particle swarm optimization algorithm for rf energy harvesting system

Sarah Aliwi , Nasr Al-Khafaji and Hayder Al-Battat1

Abstract Most previous works regarding the impedance compression network ICNs reported in the literature consist of dual branches to carry out the compression functionalities. Although this type of circuits are efficient, they are complex and have large sizes. This work proposes a complex impedance compression network with only a single branch for wireless power transfer (WPT) circuits, operating at 2.4GHz under a wide input power range and a variable load. The design size is about 4x4.2mm2 which thereby, produces a simple, and small design. The simulation results demonstrate that the improvement in efficiency is by 10%, as compared to a design without ICN. The improvement can increased by utilizing the particle swarm optimization PSO algorithm where the best dimensions of the ICN components will be selected relying on the suitable fitness function in the PSO algorithm to the given desired goals. The impedance matching is also enhanced in which it stands behind the conversion efficiency increment. The circuit size is very slightly increased and it becomes 4.2x4.3mm2. The final design has a conversion efficiency about 76%, with more than 15% improvement to a design with only a matching circuit or without using the automation techniques. Eventually, results show that the enhancement is obtained not only the designated input power but also along a range of the input power.

Effect of reinforcing materials on mechanical properties of composite material using Taguchi method

Anmar Abdulazeez Owaid1 Hakan Kaygusuz2 Farag Mahel Mohammed3

Abstract The mechanical properties play an important role in the selection of suitable material in the manufacturing of boats. In this paper, the effect of glass fiber orientations and the fillers weight fraction on the mechanical properties of un saturated polyester composite material were studied. The glass fibers were used with (0/0, 0/90, 45/45) angles. The carbon filler used with (2.5%, 5%, 7.5%), while the aluminium oxide nano be used with (0%, 1%, 3%) weight fraction respectively. The standard Taguchi's array L9 (33) was used. The signal to noise ratio and analysis of variance were introduced to analyze and estimate the optimal combination parameters. The results show that the mechanical properties improved with using the reinforcements. The glass fibers orientations angle presents the most parameter effect than the other parameters on the modulus of elasticity,

tensile strength and impact strength with a contribution of 81.8%, 83.39% and 96.75% respectively. Followed by carbon and aluminium oxide nano. The optimum parameter with their levels for the highest modulus of elasticity was obtained at (0/90 fiber orientation, 5% carbon and 0% nano aluminium oxide). While the highest tensile strength and impact strength present with using (0/0 fiber orientation and 5% carbon). The experimental and expected results are very close, with an error ratio not exceeding 5%..

Designing and Manufacturing of Home Automation Monitoring System Using Internet of Things Technology

Mustafa A Omran1, Wasan K Saad2, Bashar J Hamza3 and Ahmed F Al- Baghdadi4

Abstract Home Automation System (HAS) has seen an increase in popularity as developments in connectivity and information technology. A Smart Home (SH) is a form of advanced applications for the Internet of Things (IoT) that allows users to track and manage their electronic devices through the internet. This paper describes an affordable, secure, WiFi- based smart home or home automation system, that enables the monitoring of home devices by homeowners at local and remote locations. The Arduino Mega 2560 and Raspberry Pi 3 Model B+ were used to configuring the server automation framework. Further, various sensors were used to observe current, voltages, humidity, temperature, movement, flame, smoke, gas, doors and other household conditions. The proposed automation system can monitor home conditions via the Blynk IoT Platform for both Android or IOS.

A review of Wire Arc Additive Manufacturing (WAAM) of Aluminium Composite, Process, Classification, Advantages, Challenges, and Application

Noor Hmoud Athaib1, Ali Hubi Haleem1 and Basem Al-Zubaidy1

Abstract Wire-arc additive manufacturing (WAAM) is a common metal 3D printing technique that offers several benefits, including the high rate of deposition, cheap price, and efficacy for complex parts. Even though (WAAM) has demonstrated its ability to meet the demands of manufacture components on medium-to-large size made of (Al) for the automotive and other related industries, WAAM cannot currently use as a complete production procedure due to practical issues such as mechanical properties that aren't matched and the presence of significant residual stresses. the AM

technologies offer promising new benefits with the MMCs as a solution for some challenges. This article reviews the MMCs Mixing technique and their critical issues, AM classification, WAAM process with advantages and challenges. also reviews WAAM of some AMCs with different reinforcements and power sources. The results of the study of the influence of reinforcement particles on the structure showed that they were changed grains structure from the columnar dendrite to equiaxial dendrites after the solidification and improves hardness.

Short Review on Reinforced Concrete Beam - Column Joint : Earthquake Response and Rehabilitation Techniques

Zinah Waleed Abbas1, Hussam Raad Shakir2 and Laith A. Al Jaberi3

Abstract It is highly recognized throughout the entire literature that there are many serious attempts to investigate the structural behavior of Reinforced concrete (RC) beam column joint. These studies tried to cover many key elements that usually govern the intended behavior of such structural element. It can be also from any simple survey during that literature that the reported failures in the past confirm the fact that the used design methods did not play the required role in providing good safe design. The most classic trend in strengthening the reinforced concrete joints was the addition of transversal bars. However, there are agreements throughout the recent contributions that increasing the level of reinforcement illustrated and optimum value and the extra addition may give negative results. In contrast, many alternative rehabilitation techniques were examined in the past such as Slurry Infiltrated Fiber Reinforced Concrete (SIFCON) blocks and Fiber Reinforced Polymer (FRP) sheets which gave good results regarding mechanical strength, stiffness and ductility behavior. The current study tries to present an overview with respect to past research programs that deals with such concern of science.

Keyword: Beam Column Joints, Shear reinforcement , SIFCON , steel Fiber Reinforcement

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Corrosion behavior of aluminum alloys 2024 and 6061 in rainwater

***Saraa M. Mohammed 1 Sahib M. Mahdi2**

Abstract In the present work the corrosion behavior of both aircraft aluminum alloy 2024 and 6061 were studied by cyclic polarization test in Rainwater, before and after heat treatment at room temperature (25 oC). The corrosion resistance of both alloys decreases after these alloys were

solution treatment at a temperature of 495 oC for 2hr for AA2024 alloy and artificial aging at temperature (150, 200, 250, and 300 oC) for 1 and 2 hours this decreasing was from 1.767× 10-3 to 1.031× 10-3 mm/y, and for solution treatment at a temperature of 530 oC for 2hr for AA6061 alloy and artificial aging at temperature (150, 200, 250 and 300 oC) for 1 and 2 hours this decreasing 6.279× 10-3 to 1.204× 10-3 mm/y.

Keyword: aircraft aluminum alloy; solution treatment, cyclic polarization curve, corrosion resistance.

Coating Process on Inconel Super alloy Substrates: A Review

Ahlam Hamid Jasim *1, Abdul Raheem K.Abid-Ali 2 & Farzad Mahboubi 3

Abstract This study reviews a variety of coating types, which include, alloys, nickel, palladium, nickel alloys and composite coatings, on the super-alloy substrates with the use if the Slurry Coating- approach. Attempts have been performed for representing a general view of the conditions of plating and highlighting the significance of the layer concerning the efficiency of the high-temperature coatings that are applied on the super alloys that are utilized extensively on the components of the gas-turbine.

Induction Surface Hardening: a review

Mokhalad F. Aswad1* , Aseel J. Mohammed , Sahar R. Faraj

Abstract One of the methods of surface hardening the majority extensively used surface hardening procedure which can be used in many metals in their entirety in today's applications. Induction coil is concentrated to the localized area where the necessary piece is hardened of the material. A high inductance coil is used to heat the surface of steel into the austenitic region. High heat transformation rates result in instant quenching by oil, resulting in a steep temperature gradient. This method necessitates external quenching because it induces phase conversion from austenite to martensite. This review paper ensures an overview of the principles of induction surface hardening, as well as some of its advantages over traditional hardening techniques. The results of experiments and computational approaches reported by different researchers are discussed.

Keyword: Surface Hardening, Induction Surface Hardening, Heat treatment, Micro hardens, Microstructure.

High-Frequency Transformer Design with Hollow Core for Solid State Transformer

Haitham A Obaid 1*and Yasir M Y Ameen2

Abstract Solid-state transformer (SST) is one of the new technologies that has kept pace with the development of renewable energy sources such as the solar energy and wind turbines. The SST consists of a high-frequency (HF) transformer and power electronic converter at both ends of the HF transformer. Despite the high efficiency of the traditional transformers, is they are quite large in size and also very heavy. In order to reduce the size and weight of the transformers, SST is used as an alternative for the conventional transformer which also brings along other advantages. The type of core material, the type of wire used, and the method of winding the coils on the HF transformer core affects the core losses, copper losses, the cost, efficiency, and power density of the HF transformer. In this paper a new method has been proposed to form the core of the HF transformer used in SST where a hollow core is used, thus reducing the size and weight of the HF transformer along with the reduction in the core loss. The proposed core is designed using ANSYS Maxwell 3D software in addition to calculating the inductance matrix and the coupling coefficient. Finally, the proposed model of a high-frequency transformer was simulated using MATLAB Simulink software.

Keyword: Solid state transformer, Renewable energy sources, High frequency transformer, Power electronic converter, Hollow core, ANSYS Maxwell

Experimental investigation of base oil properties containing modified TiO_2/CuO nanoparticles additives

Mustafa Raad Fahad, * [1]). Prof Dr.Basma Abbas Abdulmajeed, [2])

Abstract The majority of lubricating oil properties are the product of a material being used to enhance or produce the desired properties. Different materials with various nanostructures are now being used as new additives to improve lubricants' properties due to their peculiar characteristics. In this study, oleic acid was used to surface-modified TiO_2 and CuO nanoparticles to enhance the dispersion and stability of Nanofluid. The X-ray diffraction and Fourier transform Infrared spectroscopy FT-IR used to characterize the nanoparticles. The main objective of this paper was to investigate the influence of adding TiO_2-CuO nanoparticles on the thermal-physical properties such as kinematic viscosity, viscosity index, pour point and flash point of base oil and nano-lubricating

oil, which is prepared by different concentration (0, 0.2, 0.5, 0.8, and 1 %) by weight, and also the contact pressure (load–carrying capacity) was examined by using commercial portable Timken tester. The results showed increases in viscosity index and flash point of nano-lubricant oil by 7.69% and 7.07%, respectively.

Keyword: base oil, TiO_2-CuO NPs, viscosity, surface modification, FTIR

Technological strategies for recycling concrete block in Iraq

Israa Mohammad Al-Saffar [1], Osamah Abdulmunem Al-Tameemi [2]

Abstract Many concrete recycling strategies have emerged and many studies were devoted so as to find the best alternative to recycle concrete waste in order to produce recycled concrete aggregates (RCA) with a quality that competes with natural aggregates which contribute to concrete mixtures and try to establish effective and practical treatment methods in applications of new concrete mixtures, where concrete is considered a building material. Concrete is considered as one of the basic materials in architecture because of its durability and strength and contributes to the worldwide constructional movement and proved its robustness, durability and flexibility in architectural applications as it is considered one of the most widespread material and in the meantime forms a burden impact on the environment at the end of its function in the structures, so it was necessary to employ technological strategies in order to face this dilemma that began to deteriorate our environment.

Therefore, the research problem is determined as the need to clarify the concept of concrete recycling and concrete waste recycling in Iraq, due to lack of local knowledge, to produce recycled concrete aggregate, applicable in the fields of architecture and can be used in new concrete mixtures.

The aim of this research is to provide knowledge on different methods of recycling concrete from construction and demolition waste (C&DW) and the possibility of reusing its components in new concrete mixes, and to raise a debate about the reality of concrete waste in Iraq and the recycling concrete technology and suggest the most effective technological strategy to solve the Iraqi concrete waste crisis.

Keyword: Technological strategies, methods of recycling concrete, concrete waste in Iraq, architecture.

Air Purification and Water Generation Using A Compression Refrigeration System

PH.D. Student. Mohammed Alsheekh 1 Prof. Dr. Saleh E. Najim Ass. Prof. Dr. Hussein S. Sultan 3

Abstract The prevention of coronavirus outbreaks requires cleaning and refreshing the closed environment where people live and operate. As a result, new environmental control methods must be developed. Also, water shortages represent an urgent problem, mainly countries that are island states and countries that have long coastlines which don't have sufficient water resources such as lakes and rivers. This paper is an experimental, theoretical and numerical study of air purification and water generation by air conditioning and refrigeration equipment. The unit is based on a standard compressive cooling cycle principle. The experimental device will be established and tested in Basra city, south of Iraq, during September and August from 2020. The experimental device was tested for different days with different climatic conditions. Theoretical data has been completed by the (EES) program and the Numerical study by (ANSYS 2020R2) to verify and study more cases in a short time with no cost. The maximum production rate is 45.7 L/Day with the system's performance factor of COP Max=4.0, Min=2.3, and Aver. =3.4. Therefore, the device can be used in coastal areas to meet water needs and provide a healthy environment.

Validation of a Three-parameters Hydrodynamic Model to Describe the non-ideal Flow in a Continuous Stirred Tank Reactor of the Electro-Fenton Oxidation of Organic Pollutants in Wastewater

Raghad S. Mahmood 1, and Ammar S. Abbas 2*

Abstract This research deals with the effect of the electrolyte flow behavior on electrochemical continuous stirred tank reactor performance. The reactor was simulated to remove organic pollutants from the wastewater and to determine the conditions for removal that will examine the effect of the electrolyte flow through the reactor. The flow behavior has been investigated using the pulse tracer technique at selected operating conditions. A model comprises three hydrodynamic parameters (bypass, active volume, and recirculation fractions) that have been used to analyze the residence time distribution. The modeling results indicate that with the increasing of the space-time, the bypass and the active volume fractions were decreasing, while the active volume of the reactor was decreasing. The obtained non-ideal space-time of the reactor using the hydrodynamic parameters and the relationship of the tracer concentration with time was much less than the ideal space-time, because of the great effect of bypassing fraction. Finally, the experimental results for the organic

removal were closeted to the results that simulated at non-ideal space-time. This comparison proving a significant impact of non-ideal flow on the reactor performance, and showing that the proposed model was well-describing the behavior of the electrolyte through the reactor.

Investigation the compression strength and thermal Properties of Composites Using Natural Additives with Epoxy

Hisham A. chlob (1)* Raad M. Fenjan (2)

Abstract The main objective of this work was to investigate the effect of natural additives with an animal and vegetable source in the form of (short fibers and particle) on the mechanical and thermal properties for epoxy. (wood dust ,date palm fiber , cow bones and sheep wool) were selected as natural additives with different weight ratios such as (%5,%15,%25) reinforcements for the epoxy matrix based composites, which were produced by the hand lay-up technique. mechanical test such compression strength and thermal properties such thermal conductivity were carried out according to ASTM standards to characterized these composites. It was found that the mechanical and thermal properties can be increased or decreased depending on the type of material additives, its origin, as well as the weight percentage used.

Keyword: Epoxy , Natural Composites , Compression strength , Thermal conductivity ,Wood Dust , Date Palm Fiber , Cow Bones and Sheep Wool .

Evaluation the microstructure , physical, magnetic and electrical properties of Al / Fe3O4 + Ni hybrid nanocomposite

Saad Hameed Al-Shafaie1, Nabaa S Radhi2 and Massoud Aziz Hussein3

Abstrac A functionally graded material is a high-performance engineering material that can withstand extreme working conditions without losing its properties or failing during operation. The design, fabrication, and characterization of Al-Ni integrated into single functionally graded materials are presented in this study. FGM (Al-Ni) have been successfully fabricated using the powder metallurgy process. FGMs samples are made up of five layers, starting with Al on one side and ending with Ni on the other. The FGM (Al-Ni) samples used in this research were made up of the following percentages: (100 Al, 25 Ni-75Al, 50Ni-50Al, 75Ni-25Al, and 100Ni) wt%. The samples were pressed with a load of 800 MPa and sintered at temperature 600°C for 3 hours. In this

research we applied the wear test and X-ray analysis of FGM (Al-Ni) samples where the intermetallic phases that formed were (AlNi3, Al0.9Ni1.1, Ni5Al3, Al3Ni2, Al4Ni3, AlNi,), in addition to optical microscopy images.

Studying and Analysis of crash severity for different Expressways on Al-Rusafa side for Baghdad city using Binary Logistic Regression Model

Hasan Hamodi Joni1, Mustafa Husham Shallal2

Abstrac Nowadays, in Iraq, especially Baghdad, many accidents are recorded daily, and the occurrence is different in terms of severity (fatal, injury, property damage only) with different seasons, days and even times, as a result of the anxiety and great concern that these accidents pose on the part of drivers of these highways. Therefore, this study has become necessary to find out the causes which have direct interference with the accident impact on these roads. On the other hand, many researchers in the field of traffic engineering in Iraq didn't address the severity of accidents on highways. In addition, this study is the first to find out the main causes of accidents for the most important main and vital highways that are used on a daily basis by drivers on the Al- Rusafa side in Baghdad (Mohamed Al-Qasim Expressway, Army Canal expressway). Furthermore, the data utilized in this research consists of a sample size of (236) forms and it was collected from traffic officers for period 2006 to 2019. After analysis by using Logistic Regression Model, there are three variables closely linked to the severity of accidents on Mohamed Al-Qasim Expressway (cause of an accident like (wrong turn, loss of control, closing (safety distance), vehicle body type, speed). Also, and four variables on Army Canal Expressway (road condition, day, vehicle body type, speed) resulting from the Binary Logistic Regression model.

Keyword: Accident severity; Binary Logistic Regression Model; Mohamed Al-Qasim expressway; Army Canal expressway; Highway's accident.

A wideband Circular polarization cross printed dipole antenna with four quadrants parasitic

Mustafa Hasan1, Nasr AlKafaji2 and Hussam Al-anssary3

Abstract The cross printed dipoles antenna is the best solution to generate wide band circular polarization, in this design prepared cross rectangular printed dipoles (antenna1) then added four inner quadrants parasitic (antenna2) with perfect arrangement and excellent dimensions. The quadrants, (inner parasitic) rotate sequentially round the crossed dipole, are used to persuade new

resonance and increase the activity bandwidth, additional improving the AR bandwidth. The results show that the antenna achieves an impedance bandwidth (IBW) of 88.38% (4.66-12.04 GHz) for |S11| < −10 dB and a wide axial ratio bandwidth (ARBW) of 55.80% (5.75-10.2 GHz). The proposed antenna would be utilized in C-band applications and for wireless local area network (WLAN) applications. The structures modelled and analysed by the Ansoft's HFSS simulation software.

Highway route selection using GIS and analytical hierarchy process case study Ramadi Heet rural highway

Yasmeen Mohammed Sameer1*, Adil N. Abed1*, Khamis Naba Sayl2*

Abstract An appropriate road network imposes on planners take into account factors such as land use, slope, soil type, hydrology, and agricultural area. Due to various considerations and desires, the planning process is difficult hence there may be confusion in interest in the decision-making process. The use of a geographic information system (GIS) and Multi-Criteria Decision Analysis (MCDA) assist planners in achieving more detailed and desirable results. Thus, reducing the complexity of the planning process and helping various stakeholders for drawing to general conclusion. The study site was chosen on an area between the cities of Ramadi and Heet in Anbar Province, western Iraq, where it suffers from congestion and traffic accidents. This research aims to integrate a set of evaluation criteria using the Analytical Hierarchy Process (AHP) and a spatial multicriteria model to find the optimal path in the study area. In this study, two alternate paths were proposed and compared with the current path to find the best path. Finally, the results indicated that the first alternative is 36% better. This research succeeded in proving that it is possible to decide a rural highway route between two cities using GIS and MCDA.

Keyword: spatial analysis; Highway route selection; GIS; MCD; AHP.

Studying of the effect of many parameters on a bulk liquid membrane and its opposition in Cd(II) removal from wastewater

Zainab Abdulmajeed Khalaf 1,a) and Asrar Abdullah Hassan2

Abstract Because of their tendency to accumulate in the body and their highly toxic potential, heavy metal pollution is becoming one of the main problems globally. The presented study

examined the likelihood of eliminating heavy metals by means of the Bulk Liquid Membrane (BLM) method, which is a tool of high importance in various applications of such type. BLM is a simple type of liquid membrane which is showing excellent membrane stability yet insignificant solute fluxes. Therefore, this study outlines the BLM's membrane resistance in removing heavy metals and recovery from the waste-waters. The cadmium (Cd) ions are fully prepared from the acidic aqueous solutions in this study with the use of the BLM. With regard to stirred transfer cell type, an experimental research has examined the recovery and extraction of Cd ions from synthetic wastewater solution via carrier Tri-butyl-phosphate TBP [C12H27O4P] with the use of BLM as an approach of separation. The impact of some parameters such as feed and stripping stirring speed, carrier concentration, membrane stirring speed, initial feed concentration, temperature, feed, and stripping phase pH is assessed for Cd removal. At pH 4 for feed, pH 10 for strip , 10 %(v/v) carrier concentration , 2 ppm initial concentration , 150 rpm,(S:F) = (1:1) in toluene, and the room temperature the maximal efficiency of extraction and stripping of cadmium (II) metal ions was 82 % and 93 %.

Keyword heavy metals, bulk liquid membrane, recovery, membrane resistance, removal.

Prototype filter design for filter bank multicarrier modulation

Mahmood Jasim Mohammed1, Abd al Kareem Ali Mohammed2

Abstract The use of the cyclic prefix in the orthogonal frequency division multiplexing (CP-OFDM) system recently it is the technique widely used method in many wireless communication systems, which depends on the use of the rectangular pulse shape for the transmission. However, the use of the rectangular pulse shape in the filter leads to appearance of many problems such as out of band emission and also the necessary need to use what is known as the cyclic prefix for the purpose of preventing interference, which leads to decrease the spectral efficiency due to the exploitation of part of the spectrum for the purpose of protection from interference. For the purpose of getting rid of these problems, the filter bank multicarrier (FBMC)system has been proposed who uses filters to construct the typical pulse that can be used in this system. The main idea in this system is how to choose the appropriate filter system for the FBMC/OQAM because this filter plays a fundamental role in the system. In this research, we will be focused on presenting a new prototype pulse shape that can be used in the fifth-generation networks(5G) of communications and also for the purpose of improving the performance of this system and overcoming the previously mentioned obstacles. During this research we will present two models to form the used pulse model, and then we compare these shapes with the most common pulse shape like (Rectangular, RC, PHYDYAS, Hermite).

Through this comparison, the efficiency of these pulses can be determined by studying several different parameters that have a direct impact on performance, such as (BER, SIR, PAPR).

Preparation and investigation of microstructure and wear properties of functionally graded materials of Aluminum-Nickel alloys

Saad Hameed Al-Shafaie1, Nabaa S Radhi2 and Massoud Aziz Hussein3

Abstract A functionally graded material is a high-performance engineering material that can withstand extreme working conditions without losing its properties or failing during operation. The design, fabrication, and characterization of Al-Ni integrated into single functionally graded materials are presented in this study. FGM (Al-Ni) have been successfully fabricated using the powder metallurgy process. FGMs samples are made up of five layers, starting with Al on one side and ending with Ni on the other. The FGM (Al-Ni) samples used in this research were made up of the following percentages: (100 Al, 25 Ni-75Al, 50Ni-50Al, 75Ni-25Al, and 100Ni) wt%. The samples were pressed with a load of 800 MPa and sintered at temperature 600°C for 3 hours. In this research we applied the wear test and X-ray analysis of FGM (Al-Ni) samples where the intermetallic phases that formed were (AlNi3, Al0.9Ni1.1, Ni5Al3, Al3Ni2, Al4Ni3, AlNi,), in addition to optical microscopy images

Surface modification of carbon steel by electrodeposit composite coating for improving erosion-corrosion resistance: a review

Dr. Ekbal M. S. Salih1* Dr. Haydar A.H. Al –juboori2* Nadheer R. A. Al-Hamdani3*

Abstract This paper included an explanation of one of the methods of protection from corrosion, as it dealt with the use of electroplating technology by using solid ceramic particles embedded in chromium on carbon steel as a base material as an effective way to increase the service life of fluid-carrying tubes, considering that they are exposed to a joint effect of chemical and physical action. The formation of composite coatings on carbon steel and the factors affecting the success of these coatings in addition to a group of studies that dealt with these factors and their impact on increasing the resistance to conditions surrounding the metal represented by resistance to chemical corrosion in the presence of erosion (such as the concentration of solid particles in the paint solution, the temperature of the paint solution, the effect of The current density on the quality of the coatings and the effect of the thermal treatment on the coatings). The current density, the concentration of solid

particles and the temperature have the greatest influence in determining the efficiency of the composite coatings.

Keyword: Cr-SiC composite coating; electrodeposition; Erosion-corrosion resistance

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Simulation study of biopolymer microspheres shape varying behavior

Roaa Mohammed Muneer*1, Prof. Nizar Jawad Hadi2, Prof. Ali Al-Zubiedy3

Abstract Simulation and modeling are very strong tools to design and simulate engineering cases that can be difficult to ably experimentally. In microscale domains, simulation and modeling play a very strong role to maintain results for specific cases that are hard to explain in microfluidic devices experimentally. Microfluidic devices were developed for mixing, separation, drug delivery, and microspheres formation. Drug delivery and microfluidic devices and modeling have a tight relationship that can solve and discuss the behavior of microspheres under variable formation process conditions. The main goal of this research is to discover the microspheres formation behavior under different flow rates. Experimentally, starch microspheres were formed with a different shape ranging from oval to spherical shape. This difference in shape was the main goal to study in this paper. To understand the shape changing, a numerical simulation study has been introduced using (ANSYS workbench 16.1) program, to simulate and study the microspheres formation process and the effect of flow rate varying on microspheres formation.

Keyword: Rheology, simulation, potato starch, microcapillary.

The effect of adding Ag nanoparticles on the electrical properties (A.C) of the PMMA-SPO-PS blend

Bahaa H Rabee1 and Rafal Haider 1,*

Abstract This paper investigates the Effect of Ag Nanoparticles on the PMMA-SPO-PS Blend, the samples of nano composition were prepared by adding Ag nano particles percentages of (1,3,5,7 mgm)wt % to the (SPO-PS-PMMA) blend, the thick films , It was the best blend when forgetting to mix (7mgm) silver nanoparticles were prepared by solvent with pure benzene at different time , The dielectric constant increases with increasing concentration and at frequency (from 100Hz to

3.E06Hz), and decreases with increasing frequency , the A.C electrical conductivity increases with increasing the frequency of applied electric field and concentrations of the (Ag) nanoparticles.

Keyword: NanoAg , Ethylene-alpha olefin , electrical Properties , A.C , Poly(methyl methacrylate) .

Design Parameters for Equal-Channel Angular Pressing (ECAP) Via Numerical Approach

Ayat Fadhil1, Saad Sami Alkhfaji1,3and Mustafa K. Ismael2

Abstract A numerical approach utilizes to investigate the optimal die design parameters of the ECAP technique. The Deformation behavior and strain distribution are affected by die geometry and processing parameters. were analyzed and evaluated. In addition, the influence of the inner channel angle (ICA) and the outer channel angle (OCA) on the behavior of plastic deformation during ECAP process also studied using a finite element technique. The numerical investigation implemented over a range of die angles (90°, 110°, and 135°) with inner corner radius (0, 3, 4, 5, and 8 mm) with their corresponding values considered for the outer corner radius (0, 10, 12,14,15 and 20 mm). The results obtained regarding the force required, maximum stress, maximum strain, and equivalent stress evaluated over a range for die inner angle radius and die outer angle radius. These results show that the size of the inner and outer curvature radii has a big effect on deformation homogeneity of the billet. had an influence on both the quantity and distribution of effective strain. With the increment of inner and outer curvature radii , the effective strain value decreased in the deformation regions. Moreover, the optimum conditions in terms of strain distribution and homogeneity of billet are associated with a radius of the inner fillet of 4 mm and radius of outer corner of 12 mm. The impacts on the von Mises strain and the press force. The optimal compromise between applied force and von Mises strain balances small press forces and high von Mises strain and homogeneity indices.

Keyword: Equal Channel angular pressing, Finite element analysis, Severe plastic Deformation, FEM, ECAP.

Synthesis and characterization of MgO nanoparticle via microwave and sol-gel methods

Khansaa D. Salman1, Haider H. Abbas2,*, Hussain A. Aljawad3*

Abstract This investigation aims to study the characterization of MgO nanoparticles prepared using two different routes via microwave method and sol-gel route. The characteristics of the fabricated of MgO nanoparticles were examined by FESEM, XRD, FTIR and BET. The results of XRD for microwave method and sol-gel route revealed peaks indicating the uniform crystalline. The images of FESEM of MgO nanoparticles by microwave method evinced an irregular shape, but the MgO nanoparticles synthesized by sol-gel route were found crystallites, nano spherical shape. The results of this work manifested that the MgO nanoparticles prepared via sol-gel route had smaller grain size as (≈ 50 nm) compared to the microwave method (≈ 72 nm). The specific surface area of the MgO nanoparticles using sol-gel route was more than with microwave route. FTIR examination reveals that the presence of Mg-O in the sample.

Keyword: MgO nanoparticles, Microwave, Sol-gel, FESEM, BET, FTIR

Manual mechanical prestressing system of thin shallow curved slab

Ashraf A. Alfeehan1*, Suhaib S. Abdulhameed and Rana H. Alkerwei

Abstract A manual mechanical prestressing system was manufactured which used to apply a post-tension force to the high-stress steel wires in the curved slab member. The study aims to experiment with the use of a mechanical prestressing technique of thin curved sections to assess the prestressed force influencing the behavior of a curved slab at the initial and final loading stages. Two advantages achieved in the system; pulling the steel wires at all positions simultaneously and application of the pulling force perpendicular to the cross-section of the curved slab. To check the efficiency of the prestressing system, two reactive powder concrete curved slab members were cast and tested under a uniformly distributed load. The first one is reinforced with micro steel fibers while the second one is reinforced with micro steel fibers in addition to four high-stress steel wires. The experimental results showed the applicability and facility of using this manual mechanical system to perform the post-tension forces of thin curved slabs. Applying the post-tension prestressing force in the curved slab member increased the cracking and ultimate loads to about 311% and 381% respectively compared to the non-prestress curved slab, whereas the failure mode was occurred by flexural-tensile stress near the edge beams for both curved slabs.

Keyword: prestress, mechanical system, curved slab, reactive powder concrete, thin shell

Manual mechanical prestressing system of thin shallow curved slab

Buckling at Elevated Temperature for (6061-T6) Aluminum Alloy Columns under Increasing Load

Abstract A column is a structural member that bears an axial compressive load and is more likely to fail due to buckling than due to material strength. Some of these columns work at high temperature and this temperature effects the behavior of buckling. Then the designer must takes this factor into consideration. The present work involves the high-temperature buckling of 6061-T6 aluminum alloy rod(column) at different range of temperature (room temperature to 200℃). This work study the critical buckling load (Pcr) under the above temperature dynamically. The (Pcr) can be predicted by Euler theory. It has been observed that the Euler theory is not satisfy to applied under high temperature unless using temperature safety factor. The results show that elevated temperature weakens the structure and decreasing its mechanical and buckling properties. From the experimental results, empirical equations were derived to predict yield strength, ultimate tensile strength, modulus of elasticity, critical buckling load and temperature safety factor at high temperature.

Study the antibacterial activity of hydroxyapatite- nano silver coating on titanium substrate

Saja Hamza1& 2Nabaa Sattar Radhi3 Nebras Mohammed Sahi4

Abstract The most often encountered laborer as a consequence prosthetic titanium (Ti) implant, failure is infection. Implant surfaces that are antibacterial due to nanoscale titanium modifications appear as an appealing peri-implantitis prevention approach. In this study, composite coating preparation) and antimicrobial properties (hydroxyapatite, hydroxyapatite/ nanosilver) on titanium substrate by Micro Arc Oxidation(MAO). Preparation the electrolyte in the electrolyte, cell was an aqueous calcium acetate monohydrate solution of 0.1.3 mol/L ((CH3-COO)2..Ca.H2O) and 0.0.6 mol/l sodium biphosphate dihydrate (NaH2PO4.2H2O) in distilled ,water, pH of electrolyte was 2.3 after that, nano silver was added to the electrolyte in different proportions (0.5, 1, 1.5, 2) g/L, and the coating times were also different (30, 45, 60) sec at a constant voltage 200 V. To observe the morphology a AFM test was done and must be known if there are bacteria present or not on Ti substrate and composite coating (HA, HA/nAg) samples by the antibacterial test. In addition, the surface, roughness was measured to study the extent of bacterial adhesion. The result of the tests for coated samples better compared with the uncoated sample. As a result, in the antibacterial test, composite coatings (HA, HA/nAg) were found to be more effective than Ti samples in destroying bacteria that had formed on their surfaces.

Manufacture of shape memory alloys NiTi and NiTiCu by casting method and studying the effect of adding the copper element in different proportions to the binary alloy on the microstructure, phase transformations and conductivity

Khansaa Dawood Salman1

Abstract Thanks to unique properties, such as light weight, good biocompatibility, high strength, and relatively low cost, shape memory alloys are of interest to researchers. In this work alloys NiTi and NiTiCu with different weight percents were made from the copper element using the casting method by (VAR) furnace. Where the elements were melted at (1350˚C) without a crucible to obtain best alloys of high purity, and after that the manufactured ingots were cooled with ice water to obtain the best homogeneity. The melting process was followed by the annealing process by an electric furnace at (750˚C). After completing the manufacturing process, specimens were prepared for microscopic and mechanical tests, and wires were drawn for the purpose of electrical testing. Several tests and examinations were carried out to ensure that the alloys manufactured are SMAs. The microscopic examinations that were performed via OM showed that the copper element is uniformly distributed within a NiTi matrix. The results showed FESEM that the microstructure is symmetric and homogeneous, and also showed phase (TI 002) and (Ti2Ni) and some defects. DSC examination showed the initial and final degrees of the austenite and martensite phase. In addition, the results of DSC showed that the best stable alloys are alloy NiTi and NiTiCu-3 and that the hysterical loop decreases with an increase in the percentage of copper. The results of the shape memory effect showed that the best SME was (88.98%) for alloy NiTiCu-3. As for the microhardness, it increased when the copper element was increased, so the maximum hardness of the specimen was at 2 wt.% Cu, and it seemed to decrease with the increase in the copper element. The electrical test that was performed using the 4T sensing method of wires showed that the conductivity value increases with the increase in ratio of Cu with the decrease in the resistance. The best conductivity ratio was for alloy NiTiCu-3 where the conduction ratio was 24096.4 (Ω.Cm)-1 and it had the lowest resistivity 41.5 (Ω.Cm)10-6. Strain rate was tested and the resistivity, so the increase in the strain rate was observed with the increase in the copper element and the decrease in the resistivity.

Parameters Estimation Tests of Induction Machine Using Matlab/Simulink

Mohammed Mustaf Khalaf 1*, Amer Mejbel Ali 2

Abstract This paper describes special tests through the Matlab/Simulink program with induction machine to estimate the parameters of the equivalent circuit step by step because they have a direct impact on the performance of induction machine while running steady-state machines and dynamic status. There are three tests to determine the parameters of the induction machine (R_1,R_2, 〖X〗_1, X_2,X_m) is a DC test and No-Load test (open-circuit test) and Blocked rotor test (short-circuit test). Despite the fact that temperature and the skin effect are not taken into account in DC resistance modelling, the results obtained are approximate and rational. For control and verification, the parameters of an induction machine can be accessed through the above three tests. Simulation and experimental results confirm the effectiveness of the proposed method. This work can be easily applied by students to enable them to know the parameters in the absence of the information provided in the motor.

Keyword: Induction Machine, The Equivalent Circuit, Test of IM, Estimation parameters, Matlab/Simulink

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Surface modification of Zirconium based alloys for bio application by Micro-arc oxidation process: A Review

Maysam Abbood Salman1*, Ali Hubi Haleem2 , Samir Hamid Awad3

Abstract Because of their superior mechanical properties, metal implants are the ideal choice for long-term reconstruction of hard tissues like the hip and knee joints. Zr and its alloys are widely recognized as biocompatible metal implants because of the self-regulating oxide coating that prevents the surface from corrosion and restricts ion release. The Osseo incorporation of these critical elements requires surface modification. The surface of metal implants is modified via micro-arc oxidation (MAO). The goal of this study is to give a summary of contemporary Micro-arc oxidation (MAO) research on zirconium and related alloys in biometal implants.

Keyword: Induction Machine, The Equivalent Circuit, Test of IM, Estimation parameters, Matlab/Simulink

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Structural Behavior of Concrete Deep Beams Reinforced with Steel Ducts

Eman A AL-Hassany 1, Labeeb S AL-Yassri 2

Abstract The aim of the research is to investigate the structural behavior of deep beams with a longitudinal opening reinforced by steel pipes. The experimental program included a test of (10) specimens with dimensions of (1500mm) length, (500mm) overall height and (250mm) width. One of these specimens was casted with solid section (without longitudinal opening) to keep it as a reference specimen for comparison purposes. The variables considered in this research were, the shape of the openings (circular, square, and rectangular) was adopted, opening size (three variable sizes of circular openings 4in,3in, and 2in) were used, in addition to the void's ratio. The Load-deflection curves and crack patterns for the tested beams were discussed. The experimental results showed that the structural behavior of specimens with circular openings was approximately equal to the reference beam, where it gave efficiency about (103%) with respect to the reference beam. The specimens with square and rectangular openings gave an average load carrying capacity about (81%-35%) respectively with respect to the reference beam. Also, its noticed that the specimens containing rectangular openings were inefficient and caused early collapse. Using of steel pipes to reinforce the longitudinal opening was observed to be efficient for improving the load carrying capacity and stiffness of deep beams, the results showed that the ultimate load was increased by 22.6% compared to the beam with unreinforced opening.

Cloud based automatic street lighting control system

Manal Fadhil Younis*1 Sarah Sadeq Salim2

Abstract Conventional street lighting control systems is manual control, light sensitive control, and simple timing control while energy consumption and operators are unable to monitor street lights, that significantly disrupts management and maintenance. This work is based on the idea of maximize the maintaining and minimize an energy loss. Much of the energy produced daytime is saved in a solar cell and then will use to glow street lights throughout the night. The system also provides an energy-efficient operation mode by adapting the automated method. The lights switch on / off automatically according to vehicle movement or day / night sensor as well as to reduce management cost and monitor status information for each street lighting unit. In this paper two sensors are utilized that are Light Dependent Resistor (LDR) sensor to signalize a day/night time and Infrared Obstacle (IR) sensors to discover the movement on the street. Arduino microcontroller is utilized as a brain to control the street lighting system. In the other hand sensors data are analyzed and stored in Thingspeak cloud after are sent by Arduino UNO. Experimental results show that the system is stable and reliable as it can be applied as a model system.

A Numerical Simulation Study to Improve Heat Transfer Rate in a Double Pipe Heat Exchanger using Different ways.

Zomorrod Ahmed Salman1,5 ,Zena Khalefa Kadhim2,6, Kamil Abdulhussein khalaf3,7, Hassanein Ali Kamil44,8.

Abstract. In this work the thermo hydraulic performance of double pipe heat exchanger made of stainless-steel with inner and outer diameters are (11.43 and 16.83cm) respectively, 0.305cm thickness and150cm length, studied numerically by using Solid Works 2016 package. It is used to the purpose of preheat heavy fuel oil flow in the outer pipe by hot air flow inside the inner one. Helical tape with different pitches (11, 14, and 17) cm the inner side of the inner tube and helical fin with different fin spaces (10, 20, and 30) cm over the inner tube are used as an enhancement heat transfer device. The study was conducted with specific identifiers, Reynold's number (Re) values are (31668, 47361, 63008, 78589) for air side (inner tube), oil inlet temperature is (313) K and flow with rate of oil (0.1 and 0.06 kg/s). The results were first verified by using both the inner helical tape and outer helical fin separately and comparing the results of them with the plain tube, and then combining each of the helical tape and helical fin together and indicating the improvement in heat transfer rate, the result show that the maximum heat transfer is (4559.726 W) obtained by merged the helical tape with smaller pitch (11 cm) and helical fin with low fin pitch (10 cm) at oil flow rate (0.1 kg/s) as compared with (2052.385W) for plain tube, the maximum enhancement percentage in heat transfer rate and overall heat transfer coefficient were is (122.167 % and 142.941%) at the same conditions. The maximum enhancement in Nusselt number (Nu) and convection heat transfer coefficient were (224.572 % and 129.523 % W/m2. K) respectively were achieved by using helical tape with pitch (11 cm). At higher Reynolds number, the higher-pressure drop for air side is (7437.8 pa) obtained when using minimum pitch for helical tape and it is (1086.26 pa) for oil side by using helical fin with pitch (10 cm).

Review: The Surface Modification of Pure Titanium by Micro-Arc Oxidation (MAO) Process

Qabas Khalid Naji Chabuk 1*, Jassim M.Salman Al-Murshdy 2 and Nawal Mohammed Dawood 3

Abstract. Titanium and titanium alloys are broadly used in biomedical applications, particularty orthopaedic and dental implants, due to their suitable properties, such as low modulus, high specific

strength to weight, high machining, high corrosion resistance, and biocompatibility. Micro-arc oxidation (MAO) is one in every of many surface modification processes that can provide porous, adhesive, and bioactivity for implantation, resulting in better and more improved osseointegration. Furthermore, antimicrobial surface coatings hold a lot of promise for reducing infection-related errors. This study provides a summary of the biological evaluation of bioactive coatings. It primarily focuses on ways for enhancing the biological characteristics of MAO-coated titanium and related alloys. The overview is to discuss the MAO process of the titanium implant to enhance bone/implant interaction.

Evaluation the magnetic and microstructure properties of Al/TiO2 nanocomposites using various stir casting temperature

Zahraa. J. Kadhim1, Hussain. J. M. Alalkawi2 and Ahmed. H. Reja3

Abstract The effect of three stir casting temperatures (ST) (900, 1000, and 1100℃) on magnetic and microstructure properties of AA5052 reinforced with 5wt% TiO2 nanoparticles has been investigated using the stir casting technique. It was found that the magnetic properties decrease with increasing stir casting temperature and the least magnetic saturation (Ms) and magnetic susceptibility (Xm) occurred for nanocomposite fabricated under stir casting temperature (1000℃) also the maximum coercivity (Hc) and residual magnetization (Mr) occurred in this nanocomposite. The values of magnetic saturation (Ms), coercivity (Hc) and residual magnetization (Mr) obtained for nanocomposite under (1000 ℃) are 2.714×10-6 (A/m), 4676.55530 (A/m) and 3.25032 ×10-8 (A/m), respectively. Scanning electron microscopy (SEM) is used to analyze the microstructure, and it is discovered that well-distributed nano particles lead to decrease grain size in the parent phase.

Key words: AA5052, TiO2 nanoparticles, (ST), magnetic, microstructure, stir casting route.

Metallurgical investigation and mechanical properties of dissimilar friction crush welded Cu-Al sheets with flanged edge

A S Jomah[1]*, F A Hashim[2] and A D Subhi[1]

Abstract Welding of dissimilar metals is one of the most substantial requirements of industries and extensively used in engineering applications. Dissimilar friction crush welding between oxygen-free

copper (C1020) and aluminum (1145-H1) sheets with a thickness of 1 mm was investigated in this work using different flange edge heights (2, 2.5 and 3 mm) and gaps (0.5 and 1 mm) between Cu-Al sheets. Tool rotational speed of 1500 rpm and feed rate of 120 mm/min were used in all welding experiments. Evaluation of Cu-Al joints was performed successfully using optical microscope, SEM, XRD, EDS, hardness and tensile tests. Several FCW experiments were carried out to obtain the optimum properties by adjusting the flanged edge height and gap between dissimilar sheets. Cracks are the main defect encountered in Cu-Al joints. The XRD results showed that no new reaction phases were formed in the Cu-Al joints. EDS results showed no pronounce diffusion of elements in the crush zone and mechanical coalescence was responsible for welding. The results also indicated that the FCW parameters has a significant effect on the hardness and tensile strength of Cu-Al joints.

Progress In Lead Free- Relaxor Ferroelectrics For Energy Storage Applications.

Mohammed N Al-Aaraji1*, Wisam N Hasan2 and Kutaiba Al-Marzoki1

Abstract . The noticeable progression in the power electronic devices pushes a crucial demand to develop dielectrics with low loss, good temperature stability and high energy-storage density in addition to enhanced energy recovery characteristics. These properties are very important in order to use in advanced pulsed capacitors. Capacitors form a main part of many modern electrical and electronic devices. In this regards, relaxor ferroelectrics form an appropriate candidate for ceramic-based capacitor applications, due to their low loss and high energy density. This review provide theoretical basis at first, which help to evaluate the capacitors characteristics that contribute to high energy storage behavior. Moreover, serves to give an overall summary on latest development on electric energy-storage performance in the candidate materials, particularly in bismuth based peroviskite materials. For example, Bi0.5Na0.5TiO3, BiFeO3 and their solid solutions with BaTiO3 or with K0.5Na0.5NbO3.

Key words: Energy storage density; Energy storage efficiency; Lead free ceramics; Ferroelectrics; relaxor ferroelectrics

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Evaluation the effects of some parameters on the operational efficiency of the main water pipe in Karbala city

Hussein Ali Hussein1*, Jabbar H. Al Baidhani2, Musa Habib Alshammari3

Abstract This study analyzes the results obtained from field measurements to one of the main water pipe operating with the dead end system in Karbala city (located in the middle of Iraq is located 105 kilometers south of the capital Baghdad) utilizing Water CAD software. Moreover, the study is conduct to evaluate the existing mainline supply water from AL-khairat area where is the location of the pumping station to improve existing water main line efficiency. The field readings at different junctions' locations is take and which branch out the mainline at seasons in summer, autumn, winter, and different times by using an ultrasonic device. The collected data then simulated in WaterCAD software using an extended period scenario to determine future network defects. Based on the results, The hydraulic analysis demonstrates the extra flow is required to increase pressure and velocity in junctions. The existing pumping, that is a design amount of about 1200 m3/hr is not sufficient to deliver water to the end zones of the line, since the produced quantity of the pumps in the mainline does not exceed 950 m3/hr which was less than the design capacity as shown by field readings, because damaged many parts of which, It needs to increase the design capacity of not less than 2000m3/hr and this conclusion was made based on analysis of the obtained data. In addition, it is necessary to replace the old pumps with new ones in order to provide adequate flow that achieves the pressure and water velocity required.

Key words: , Efficiency pipe, Hydraulic analysis, WaterCAD, Some prameters, Karbala city

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Effect of different strengthening techniques on the behavior of one-way continuous slab with insufficient length of development

Ruqayah D. AL-Shebawi1, Labeeb S. AL-yassri 2

Abstract The purpose of this paper is to investigate the effect of the different strengthening techniques on the behavior of continuous one-way slab with insufficient length of development of rebars at the internal joint. The insufficient length of development of rebars in the zone of negative steel reinforcement leads to a reduction in force which has dangerous consequences that affect the structure and its serviceability. This study proposed three strengthening techniques to compensate the insufficient development length which including: internal strengthening by confining the lap zone by spiral bar, externally strengthened by CFRP

sheet and steel plates. Six one-way concrete slabs with dimensions of 2200 mm length, 500 mm width, and 125 mm thickness were casted and tested under static load. The main variables adopted in this study are: the length of development, type of strengthening, and presence of construction joint. All slabs were loaded to failure. Form results, it's found that the presence of construction joint and insufficient length of development of rebars at internal support of the continuous one-way slab had a tangible influence on the structural behavior, also, the insufficient length of development resulted in a deterioration of the structure, decrease in stiffness, and change in the mode failure. It was observed that the strengthening techniques used in this study able to compensate the reduction in stiffness and enhancing mode of failure. All the proposed strengthening techniques was efficient especially steel plates which gave a high increasing in ultimate load by about 16.14 % and by about 8.7-3.73% for the other. the pressure and water velocity required.

Using Geotextile to Reduce the Required Thickness of Sub Base Layer of the Road and Improvement in CBR Value

Abdulbasit Abdu laziz Muhmood1, Rafaa Mohammed khudhur2

Abstract : Soil fabrics (geotextiles) are a permeable textile structural composition, and are mainly use in civil engineering applications associated with soil, rocks, or water. The American specifications (ASTM-D1316) indicated in the definition of this type of fabrics that they are use in some installations for civil and structural engineering, as the traffic increases day by day, many road related problems happen. Due to the heavy volume and heavy traffic the roads were damage very early, to avoid such a situation, we can use the geotextile.

Geotextiles can be roughly in to two-type woven and nonwoven, in this research, non-woven (geotextile-50 pressed) was use in the work. The effect of geotextile sheets on improving the load-settlement characters of five-layered soil (three-layer clay, two-layer recycle concrete aggregate); moreover, the use of geotextiles has been study to reduce the required thickness of the sub-base layer of the road. Given the widespread use of bearing testing rate in the projects of road construction, it has used this test in this research, it was a test California bearing ratio (CBR) on the soil of five layers including the rubble of recycled concrete layer recycled (RCA) in the top (sub base)) and the clay soil place bottom(subgrade)

These tests were conduct different the situations, including the use of test geotextile and test not use geotextile. In this research, the performance of nonwoven geotextiles, interconnect between the soft subgrade and the sub-base of the recycle of the recycle concrete aggregate (RCA) in the flexible paving system was good as the Geotextiles improve and increase the CBR value about (20%) of the road layers as well as the geotextile worked on reduce permeability about (50%).

Geotextile also worked to separate or (isolate) two materials that are not alike, such as two soil layers with different properties, such as separating the subgrade layer from the subbase layer.

Key words: geotextiles, woven, nonwoven, RCA, California bearing ratio,

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The effect of recycled plastic waste polyethylene terephthalate (PET) on characteristics of cement mortar

Jasim M Abed1, Ban A Khaleel1, Inas S Aldabagh1 and Nadhim Hamah Sor2,3,

Abstract : . This paper studied the effect of waste Polyethylene Terephthalate (PET) on the workability and mechanical properties of the produced cement based mortar. However, five different waste PET weight fractions of 0, 5, 15, 25 and 50% were replaced with river sand in cement mortar mixtures with constant cement content and water to cement ratio of 525 kg/m3 and 0.48, respectively. The workability of the mixtures is enhanced by increasing the replacement level of plastic waste PET. On the other hand, the dry density, compressive and flexural strengths were reduced as waste PET incorporation increased except the mix contained 5% of PET which improved the compressive and flexural strengths. As a result of the dry density and compressive strength results, it was determined that the mixture containing 25% waste PET is considered as a lightweight mortar and suitable for structural purposes.

Key words cement mortar, plastic waste PET, workability, mechanical properties.

Effects of operating parameters on the performance of a zinc-air fuel cell

Ahmed Habib Shallal1*, Ibtehal Kareem Shakir 1**

Abstract : As a promising energy storage device, the rechargeable Zinc-air fuel cells (ZAFCs) has attracted an increasing attention because of their high energy density, cost-effectiveness, non-toxic (in terms of the manufacturing materials of the cell as well as the products of the reactions), the rich abundance of zinc, compact system design, as well as its environmental benignity. Rechargeable Zinc-air fuel cells (ZAFCs) are

investigated as a possible technology for fast responding large-scale electrical energy. a broad study was performed to examine the influence of different ranges of parameters such as electrolyte flow rate (0-250 mL/min), electrolyte concentration (10- 60% by weight KOH), electrolyte temperature (26-60°C), active or passive air supply (0-8 L/min), and the effects of each parameter on the cell performance was studied and analysed and the best parameters were chosen to maintain the most effective cell operation.

The possibilities of using nano-CuO as coolants for PVT system: An experimental study

Moafaq K S Al-Ghezi1*, Khaleel I Abass2, Ahmed Q Salam3, Raid S Jawad4, Hussein A Kazem5

Abstract : . Photovoltaic/thermal system (PVT) is a modern technology that increase the productivity of a PV panel through nanofluid cooling. In this study, the use of a group of nano-coolants consisting of nano-CuO plus water and surfactant was investigated. The study was conducted using a solar simulator and studied the thermophysical properties of the prepared fluids to demonstrate their effects on the PVT system cooling. Adding nanoparticles to water caused an increase in density and viscosity, but at a limited rate, and it did not have an effect during the experiments. The thermal conductivity of the nanofluids showed a clear increase compared to water, and the highest conductivity measured was 100.3% (when adding 2% nano-CuO). The Zeta potential test was used to measure the stability of the prepared nanofluids, and the results showed the high stability of all the prepared nanofluids. The stability of the suspension improved as the proportion of added nanoparticles decreased. The electrical, thermal, and total efficiencies improved with employing nanofluids to cool the PVT system compared to cooling with water alone. The maximum efficiencies obtained when adding 2% nano-CuO to the water were 29.92%, 61.08%, and 91% for electrical, thermal, and total efficiencies respectively

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Cellular Total Lipid Peroxidation, and Glutathione S Transferase Levels in Larvae and Pupae of Aedes Aegypti with Catalysts Preparation of Mg-doped tio2 Nanoparticles.

Moatasem AlSalih1*, Syakirah Samsudin2 , Siti Suri Arshad3rd

Abstract : . Aim: synthesis, characterization, and application of modifying nanocomposite TiO2 doped with Magnesium for photodegradation of antioxidant system Larvae and Pupae of Aedes Aegypti Catalysts Preparation of Mg-doped TiO2 to determine activity of oxidative stress (MDA) and glutathione S

Transferase, were known as a parameter of defense system resistance and immune maintained. This study was undertaken to assess the potential role of growth of stages of Aedes Aegypti correspondence with oxidant and antioxidant balance triggered by nanoparticle exposure. The amounts of these parameters in cellular samples were investigated using the following materials and procedures, intake 100 larvae and 100 pupae as subjects with (study subjects) and 3-9 days' age-matched with healthy subjects as controls. at the second of the admission, as a marker of lipid peroxidation, and therefore an indicator of the activity of standard free radicals Nanoparticles Photo Catalysts, TiO2 doped with Mg, the standard prepared Nanopowder changes from the forbidden band TiO2 standard doping with atoms of Mg ‹Mg) using the sol-gel method, for Mg-doped TiO2 nanoparticles, the estimated band gap energy is 2.92 eV. Tissue MDA was used to estimate thiobarbituric acid reactive substances (TBARS), and liquid glutathione reductase activity was assessed using Goldberg DM's method. Results: When compared to controls, there was a dramatic rise in MDA content and glutathione s transferase efficiency in larvae and pupae populations exposed to photo catalyst modified nanoparticles. Conclusion: Increased MDA support to oxidative stress in larvae and pupae samples supports enhanced oxygen-free radical generation, as indicated by our findings. Increased antioxidant enzyme activity could be a compensatory mechanism in response to increased oxidative stress. The findings point to glutathione s transferase's antioxidant activity in response to increasing oxidative stress in the treated group.

Key words Titanium Dioxide, Bandgap energy, Aedes Aegypti, malondialdehyde (MDA), glutathione s transferase

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Review of ceramic materials that used as a thermal barrier in diesel engine pistons

E A majeed[1] , H K Rashid[2] and M K Hussain[3]

Abstract : . Aim: synthesis, characterization, and application of modifying nanocomposite TiO2 doped with Magnesium for photodegradation of antioxidant system Larvae and Pupae of Aedes Aegypti Catalysts Preparation of Mg-doped TiO2 to determine activity of oxidative stress (MDA) and glutathione S Transferase, were known as a parameter of defense system resistance and immune maintained. This study was undertaken to assess the potential role of growth of stages of Aedes Aegypti correspondence with oxidant and antioxidant balance triggered by nanoparticle exposure. The amounts of these parameters in cellular samples were investigated using the following materials and procedures, intake 100 larvae and 100 pupae as subjects with (study subjects) and 3-9 days' age-matched with healthy subjects as controls. at the second of the admission, as a marker of lipid peroxidation, and therefore an indicator of the activity of standard free radicals Nanoparticles Photo Catalysts, TiO2 doped with Mg, the standard prepared Nanopowder changes from the forbidden band TiO2 standard doping with atoms of Mg ‹Mg) using the sol-gel method, for Mg-doped TiO2 nanoparticles, the estimated band gap energy is 2.92 eV. Tissue MDA was

used to estimate thiobarbituric acid reactive substances (TBARS), and liquid glutathione reductase activity was assessed using Goldberg DM's method. Results: When compared to controls, there was a dramatic rise in MDA content and glutathione s transferase efficiency in larvae and pupae populations exposed to photo catalyst modified nanoparticles. Conclusion: Increased MDA support to oxidative stress in larvae and pupae samples supports enhanced oxygen-free radical generation, as indicated by our findings. Increased antioxidant enzyme activity could be a compensatory mechanism in response to increased oxidative stress. The findings point to glutathione s transferase's antioxidant activity in response to increasing oxidative stress in the treated group.

The effect of sulfate attack on the compressive strength of fly ash based geopolymer binder

Shaymaa alsafi1

Abstract : . . This study focused on effects of the sulfate solution in the geopolymer binder (activated fly ash with NaOH or KOH) on its compressive strength. The compression tests were performed on the binder. Brunauer-Emmett- Surface Area Analysis (BET) and Thermo-Gravimetric Analysis (TGA) tests were also conducted to trace changes due to sulfate attack before and after exposure at different ages of up to 90 days. The results showed the formation of geopolymer aluminosilicate hydro gel (A-S-H) with higher strength and more sulfate resistance than Portland cement paste in binder.

Key words . Sulfate attack, Geopolymer, Fly ash

A Study of Natural Rosmarinus Corrosion Inhibitor for Zinc In HCl Solution

Haneen Faleh Wali1, Shaker Salih Bahar2

Abstract : . In this study, the effect of important variables on the corrosion rate of Zinc metal was studied with free corrosion, weight loss, and polarization techniques. The test system was designed to measure corrosion potential, corrosion rate, limited current density, and the polarization technique. The experiment used a 0.1M HCl solution as its medium. Temperatures (20,30, 40, 50, and 60) C and rosemary inhibitor concentrations (1 and 5) g/L were used to study the efficacy of the zinc corrosion process. The results showed that the corrosion rate increased with increasing temperature but decreased with increasing inhibitor concentration in acid solution. The maximum inhibition efficiency in Weight Loss Experiments observed at 5g/L of rosemary and 20 ˚C is 49.07%. The corrosion potential became more negative with

increasing temperature and became nobler (less negative) with increasing inhibitor concentration. It has been shown that rosemary is good as a green inhibitor in acid solution.

Keywords: Corrosion; Zinc metal; Rosemary; inhibitor; polarization.

Time-Series Deep-Learning Classifier for Human Activity Recognition Based On Smartphone Built-in Sensors

Ghada Qanbar Ali, Dr. Hilal Al-Libawy

Abstract : Human Activity Recognition (HAR) is gaining more interest in recent years due to its growing role in many human-related sectors such as the health sector especially with elderly people and motion restricted patients. In recent years, there has been great progress in identifying human activity using various machine learning approaches. However, traditional methods of feature extraction are the most challenging in the feature selection process. Deep learning is a promising approach in the human activity recognition research area and has overcome the feature selection problem. However, several challenges are still open to research issues such as classification performance. This paper describes how to identify specific types of human physical activities using the accelerator and gyroscope data generated by the smartphone user. A deep convolutional neural network architecture has been proposed to perform HAR efficiently and effectively the system has been trained and tested over a dataset generated with the aid of 50 volunteers with four activities (walking, running, walking up-down stairs finally sitting-standing on the chair) events in real-world conditions. We chose four classes, each of which performs well, get to know our range of activities achieving 99% for validation and 99.8% for testing overall accuracy

Keywords: Human Activity Recognition (HAR); Deep Learning (DL); Convolutional Neural Network (CNN); continuous wavelet and smartphone sensors

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Production of Lightweight Concrete by Using Polystyrene (cork) waste

Wisam Abdulkadhim Hussein ,

Abstract : There are two important subjects in the local and global areas, the first is the environmental pollution and the second is economic advantages of recycling and reusing of industrial materials. One of the most important industrial materials is cork waste. Because of many good properties of cork, like compressibility and a good ability to mould according to human needs, this material become as an important material in several life categories. This research work includes

production of new type of light weight concrete and studies the mechanical and thermal properties. Several proportions of raw materials were used to produce this type of concrete. This study is intended to produce light weight concrete with low thermal conductivity so that it can be used for concrete masonry units. Polystyrene aggregate was added as percentages by weight of cement to improve the thermal properties of this type of concrete .Mechanical , and thermal tests with difference ages were made in this work .For polystyrene concrete with polystyrene cement ratio (p/c) of (2.67 – 6)%, the 28-day compressive strength range is from (4.31 – 2.67)MPa, flexural strength range is from (3.05-1.719) MPa , density range is from (1493-1213) kg/m3 ,and thermal conductivity range is from (0.91-0.782)% as a percentage by that of reference mix. The study show suitability of this type of concrete to be used in concrete masonry units of non-bearing walls.

Keywords: cork waste , light weight concrete , environmental pollution. low thermal conductivity

Using Cooling System for Increasing the Efficiency of Solar Cell

Teba Nassir Sultan1, Mansour S. Farhan2, Haider TH. Salim ALRikabi3,

Abstract : According to future predictions, reliance will be largely on solar panels to provide electrical energy. Given its importance, the factors that maintain or increase its efficiency must be studied. Among the factors that reduce its efficiency are temperature, shade, dust and many others. The effect of the temperature on the performance and efficiency of a photovoltaic (pv) panel is the one of the main important facing the renewable energy, especially in hot regions, e g. South part of iraq. The high temperature to which the pv module is exposed in hot weather reduces the open circuit voltage and the efficiency. In this work, use two methods for cooling, namely water cooling and air cooling. The first method of cooling was air cooling by using dc fan that placed in the back of pv module. While the second method water cooling divided in two techniques, the first technique done by using two pieces of aluminum for cooling (water cooling blocks) placed in the rear of pv module and the second technique of water cooling by using copper perforated tube for spraying water placed in the front of pv module. The average of experimental results shows that the use of technique spraying water cooling are highest enhancement in efficiency than others techniques (water cooling blocks and dc fan) and more effective at high pv temperatures

Keywords: pv module, water cooling, air cooling, dc fan, water cooling blocks, spraying water, solar cell.

Flexural Behaviour of Hybrid Concrete Beam-Column Connections Under Static and Repeated Loads

Khamail Abdul-Mahdi Mosheer 1,2, Mustafa B Dawood3 and M H Ghalib4

Abstract : The present study includes an experimental investigations for the behavior and the load carrying capacity of hybrid beam-column connections subjected to static and repeated loading condition. The goals were to evaluate the effect of using slurry infiltrated fiber concrete (SIFCON). Experimental program consists of testing six beam-column connections, two of them casted with normal concrete and the other using SIFCON in crtical section in addation to normal concrete. Also, the program testing three of connection subjected to static load and the similar other subjected to repeated loads. Results show an improve in flexural behavior for specimens with SIFCON as compared with normal concrete under static and condition, on the other hand , the reduction in flexural strength when was exposed to repeated loads in comparison with that under static loads reach 2.6% at hybrid connection. While, the reduction was increased to 5.1% for the specimen without SIFCON.

Transmitting Image in 3D Wireless Channel using Adaptive Algorithm Processing with MMSE based on MIMO principles

V.P. Fedosov, J.S. Jameel, S.V. Kucheryavenko

Abstract With the growing evolution of wireless communication technologies, there is still a need for higher data rates, increased system capacity, and improved service quality. OFDM WiMAX technology is now regarded as one of the most common solutions for Broadband Wireless Connectivity in Urban Areas, capable of offering faster implementation and lower costs than standard wired options. This paper proposes effective adaptive algorithm processing with MMSE for use in wireless networks based on SISO and MIMO OFDM WiMAX, enabling network performance to be enhanced in the case of non-LOS wireless communications, which are standard in urban conditions. On the performance of the system, signal attenuation, the effects of several paths l, different mobility speeds and Doppler shift were studied. Combines the adaptive algorithm with MMSE, achieves improved joint channel estimation and signal detection which performs the technique effectively mobile. SNR, MSE and noise components are used to analyses mathematical models of adaptive modulation for transmitting images in SISO and MIMO systems.

Simulation results show that the adaptive algorithm with MMSE would improve throughput. For example, when SNR equal 15 dB, the probability of MSE for BPSK based on MIMO principle is equal to 0.0016 with adaptive algorithm. Also, for the same value of SNR, the probability of MSE for BPSK based on MIMO principle is equal to 0.164 without adaptive algorithm. It can also be concluded that when processing signals in a receiving system under conditions of multi-path signal propagation, the use of adaptive algorithms with MMSE has a positive effect on noise immunity.under static loads reach 2.6% at hybrid connection. While, the reduction was increased to 5.1% for the specimen without SIFCON

. Morphological Characterzations of Spinel 〖MgAl〗_(2-X) 〖Fe〗_X O_(4) Nanoparticles Synthesized by Sol- Gel Method

Dr. Shaker J. Edrees1 ,Dr. Shaima'a J.Kareem1, Al-Khader Mohammed Fadel 1

Abstract. Abstract. In this paper, pure magnesium alumina (〖MgAl〗_2 O_(4)) and magnesium alumina spinel nanoparticles doped iron (〖MgAl〗_(2-X) 〖Fe〗_X O_(4)) where (X= 0.01, 0.02, 0.03, 0.04, 0.05) were by sol-gel method. The calcination operation was performed at a temperature of 800 ° C at a rate of 5 ° C / min. The resulting materials of MgAl_(2-X) Fe_X O_(4)nanoparticles were determined using, ,XRD, FT-IR, EDX, SEM methods. XRD results show that Mg〖Al〗_2 O_(4)and 〖Fe〗^(+3):〖MgAl〗_2 O_(4)nanoparticles have a single-phase at 800 ° C. FTIR analyze confirmed the presence of 〖MgAl〗_2 O_(4)and 〖Fe〗^(+3):〖MgAl〗_2 O_4 as well as FTIR analysis shows its composition and structure. Surface morphology examinations by scanning electron microscopy (SEM) show that the nanoparticles synthesized in this way are estimated to be angular, uniform and about 50-70 nm in size.

Keyword: Magnesium aluminate spinel, Iron, Dopind, Sol-gel

Numerical modeling of free convection in a partially heated triangular enclosure with chamfer

H H Alaydamee1*, M A Alomari2 and H I Dawood3

Abstract. Two-dimensional numerical modelling of water natural convection inside a chamfered triangular cavity, that is being partially heated from below has been investigated in this paper. The

walls of the cavity are considered isothermally isolated except a source part of heat which is inserted at the bottom wall while the inclined wall is considered as cold wall. A COMSOL Multiphysics 5.5 has been used to solve the numerical solutions. This paper considered some variables such as Rayleigh number (Ra = 103 to 106), heating length ratio (HL= 0.2, 0.4, and 0.5) and the ratio of the chamfer's radius (R= 0.1, 0.2, and 0.25) while all other physical parameters are considered constant such as the length of the cold wall and the adiabatic wall. The results have been validated with previous published work in order to ensure the accuracy of the current coding. The main results observed an increase in streamlines and isotherms with the rise of Rayleigh (Ra) number and the rise of heating length ratio; additionally, the average Nusselt number (Nuavg) value increases with the rise of the Ra number and the length of the heating source. For example, average Nusselt number increased from 2.0443 at Ra=103 to 7.2793 at Ra= 106 for (R=0.25 and HL = 0.5).

Keyword: Triangular enclosure; natural convection, numerical simulation, chamfer, Partially heated

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Factors affect the bond strength of Geopolymer repair material: Review

Ahmed Jaafer Abed AL-Jabar 1*, Sarmad I. Ibrahim2, Hanaa A. Al-kaisy3

Abstract. : One of the most important construction activities worldwide is the repair and rehabilitation of damaged concrete structures. Many concrete structures are decaying, sometimes early, and need remediation to restore their protection and serviceability. As a result, in recent years the need for repair and safety has increased dramatically. This paper reviewed some studies about the potential for geopolymer to be used as a repair material and highlighted the main factors effect bond strength between GP and OPCC. The bond strength of GP was assessed using splitting tensile test and slant shear test. The results of bond strength indicated that this form of GP could be employed as a potential repair material..

Effect of Tungsten additions on Microstructure and Corrosion resistance of F75 alloy.

Nuha Hasan Jabr1, Nawal Mohammed Dawood2

Abstract. : For many surgical applications such as knee implant, metal-to-metal Hip jointing and denta implants, CoCrMo allays are the main choice.The present study aims to study the effect of Tungsten on Microstructure and Corrosion resistance of CoCrMo (F75) alloy. Tungsten has been

added to the base alloy in various weight ratios (0.5, 1 and 1.5 wt. percent). The alloys have been made using powder metallurgywhich has been sintered with two stages at 500°C (2 h) and 850°C (6 h) under Argon atmosphereMicrostructures observation , Corrosion resistance, open circuit potential and Brinell macro-hardness , have been performed . In the microstructure test this phases (CoCr and CoCrMo) was appeared. Corrosion test results have shown that with the addition of (1,5% W) the highest corrosion resistance was found, which gives the lowest rate of corrosion (4.310 mpy) in Ringer's solution .The hardness of F75 alloy improve after the addition of tungsten in Ringer's solution , Also hardness increase as tungsten additives increase, which have the highest percentage (1.5%W) gave the highest hardnes

Keyword: CoCrMo alloys, F75 alloy,W addition, Corrosion resistance, Powder Metallurgy.

Cefepime electronic structure, optical, spectroscopic, and the effect of water molecules on its physical properties

Mudar Ahmed Abdulsattar1*, Nooruldeen Mudher Almaroof2

Abstract Cefepime is a fourth-generation antibiotic with the Stoichiometry C19H24N6O5S2. It is a 1.5 nm molecule. The electronic structure and related spectroscopic properties of cefepime are discussed in the present work. The thermodynamic interaction of the cefepime molecule with water molecules is also discussed. Density functional theory at the B3LYP/6-311G** level is used. Results show good agreement with available structural experimental results such as bond lengths. The iso-electrostatic potential energy shows the position of positive and negative potentials. The HOMO-LUMO energy gap is increased to more than 4 eV due to interaction with water molecules. The highest peak in the experimental IR spectrum (1773 cm-1) is confined between the calculated cefepime highest peak at (1694.4 cm-1) and the hydrated cefepime molecules at (1819-1823 cm-1). Many other evaluated properties such as Raman spectrum, dipole moment, Gibbs free energy, enthalpy, and entropy of interaction with water do not have experimentally measured values. The most stable Gibbs free energy is when cefepime interacts with two H2O molecules.

The quest for the most eco-friendly solutions for long-term housing changes

Zainab Abdul Sattar Ghali 1*

Abstract Lodging changes are an intriguing intercession with regards to post-war lodging regions. Two contextual investigations show that lodging changes can fill the hole among solidification and huge scope destruction. It is regularly said that this causes less natural effect. In any case, very little information regarding this matter is accessible yet. Naturally contrasting lodging changes versus new development not just needs to manage ecological effects during development, yet in addition with ecological effects after some time. An equilibrium must be looked for between these two sorts of natural effects. That is possible by learning typical yearly natural impacts from the hour of interesting advancement up to and including discard around the completion of-life of the housing change or new turn of events. This is against current evaluations of differentiating choices over a comparable lifetime. The system will be attempted in the accompanying period of the assessment.

Effect of silver doping on the optical properties of SiC thin films

H H Khudher1 and J A Abd2

Abstract . In this work, pulsed laser deposition technique (PLD) with the Nd: YAG laser (1064 nm, 6 Hz, 500 mJ) had been used to prepare the pure and Ag-doped silicon carbide (SiC) films on the quartz substrates with various dopant ratios (1% wt, 3% wt, 5% wt, and 7% wt) of Ag. The optical absorbance measurements of SiC films have been studied by ultraviolet-visible spectrophotometry (UV–Vis). The optical parameters that calculated are absorbance, transmittance, reflectivity, absorption coefficient, optical energy gap, extinction coefficient, refractive index and complex dielectric constant. The results showed that the absorbance spectrum had been decreased as the doping ratio increasing. The optical energy gap was decreased from (2.62 to 2.02 eV) as the doping ratio increasing.

Keyword: Silicon carbide; Thin film; silver-doped; Optical properties.

Variation Resistance of different operation temperature of NO2 and NH3 gases for the Ag-doped SiC gas sensor

H H Khudher1 and J A Abd2

Abstract . A pure and Ag-doped silicon carbide (SiC) films on the p-type silicon (110) wafers were prepared with various dopant ratios (1, 3, 5 and 7 %) using pulsed laser deposition technique (PLD)

with the Nd: YAG laser (λ= 1064 nm, 500 mJ, 6 Hz). The samples were deposited under high pressure up to (10-4 mbar) at a substrate temperature of 250 °C. The thin films have been examined for (NO2 and NH3) sensing at different operating temperatures. The maximum sensitivity of pure SiC of NH3 gas about (12%) at 200 oC and (14.42%) for NO2 gas at 100oC while the maximum sensitivity of Ag-doped samples about (24.39%) of NH3 gas at 200°C for (1%wt) and (62.98%) of NO2 gas at 25oC for (3%wt). For the pure sample, we found that the fastest response time was (18.9 s, 22.5 s) for NH3 and NO2 gases at (300 oC,100 oC), respectively, while for impure samples (3% wt) about (12.6 s, 13.5 s) of NH3 and NO2 at 100°C. The results also showed that the lowest recovery time for the pure film was 33.3 s for NH3 gas at 100°C, while for NO2 gas its value was (30.6 s) at 200°C. Also for the SiC: Ag (3% wt, 5%), it was found that the fastest recovery time was about (45 s) for NH3 gas at 25 oC and (41.4 s) for NO2 gas at 100 oC.

Keyword:. Silicon carbide; Thin film; silver-doped; Gas sensor;

Preparation and Characterization of Hydroxyapatite and Optimizing Its Properties Using Regression Model

Al-dujaili, Mohammed A. Ahmed, Aswad, Mohsin Abbas,

Oribi, Mariam Ibrahim

Abstract . A pure and Ag-doped silicon carbide (SiC) films on the p-type silicon (110) wafers were prepared with various dopant ratios (1, 3, 5 and 7 %) using pulsed laser deposition technique (PLD) with the Nd: YAG laser (λ= 1064 nm, 500 mJ, 6 Hz). The samples were deposited under high pressure up to (10-4 mbar) at a substrate temperature of 250 °C. The thin films have been examined for (NO2 and NH3) sensing at different operating temperatures. The maximum sensitivity of pure SiC of NH3 gas about (12%) at 200 oC and (14.42%) for NO2 gas at 100oC while the maximum sensitivity of Ag-doped samples about (24.39%) of NH3 gas at 200°C for (1%wt) and (62.98%) of NO2 gas at 25oC for (3%wt). For the pure sample, we found that the fastest response time was (18.9 s, 22.5 s) for NH3 and NO2 gases at (300 oC,100 oC), respectively, while for impure samples (3% wt) about (12.6 s, 13.5 s) of NH3 and NO2 at 100°C. The results also showed that the lowest recovery time for the pure film was 33.3 s for NH3 gas at 100°C, while for NO2 gas its value was (30.6 s) at 200°C. Also for the SiC: Ag (3% wt, 5%), it was found that the fastest recovery time was about (45 s) for NH3 gas at 25 oC and (41.4 s) for NO2 gas at 100 oC.

Development of self-cleaning bricks surfaces by CaCO3 modified nano-TiO2 composite coatings

Samir H Awad1 , Fatima Shaker2

Abstract . Recently, many studies have been carried out on self-cleaning characteristic because it is being regarded as one of the most interesting topics in biomimicry because of its potential applications in energy conversion, and biomedical and environmental protection. In this study, spin coating process has been introduced to coat bricks surfaces with TiO2 nanoparticles based polymer composite coatings modified using CaCO3 particles for self-cleaning and environmental purposes. The matrix solutions were prepared from Polystyrene . Particle size analyzing PSA and x-ray diffraction XRD were employed for characterization of the particles .The coatings were characterized by SEM and AFM techniques , and contact angle measurement CA. Results proved that CA increased with the increasing of PS ratio and additions of nano-TiO2 and CaCO3.The composite coatings have dense topography with roughness increased with increasing of the CaCO3 addition, and porous morphology characterized by clear distribution of the nano TiO2 particles and larger CaCO3 modification particles. Also, it could be concluded that the %20PS/%6TiO2/1gCaCO3 coatings, could give promised effect in modification of bricks surfaces from superhydrophilic substrates to Superhydrophobic with higher contact angle 167.3987o .This results will encourage the future research in surface engineering of bricks surfaces using CaCO3 particles for self-cleaning and environmental applications .

Keyword:. TiO2 nanoparticls,CaCO3,Spin coating, super hydrophobic, Bricks, self-cleaning .

The behavior of eco-friendly self – compacting concrete partially utilized ultra-fine eggshell powder waste

Ayad S Aadi 1, Nadhim Hamah Sor 2,3,* and Ahmed Ali Mohammed 4

Abstract From food wastes, there are many materials that can be used as building materials like eggshells. This paper examined the effect of ultra-fine eggshell powder (UFESP) as a partial cement replacement by (0–25% with 5% increments) in weight on fresh and compressive strength of sustainable Self-Compacting Concrete (SCC) with a constant water to binder ratio and binder content of 0.38 and 450 kg/m3, respectively. All mixes were tested for fresh properties of slump flow diameter and time, V-funnel time, L-box height ratio, dry density and compressive strength. The results of fresh properties for all mixtures satisfied the requirements recommended by EFNARC for SCC. However, the compressive strength of SCC mixes increased by the addition of UFESP up

to 15% compared to the control mixture, then decreased and recorded 42 MPa for the mix containing 25% of UFESP. Meanwhile, the dry density decreased as UFESP utilization increased in the mixtures.

Keyword:. Self-compacting concrete, UFESP, fresh properties, dry density, compressive strength.

Investigation Quantum Electronic Transition of Organometallic Molecules

Israa F Ghazi and Riyam I Jaddan

Abstract Natural additives are largely available and have good environmental properties, therefore it mostly added as reinforcing material in a large number of polymeric materials. The intention of this study is to prepared green composite products to utilize as an insulating material and also in internal components of automobiles and the shipbuilding industry. For that reason, six composites were prepared that using particles from the date palm waste (palm mesh , seed of fruit, and trunk) as reinforcing fillers at (10, 20, and 30) wt.% loading as well as a hybrid of each three fillers in an epoxy matrix.The result included that the variation of thermal properties with the filler volume fraction and also with the type of fillers. At maximum volume fractions (30%), the seed date palm attained the lowest values of thermal properties of 0.138W/m.K, 720 m2/s, and 0.0201 J/kg.K for the thermal conductivity, specific heat, and thermal diffusivity respectively. Epoxy hybrid composites have the lowest thermal conductivity than other composite materials, making them more suitable for thermal insulation materials.

Keyword:. Epoxy composites; date palm fillers, thermal properties, insulating material.

Experimental and theoretical analysis of heat transfer in a solar collector storage

Hadi R. Al-Dayyenia, Wisam J. Khudhayerb, Cihan Karatasc, Mustafa Wahby Kanbar JABERd, Hasan T. Jalele.

Abstract The current research includes a practical study of the thermal performance of solar collector integral storage system (ISCS) in which different types of heat exchangers are immersed in its enclosure for comparison. The first type is a straight tube heat exchanger (ST) and the other is a heat exchanger in the form of a coiled tube (CT). The effect of single and double glass layers and fluid flow rates inside the heat exchanger on the natural convection heat transfer of ISCS system is

experimentally evaluated by determining the temperature difference of inlet and outlet water through the heat exchanger immersed into the ISCS enclosure, the temperature distribution inside the enclosure, the ISCS efficiency, and the amount of thermal storage during evening times. Three sets of experiments are performed for a different water flow rates (1.0, 1.5, 2.0, and 2.5 Lpm) inside the heat exchanger that is immersed in the thermally insulated enclosure and different glassing layers. The first set represents the presence of a heat exchanger in the form of a straight tube with a single glass was layer on the top face of the enclosure that is called (STSG). The second set uses a coiled tube heat exchanger with a single glass on the upper side of the enclosure and it's named as (CTSG). The last set of experiments is represented by a heat exchanger in the form of a coiled tube with a double glass on the upper face of the enclosure and it's abbreviated as (CTDG). At water flow rate of 1 Lpm, the CTDG exhibited higher temperature difference (28 °C and 19.9 °C than (19.4 and 11.4 °C) for CTSG and (12 and 7.3°C) for STSG during day and night times, respectively. The results reveal that the thermal efficiency (84.5 - 77.8 %) of the (CTDG) case at water flow rate of 2.5 Lpm was higher than the efficiency (68.8 - 56.6%) of (CTSG) case and that (41.7 - 39.7%) of STSG) case during day and night times, respectively. It was also observed that the internal energy exceeds the amount of solar radiation during the day and provides a thermal storage at night due to the complete isolation of the collector. The temperature measurements near the tube allow the calculation of the Rayleigh number during the heat transfer process, and empirical relationships haves been deduced for each set of experiments between the Nusselt number and the Rayleigh number. Keywords: Integral Collector Storage, Solar Water Heating System, Natural Convection, Heat Exchanger, Single & Double Glazing.

Investigation Quantum Electronic Transition of Organometallic Molecules

Abbas Ibrahim Obayes M.1, Enas M. Al-Robayi2, Oday A. Al-Owaedi3

Abstract We provide a brief overview of recent calculations and predictions of electronic properties for single-molecules and discuss some principles underpinning strategies for enhancing their electronic performance. Quantum interference effects in the electronic properties of (Pyridine-2Cyclopentene Metallic) organometallic-type molecules possessing four aromatic rings were investigate theoretically. In this paper, electronic transmission properties were study for different types of organometallic molecules. A calculation also provides a powerful tool to estimate the electrical and electronic properties. Furthermore, to probe the electronic structure of all compounds in this study we compute the UV-visible, iso- surface and energies calculations. It is find that the (HOMO and LUMO) energy changing with replace metallic atoms as well as the energy gap changes as the metal different. Therefore, this indicates the energies depend on the type of the metallic atoms in the studied molecules. All calculations were performed using density functional theory at three parameters with the Lee-Yang-Parr functional (B3 LYP) levels with SDD basis sets.

Keyword:. DFT, organometallic molecules, UV-visible calculations.

Functionally graded coating (silver/yttria) multi layers by pulsed laser deposition technique on 316L stainless steel substrate

Nabaa Sattar Radhi1 Saja Hamza2&3 Rafea Tuama Ahmed4 Nebras Mohammed Sahi5

Abstract Biomaterial surface modifications are crucial for matching the dynamics of the biological system and improving bioimplant efficiency. Surface modifications that are tailored to the material's biocompatibility, bondability, and host cell associations can significantly improve the material's biocompatibility, bondability, and host cell associations. In this investigation, silver, yttria and silver/yttria thin covers preparation and antimicrobial characteristics on St.St. 316L by pulsed laser deposition(PLD). The mechanical5 property of the 5coating has been evaluated 5by 5Vickers micro-hardness 5test, surface 5characterization studies of the 5coatings such as LOM and an antibacterial test has been conducted to ensure the coating's antibacterial efficacy.

Surface Water Detection Method for Water Resources Management

Abdulmalik T. Assaf*1, Khamis N. Sayl*1and Ammar Adham*1

Abstract Small significance earth dams during the dry period for locals at most semi-arid cannot be overestimated. Water stored in the same of these dams is little or no lack of domestic water and drinking water for residents during dry periods. The main limitation is the lack of knowledge of the storage quantities of small dams in the study area and knowing this form of field data regularly is costly and needs a long and arduous time. Remote sensing and geographic information systems (GIS) can be used in this study due to their ability to measure and analyze the amount of water stored in some small reservoirs. In this paper, the Water Natural Difference Index (NDWI) is used to detect the surface area as the base to estimate small reservoir storage capacities. The model equation created by this study provided a tool to know the amount of water available per day in the small reservoirs during the dry season and thus was able to obtain clear pictures of the water resources system by the planners. This method may help the planners and water managers will quickly make decisions on how to utilize and manage the available water given the various competing uses.

Keyword:. area curve method - volume - altitude - remote sensing - geographic information system (GIS). Water Natural Difference Index (NDWI).

Determination the Normalized Difference Vegetation Index (NDVI) for the NH-38-2 Al-Najaf Plateau, Iraq with the Assistance of the Remote Sensing Technology

Aseel A Alkatib

Abstract The satellites and the data that is provided by are an effective way to distinguish the characteristics of agricultural crops, crops density, and the changes that affect the vegetation cover. The Normalized Difference Vegetation Index (NDVI) has been widely used in conducting a quantitative assessment of plants that cover the surface of the earth, as it revealed many problems facing the agricultural environment, especially those located in arid or semi-arid areas. This study dealt with analyzing the vegetation cover of the plateau NH-38-2 located in Al-Najaf, Iraq by finding the NDVI using remote sensing technology and Geological Information System (GIS), in addition to finding its value for the study area. The study showed that the vegetation cover is largely non-existent and ranges between (0-1) as the region suffers from desertification, which requires the relevant authorities to rectify the matter by developing projects that will increase the vegetation cover as it helps to improve the environment. In addition, the study showed that there is an area that does not exceed 110 km2 that contains vegetation, which is a very small area compared to the total area under study, which is 15225 km2.

Keyword:. Normalized Difference Vegetation Index (NDVI), Remote Sensing Technology, GIS, NH-38-2 Al-Najaf Plateau, Iraq

RSM Optimizing the Characteristics of Metakaolin based Geopolymer Foam

Mohammed S. Radhi *1, Ahmed M. H. Al-Ghaban2 & Imad A. D. Al-Hydary3

Abstract The present study reports on the development of cost-effective hybrid geopolymer foam from metakaolin via a direct foaming mechanism to produce pores differ in amount and size to be suitable for wide range of applications such as filtration, catalyst support, acoustic and thermal insulation. The main goal of this research project has been to investigate the possibility of producing geopolymer foam with high compressive strength and high porosity at the same time. The complexity of the structure, the variety of the process parameters, and the impure nature of the starting materials make it hard to optimize the preparation process of HGPF and to evaluate the

influence of each processing parameter on the final conducted characteristics. Response Surface Methodology (RSM) has been utilized to examine the influence of the main process parameters, on the compressive strength, and the physical characteristics of the samples with final aim to optimize the preparation process. The study involved investigation of batch (0.2 of K2O). The studied parameters were (silica content, water amount, OPC%, H2O2 %, and Olive oil %).

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Keyword:. Normalized Difference Vegetation Index (NDVI), Remote Sensing Technology, GIS, NH-38-2 Al-Najaf Plateau, Iraq

The Effect of Boron Addition on the corrosion behavior of Ni Cr Modental alloy prepared by powder metallurgy.

Ali Hubi Haleem1 , Haydar H.J. Jamal Al-Deen1 , Ban Ahmed shanan2

Abstract. The powder metallurgy (PM) method was used to create the alloy. The sintering process was carried out in an inert high-temperature tube furnace in the presence of inert gas at a temperature of 1000 ° C for 8 hours (Argon). In this article, the effect of (B) at three wt.% (0.4,0.8,1.2) on the corrosion rate, hardness, and microstructure of alloys was examined. X-ray diffraction (XRD), open circuit potential, electrochemical tests (Tafel extrapolation method), and

Macro hardness Brinell were used to study the effect of adding (B) in various amounts to alloys. Saliva was utilized as the corrosion solution for the testing. The inclusion of the alloy element (B) increased hardness and a decrease in particle size, as seen by the microstructures. Furthermore, the corrosion resistance of the master alloy improved next the addition, as shown by Corrosion potential has increased while corrosion current densities have decreased. The corrosion rate for A, A1,A2 and A3 was 14.50, 7.42 , 2.03and 2.77 (mpy) respectively.

Keyword: Powder metallurgy, XRD, Boron addition, Corrosion, Ni-Cr-Mo alloy.

An insight on the response of foundations resting on sand with geosynthetic materials as a reinforcement

Manal Alali1*, Bandita Paikaray1 and Benu Mohapatra1

Abstract. Application of Geosynthetic to resolve several geotechnical engineering problems is widely accepted and effective methods. It improved the foundation's bearing ability as well as minimizes the settlements associate to footings resting on weak soils. Their use is not only restricted to footings in fact they are widely used in improving the subgrade performance of the pavement sand for slope stabilizations. Over the past few decades numerous researchers have contributed their valuable results based on laboratory tests or numerical investigations. The present study aims to provide a detailed literature survey of research work associated with soil reinforcements together under a common hood which can help the upcoming researchers to understand the work done in this field simply and effectively. It also aims to highlight the effect of depth of geosynthetics, their respective width, relative density of sand or other geo-parameters and layers' number provided with geosynthetic affect the bearing capability and settlement behavior of reinforced and unreinforced soil structures.

Study of the Optical Properties of Poly (Methyl Methacrylate) (PMMA) By Using Spin Coating Method

Lamis Faaz Nassier1*, Mohammed Hadi Shinen2

Abstract. In this paper, thin films of poly (methyl methacrylate) [PMMA] were prepared using spin coating method. PMMA was prepared and deposited on glass slides with Spin Coating technology at three different speeds ranging from 1000 to 3000 rpm. a thin film was obtained with a certain

thickness according to the speed, as the faster the speed, the less the thickness of the film and vice versa. The changes in the optical parameters including: absorbance and transmittance spectra as a function of wavelength have been measured as well as the absorption coefficient and other optical constants. The values of absorbance, absorption coefficient and refractive index values of pure polymer are increase with the increasing of the concentration ratios of PMMA. The results showed a decrease in the values of transmittance with all concentration ratios of PMMA. The values of reflectance are increased with the increasing of concentration ratio; also results showed decrease of energy gap for allowed direct transition with increasing of PMMA.

Keyword: poly (methyl methacrylate), optical properties, thin films.

Influence of electrical discharge machining parameters by additives Nano [AL2O3] on surface roughness and material removal rate in machining of AISI 304

Abbas Fadhil Ibrahim

Abstract. Experimental investigation and optimization of machining parameters in electrical discharge machining (EDM) in terms adding particles Nano-reinforced among the various mechanical processes, the process of manufacturing in electrical discharge machines is one of the most effective and cost-efficient manufacturing processes in the manufacture of stainless steel. It has been dealt with in this article investigate each of operating parameters such as peak current (Ip), pulse on time (Pon) and pulse off time(Poff), insulating liquid with Nano powder (AL2O3) in EDM compounds AISI 304. In the present research work, the influences of certain process parameters on surface roughness(Ra) and material removal rate(MRR) were investigated on stainless steel carried out with powder mixture with particles size average of [5 nm]. Operating parameters are taking into consideration three factors based on the Taguchi method. The results from this work will be useful for manufacturing engineers to select appropriate set of process parameters to machine stainless steel.

Keyword: Taguchi method, surface roughness, additives Nano, MRR, Al2O3

The Effect of □-Particles on Structural, optical and Morphological Properties for Cadmium Selenide Thin Film

D H Al Refaei, L M Al Taan and L A Najam

Abstract In this paper, the effect of alpha particles on cadmium selenide thin film properties was invistecated. (CdSe) thin films prepared on glass bases at 50°C and 70°C tempartures, and pH=9 using the chemical bath deposition method. The irradiation was performed on (CdSe) films use the alpha particles source Americium (Am-241) with activity of 50 Ci and energy 5.3MeV for a period irradiation of 5 hours. The samples were characterized by using the XRD, FESEM and EDX techniques. The optical measurements have been obtained by using the UV-V spectrophotometer. The results showed that there are effects of alpha particles on the optical and structural properties of the films. It was found that the energy gap increases slightly after the CdSe thin film irradiated, the absorption coefficient ( ) is increases with irradiation due to the increase in the energy gap. The structure of the CdSe films has been transformed slightly from the cube structure to the hexagonal structure. The grain size increases with irradiation where the relative density increases clearly. The shape of the CdSe thin film at 70°C is affected by irradiation more over than at 50°C.

Keyword: CdSe thin film, CBD method, alpha particles.

An Approach for Designing Different Sustainable and Economical Concrete Mixes

Eethar Thanon Dawood1, Marwa Saadi Mhmood2 and Mohammad Abdul-Kareem Malallah3

Abstract The design of sustainable and economic concrete mixes can be considered as a potential challenge for building's engineers and experts. Thus, this paper presents the possibility of designing such concrete mixes using low to moderate amounts of cement and using waste glass and steel slag powders. The use of three groups from concrete mixes have been prepared by control mix, 20% cement replacement, 25% cement replacement and 30% cement replacement by such powders. The compressive strength, flexural strength, splitting tensile strength and the dry density of concrete have been studied. Besides, the economic efficiency for the different concrete mixes has also been studied. The results show that the use of combination of glass and steel slag powders of 20% replacement of cement (10% each) exhibited a significant balance between strengths values and `.economical consideration

Direct Oxidation of Antibiotics from Aqueous Solution by Ozonation with Microbubbles

Fadhil K. Dawood1*, Nada N. Abdulrazzaq1

Abstract. in this research, antibiotics (tetracycline, ceftriaxone, and metronidazole) were removed in a batch reactor each one separately and together using ozone microbubbles (OMBs) method. The antibiotic removal efficiency was analyzed under different reaction conditions, including initial solution pH, ozonation time, ozone production rate, and initial antibiotic concentration. It was found from the experiments that the elimination of antibiotics by ozone microbubbles was higher at the basal medium between (7-8). In addition, as the ozone production rate was raised from (3.33-16.66) mg/min, the removal efficiency increased, as did the antibiotic concentration (1-100) PPM. Also, the removal tests were carried out under optimal conditions using the conventional ozonation method, and the microbubble technology and the results were compared under the same operating conditions. The microbubbles were found to save a lot of time and reduce the amount of ozone used

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Keyword:Antibiotics,Tetracycline,Ceftriaxone,Metronidazole,Ozone Microbubble.

Application of Statistical Control Charts for Monitoring the Textile Yarn Quality

Amjad B. Abdulghafour1*, Salman H. Omran2+, Mohaned S. Jafar3o, Murtadha M.Mottar4#, Osamah H. Hussein1@

Abstract. : At the current time, textile product quality is the most attractive factor for the consumer market. Iraqis' textile yarn industries are facing a lot of difficulties and competition of cotton yarn products, which has been increased versus artificial fibers. The main problems include the physical and chemical characteristics of cotton yarn because of genetic, environmental, harvesting, and ginning factors. The Statistical control process is a powerful and useful methodology used to solve problems in textile yarn industries to achieve process stability, improve process capability, and reduce process variability. The main objective of this study is to apply control charts and comparison control chart performance of yarn spinning data for quick detection of process shifts that occur to take corrective action. Therefore, in this study, the control charts have been applied at the

Wasit state company for textile industries to control the quality of cotton yarns produced. Applying control charts in all yarn spinning stages is a very important issue, especially in production cost and yarn quality. Quality control charts selected for variables that include ($\bar{X}$-R and $\bar{X}$-S charts) are constructed to describe tenacity, elongation, and the coefficient of variation. Thirty samples size of yarns with five reading of observations per sample of count 1/27Ne are drawn from spinning machine. Minitab is statistical software used to construct the control charts because of its good reputation which is confirmed by the results achieved in our research. The final results of this study will help us to distinguish yarns parameters in the points of the economy and the quality, by comparison, their above-mention parameters..

Keyword: : Quality Control, Variable Control Chart, $\bar{X}$-R Chart, $\bar{X}$-S Chart, Yarn Quality, Textile .Industry

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Assessment of Multiaxial Fatigue Damage Criteria Based on the Critical Plane Concept in Micro-EHL Line Contact.

M F Al-Mayali1, Ali Albattat1, Hassneen AL – Asadi2 and K J Sharif2.

Abstract. : Micropitting is a fatigue failure phenomenon that concentrates at the surface roughness level between interacting surfaces. This type of surface fatigue is commonly recognized to exist in gears and bearings, where specific film thicknesses are sufficiently low that the rough surfaces run in the EHL condition, where the direct asperity contacts are prominent. This paper is an experimental and theoretical study to investigate a number of fatigue failure theories concerning the multi-axial fatigue models which are depended on a critical plane analysis in the mixed lubrication regime. These failure theories are namely the Findley, the Matake, the Dang Van, McDiarmid and, Fatemi and Socie model, where they are used to perform fatigue investigation for Micro- EHL contacts problem. Numerical analysis to investigate the cumulative damage and fatigue parameter in a Micro- EHL contact is established in this paper. The results of applying failure theories have indicated that the different multiaxial fatigue criteria adopted provide significant results for contact analysis in lubricated conditions, and they are more relevant to the applications of the rough surface Micro-EHL mode.

Predicting the Discharge Coefficient of Oblique Cylindrical Weir Using Neural Network Techniques

Adnan A. Ismael11*, Saleh J. Suleiman 2 and Raid Rafi Omar Al-Nima3

Abstract. Cylindrical weir shapes offers a steady-state overflow pattern, where the type of weirs can offer a simple design and provide the ease-to-pass floating debris. This study considers a Coefficient of discharge (Cd) prediction for oblique cylindrical weir using three diameters, the first is of D1 = 0.11m, the second is of D2 = 0.09m and the third is of D3 = 0.06.5m and three inclination angles with respect to channel axis, The first is of $\theta 1 = 90^{\circ}$, the second is of $\theta 2 = 45^{\circ}$ and the third is of $\theta 3 = 30^{\circ}$. The Cd values for total of 56 experiments are estimated by using the Radial Basis Function Network (RBFN). In addition of comparing that with the Back-Propagation Neural Network (BPNN) and Cascade-Forward Neural Network (CFNN). Root Mean Square Error (RMSE), Mean Square Error (MSE) and Correlation Coefficient (CC) statics are used as metrics measurements. The RBFN attained superior performance comparing to the other neural networks of BPNN and CFNN. It is found that, for the training stage the RBFN network benchmarked very small RMSE and MSE values of 1.35E-12 and 1.83E-24, respectively and for the testing stage it also could benchmark very small RMSE and MSE values of 0.0082 and 6.80E-05, respectively.

Rheological Properties Of (NR / SBR / CMC / C.B) Nanocomposites

Essam Filayyih Al-Nesrawy1 And Sameer Hassan Hadi Al-Nesrawy

Abstract This research focuses on the impact of adding materials such as carbon black and polymer of carboxyl methylcellulose on the the rheological properties of styrene butadiene rubber (SBR) and natural rubber (NR) which was studied as a matrix. The present study was a carried out by two groups according to the loading level of carboxyl methylcellulose (CMC) and carbon black(C.B) its molecular weight (N660) which their used as stiffeners in the composites. on the other side, rheometer tests carried according to ASTM D 2705 For the purpose use these composites in various tire making and fender ship. All composites are consisting of carbon black (C.B) N660 (0, 10, 10, 10, 10) pphr and carboxyl methyl cellulose (CMC) (0, 0, 10, 20, 30) pphr respectively for the first group (A) and (0, 20, 20, 20, 20) pphr for C.B , (0, 0, 10, 20, 30) pphr for CMC for the second group (B). The maximum torque, minimum torque, scorch time, viscosity and Tc90 optimum curing time were checked. The results revealed that the parameters differ according to the level of loading.

Viscosity, lower torque, maximum torque and optimal curing were reduced for increasing loading ratio of the C.B and CMC. As well, an optimal curing time of the TC90 burning time was reduced as .addition ratios of the carbon black (C.B) and carboxyl methyl cellulose (CMC) increased

Keyword Rheological properties , Natural rubber (NR) , synthetic rubber (SBR) , carboxyl methyl cellulose (CMC) , Carbon black (C.B), Torque, Scorch time, Min. torque, Max. torque, viscosity

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Harvesting Energy by Solar Thermo-Electric Generation in Tropical Regions

Khalid Salem Shibib1, Haqi I Qatta2, Sudad I Younis1

Abstract Thermos-electric generation (TEG) is a promising technique that transforms heat into electric energy even it has low conservation efficiency. In this work. The finite element method (FEM) has been used to determine the temperature distribution in the soil also a parameter that already used to present the effectiveness of the TEG was obtained. The temperature of the soil surface and temperature at any depth was obtained together with the temperature of a plate located above the TEG device which served as a hot source. The developed sum of the square of the temperature difference between the plate and different depths multiplying by the time interval of the soil is obtained and the maximum sum is searched for to see at which time and depth should the TEG be fixed to obtain the maximum output from the TEG device. From the result of this work, it is found that the maximum sum occurred in May and at depth of 0.3 m, and also a verified program has been built and tested and can be used successfully in other regions by changing latitude, weather .conditions, and soil properties

.Keyword : Thermos-electric generation, soil temperature, heat transfer, weather condition

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Design, modeling and FEA analysis of internal symmetric and asymmetric involute spur gears

H A Alarazah1*, M Q Abdullah 22

Abstract. Recently, internal gears become widely used and highly required according to its ability to transmit large torque to weight ratio, high bending strength, smooth transmission, low noise, and low vibration. Therefore, internal gears are strongly recommended in particular “planetary gear transmission systems”. In this paper, internal involute spur gears are designed based on conventional approach of involute gears. Matlab is used to attain the points of internal gear and to get the main parameters of internal tooth profile, these points have been read by AutoCad to have two dimensional tooth profile. Finite element analysis using Ansys is achieved to analyze and compared the strength of three types of internal gears, Symmetric (〖20〗^°- 〖20〗^°) that has been chose to be the standard case, Asymmetric (〖14.5〗^°- 〖35〗^°) and Corrected Asymmetric (〖14.5〗^°- 〖35〗^°). Tetrahedral type patch conforming method with element size1mm have been chose for fine meshing. The internal gear is fixed supported from the outer ring then, 6500 N.m torque is applied at the rotating axis of the pinion. The bending stresses are calculated based on Von-Mises theory using (FEA). Finally, this study is presented to demonstrate the superiority of internal asymmetric tooth and improve and optimize this significant type of gears.

New Fabricated UHMWPEO-PVA Hybrid Nanocomposites Reinforced by GO Nanosheets: Structure and DC Electrical Behaviour

Nisreen R. Aldulaimi 1,2 and Ehssan Al-Bermany 1,*

Abstract. : Polymer-graphene-based nanocomposites are promising to subject for engineering and industrial. This investigation focused on fabricated new nanocomposites from polyethylene oxide (UHMWPEO) with polyvinyl alcohol (PVA) with various loading ratios. In addition, the influence of graphene oxide nanosheets (GO) contribution was significant enhanced the electrical properties. Three different loading ratios of both polymers were applied with the addition of GO to synthesis new six samples using the solution-sonication-casting method as UHMWPEO: PVA: GO (87:12:1, 74.5:24.5:1, and 63:36:1 wt. %). Rang of characterizations was applied such as Fourier-transform infrared spectroscopy (FTIR) spectra that presented showed strong interfacial connections formed between the blended polymers in the matrix and GO nanosheets in the nanocomposites and the optical microscopy (OM) images exhibited fine homogeneity of the polymer matrix and excellent dispersal of the GO in the matrix of polymers. The DC electrical conductivity showed notable improvement of (PEO - PVA) blended polymer form (2.34663 * 10-17) (Ω.cm)-1 up to (3.00327*10-10) of nanocomposites. The findings are promising that could grow various applications such as sensors, solar cells, IR, electrical and microwave absorption panels.

Keywords: UHMWPEO, PVA, GO, electrical properties, nanocomposites, reinforcement

Speech Recognition using Convolution Deep Neural Networks

Ayad Alsobhani1*, Hanaa M A ALabboodi2, Haider Mahdi 3

Abstract: The use of a speech recognition model has become extremely important. Speech control has become an important type; Our project worked on designing a word-tracking model by applying speech recognition features with deep convolutional neuro-learning. Six control words are used (start, stop, forward, backward, right, left). Words from people of different ages. Two equal parts, men and women, contribute to our speech dataset which is used to train and test proposed deep neural networks. Collect data in different places in the street, park, laboratory and market. Words ranged in length from 1 to 1.30 seconds for thirty people. Convolutional Neural Network (CNN) is applied as advanced deep neural networks to classify each word from our pooled data set as a multi-class classification task. The proposed deep neural network returned 97.06% as word classification accuracy with a completely unknown speech sample. CNN is used to train and test our data. Our work has been distinguished from many other papers that often use ready-made and fairly consistent data of the isolated word type. While our data are collected in different noisy environments under different conditions and from two types of speech, isolated word and continuous word.

Impact and Mechanical Properties Modifying for Below Knee Prosthesis Socket Laminations by using Natural Kenaf Fiber

Sumeia A Mechi *, Muhannad Al-Waily **

Abstract: Material properties that can be done to show a smooth and constant change starting with one surface then onto the next, along these lines taking out interface issues and alleviating concentrations of thermal stress. In the present work, a polymeric composite with functionally graded mode and their deflection behavior were studied using analysis through Finite element analysis via ANSYS 16.1 and visual basics 6.0 language depending on Mori Tanka formula and classical laminated theory in order to decide the stiffer material under flexural load. The proposed tests were essentially using the square plates under static uniform stress. The two kinds of composites were involved in a paired of materials with constant volume fraction. The outcomes revealed that stiffness of FGM less than laminate composite.

Key words: FGM, Laminate, ANSYS, Visual basic, Flexural.

Numerical investigation of flexural strength for functionally graded composite and laminated composite material

Ahmed fadhil hamzah1, ammar emad al-kawaz2, mustafa baqir hunain3

Abstract: Material properties that can be done to show a smooth and constant change starting with one surface then onto the next, along these lines taking out interface issues and alleviating concentrations of thermal stress. In the present work, a polymeric composite with functionally graded mode and their deflection behavior were studied using analysis through Finite element analysis via ANSYS 16.1 and visual basics 6.0 language depending on Mori Tanka formula and classical laminated theory in order to decide the stiffer material under flexural load. The proposed tests were essentially using the square plates under static uniform stress. The two kinds of composites were involved in a paired of materials with constant volume fraction. The outcomes revealed that stiffness of FGM less than laminate composite.

Key words: Below Knee, Prosthetic Socket, impact test, Natural Fibers, Mechanical Properties

A New Suppression approach of FWM Crosstalk Effect in Optical Communication Link based on Polarization combiner Method

Nidhal A. Mohammed 1 Haider J. Abd 2*

Abstract: To meet the growing needs of internet data, optical communication systems have become the backbone of modern communications networks. At the present time, the dense wavelength division multiplexing (DWDM) technique has been used to increase the number of channels, but the nonlinear effects have a great impact that limits the performance of doubling the DWDM system. The four wave mixing (FWM) is the most harmful and dangerous as the effect of FWM increases on the system the greater the optical connection distances. The new approach of pairing groups of different optical signals was investigated to suppress the FWM effect. The simulation was conducted for an 8-channel system with a total data rate (80Gb/s). A comparative study was conducted on the suppression of FWM by the difference in the power inputs (-0.5 to 20) dBm. The robustness of the proposed technique was examined using two forms of modulation (Carrier Suppressed Return to Zero (CSRZ) and Duo Binary Modulation class -1(DBM-1)) techniques, with

optical fiber system of (1,2,5) spans, each of length 60 Km, with spacing between the channels 50GHz. The power of FWM was significantly reduced with the CSRZ & DBM-1 techniques to less than (47.97%, 41.38 %) respectively, at an input power of 12.5 dBm. The performance of the proposed system with the polarization technique was improved by the rate of the quality factor (Q-factor of (91.59%, 78.67%) for the same sequence of modulation.

Key words: Polarization combiner, Modulation Formats, Q-Factor, FWM, Nonlinear effect, DWDM