



**2<sup>nd</sup> Proceeding**  
INTERNATIONAL CONFERENCE  
for Physics and Applied Science

وقائع

المؤتمر العلمي الدولي الثاني  
للفيزياء والعلوم التطبيقية

College of Education - Mustansiriyah University

Baghdad - Iraq  
26-27 MAY 2021



**2<sup>nd</sup>** ICPAS  
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(College of Education - Mustansiriyah University)

Baghdad - Iraq

26-27 MAY 2021



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# 2<sup>nd</sup> International Conference FOR PHYSICS AND APPLIED SCIENCE



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ICPAS-2021 Welcomes Submissions on Original Contributions are solicited on topics covered under broad areas such as (but not limited to):

Physics and Applied Physics	Computational and Quantum Systems
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# Track 1

# Physics and Applied Physics



## Synthesis of ZnO: Sb thin films Dropped on glass and Porous Silicon for CO Gas Sensing

Rashid Hashim Jabbar, Shurooq Jasim Jabbar,  
Warqa Adnan Shakir, Mudar Ahmed Abdulsattar,  
Israa Hadi Hilal

**Abstract.** Membranes Structural properties have been studied using XRD and compare the different values of the average crystallite size by using correction equations. undoped ZnO and ZnO: Sb for (0.5- 2) % membranes has been dropped on glass and p-type porous silicon (PS) substrate at 400 °C to use it as a sensor for CO gas. The crystal growth of the films that were deposited on the PS was not uniform due to the nature of the PS surface and due to the breakage of the crystal structure of the membrane material. the sensitivity of membranes dropped on (PS) for CO gas was higher than on glass substrate.

**Keyword:** ZnO: Sb; PS; membranes; CO.

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## Influence of copper addition on the properties of equiatomic NiTi shape memory alloy prepared by vacuum induction melting method

Safa H. Mohammed, Mudhafar A. Mohammed, Ali  
A. Aljubouri, Sara H. Shahatha

**Abstract.** In this study the effect of Cu addition on the phase transformation behavior, microstructure, and micro hardness of equiatomic Ni-Ti shape memory alloy was investigated. NiTiCu SMA prepared with the composition (52.119 % at. Ni, 41.731% at. Ti and Cu 6.15 % at.) and compared with the properties of the equiatomic NiTi SMA with composition (50% at. Ni, 50% at. Ti). Vacuum induction melting method used in the preparation of Both SMAs. The Differential Scanning Calorimetry, Scanning Electron Microscope, X- ray Diffraction Analysis, optical microscope and vicker's microhardness test was used to investigate the characteristics of the equiatomic NiTi and NiTiCu SMAs. The results revealed that when Cu element was added the phase transformation temperatures decreased below body temperature. NiTi matrix phase and Ti<sub>2</sub>Ni secondary phase exist in both SMA samples, also Cu-rich phase appeared in NiTiCu SMA and this is one of the reasons that lead to increasing the microhardness of alloy when Cu element was

added. The value of equiatomic NiTi increases from 238.74 to 329 when Cu element was added (for NiTiCu alloy) after heat treatment.

**Keyword:** shape memory materials, NiTi shape memory alloys, DSC, XRD, phase transformation

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## Plasma – Assisted Growth of MnO<sub>2</sub> Nanostructures for Sensing Application

Muzahim A. A. Al.amery, Asmiet Ramizy , Najat A.Dahham

**Abstract.** The limited research based on the prepare of a MnO<sub>2</sub> gas sensor on silicon and the testing of its sensitivity to targeted gases such as the CO<sub>2</sub> gas adopted in this work has led us to prepare and prepare such important sensors in human daily life. Initially, three different co<sub>2</sub> concentrations were selected: (1.49ppm, 5.8ppm, 21.8ppm) we found that the best allergic ( $S = 98.28$ ) was from the focus share (21.8ppm). This focus was worked and we also studied the amount of allergic to different temperatures 50.10° and the response time and recovery time were set for both thermal degrees, the best sensitivity was (97.22) for the sensitivity of the gas manufactured from porous silicon at a temperature (100° C) With a short response time of (10.21sec) and a shorter recovery time at (9.1sec) all this work after the thin membrane was deposited on a slice of porous silicon type n and performed visual tests represented by UV-vis that showed that emissions occurred in the region Ultraviolet close to the electromagnetic spectrum and the optical energy gap was identified using this technique was equivalent to 3.88eV. The photosynthesis technology showed a clear peak at 324nm wavelength. There was a significant convergence in the amount of the optical energy gap calculated by this technique of 3.73nm compared to the value of the optical power gap resulting from UV-vis, which was equal to 3.88eV. The results of the Raman spectroscopy test confirmed the acquisition of the thin four-angle MnO<sub>2</sub> membranes resulting from the vibration of one type of atoms, as the displacement of Raman appeared at the highest intensity corresponding to the wavenumber of these thin membranes 512cm<sup>-1</sup>. The synthetic examinations represented by both the atomic force microscope for the study of the topography of the thin membrane recorded proved that the thin membrane is characterized by high roughness and granular vertical growth, and the square root of the square of the average roughness square has been calculated, granular volume rate 30.68nm, deviation 6.768nm, increase in surface area 4.446nm, surface thickness 46.78nm and this large surface roughness of the membrane surface has increased

the sensitivity of the gas sensor. Then came the role of using FESEM technicians, the results of which came after the tests that the membrane is characterized by the dense random and compressed distribution of semi-spherical nanoparticles and a nanosize rate of about 33.58nm using ImageJ. Finally, the pattern of x-ray diffraction that the membrane formed with a quadruple-angle, monolithic and high-crystallization composition, the degree of crystallization was 70.25, and the granular size was found according to Shearer's image from the pattern data of the pattern of the dehydration has been calculated and is equivalent to 31.81nm.

**Keyword:** MnO<sub>2</sub>, Porous Silicon, Photoluminescence, FESEM, gas sensor.

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## Investigation of properties of selective Laser sintering of Titanium alloy composite

**Ghassan Hassan Abdul Razzaq, Saad A Jafar and Jasim I Humadi**

**Abstract.** A wide range of material utilized in Selective Laser Sintering (SLS) method opens the research thrust in the Additive Manufacturing (AM) or Solid Freeform Fabrication (SFF) technology for the researchers There are many works done on materials like polymer metal composite ceramics & sand under SLS method to enhance the quality & mechanical properties of parts described through optimizing the process parameters Still there is a wide scope to optimize the SLS process parameters which are using materials such as sand ceramics & metals Also among the different response variables available the impact of surface roughness on SLS stainless steel metal parts & the quality of sand mould casting parts have not yet been analyzed Further if the gap of the influencing process parameters on different materials is fulfilled, the operator can easily utilize the SLS process before carrying out the actual process The main objective of this s focuses on the design & investigation of SLS process parameter & final part properties Also a manual suggestive process parameter selection methodology has developed for the laser sintering processes.

**Keyword:** Algorithm, Laser sintering, titanium alloy.

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## Evaluation of Entrance Surface Air Kerma in Patients During PA Chest Radiography Using CALDose Program in Al Najaf Governorate Hospitals

Hussien Abid Ali Mraity (PhD), Mustafa Kadhum AL Aseebee1b

**Abstract.** Due to its value in providing diagnostic information, large Figure of chest X-rays conducted everywhere. This therefore necessitate assessing patients' dose to avoid any potential harm. This work is aimed at evaluating the Entrance Surface Air Kerma (ESAK) for adult patients undergoing chest radiographic examination (posterior - anterior (PA)) in Al Najaf (Iraq). The ESAK were evaluated for 186 patients utilizing CALDose program. The tube output measurements were carried out using Rad-Check dosimeter. Patient demographic data was also recorded (height and weight). Nine X-ray units were considered in this research (i.e. Al-Furat hospital (AFH), Al Sajad General Hospital (ASGH), Al-Hakeem hospital (AHH), Al-Zahra hospital (AZH), Al-Sadder hospital (ASH), Al Hydria General Hospital (AHGH), Middle Euphrates cancer center (MECC), Al Manzrah General Hospitals (AMGH) and Al Mishkhab Hospital (AMH)). The resulted data revealed that the ESAK for the considered hospitals AFH, ASH, ASGH, AHH, AZH, AHGH, MECC, AMGH and AMH are 0.67, 0.069, 0.59, 0.05, 0.79, 0.76, 0.48, 0.21 and 0.18, respectively with an overall average of  $0.425 \pm (0.299)$  mGy. In AZH, the ESAK was generally higher than those of other X-ray units of this study. Finally, performing a regular quality control (QC) checking with dose audit is largely advised.

## Effect of Adding Titania and Alumina on the Bioactivity Properties of Porous Hydroxyapatite via Replication Method for Bone Reconstruction

Sara H. Shahatha , Mudhafar A. Mohammed , Safa H. Mohammed And Lina Mohammed Jaffer

**Abstract.** In this investigation, Hydroxyapatite/Titania and hydroxyapatite/Alumina porous composites at five various proportions were manufactured by replication method A.K.A the polymeric sponge method. HAp powder was fabricated by a "solid-state reaction" in molar proportion between (TCP)Tri calcium phosphate and Ca(OH)<sub>2</sub> Calcium hydroxide. The microstructures were examined by utilizing (XRD), (SEM) and EDX". Incubated for thirty days in SBF (Simulation Body Fluid), a thin layer like apatite formed

completely on a bone specially on the surface of the samples was.. There's a very low degeneracy degree when amount of the reinforcements materials increased..

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## Controllable synthesization of Au nanoparticles by laser enhanced wet KOH etching process

Alwan M.Alwan, Ali A.Youssef and Aseel A.Chasb

**Abstract.** In Si substrate, anisotropic KOH etchants are mainly utilized to form pyramids like on the Si surface . However, this process is not well controlled way owing to the different and random etching pathway. In this work, we applied laser radiation during the anisotropic KOH wet etching process to modifies the topographical properties of Si substrate, as an efficient ,simple and low cost texturing process for Si substrate. This approach employs different laser wavelength to modify the topographical features from a crater like structures to Si nanocrystallites in the form of pillars like structures on the Si surface. In order to investigate the formation of plasmonics species, gold nanoparticles was incorporated into Si surfaces by simple ion reduction process. The Si topographical features was studied with atomic scanning microscopy (AFM) images of Si before and after laser irradiation process. The irradiation with 405 laser wavelength, show the formation of thin and high density of Si nano pillars-like structures compared with more thick depther Si nano pillars like structures layer.

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## Spectroscopic diagnostic and structural characterization for (Selenium, Zinc oxide and Manganese oxide) prepared by laser induce plasma

Kadhim A. Aadim and Rafal H. Jassim

**Abstract** In this paper, the plasma parameters of the three materials (selenium, zinc oxide, and manganese oxide) were calculated using laser induced breakdown spectroscopy, where the plasma is generated by this technique through the interaction of the laser with the solid target and the calculation of the electron temperature and electron density. Also, the structural properties of the prepared thin films were studied. It was found from the standards that the crystal size (XRD) of the three materials decreases with increasing

energy, and this corresponds to measurements of (AFM) where the average diameter decreases with increasing energy

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## The Effect of Non-Thermal Plasma on the Topographical and Optical Constants of Cd Doped ZnO Thin Films

**Khudheir A Mishjil, Ali H Abdulsada , Hayfa G Rashid, Hamid H Murbat and Nadir F Habubi**

**Abstract** Nanostructured ZnO and Cd doped ZnO were deposited employing spray pyrolysis technique. Atomic force microscope and double beam spectrophotometer were utilized to study the influence of non-thermal plasma on topographical and some optical constants. AFM results indicate that the average diameter was 43.4-68.81 nm before exposure and their values were slightly influenced by exposure to plasma to be 42.74-69.25 nm and all the results indicate the deposited films have a nanostructure. Surface roughness  $R_a$  and root mean square roughness  $R_{rms}$  were in the ambit of (2.09-5.3 nm), (2.43-6.12 nm) before exposure to plasma, while their values were in the ambit of (2.09-5.3 nm), (2.58-10.3 nm) after the influence of plasma. Optical constants such as absorbance were increased with the increment of Cd content, the same trend was noticed after exposure to non-thermal plasma. High absorbance was seen near 400 nm. Whereas extinction coefficient, refractive index show a decrement with the increment of Cd content before and after exposure to plasma. Reflectance also offers the same trend of the above optical constants, a comparatively low reflectance is shown for the pure ZnO thin films before and after exposure. Finally, all the studied parameters were influenced by plasma exposure.

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## Properties and Biomedical Applications of Hydrothermal method Synthesized of Vanadium Oxide nanoparticles

Saif Altimime , Sundus Q. Mohammed , Majid H. Hassoni, Ahmed N. Abd

**Abstract** Vanadium oxide thin films were successfully prepared hydrothermally and deposited on a substrate using the drop casting method. Analytical techniques such as XRD, AFM, (SEM) analyses, Ultraviolet-Visible (UV-Vis), PL, and FTIR measurements were used to confirm the characterization of the prepared vanadium oxide NPs. The XRD measurements show that the VO<sub>2</sub> thin film was polycrystalline, with a (monoclinic) phase and crystallite size calculated using Scherrer's equation, as well as dislocation density and microstrain. The optical properties show that the energy gap (4.49) eV, and depending on PL, a single sharp emission peak was found at location 350 nm (3.54 eV). The Antibacterial activity of the vanadium oxide nanoparticles were investigated, with inhibition zone Escherichia coli (17) mm, Staphylococcus aureus 20 mm, Bacillus subtilis 18 mm, and Klebsiella pneumonia 19 mm and Candida isolates 15 mm. The study confirms that the prepared VO<sub>2</sub> samples can be used as an antibacterial agent. The results suggest that proper tuning can make them a good antimicrobial agent.

**Keyword:** Vanadium dioxide, thin film, Hydrothermal, Antibacterial Activity

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## Controlling a chaotic anti-synchronized oscillator by a phase interplayed optical injected seed with an FBG Sensor

Ayser A. Hemed, Zainab Rashid Ghayiband Hayfa Ghazi Rashid

**Abstract.** In this simulation study, a fiber Bragg grating (FBG) sensor is used to partially separate a signal emitted from a laser diode (LD1), which is originally modulated with a noise source. Separation done into two parts; reflected, in which a phase is interplayed (similarly to Michelson interferometry) in order to make it differ than that passed without reflection. The two separated signals, remixed again with themselves and additionally add to a third signal came from second laser diode (LD2), which is also modulated with a noise source furthermore to a frequency message. Output signal resulted from this interferometry, originally based on two self electro optic effect devices (seed) undergoes external optical injection. Thus these two oscillators follow anti-synchronization within their emission. Observation and analyses was based on determination for their final output spectra from periodic to chaotic. FBG sensor used in this experiment is play a role of

temperature (T) and/or Stress (S) controlling to the incident signal for LD1. Results shows that LD1 signal cannot modify output final signal, unless several parameters are carefully tuned. These parameters are; LD1 seed, LD2 seed, LD1 phase (filtering with FBG). These results approve novel application for operating sensors in parallel to optical communications in order to satisfy the application of high level security with two antisynchronized lasers within one chaotic transmitter.

**Keyword:** Chaotic Dynamics, Coupled Mode Theory, Fiber Bragg Grating, Interference, Optical Injection, Self Electro Optic Effect, Anti-Synchronization

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## Atmospheric stability classes and its effect on CO concentration emission around Kirkuk refinery

Sajjad H Saleh and Ahmed F Hassoon

**Abstract.** Atmospheric stability defines as the atmospheric tendency to reduce or intensify vertical motion, in other words, suppress or enhance existing turbulence, thus atmospheric stability play important role in transport and dispersion of air pollutant. In This study relationship between air pollutant of CO gases in 2019 resulted from burning three types of fuels (fuel gas, gas oil, naphtha) in 8 production units inside Kirkuk refinery (located in north-east of Iraq), and atmospheric stability analysis in different directions to know the effect of atmospheric stability classes on the emission of CO poison gas. Atmospheric element such as wind speed, cloud amount and solar altitude used by the Turner method to calculate seven stability classes, these classes are compared with CO pollutant at a different distance from the source point. From samples taken from stacks and fuels burned in a refinery, emission rate and exist velocity from 11 stacks calculated and used to estimated CO gas by Gaussian equation for dispersion at two months (January, July) in 2019. The comparison values of the concentrations with the distances from the point source for January and July was carefully examined, as it was noticed that the concentrations during the month's classes B and F varieties in percent between January and July reach %120 - %170, while in the rest classes C, D, and G were close to 80% it decreases with the distance through (1000m– 10000m) by 81% - 59%, in Class A and E There is a difference in one of the two months.

**Keyword:** Stability Classes, CO concentration, Emission rate, Kirkuk Refinery.

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## Enhanced Optical Characteristics and Low Energy Gap of SrTiO<sub>3</sub> Doped Polymeric Blend for Optoelectronics Devices

Abeer Ghalib Hadi, Zainab Al-Ramadhan  
and Ahmed Hashim

**Abstract.** Films of PVA/PAA/SrTiO<sub>3</sub> nanostructures were prepared for flexible optoelectronic devices. Studying the optical characteristics of PVA/PAA/SrTiO<sub>3</sub> films were tested. The results showed the improving of the optical characteristics of (PVA/PAA) mixtures by the increase in SrTiO<sub>3</sub> NPs content. Also, results showed the energy gap of PVA/PAA mixtures decreased from to with adding of SrTiO<sub>3</sub> NPs. Finally, the results indicated to the PVA/PAA/SrTiO<sub>3</sub> nanostructures may be used in various optoelectronic devices.

**Keyword:** PAA, energy gap, SrTiO<sub>3</sub>, PVA, absorbance.

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## Controlling a chaotic anti-synchronized oscillator by a phase interplayed optical injected seed with an FBG Sensor

Ayser A. Hemed, Zainab Rashid Ghayib and Hayfa Ghazi Rashid

**Abstract.** In this simulation study, a fiber Bragg grating (FBG) sensor is used to partially separate a signal emitted from a laser diode (LD1), which is originally modulated with a noise source. Separation done into two parts; reflected, in which a phase is interplayed (similarly to Michelson interferometry) in order to make it differ than that passed without reflection. The two separated signals, remixed again with themselves and additionally add to a third signal came from second laser diode (LD2), which is also modulated with a noise source furthermore to a frequency message. Output signal resulted from this interferometry, originally based on two self electro optic effect devices (seed) undergoes external optical injection. Thus these two oscillators follow anti-synchronization within their emission. Observation and analyses was based on determination for their final output spectra from periodic to chaotic. FBG sensor used in this experiment is play a role of temperature (T) and/or Stress (S) controlling to the incident signal for LD1. Results shows that LD1 signal cannot modify output final signal, unless several parameters are carefully

tuned. These parameters are; LD1 seed, LD2 seed, LD1 phase (filtering with FBG). These results approves noval application for operating sensors in parallel to optical communications in order to satisfy the application of high level security with two antisynchronized lasers within one chaotic transmitter.

**Keyword:** Chaotic Dynamics, Coupled Mode Theory, Fiber Bragg Grating, Interference, Optical Injection, Self Electro Optic Effect, Anti-Synchronization

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## A Simplified and Comprehensive Approach to Characterize Photovoltaic Cell Performance

**Mohammed Rasheed, Mustafa Nuhad Al-Darraji, Suha Shihab, Ahmed Rashid and Taha Rashid**

**Abstract.** In the present work, we present two numerical algorithms in order to solve an equation of PV cell one-diode model using two suitable approximations; Double False Position (FPM) and Classic Chord (CCM) algorithms. The new proposed method requires two iterations of the nonlinear function. The progress of the proposed algorithm is based on CCM. The proposed method Double False Position Method requires two steps per iteration. The results obtained explain that the suggested algorithm is easy to use, efficient and more accurate than other numerical methods are introduced.

**Keyword:** Double False Position Method; Classic Chord method; zeroes; load resistance; PV cell.

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## Solar PV Modelling and Parameter Extraction Using Iterative Algorithms

**Mohammed Rasheed, Mustafa Nuhad Al-Darraji, Suha Shihab, Ahmed Rashid and Taha Rashid**

**Abstract.** In the present work, improvement of Newton's method with high order convergence has been suggested. This improvement is based on Two-Point Bracketing method. The proposed method Inverse Quadratic Interpolation method requires two steps

per iteration. By means of the numerical equation of the one diode model of PV equivalent circuit, included five values of R from 1 to 5 ohms (load resistance of the circuit). The results obtained explain that the new suggested technique is easy to use, more accurate and efficient than other numerical methods are presented here.

**Keyword:** Inverse Quadratic Interpolation method; Two-Point Bracketing method; equivalent circuit; zeroes; single diode.

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## The numerical Calculations of Single-Diode Solar Cell Modeling Parameters

Mohammed Rasheed, Mustafa Nuhad Al-Darraji,  
Suha Shihab, Ahmed Rashid and Taha Rashid

**Abstract.** In this paper, we suggest and analyze two algorithms; a new Inverse Quadratic Interpolation and Illinois for solving nonlinear equation of a solar cell single diode type with initial value  $x_0$  and load resistance R varies from 1 to 5  $\Omega$  is implemented in MATLAB program. Using five numerical testes examples, the results secured reveal that the suggested algorithm has lesser iterations than the other method (Illinois method), so the accuracy and efficiency of the proposed method is the best.

**Keyword:** Inverse Quadratic Interpolation method; Illinois method; nonlinear equation; roots; iterative methods.

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## Synthesis and characterization of metastable phases of SnO and Sn<sub>3</sub>O<sub>4</sub> thin films for solar cells applications

Suha.A.Fadaam, Hiba M. Ali, Ayad.Ahmed.Salih,  
Maithm.A.Obaid, Ali Sabeeh Ali and Nadir F.Habubi

**Abstract.** Meta stable phase of SnO as stoichiometric compound is deposited utilizing thermal evaporation technique under high vacuum onto glass and p-type silicon. These films are subjected to thermal treatment under oxygen for different temperatures (150, 350 and 550 °C). The Sn metal transformed to SnO at 350 °C, which was clearly seen via XRD measurements, SnO was transformed to a nonstoichiometric phase at 550 °C. AFM was used to obtain topography of the deposited films. The grains are combined compactly

to form ridges and clusters along the surface of the SnO and Sn<sub>3</sub>O<sub>3</sub> films. Films were transparent in the visible area and the values of the optical band gap for (150 ,350 and 550 °C ) 3.1, 2.7and 2.4 eV respectively. AFM shows that the granular size of all films increases by increasing the oxidation temperature. The PL emission results were matched the results of the optical energy gap. The solar parameters for the three phases are studied to obtain the efficiency , which were found to be 2%, 3.7% ,5.1

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## Improving the Optical Properties of PVA/PEG Blend Doped with BaTiO<sub>3</sub> NPs

Batool Mohammed, Hind Ahmed and Ahmed Hashim

**Abstract.** In this paper, synthesis in PVA/PEG/BaTiO<sub>3</sub> new nanocomposites was investigated to use in various optoelectronics fields. The PVA/PEG/BaTiO<sub>3</sub> nanostructures prepared from PVA/PEG blend with various ratios of BaTiO<sub>3</sub> NPs. The optical characteristics of synthesized PVA/PEG/BaTiO<sub>3</sub> nanostructures have studied. Results indicated that the optical characteristics of PVA/PEG improved as BaTiO<sub>3</sub> NPs ratio increase, this behavior makes it may be used in different electronics and photonics fields.

**Keyword:** nanostructures, BaTiO<sub>3</sub>, photonics fields, PEG, optical characteristics.

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## Determining the excitation energies of <sup>68</sup>Ni Nucleus a Function of the Coupling Angle By Means of Modified Surface Delta- Interaction

Dalal Naji Hameed and Ali Khalaf Hasan

**Abstract** In this paper, the nuclear shell model SM was applied to study the energy levels of the nucleus the effect of orbit on energy levels was studied ,we consider the residual

interaction to be modified surface delta interaction MSDI .We have studied the excitation energies of the  $^{68}\text{Ni}$  a nucleus, which contain two neutrons outside closed shell of the  $^{66}\text{Ni}$  . the computation of eigenvalues of  $^{68}\text{Ni}$  is performed in the frame of  $(1p_{1/2} 0g_{9/2})$  and  $(1p_{1/2} 0g_{9/2} 0d_{5/2})$  , we search the effect of the orbital  $0d_{5/2}$  on the energy levels. The energy levels and angular momentum of all possible cases were investigated. Thus , we have worked on a theoretical process to discover the relation between the energy levels and the classical coupling angle  $\theta_{a,b}$  at different orbital within neutron - neutron interaction . Accordingly, We have noticed that the energy levels manifest to follow two inclusive functions , which depend on the classical coupling angles, but are not constrained of angular momentum I . In conclusion, we conclude that our results agree with the experimental data.

**Keyword:**. Shell model, modified surface delta interaction ,  $^{68}\text{Ni}$

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## The Novel Refractive Index for Optical Coating Applications

Rand H Ali, Kadhim A Aadim , and Alaa N Abd Algaffar

**Abstract** In this work, an attempt to produce a novel refractive index using mixing dielectric material. Composed of ZnS and MgF2 with a different concentrate ratio using a pulsed laser deposition (PLD) technique. The effect of shots and energy were studied. Resulting indicate that flexibility refractive indexes can be obtained with optimum optical performance for optical coating application.

**Keyword** Mixed dielectric material coating, PLD, Lorentz-Lorenz theory, dispersion phenomena, ARCs.

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## On Some Types of Proximity $\psi$ –set

Y K ALtalkany, and L A A AL-swidi

**Abstract** Various forms of  $\psi$ - set corresponding to different cases of spaces were introduced in a previous studies and The relationships among them therefore the focus of the study in this paper is the nature of the effects that can be obtained by using proximity

spaces when studying this type of set by investigated a new class of sets called  $\psi_\delta$ -set and  $F\psi$ -set in  $i$ -topological proximity spaces.

**Keyword** focal function, focal closure,  $i$ -topological proximity space,  $\psi_\delta$ -set,  $F\psi$ -set

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## Characterization study of Optical Fiber Refractive Index Sensor Based on Fabry-Perot Interferometer

Nisreen Abdul-Jabbar, Shehab A. Kadhim , Intisar A. Naseef

**Abstract** In this work, an optical fiber refractive index sensor based on the Fabry-Perot interferometer technique is submitted. Single-mode fibers with different diameters (125, 60, and 50)  $\mu\text{m}$  were used. The chemical etching technique is used to reduce the fiber diameters. The sensor heads were immersed into liquids of different refractive indices. Two types of liquids were tested, salty and sugary liquids with different refractive indices. From the obtained results all the sensors have a high linearity and good wavelength and intensity sensitivity. For all tested sensors, the wavelength sensitivity was higher for sensors immersed in salty liquids. The sensitivity is 34338 pm/RIU for sensors with a diameter of 50  $\mu\text{m}$ . The response of changing the intensity is also observed the higher intensity sensitivity is 1116.859  $\mu\text{W}/\text{RIU}$  for sensors with a diameter of 125  $\mu\text{m}$  immersed into sugary liquids.

**Keyword** Optical Fiber Sensors, Refractive Index, Fabry –Perot Interferometer, Micro-fibers

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## Temperature dependence of electrical and optical characteristics of InAsP laser diode

Ivan B. Karomi Yasir Y. Kassim, Hisham A. Salih, Mohammed S. Al-Ghamdi

**Abstract.** In this article, we report experimental investigations on the current-voltage (I-V) and the current-power (I-P) characteristics of 3mm cavity length InAsP/GaAs QD laser diode emitting at 773nm over a wide temperature range of 150-400 K. The results of the (I-V-T) measurements showed a decrease in the turn-on-voltage of the sample by (-3.52

mV/K) as well as a decrease in the dynamic resistance by (-4.9 mΩ/K). Conversely, the (I-P-T) measurements strongly exhibited the temperature dependence of the threshold current density above 300 K, whilst the characteristic temperature ( $T_0$ ) of the laser diode was calculated to be between 250 - 370 K as ( $T_0 = 70.4$  K). Moreover, the external differential quantum efficiency ( $\eta_{\text{d}}^{\text{ext}}$ ) decreases by (- 0.14% /K) from 190 to 300 K. The increases in  $\eta_{\text{d}}^{\text{ext}}$  of above 300 K, was observed. This opens the door for further investigations in this material such as carrier distribution and gain measurements.

**Keyword:** nanostructures, BaTiO<sub>3</sub>, photonics fields, PEG, optical characteristics.

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## Estimation of the reliability function of the Rayleigh distribution using some robust and kernel methods

**Thaer Hashim AbdulMuttaleb, Hayder Raaid Talib**

**Ali Hamdullah Ahmed**

**Abstract** The research presents the reliability. It is defined as the probability of accomplishing any part of the system within a specified time and under the same circumstances. On the theoretical side, the reliability, the reliability function, and the cumulative function of failure are studied within the one-parameter Rayleigh distribution. This research aims to discover many factors that are missed the reliability evaluation which causes constant interruptions of the machines in addition to the problems of data. The problem of the research is that there are many methods for estimating the reliability function but no one has suitable qualifications for most of these methods in the data such as the presence of anomalous values or extreme values or the appropriate distribution of these data is unknown. Therefore, the data need methods through which can be dealt with this problem. Two of the estimation methods have been used: the robust (estimator M) method and the nonparametric Kernel method. These estimation methods are derived to arrive at the formulas of their capabilities. A comparison of these estimations is made using the simulation method as it is implemented. Simulation experiments using different sample sizes and each experiment is repeated (1000) times to achieve the objective. The results are compared by using one of the most important statistical measures which is the mean of error squares (MSE). The best estimation method has been reached is the robust (M estimator) method. It has been shown that the estimation of the reliability function gradually decreases with time, and this is identical to the properties of this function.

**Keyword** Mixed dielectric material coating, PLD, Lorentz-Lorenz theory, dispersion phenomena, ARCs.

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## Quantitative Analysis of heavy metals in gallstone Using LIBS

Hawraa J. Naser, Tagreed K. Hamad

**Abstract** Concentrations of heavy metals in gallstones samples gathered from different hospital were estimated via laser induced breakdown spectroscopy (LIBS ).Quantitative and qualitative analysis of the gallstone samples were achieved by using the locally developed LIBS set up equipped with Nd: YAG laser (Q-switched) at 1064 nm, pulse duration 9 ns and pulse energy 300 mJ .Quantitative analysis was performed for Cr, Cd, Zn, Pb, Cu and As based on calibration curve constructed from the correlation between the intensity of the LIBS emission lines and the concentration of each element measured by AAS. It was noticed that the percentage of copper, zinc, and manganese was higher in pigment samples higher than in mixed samples, and that it was not present in the cholesterol samples. However, chromium and cadmium elements were present in a high percentage in cholesterol samples and higher than other types of gallstones. The most important conclusion was that heavy elements such as Pb and As were present in the samples of smoking patients. The relative errors for all samples were in the range of (1.5-7.8) %.

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## A statistical study of 90-MeV proton events during the rising phase of solar cycle 23 observed with SOHO/ERNE

Amjad Al-Sawad, Silja Pohjolainen, Timo Laitinen, and

Kalle Huttunen- Heikinmaa

**Abstract.** To understand what kind of solar or interplanetary events are capable of producing solar energetic particle (SEP) events with proton energies  $> 90$  MeV, and where and when acceleration of such protons starts.Methods. We have selected 40 energetic proton events with intensities  $> 10^{-3} \text{cm}^{-2} \text{sr}^{-1} \text{s}^{-1} \text{MeV}^{-1}$  at 93.8–94 MeV, detected by the Energetic and Relativistic Nuclei and Electrons (ERNE) instrument onboard SOHO during solar cycle 23, in 1997–2003. We have estimated

the first injection times of the particles using two different methods, the fixed path length method (1.2 AU) and the velocity dispersion analysis (VDA). We evaluated the injection time results by comparing each method (Fixed and VDA) to the estimated height of radio type II/IV burst emission, and then compared the estimated times and heights with related flare and coronal mass ejection (CME) characteristics. Results. We find that all the analysed proton events were associated with CMEs and 27 of the proton events were associated with on-the-disk soft X-ray flares. Of the 13 other events, six did not have a GOES flare reported but in eleven events evidence exist of behind-the-limb flaring. Only two events were void of any flare signatures. Radio type II/IV burst emission association was also significant. Of the non-associated two events, only one was completely void of radio emission and one showed metric continuum and tilted type III burst lane emission. Most of the first protons were injected when the CME leading edges were below 5 solar radii, and most of the protons reached their maximum intensity while the CMEs were above 10 solar radii. The maximum proton intensities were achieved much earlier than the possible passage of an interplanetary shock near Earth, suggesting that the majority of high-energy protons at 90 MeV were accelerated as a result of earlier processes. In roughly half of the events the CME front was above the estimated type II burst location. We suggest that in these cases the type II bursts may be related to CME interaction processes and shocks at the CME flanks.

**Keyword:** Sun: coronal mass ejections (CMEs) – Sun: flares – Sun: corona – Sun: acceleration of particles

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## Construction and spectral characterization of the gliding arc reverse vortex flow plasma system at atmospheric pressure

**Farah A. Lazem, Hammad R. Humud , Mohammed J. Alwazzan**

**Abstract.** In this paper, a low-cost reverse-gliding arc three-dimensional reactor with local materials and a homemade voltage source was proposed. This system works by pumping out argon gas while mixing in atmospheric air. The spectral properties of the resulting arc were investigated, as well as the calculation of electron temperature and density. The process of mixing air with argon gas is a novel method for obtaining nitrogen gas at a low cost and with ease of access. Nitrogen gas has numerous applications, and the findings are promising for future applications.

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## Design and Evaluation of Homogeneously Mixed Dielectric Antireflection Coatings with ZEMAX

Hayfa G Rashid, Khudheir A Mishjil, Hussian T. Hassim, Alaa N Abd Algaffar, Nadir F Habubi

**Abstract.** Mixed dielectric films of ZnS and MgF<sub>2</sub> have been modeled in IR (3-5 $\mu$ m) band to reduce a reflectance from ZnS substrate which is around 14%. Reflectance value are enhanced starting from a mixed quarter single layer, double and triple layer as innermost and intermediate layers (quarter-quarter-quarter) and (quarter-half –quarter) ARC's. The designed layers are optimized with Zemax-EE operand to reach the target by varying their thickness and refractive indices simultaneously . The analysis has shown that the proposed mixing multilayer construction are very effective in enhancing the transmittance for ZnS.

**Keyword :** Mixed dielectric films, ARC's coatings, Zemax software , Lorentz-Lorenz theory , Drude dispersion theor

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## Green Synthesis, Characterization and Antimicrobial activity of CuO nanoparticles (NPs) Derived from Hibiscus sabdariffa a plant and CuCl

Ehab Mohammed Ali , Khetam H.Rasool, Wedian K. Abad, Ahmed N. Abd

**Abstract.** This study was the synthesis of CuO NPs) using Hibiscus sabdariffa plant extracts and CuCl. Copper Oxide CuO prepared by simple a chemical method. Analytical techniques such as Ultraviolet-Visible (UV-Vis), XRD and SEM (XRD analyses confirmed the characterization of the prepared CuO NPs. (XRD) measurements that the (CuO) thin film was poly-crystalline, and there is no trace of the other material. Crystallite sizes 18.99nm calculated using the Scherrer's equation. SEM was used to estimate the average diameter CuO NPs was less than 100 nm. From the optical properties the energy gap was 5eV. This study focused on effect of CuO on the Antifungal and different type of bacterial. CuO had a inhibitory effects against fungal more than bacterial

**Keyword :** CuONPs, Hibiscus sabdariffa plant, Antibacterial Activity, Bacillus, E. coli and Enterobacter.

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## Effect of HCL Molarity on the Properties of PANI/MgO Nanocomposite Thin Films

Sura S. Mohammed, Tariq J. Alwan

**Abstract** In this work PANI/MgO nanocomposite thin films were prepared by situ oxidative polymerisation method under different hydrochloric acid (HCl) molarity. The PANI/MgO nanocomposite thin films were characterized by X-ray diffraction, field emission scanning electron microscope (FESEM) and Fourier transform infrared spectroscopy to study the effect of HCL molarity on structural properties and functional groups for the prepared samples. The electrical properties of the prepared samples were studied, and it was found that the best molarity of the preparation is 1.5M where the conductivity value became 2.25 S.cm<sup>-1</sup>

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## Calculation of ensquared energy of the diffraction-limited optical system with Higher-order parabolic filter

Nada Qasim , Ghada S. Karam , Ali H. Al-Hamadani Rafid A. Haleot, Ziad M. Abood

**Abstract** Mathematical properties of the ensquared energy functions for apodized point-spread function (PSF) are presented. An expression of ensquared energy for the apodized point Spread function of the optical system with a circular aperture was derived using a parabolic apodized filter with a different arrangement  $N = 1, 2, 3, 4$ . The results obtained were discussed graphically.

**Keyword** ensquared Energy, Point Spread Function, parabolic filter

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## Water Pollution Fiber Sensor Based on Surface Plasmon Resonance Technique; Implementation and Characterization

**Maher Khaleel ,Ibrahim, Shehab A. Kadhim , Nabeil Ibrahim Fawaz**

**Abstract** In this work, a single fiber optic fiber was developed as a water pollution sensor based on the Surface Plasmon Resonance Phenomenon based upon the Mach - Zehender Interferometry (MZI) technology. The sensor submitted was developed to detect water pollutants. The SPR sensors were prepared by coating a golden metallic film which thickness 42 nm on a chemically etched single-mode fiber with a thickness of 20 micrometers, which achieved the best results of sensitivity to water pollution, the results of the high sensitivity of the optical fiber sensor were obtained based on the surface plasmon resonance phenomenon. The experimental results showed high sensitivity, reaching 1315 pm/mol.l-1 for a salty solution with distilled water, 1705 pm/mol.l-1 for the salty solution with tap water, as well as 2222 pm/mol.l-1 for sugar solution with distilled water, and 1925 pm/mol.l-1 for sugar solution with tap water. This means that these sensors which are based on SPR could be very useful in the field of water pollution detection.

**Keyword** optical fiber sensors, Surface Plasmon Resonance, evanescent wave, water pollution, MZI.

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## **Effect Hyphal Death On TW BranchingType With Energy**

**Zainab Jafaar , Ali Hussein**

**Abstract** The mathematical model is model show behavior for growth of Tip-tip anastomosis, Tip death, hyphal death and we show the consumption energy. In general, To study the growth of fungus we need to effort , time and money, That's why we use mathematical modeling to shorten the effort , time and mony to get the right result even though there is error ratio. In this paper we will study a mathematical model of branching using the solution of a system of partial equations (PDES). The results of this solution will be describe a success or failure of the growth of the fungus species studied, and we used some codes in numerical analysis because some difficulty in direct mathematical solution.

**Keyword** Tip-tip anastomosis, Tip death, Hyphal death

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## **Transition state application to simulate CO gas sensor of pristine and Pt doped tin dioxide clusters**

**Mudar Ahmed Abdulsattar, Rashid Hashim Jabbar, Hussein H. Abed**

**Abstract.** Carbon monoxide sensitivity of pristine and Pt doped tin dioxide ( $\text{SnO}_2$ ) is investigated in the present work using transition state theory. The use of transition state theory leads to a double exponent function formula for the concentration and sensitivity of the material. The method uses Gibbs free energy, enthalpy, and entropy of activation to formulate sensitivity, response time, and recovery time. The results showed that the activation energy of Pt doped  $\text{SnO}_2$  nanocluster is lower than the pristine  $\text{SnO}_2$  nanocluster. The Pt doped clusters promote higher reaction rates than pristine clusters. However, the activation energy of recovery with oxygen reaction is lower for the pristine cluster. The results also showed that the activation energy and reaction rates increase with temperature. The concentration of oxygen-deficient molecules in pristine and doped tin oxide as a function of temperature that represents the sensitivity of the sensor has the highest value at 225 °C. The theoretical results also show that response time decreases while recovery time increases with the increase of CO concentration. The results agree with experimental results.

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## **Estimation of the annual effective doses from direct ingestion of $^{226}\text{Ra}$ and $^{228}\text{Ra}$ in the Disi groundwater for different age groups**

**Mohammed B H Al-Bedri**

**Abstract** The total annual effective doses (TAED) from ingestion of naturally occurring radionuclides (NOR) in Disi groundwater for infants, children, and adults have been calculated. The ranges of the estimated annual effective dose reported in this study from direct ingestion of radium ( $^{226}\text{Ra}$  and  $^{228}\text{Ra}$ ) were found to be from  $0.085 \pm 0.021$  to  $0.532 \pm 0.205$  mSv  $\text{y}^{-1}$ , with a mean value of  $0.322 \pm 0.095$  mSv  $\text{y}^{-1}$  for infants, from  $0.144 \pm 0.011$  to  $0.828 \pm 0.203$  mSv  $\text{y}^{-1}$ , with a mean value of  $0.519 \pm 0.102$  mSv  $\text{y}^{-1}$  for children and from  $0.087 \pm 0.024$  to  $0.383 \pm 0.130$  mSv  $\text{y}^{-1}$ , with a mean value of  $0.252 \pm 0.067$  mSv  $\text{y}^{-1}$  for adults. The present results of this study were compared with the minimum recommended limits (MRL) reported by the World Health Organization (WHO, 2008) and the International Commission on Radiological Protection (ICRP, 2000), and the previously published data in different countries. The mean annual effective dose from direct consumption of Disi groundwater for infants and adults found to be about three times higher than the MRL of 0.1 mSv/y suggested by WHO, 2008. The average TAED for children found to be five times higher than that recommended limits by WHO, 2008.

**Keyword** Total annual effective dose; Direct ingestion of  $^{226}\text{R}$  and  $^{228}\text{Ra}$  in the groundwater; Disi groundwater; Age groups; Radiological quality of the drinking water;

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## Study the Effect of Concentration on the Evolution of Far-Field Diffraction Patterns of Bromocresol Purple and Congo Red Solution

Hussain Ali Badran, Abu Talib Y. Abbas, R. K. Fakher Alfahed

**Abstract** Experimental evolution of the diffraction pattern of Bromocresol Purple (BCP) and Congo Red (COGR) Solutions, by diffraction ring technique under CW laser illumination is present. The two azo dyes, COGR dye and COGR dye, were studied for their absorbance spectra, as well as the diffraction rings experimental. The measurement rings were performed when the incident beam propagates through a quartz cell containing dye. Many diffraction rings were observed on the sensitive screen. Among the results we obtained are the diffraction rings at 0.07mM concentration, where the number of rings was 4 at the power of the 50 mW laser beam for the Bromocresol dye and three rings in the congo red dye. The nonlinear refractive index for the Bromocresol dye and congo red dye are found to be in the order of  $0.11 \times 10^{-8} \text{ cm}^2/\text{Watt}$ ,  $3.093 \times 10^{-8} \text{ cm}^2/\text{Watt}$ , respectively. The efficiency of the ring pattern was found to depend on the concentration of the dye and the power of the laser.

**Keyword** azo dye; diffraction ring; refractive index; relative phase shift; laser.

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## Effect of Detuning on Synchronization of Semiconductor Lasers

Hayder Abdulwahid Hammood and H. A. Sultan

**Abstract** A simulation of chaos-synchronization of unidirectionally open-loop master-slave configuration semiconductor lasers is introduced. We consider three scenarios, both lasers are single-mode, multi-mode lasers, with three modes where the interaction is between each mode of transmitter with the corresponding mode of the receiver, and the third scenario is for 5 modes. The simulation was focused on the influences of frequency-detuning of different values of coupling strength for two types of synchronization, anticipating synchronization (AS) and isochronous synchronization (IS). The simulation results demonstrate that scenarios are sensitive to the frequency-detuning between transmitter's and receiver's lasers. So, the suitable increasing of coupling strength is a

necessary solution to decrease the frequency-detuning effect and saving synchronization with significantly broad high-quality, which means excellent feasibility.

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## Comparative Study of the Structural Properties for Thin and Thick ZnO Films

N. N. Jandow, A.A. Abbas, Kh. G. Mohammed, N. F. Habubi, F.K. Yam

**Abstract.** ZnO films with various thicknesses (0.4, 0.6, 0.8, 1 and 1.3  $\mu\text{m}$ ) had been prepared on PPC plastic bases by using DC sputtering. XRD results showed that all the films displayed principally ZnO (002) peak at  $2\theta = 34.115^\circ, 34.01^\circ, 34.16^\circ, 34.07^\circ$  and  $34.12^\circ$  with FWHM of  $0.41^\circ, 0.34^\circ, 0.27^\circ, 0.21^\circ$  and  $0.368^\circ$  respectively, which is coincide with wurtzite hexagonal phase, indicated that films were preferentially grown along c-axis. XRD results also showed that the lattice constant and the crystallite size for the deposited thin films became larger than those for the thick film 1.3  $\mu\text{m}$ ; while the stress and microstrain increased for the thick films.

**Keyword** Thin Films; PPC Plastic; Physical properties; Structural Properties; Thick Films

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## Study the Effect of Concentration on the Evolution of Far-Field Diffraction Patterns of Bromocresol Purple and Congo Red Solution

Hussain Ali Badran, Abu Talib Y. Abbas, R. K. Fakher Alfahed

**Abstract** Experimental evolution of the diffraction pattern of Bromocresol Purple (BCP) and Congo Red (COGR) Solutions, by diffraction ring technique under CW laser illumination is present. The two azo dyes, COGR dye and COGR dye, were studied for their absorbance spectra, as well as the diffraction rings experimental. The measurement rings were performed when the incident beam propagates through a quartz cell containing dye. Many diffraction rings were observed on the sensitive screen. Among the results we obtained are the diffraction rings at 0.07mM concentration, where the number of rings was 4 at the power of the 50 mW laser beam for the Bromocresol dye and three rings in the congo red dye. The nonlinear refractive index for the Bromocresol dye and congo red dye are found to be in the order of  $0.11 \times 10^{-8} \text{ cm}^2/\text{Watt}$ ,  $3.093 \times 10^{-8} \text{ cm}^2/\text{Watt}$ ,

respectively. The efficiency of the ring pattern was found to depend on the concentration of the dye and the power of the laser.

**Keyword** azo dye; diffraction ring; refractive index; relative phase shift; laser.

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## **SEM-EDS, PIXE and Raman spectroscopies analysis of Khlong Thom ancient glass bead, southern Thailand**

**C Boonruang, K Won-in, P Dararutana**

**Abstract.** Various colors of glass beads excavated at the Khlong Thom archaeological site in southern Thailand were characterized non-destructively using proton-induced X-ray emission spectroscopy (PIXE), scanning electron microscope coupled with energy dispersive X-ray spectrometer (SEM-EDS), and Raman spectroscopy in order to determine the glass composition and production technology in ancient time. The results show that most of them are alkali-based glass matrices. Some of them are high lead-bearing glass. The glass compositions are approximately the same as the Mediterranean, Islamic, and Indian glasses, but with a higher concentration of aluminum. The colors are influenced by transition metal-ions content such as copper, iron, and manganese. High content of lead has been found in the samples with opaque colors, especially the yellow opaque. The corroded and flaked surface of the glass bead has been revealed by SEM. In a comparison of glass composition, it can be proposed that there is some relationship in production technology between Khlong Thom archaeological site and other sites: South-East Asia; South Asia; East Asia; Asia Minor; and South Africa. This information indicates the historical link of both land and maritime networks for long-distance trade and exchange in ancient time.

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## **Modify of electronic properties for carbon nanoribbon due to effect different donors and acceptors**

**Rabab Abdulzahrah Moslem, Nidha Mohammed Al Shareefi and Hamid Ibrahim  
Abbood**

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**Abstract.** Present work focuses on modify of the electronic properties of CNR by adding different donors and acceptors to the ribbon. The result showed the carbon nanoribbon structure has small energy gap, it less than 1 eV. The effect of adding donors and acceptors molecules to the ribbon leads to slightly decreasing the energy gap of the ribbon depending on the type of both donors and acceptors. The calculation of global quantum parameter the electronic softness for the CNR was increased due to adding the donors and acceptors molecules in the ribbon. Also, the charge was dragged towards the areas of high negativity in CNR2 and CNR3 due to presence nitrogen and oxygen atoms in these structures instead of symmetrical distribution for electronic charges in CNR due to periodically distribution of carbon atoms in the CNR1, this modify of the electronic properties of CNR and give it to play a significant role in many electronic applications in charge transfer with other surrounding species.

**Keyword** CNR, electronic states, ESP and transition states.

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## The impact of deposition time on the morphological and structural characteristics of silver nanoparticles using the DC sputtering process

**Hind Dhari Awad, Alaa Nazar Abd Algaffar Mohammed Khamas Khalaf**

**Abstract** Silver nanoparticles were prepared on glass substrates at room temperature using four different deposition times (10, 15, 20, and 25 minutes). The dc magnetron sputtering technique is used to prepare the surface, with thicknesses of (30, 40, 50, and 60) nm, respectively. The effect of deposition times on the microstructure and morphology of the surface of deposited thin films was examined. Moreover, X-ray diffractometer (XRD) and atomic force microscopy were used to examine the structural properties and morphological characterization of sputtered films. Parameters such as crystallite size are also measured. The research indicates that the XRD pattern has a polycrystalline structure with a preference for orientation along the (111) axis. The AFM images confirmed that the thin films shaped uniformly distributed spherical particles (in terms of size). Finally, increasing the film thickness causes the average surface roughness of the films to increase between (2.6-11.6) nm.

**Keyword** DC Sputtering; Crystal growth; thin film, surface roughness, Surface morphology.

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## porous silicon fabrication by electrochemical and photo-electrochemical methods

Taebaraek Safaa Atta , Mauyyed Jabar Zoory , Ahmed N. Abd

**Abstract.** n and p types of porous silicon were fabricated using two methods electrochemical etching EC and photo-electrochemical etching PEC. Structural studies of both types of porous silicon were carried out by X-Ray Diffraction XRD getting 24.5 nm crystallite size in p-PSi and 28.05 nm in n-PSi, AFM, Fourier-Transformation InfraRed FT-IR.

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## Potential of Fuzzy Methodology for Investigation in Nanofluids Heat Transfer

Sattar A. Mutlag , Kadhum A. Abed, Al-janabi Abdulsattar A. Abdllah

**Abstract.** In this paper, the Fuzzy Nanofluid Model (FNFM) used to develop a fuzzy analysis investigation on heat transfer optimal performance at different Nanofluids flow rate .The fuzzy Nanofluid model is applied to examine the effects of heat transfer parameters on heat transfer performance. Silicon Oxide  $\text{SiO}_2$  Nanofluid is used to explain their effects on heat transfer by two methods traditional and fuzzy (with two shapes of member ship function triangular and trapezoidal). This study evaluates the effects of nanoparticles  $\text{SiO}_2$  with different value of particle concentration PC (0.0-4.0%) using the water as a base fluid. This investigation covers a Reynolds number (Re) in the range of (100-500) as a flow rate (FR) for laminar flow. The main objective of present research, first one, compared a developed FNFM model with traditional model (TM) and determines how fuzzy model plays a significant role in prediction of Heat Transfer performance. Second one, to provide developed methodology for performance evaluation of heat transfer by connecting more than one parameter to a single output which is invaluable supplements relative to classical models. Third one, a developed FNFM can be used as a help tool for decision making to get the best judge (optimum) the performance of any system. The results of fuzzy model showed the heat transfer of  $\text{SiO}_2/\text{H}_2\text{O}$  Nanofluids significantly increased the PC compared with the increase in FR. However, however, using this method, there will be no need to resort to solving complex equations to arrive at a representation of

the performance of any system. Finally, the study shows that fuzzy model plays significant role in prediction of heat transfer investigation without the complexity of mathematical tradition models. The correlations coefficients  $R^2$  between TM and FNFM models for heat transfer coefficient (0.97) and the average relative error ( $\epsilon$ ) is (4.4%).FNFM models can predict heat transfer characteristics with higher accuracy than that of the traditional model.

**Keyword** : Nanofluids, Heat Transfer, Flow Rate, Fuzzy theory, Decision Making.

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## Photocatalytic Activity of CdS Nanosheets Prepared by Chemical Bath Deposition Method

**Marwa M. Ali, Muhsin A. Kudhier , Raad S. Sabry**

**Abstract.** CdS nanosheets are synthesized via the chemical bath deposition method (CBD) using three different Cd/S molar ratios for the photocatalytic degradation of methylene blue (MB), as an example of an organic pollutant. The resulting nanosheets were characterized by XRD, FESEM, and UV-VIS spectroscopy. The XRD data analysis for prepared powder resulted in mixed phases of zinc-blende and wurtzite in all different Cd/S molar ratios with average crystalline size increased from (50.9 nm to 59.7 nm). The as-prepared CdS shows an absorbance edge increased from (340 nm, to 490). The value of the bandgap decreased from (2.6 eV to 2.3 eV) with an increasing molar ratio. Increasing molar ratio also leads to high and stable photocatalytic with high degradation efficiency (92.7-98.4) % after 150 min of sunlight irradiation.

**Keyword** : CdS; Chemical bath deposition (CBD); Nanosheet; Photocatalytic activity; Methylene blue.

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## A Review: Non Invasive Sensing System for Detection Glucose Level

**Lina Nasseer Bachache, Jamal Abduljabar Hasan<sup>1</sup>, Auns Qusai Al- Neami**

**Abstract.** Attributable to the probability of rapidly increasing numbers of diabetic patients in the world, and due to the effect of COVID-19 virus and the hazardous of life-jeopardizing critical cases that require continuous nursing monitoring the glucose level (CNMGL). The contamination possibility and the pain of the traditional measuring systems limiting the number of blood glucose checking, which decreases the diabetic patient

controlling their blood glucose level (BGL). Now the indigency for a non-invasive glucose detecting system (NIGDS) is highly praised. The aim of the review of the NIGMS and their challenges to the future transcend these challenges. The last reviews of NIGDS discuss the measuring system concerned with their techniques but this study has been reviewing the detection system by their measuring site and collects the complication of measuring systems in each site. The main contribution of our works is to demonstrate that all the previous studies of glucose detection systems depend on the invasive calibration for each patient before starting the measurements due to the high numbers of parameters that interfere with glucose measurements. Toward NIGDS that is wearable and monitors the patient blood glucose continuously.

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## Green Syntheses of CdO NPs and evaluation of their antimicrobial activities

Saadoon M. Abdulkareem , Ali Hassoun Hammadi

Majid H Hassoni, Ahmed N. Abd , Ehab M. Ali

**Abstract.** The aim of this study is to look into the influence of CdO NPs on antimicrobial activity. Green synthesis has been used to produce CdO nanoparticles from cadmium acetate and the Crocus plant in this study. The properties of the synthesized nanoparticles of CdO thin materials were studied (optic, structural, and topographical of surface), it found that the CdO thin film is poly-crystalline and has multiple peaks. The size of crystallite of film calculated by the Scherrer's formula. The disk method used to test antimicrobial activity against two bacteria; the observed areas of inhibition confirm that the as-synthesized CdO NPs act as an important antimicrobial agent against pathogenic microorganisms.

**Keyword :** Cadmium oxide, thin film, Green Synthesis, Antibacterial Activity

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## Biosynthesis of CuO NPS and its anticancer activity on human colon cancer cell lines (HT-29)

Maithm A. obaid, Khalid Hellal Harbi , Ahmed N. Abd

**Abstract.** The environmentally friendly syntheses of the nanoparticles through the green way from the extracts of the plants has proven itself in the field of modern sciences, with improved drug efficiency and less toxicity. The study groups in the have bio-synthesized cost-effective and stable copper oxide nano-particles (CuONPs) from plant leaves (i.e. the Turmeric). A variety of the analytical approaches, like the UV-Visible Spectroscopy (UV-Vis), Fourier-Transformation Infra-red Spectroscopy (FTIR), Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD), have been utilized for the confirmation of the syntheses of the crystalline CuONPs from the extract of the turmeric leaves (SEM), Transmission Electron Microscopy (TEM) and Selected Area Electron Diffraction (SAED) pattern. Synthesized CuONPs have been tested as well for the anti-cancer activity with the use of the MTT (3-(4,5dimethyl-2thiazolyl)-2,5-diphenyl-2tetrazolium bromide) assay on the cell lines of the human colon cancer (HT29). The results have shown that the synthesized CuONPs had a high anti-cancer cytotoxicity on the cell lines of the human colon cancer (HT-29) with an IC-50 value of 40 g mL<sup>-1</sup>, which was briefly addressed in the present paper.

**Keyword :** Ecofriendly, CuO NPs, Ormocarpum cochinchinense, Cytotoxicit

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## Cross Sectional-Area Effect On The Optical Properties Of The CdS Nanoparticles Prepared By The Exploding Wire Technique

Haneen T. Abed ,Hammad R. Humud

**Abstract.** The characteristics of the cadmium sulfide films prepared with the explosive wire were studied and the effect of changing the cross-sectional area of the wire on these properties was found. It was found that the energy gap is inversely proportional to the area where the greater the area, the lower the energy gap values (from 1.65 to 1.12) eV. Also, the absorption and its modulus were increased by increasing the cross-sectional area of the wire. The refractive index and extinction factor showed a clear response, as the value of both decreased due to the effect of this increase in the wire area.

## Study of the temperature and electron density of the cadmium sulfide plasma produced by the exploding wire technique using optical emission spectroscopy

Haneen T. Abed , Hammad R. Humud

**Abstract.** The current study was conducted to reveal the most important parameters of the plasma which are the temperature and density of the electron, the plasma response, the Debye length and the number of particles inside the Debye sphere of the cadmium sulfide by a spectrometer. The results of the electron temperature ( $T_e$ ) and the electron density ( $n_e$ ) were discussed. The results of the cadmium sulfide plasma were discussed. It is generated by using the explosive wire and with different currents.

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## A comparative study of the photoelectric properties for lithium oxide prepared by Green synthesis method

Taebareak Safaa Attaa , Ahmed Naji Abd , Muayyed Jabar Zoory

**Abstract.** Lithium oxide  $\text{Li}_2\text{O}$  was synthesized by two green synthesis methods using two plants saffron and turmeric. Then the  $\text{Li}_2\text{O}$  colloidal were deposited on p-type porous silicon substrate p-PSi and n-type porous silicon substrate n-PSi to fabricate Al/ $\text{Li}_2\text{O}$ /p-PSi/pSi/ Al heterojunction and Al/  $\text{Li}_2\text{O}$  /n-Psi /nSi /Al heterojunction. The morphological studies were measured by X-Ray Diffraction XRD getting an average crystallite size 34.7 nm for green synthesized saffron and 31.36 nm average crystallite size in case of green synthesized turmeric. Scanning Electron Microscopy SEM was about 80 nm size in case of saffron and about 55 nm. Fourier Transformation Infra-Red FT-IR was nearly the same in both cases. Optical measurement UV-visible occurred by calculating the transmittance and absorbance spectra and finally IV- in dark and IV under illumination were measured for the application of a heterojunction as a solar cell.

**Keyword:** Green synthesis, Biosynthesis, artificial methods Nanoparticles, porous silicon.

## Strength of Yukawa Potential for Elementary Masses Less than Meson Mass

**Bhishma Karki, Saddam Husain Dhobi, Narayan Gautam,  
Mohammed Alzuhairi , Arun Kumar Shrestha**

**Abstract.** Study of uncorrected and corrected Yukawa Potential show that at both Yukawa potential have same nature but strength is different. The strength of uncorrected Yukawa potential is identical at short range while corrected Yukawa potential strength is not identical at short range. Moreover, the strength of uncorrected and corrected Yukawa potential has the same strength at long distances when separated from each other. Uncorrected Yukawa potential is study gives more detail at a short distance while corrected not give such detail at the same distance, for considered elementary particles masses less than the mass of meson. The solution of corrected Yukawa potential show depends upon the quantum number and distance separation between two elementary particles masses less than meson

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## Variation of mass and time conversion of rest into a non-rest visible photon or vice-versa

**Bhishma Karki, Saddam Husain Dhobi, Jeevan Jyoti Nakarmi, Mohammed Alzuhairi, Narayan Gautam,**

**Abstract.** In this work, the time rest time of incidence photon on reflecting surface before going to the motion was calculated for a visible photon of wavelength (380nm to 750nm) be found in between 1.27fs to 2.50fs. This time is also known as the time needed for a visible photon to come rest from motion and motion from rest from the reflection surface, for the same photon. This times shows how long a photon are in rest on the surface and then come motion or non-rest photon. More clearly one can understand the decay time of photon that rest to non-rest and non-rest to rest, self-energy time, mass variance time, quantization time and other information related to time. On other hand, the variation of mass of photon with time closure the surface is also studied.

**Keyword:** Green synthesis, Biosynthesis, artificial methods Nanoparticles, porous silicon.

## Synthesis of IONPS by mixing leek extract with iron chloride salt for antibacterial application.

Sarah Q Hussein, Raad S Sabry, Muslim A Abid

**Abstract.** Synthesis of IONPS by mixing leek extract with iron chloride salt. By simple chemical process, with Change in PH which has a variety of effects on the optical and structural properties of IONPs. The iron oxide NPs were characterized by XRD, SEM and UV-vis techniques. XRD results showed average Crystallite size changed from (23.23) nm to (20.70) nm as pH was increased from 1.6 to 12. The particle size of ( $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>) NPs was about (101.60) nm in SEM pictures, but as the PH increased, the particle size decreased to(34.30) nm. UV-vis measurements showed energy band increased from ( 3.33- 5.62) eV. Antimicrobial activity of iron oxide NPs was determined by growth inhibition zones of the gram negative bacteria E.coli, Klebsiella spp and gram-positive bacteria S.aureus, S.epidermidis and fungal Candida albicans. It found the zones for ( $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>) NPs when PH 1.6 was between (12-14) mm. The zones for ( $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>) NPs when PH 12 was between (12-13) mm..

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## Estimation of monthly average daily of the global solar radiation using the linear regression algorithm

Hussein H. Hadi

**Abstract.** Solar radiation is the backbone for the existence of life on the earth. Its measurement is too expensive. Therefore, it has been great importance to propose an efficient method to use as a solar predictor based on other more readily available meteorological data. In this study, Linear regression method has been applied in two locations that have two different climates in Egypt, location A that has a coastal climate on the Mediterranean coast and location B that has a dry desert climate, using three weather vectors (minimum, maximum and average) of temperature values. The performance of the linear regression models provides better predictions for global solar radiation (GSRa) at different locations. The Root Mean Square Error (RMSE) = (2.7716 and 2.9392) MJ m<sup>-2</sup> with Relative Root Mean Square Error (rRMSE) = (14.5962 and 14.0861) % in location A and B respectively. The accurate prediction results of the GSRa using this approach can be employed in the various purposes of the solar applications.

**Keyword:** Egypt, linear regression, prediction model, solar radiation, temperature value.

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## Ion Trajectory Analysis in FIB Microscope to Study the Dielectric Constant using Mirror Method

Luna Basil Hazime , Muayyed Jabar Zoory

**Abstract.** The current work used the same mathematical model that was used to study the behavior of an accelerated probing electron in order to create electron-mirror images [1]. Using straightforward trigonometry, this mathematical model was used to investigate the properties of the polymer PMMA as a result of the ion mirror effect phenomenon. This work also considers determining the influence of dielectric constant, which is one of the most important electrical properties of the material by using MATLAB simulation to help the practical results that we obtained and comparing it to the findings obtained for the electron mirror. The obtained results indicate that the presented methodology can be used to explain, interpret, and add further detail to the understanding of the ion mirror effect for future studies.

## Analysis of the Focusing Ion Beam Microscope Ion Mirror Method for Studying Influence of the Measuring Chamber

Luna Basil Hazime , Muayyed Jabar Zoory

**Abstract.** Using the ion mirror image (IMIM) technique, a focused ion beam (FIB) microscope is used to investigate the charging phenomenon of Polymethyl methacrylate (PMMA) .The effect of the experimental chamber's finite size is studied using classical scattering theory. We test the widely held belief that the method tests the radius of curvature of the equipotential by performing a thorough calculation of the Ion orbits in the presence of extended sources. We show that, near to the chamber walls, the field lines bend until they are normal to the walls, the field is small, and the ion orbit is unaffected, as well as how to get rid of the "mirror effect".

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## Studying The Topographic and Morphology Structure of CdO:In Thin Films

Faisal G Hammoodi, Aliyah A Shuihab and Sameera A Ebrahiem

**Abstract.** Cadmium oxide thin films was deposited by thermal oxidation method, on glass substrate with the thickness  $(300 \pm 10)nm$  and deposition rate  $(1.25)nm/sec$ . The films doped with the (In) with the different ratios (1,2,3)%. The topographic and morphology structures of films are characterized by (XRD), (SEM) and (AFM) techniques. XRD investigation showed all films have polycrystalline structures with the preferred orientation (111) plane. The results of microscopic testing proved that presence the nanostructures and all the films were homogeneous and smooth, with a characteristic nano grain size, by scanning electron microscope (SEM), which show that fact formation of all nanostructures with different shapes and grain size. In addition, the results of atomic force microscope (AFM) show that presence nanostructures and there is effect of In-dopant on the root mean square (RMS) roughness of the films, where it increases while the grain size decreases with the increasing of In-dopant.

**Keyword:** Cadmium oxide (CdO), structure, topographic and morphology and roughness.

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## Study of Colorimetric properties of Ethidium bromide dye-doped PVP/DNA film.

Hussain Ali Badran, Sattar Jabbar Bader, R. K. Fakher Alfahed and Noor Al-Huda Saleh.

**Abstract.** The effects of deoxyribonucleic acid (biological polymer DNA) on full brightness, and color matching functions of Ethidium bromide dye doped PVP/DNA films were studied. Ethidium bromide dye doped PVP/DNA films were deposited on soda-lime glass substrates by the deep casting method. The variation of CIE chromaticity coordinates for PVP/DNA films with increasing Ethidium bromide dye concentration values are determined. The CIE 1931 color space move to the magenta region. The results indicate that Ethidium bromide dye doped PVP/DNA films have potential promising material for optical device applications and candidates used for LEDs pumped by UV chips and applied in many advanced technologies.

**Keyword:** deoxyribonucleic acid; CIE 1931 color space; Ethidium bromide; CIE chromaticity; PVP

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## Study of the Blood Flow average for Atherosclerosis using Ultrasound Doppler shift

Q A Nabaa, Dr. M A Mariam

**Abstract.** Atherosclerosis is a condition that affects the walls of arteries repeatedly; blood vessel blockage caused by atherosclerosis is a frequent cause of heart attack and stroke. The use of Doppler change, a recent advancement in ultrasound technology, would improve its function by improving accuracy. Blood flow measurement is crucial because it can aid in the early detection of many diseases. One of these diseases is atherosclerosis, which has been researched using the ultrasound Doppler scattering method to measure blood flow average velocity in the dorsal artery of the foot. The study's findings revealed that age and diabetes had a greater impact than other factors such as medical history, high blood pressure, and triglycerides.

**Keyword:** Blood flow average, Doppler shift, ultrasound techniques, Factors of atherosclerosis, Piezoelectric (transduce probe), Variance.

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## Determination of electrons location using mirror effect phenomena in scanning electron microscope

Tareq H Abbood, Saadi R Abbas and Huda K Husien

**Abstract.** In sense of the phenomena of mirror effects, the behavior of electrons inside the chamber of scanning electron microscope (SEM) investigated. Indeed, a simplified geometrical explanation for the behavior of incident electrons introduced. The presented description is mainly concerns with simple trigonometric functions. However, the synthesis of these functions provide a tool which can be used to trace electron as it leaves the column diaphragm until it reaches the detectors. Accordingly, the position of landing electrons throughout its travel being determinable in terms of the sample potential the operation variables. Results have shown that introduced approach could commendably use to simulate behavior of electrons inside the chamber of SEM.

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## Determination of electrons location using mirror effect phenomena in scanning electron microscope

Su'adod Osama Al-khateeb

**Abstract.** The present study was designed to investigate some of the physiological effects in the blood of white male rats exposed to oxidative stress induced by hydrogen peroxide in drinking water at a concentration of 0.5% for a period of 50 days and to compare it with the group exposed to ultraviolet rays at a rate of 6 watts per candle for a period of 50 days. **First:-** The results showed a significant increase ( $P \leq 0.05$ ) in the group of rats exposed to radiation in the group of ultraviolet rays (18 watts) UV3 and hydrogen peroxide both when compared with the control group. In radical Peroxy nitrite level and in total white blood cell count and for both Ly% and GR%. The results also showed a significant increase ( $P \leq 0.05$ ) in the level of glucose. **:-** There was a significant decrease at a significant level ( $P \leq 0.05$ ) in the level of glutathione in the group of rats exposed to UV3 radiation and the hydrogen peroxide group alike when compared with the control group, with a significant decrease at a significant level of ( $P \leq 0.05$ ) in the activity of the enzyme glutathione. Glutathione peroxidase and a significant decrease ( $P \leq 0.05$ ) in the volume of packed blood

cells, the hemoglobin value, the red blood cell count, and the platelet value, with a significant decrease of MO. %The occurrence of signs of blurred vision in the eyes of the ultraviolet rays group with a strength (3 candles) in addition to the darkening of the tail in a clear and striking way and the lack of movement and activity compared to the hydrogen peroxide group and the rays group.

**Keyword:** Ultraviolet UV, Oxidative Stress, Blood Parameters, biophysics



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(College of Education - Mustansiriyah University)

Baghdad - Iraq  
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# Track 2

## Computational and Quantum Systems

**Design and Implementation of 1.28 Tbps DWDM based RoF system  
with External Modulation and Dispersion Compensation Fiber**



**D E Mohsen, A M Hammadi, and A J Alaskary**

**Abstract** The improvement of 5G networks started in 2019 and is commonly accepted to bring changes not restricted to individuals' day-by-day life. The interconnection between the nodes of 5G network is realized through the utilization of optical transceiver modules and optical fibers. The most interesting part in the 5G communication network is the communication between the Central Office (CO) and the Base Station (BS), which has been widely investigated by several researchers to enhance and optimize such network performance. As a result, in this paper we demonstrate, design and implemented a) based on Dense Wavelength Division Multiplexing (DWDM Radio over Fiber (RoF) system and by using the software of Optisystem 17.1 version. Such system is considered a 32X40 Gbps of data transmission for higher speed transmission system towards the Tera bit per second (Tbps) communication. The channels of 1, 4, 8, 12, 16, 20, 24, 28 and 32 were selected as samples for the investigation. The performance analysis would be based on the parameters of the eye diagram, (Quality Factor) Q-factor and Min Bit Error Rate (BER) and for distances of 60, 120 and 180 km respectively. Analyzing results indicate a higher performance system toward the 1.28 Tbps of data rate transmission.

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## **An Evolutionary Algorithm for Task scheduling Problem in the Cloud-Fog environment**

**Mohammed Najm Abdulredha**

**Abstract** The rapid and enormous growth of the Internet of Things, as well as its widespread adoption, has resulted in the production of massive quantities of data that must be processed and sent to the cloud, but the delay in processing the data and the time it takes to send it to the cloud has resulted in the emergence of fog, a new generation of cloud in which the fog serves as an extension of cloud services at the edge of the network, reducing latency and traffic. The distribution of computational resources to minimize makespan and running costs is one of the disadvantages of fog computing. This paper provides a new approach for improving the task scheduling problem in a Cloud-Fog environment in terms of execution time(makespan) and operating costs for Bag-of-Tasks applications. A task scheduling evolutionary algorithm has been proposed. A single custom representation of the problem and a uniform intersection are built for the proposed algorithm. Furthermore, the individual initialization and perturbation operators (crossover and mutation) were created to resolve the inapplicability of any solution found or reached by the proposed evolutionary algorithm. The proposed ETS (Evolutionary Task Scheduling algorithm)

algorithm was evaluated on 11 datasets of varying size in a number of tasks. The ETS outperformed the Bee Life (BLA), Modified Particle Swarm (MPSO), and RR algorithms in terms of Makespan and operating costs, according to the results of the experiments.

**Keyword:** task scheduling, cloud computing, fog computing, Evolutionary algorithm, BOT.

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## The Necessary Condition of Hypercyclicity of Truncated Toeplitz Operator

**Ali A. Shukur**

**Abstract** We study hypercyclicity of truncated Toeplitz operators in the model space  $H^2(D) \ominus \theta H^2(D)$  where  $\theta$  is inner function and  $H^2(D)$  is Hardy space. In this paper, the necessary condition of hypercyclicity of truncated Toeplitz operator is given.

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## A Review of IoT platforms for Detection and Diagnosis covid\_19 :

**Reham Basim Kadim, Naseer Ali Hussien**

**Abstract** As a result of the spread of Coronavirus very quickly. The difficulty of controlling its spread. Moreover, the lack of a specific mechanism to limit the spread of the Coronavirus. The role of the Internet of Things has emerged in the fight against the Corona pandemic. This paper reviews the Internet platform, for things to diagnose and fight Coronavirus that help to control this disease with its sensors as well as various tools. that help to limit its spread also prevent human rapprochement. Furthermore, this paper discusses the most important approaches that assist in diagnosing this disease. In addition to networks, the role of the Internet in dealing with this virus is addressed at the end of this paper.

**Keyword:** Internet of Things, 5G Technologies, COVID-19, PON, IoT Application.

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## Human Dynamic Behavior: Reconstruction Trajectories Using CDRs

Suhad Faisal Behadili and Israa Abdulqasim Mohammed Ali

**Abstract** . . Investigating the human mobility patterns is a high interested field in the 21th century, and it takes vast attention from multi-disciplinary scientists in physics, economic, social, computer, engineering...etc. depending on the concept that relates between human mobility patterns and his communications. Hence, the necessity for rich repository of data is emerged. Therefore, the most powerful solution is the usage of GSM network data, which gives millions of Call Details Records gained from urban regions. However, the available data still have shortcomings, because it gives only the indication of spatio-temporal data at only the moment of mobile communication activities. In this chapter, Gama platform development environment of constructing spatially multi agent simulation is used for modeling and simulating the individual reconstructed trajectories. As a result, the individual trajectories revealed the human daily life patterns.

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## Smart System for Detecting the Entry of Authority People in the Security Facilities Based IoT using SURF Recognition and Viola-Jones Algorithms

Nadia Mahmood Hussien, Mohanad Ali Metiab Al-Obaidi, Rasha Awad Abtan, Anwar H. Al-Saleh, Ali Abid D Al-Zuky

**Abstract** . . Investigating the human mobility patterns is a high interested field in the 21th century, and it takes vast attention from multi-disciplinary scientists in physics, economic, social, computer, engineering...etc. depending on the concept that relates between human mobility patterns and his communications. Hence, the necessity for rich repository of data is emerged. Therefore, the most powerful solution is the usage of GSM network data, which gives millions of Call Details Records gained from urban regions. However, the available data still have shortcomings, because it gives only the indication of spatio-temporal data at only the moment of mobile communication activities. In this chapter, Gama platform development environment of constructing spatially multi agent simulation is used for modeling and simulating the individual reconstructed trajectories. As a result, the individual trajectories revealed the human daily life patterns.

**Keyword:** Security facilities, Arduino UNO R3, PIR sensor, Face recognition, VIOLA-JONES, IoT, Twilio , WhatsApp, SURF, SIFT.

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## Interaction thermodynamics of human hemoglobin with environmental and toxic gases: A density functional theory study

**Mudar Ahmed Abdulsattar, Nooruldeen Mudher Almarroof, Rashid Hashim Jabbar**

**Abstract** The interaction of human hemoglobin with environmental and other gases and molecules is investigated using density functional theory. The investigation includes gases and molecules such as O<sub>2</sub>, N<sub>2</sub>, Ar, CO<sub>2</sub>, H<sub>2</sub>O, CO, and Cl<sub>2</sub>. Thermodynamic quantities usually include Gibbs free energy, enthalpy, and entropy. These thermodynamic quantities can be used to distinguish how much strong these molecules are bonded to hemoglobin. The interaction with the two different heme molecules, singlet and triplet states, is shown. Results show that the bonding strength differs greatly between these gases. Most of the investigated molecules remain at their monoatomic, diatomic, or triatomic structure except for O<sub>2</sub> and Cl<sub>2</sub> that may dissociate into two atoms attached to hemoglobin. The Gibbs free energy of interaction of these atoms and molecules reveals the toxicity of some of these gases, such as CO and Cl<sub>2</sub>.

**Keyword:** Hemoglobin; Density functional theory; Gibbs free energy

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## On perturbation theory and its application in solving ordinary differential equations using the asymptotic expansion method

**Safaa Ali Salem ,Thair Younis Thanoon**

**Abstract** The perturbation theory is one of the tricks or tools used mathematically to find approximate solutions to fluctuating problems for which no accurate solutions can be found. In this paper we will deal with a number of basic concepts related to perturbation theory, including regular perturbation and singular perturbation, and then apply these tricks or tools theoretically to ordinary first and second order differential equations for regular perturbation using the asymptotic expansion method, which is considered one of the most important methods used to find approximate solutions of perturbation equations.

**Keyword:** perturbation theory , singular perturbation , regular perturbation , asymptotic expansion method , approximate solution .

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## **A Novel approach towards Implicit Authentication System by using Multi-share visual key Cryptography Mechanism**

**Dr. Ajay B. Gadicha ,Dr. Vijay B Gadicha , Prof. Dr. Ahmed Jabbar Obaid**

**Abstract** Currently huge amount of data used to stored, extracted and transacted via various stand alone and internet based applications. These applications are extended towards the verticals like huge databases, data warehouses, cloud computing services and various client-server applications. In all these applications important data used to float day in day out. Therefore preserving user authentication & access control is extremely important aspect of information security. Here an attempt is made to generate an implicit authentication system using multi-share visual key cryptography which will generate strong password keys by using images. Initially various images will be fused to form a resultant image than on this fused visual key cryptography will be performed which will provide multiple shares, out of these one of the share is selected to generate strong password strings/keys to accomplish the task of access control or user authentications.

**Keyword:** Data confidentiality, databases, data warehouses, cloud computing services, Cryptography, Cipher Text

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## **Design and Simulation of Optical Logic Gates Based on (MIM) Plasmonic Waveguides and slot cavity resonator for Optical Communications**

**Wissam Abed jasim , Faris Mohammed Ali, Ahmed Kareem Abdullah , Mohammed Ahmed AbdulNabi**

**Abstract** . In the field of optics the tinier devices are the better; therefore, the diffraction limit of light seems like an essential limitation in the way of that field. In return, new methods have appeared to resolve this issue. One of these methods is the plasmonic technology which allows light pressure into nanostructures. The current study proposes all-optical logic gates based on metal insulator metal structures (mim) waveguide. This

waveguide has an important characteristic which is restricting the applied light strongly far from the diffraction limit. The proposed structure is small compared to the applied wavelength. The optical plasmonic gates proposed are (OR, NOR, AND, NAND, NOT). The comsol multiphysics 5.5 software was used for simulation by the 2-D FDTD method. Hence, these five gates will be obtained by optical interference between the propagating signals through the input ports and the control ports, whose positions can be altered according to the gate needed. The implementation and simulation of the proposed gates were all in the same structure, with the same dimensions, the same wavelength and the same transmission threshold, with applicable wavelength of (1550 nm). The performance of the proposed plasmonic gates was tested by two criteria; the optical transmission ratio and the contrast ratio, which is the ratio between the ON and OFF states of the proposed gate..

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## An Amendment RSA and A modified SHA3 for A new Design of Blockchain Technology

Aun H. Jasim and Ali H. Kashmar

**Abstract** . Blockchain is a distributed database solution which maintains an ever-growing list of data records verified by the nodes involved. The data is registered in a public directory with details about each completed transaction. Blockchain is a decentralized solution that requires no third-party organisation. All the nodes are shared and accessible for any transaction that has ever been completed in Blockchain. This feature makes the system transparent rather than centralized third-party transactions. Furthermore, the nodes in Blockchain are all anonymous, making transactions safer for others. However, while Blockchain appears to be an appropriate solution for transactions through utilizing cryptocurrencies, some technological challenges and constraints still remain to be examined and addressed. High transaction integrity, memory consumption, complexity, speed, and protection, as well as node privacy, are required to avoid attacks and attempts to distort transactions in Blockchain. This paper proposed an amendment to the RSA algorithm that used in design of some blockchain technology by adding a new variable to improve memory consumption. In addition, a modified hash function (SHA3) was suggested by replacement the operations (AND) and (NOT) by (ADD) arithmetic operation to improve hashing speed. The primarily results reduced the process of memory consumption and increasing the complexity in amendment RSA algorithm as well as hashing speed. Finally, some compression between suggested algorithms (amendment RSA and modified SHA3) among origin and similar algorithms with respect to memory,

security and speed was demonstrated to improve the secure, performance and efficiently of suggested algorithms.

**Keyword:** Blockchain, RSA, SHA3

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## Convergence Rate For Low-Pass Infinite Impulse Response Digital Filter

**Aun H. Jasim and Ali H. Kashmar**

**Abstract** The hybrid optimization technique is used to design a low-pass infinite impulse response (IIR) digital filter, to improve the coefficients of adaptive IIR digital filter, thus ensure stability. In this paper, the newly technique of hybrid particle swarm optimization (PSO) algorithm is proposed. This technique is a dynamic and static topology with a PSO algorithm, which called dynamic and static PSO (DS-PSO) algorithm. In the simulation, the low-pass IIR digital filter 8th order is designed. The fitness function problem is discussed based on values of the ripple of the passband, a ripple of the stopband, and a transition band. Thus, the proposed algorithm results are compared with previous studies results. From results comparison, results have shown the convergence rate with the DS-PSO algorithm outperformed the convergence rates using fuzzy gravitational search algorithm (FGSA), gravitational search algorithm (GSA), and differential evolution (DE) with mean values of 31.41%, 67.31%, and 55.21%, respectively.

**Keyword:** Adaptive filter; Fitness function; Optimization Algorithm; Particle Swarm Optimization; Signal Processing.

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## Medical Image Authentication by Combining Hash Signature and Watermarking Based on Frequency Domains

**Amira K. Jabbar Ashwaq T. Hashim, Qussay F. Hassan**

**Abstract** — Medical images are transmitted to other remote places through the E-healthcare system. The protection of medical images is very crucial. Medical images need to be protected against any modification which the attacker may do through the unsecured channel. It is necessary for inspecting the integrity of the ROI (Region of Interest) of the

received medical image prior to the adoption of any diagnostic decision to avoid a misdiagnosis. This paper aimed to confirm the integrity and authenticity of medical images by combining the hash signature with the watermarking technique based on the frequency domains. At first, the medical image is divided into ROI and RONI (Region of Non-Interest). The SLT and DCT transformations are employed together to extract the essential features set from ROI and then combined with EPR (Electronic Patient Registration) to produce a watermark, and then it is encoded by a chaotic map with a secret key to provide a signature. On the other hand, the RONI is mapping into randomly subblocks based on the linear system, and then the Signature is embedded in the chosen block using DWT. The hash code of the recovered image and EPR will be compared with the extracted watermark for integrity and authenticity. The experimental results demonstrate the watermark's robustness against many of the more aggressive and geometric signal processing distortions without affecting the quality of the original medical image. In particular, compared with state-of-the-art technology, the proposed algorithm improves the average NC value larger than 0.90 under all types of attacks.

**Keyword:** Authenticity, Chaotic map, DCT, DWT, Hashing, Integrity, Medical image, SLT, Watermarking.

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## Privacy Preserving Algorithm using Chao-Scattering of Partial Homomorphic Encryption

**Saja J Mohammed and Dujan B Taha**

**Abstract** . A big challenge of privacy-preserving is found when trying is to share data while protecting the information of personally identifiable, such as phone numbers, email addresses, and biometric. The same challenges have appeared when keeping sensitive data remotely in complete privacy, without recognizing it from any unauthorized persons. In such cases, Homomorphic encryption is the highlight and considered the most suitable solution. The goal of this paper is to keep the privacy of the data stored in a database system using a new Chao-modification to the partial homomorphic encryption algorithm. It uses the chaotic system to scatter the code of data before direct them to the encryption algorithm. This will be appending an additional level of security to partial homomorphic encryption algorithms that helps them to be more resisting attacking..

## Synthesis and Properties Application of Titanium Dioxide Doped with Nitrogen. Its Effectiveness on Photo Degradation Glutathione-S-Transferase (GST) enzymes Pupae Instar of *Aedes aegypti*

Moatasem AlSalih, Syakirah Samsudin, Siti Suri Arshad

**Abstract** N-doped TiO<sub>2</sub> was prepared via the sol-gel method, From the characterization results, it was found that N-doped TiO<sub>2</sub> using titanium(IV) tetraisopropoxide with ammonia solution and calcined at 673 K provided the most appropriate properties for acting as the photo catalyst can be use as inhibitor of GST. SEM, AFM and XRD results indicated that this N-doped TiO<sub>2</sub> catalyst had high crystallinity because its titania precursor was simply hydrolyzed completely so no organic contents blocked initial phase construction. SEM and AFM results demonstrated that its surface morphology was spherical like fluffy powders. Moreover, with increasing calcination temperature, its anatase-to-rutile phase transformation was retarded by the incorporated nitrogen. Elemental Analysis and UV-Vis/DR results also suggested that nitrogen could be dormant in the TiO<sub>2</sub> lattice with strong bonds, causing the effect on the band gap structure by adding energy states nearly valence band of TiO<sub>2</sub>. All of these properties enhanced the photocatalytic activity of N-doped TiO<sub>2</sub> under visible light.

Regarding the photocatalytic activity, N-doped TiO<sub>2</sub> using titanium(IV) tetraisopropoxide with ammonia solution and calcined at 600 K succeeded in degrading glutathione- S-transferase (GST) enzymes, with the highest efficiency. However, its photocatalytic activity was drastically decreased when it was calcined at higher temperature. Additionally, the plausible mechanism was also proposed in case of photo degradation of antioxidant content based on two detected intermediates by The relation between  $\ln Co/C$  and time (h) of photo degradation.

**Keyword:** Titanium Dioxide, Glutathione- S-Transferase (GST), *Aedes aegypti*

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## Predicting the knowledge flow of social networks based on machine learning

Muhi Saadi Radhi, Mohammadreza Soltan Aghaei

**Abstract** Predicting the release of information deals with the path of publishing a news or information or topic in a structural data such as a graph. Researchers in this field seek to

solve the following questions by providing methods for predicting the path of publication: 1- Which information or topics that are most common, 2- Why, how and in what Information path will be published and will be published in the future? And 3- Which network member has an important role in the dissemination process? Machine learning is an area which has been very helpful recently in order to answer such questions. Machine learning as an artificial intelligence subset presents so acceptable to predict the dissemination of information. Since predicting novel users who are in information flow is the process of diagnostic, the issue is able to be solved by the algorithms of Machine learning.

**Keyword:** Titanium Dioxide, Glutathione- S-Transferase (GST), Aedes aegypti

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## **DFT/ TD-DFT Study of Donor- $\pi$ -Acceptor Organic Dye models contained Triarylamine for an Efficient Dye-Sensitized Solar Cell**

**Khulood Obaid Kzar Al-Masoodi, I. Rafiq, A. El Assyry, A. Derouiche**

**Abstract** A systematic theoretical study was performed for dipolar triarylamine-based D- $\pi$ -A dyes. These dyes are composed of good required features to be active for enhancing the efficiency of solar cell such as arylamine donor moieties, and an acceptor part with cyanoacetic acid, while the conjugation process is adopted by the fluorene or biphenyl linkers. The required properties both electronic and opticals were computed with DFT/TDDFT levels and 6-31G (d, p) basis set, then show the response of the efficiency. The obtained results have predicted the excitation energies, HOMO-LUMO energy levels which indicate an improvement in the two principle processes; electron injection and the regeneration of dyes. Also, the important factors in close connection with the short-circuit current density ( $J_{sc}$ ), such as light-harvesting efficiency (LHE), the open-circuit photovoltage ( $V_{oc}$ ), total reorganization energy ( $\lambda_{total}$ ) and injection driving force ( $\Delta G_{inject}$ ) have been explained. As a result, the calculated data verify that the D dye can represent a potential sensitizer for solar cells, this can be rationalized by its reasonable photovoltaic parameters with other electronic and optical properties.

**Keyword:** Donor- $\pi$ -Acceptor, TDDFT, UV-visible spectra, photovoltaic properties.

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## Replicating the MAP Kinase Cascade in Membrane Computing

**Bareq Shaalan Mohan**

**Abstract** Membrane Computing (MC) is defined as one of the main areas in computer sciences; MC has the aim of discovering novel computational models from studying biological cells, specifically the cellular membranes. Mitogen-Activated Protein Kinases (MAPK) cascade was the subject of research in the areas of modeling and simulation. Various software tools such as Performance Evaluation Process Algebra (PEPA) have been used to solve the MAPK cascade for the purpose of improving the effectiveness of signaling. In this study, the MAPK cascade is modeled by using MC. The models of Membrane Computing could be totally fully utilized by applying parallel computing platforms. P-Lingua can be defined as a programming language for MeCoSim and MC, where MC simulators are used to model and simulate MAPK. P-Lingua will be applied to structure, develop and examine the implementation of MAPK cascades in membrane computing. MeCoSim supports charts, outputs, and inputs which have been adapted to MC. The simulation results have been put to comparison with PEPA model. The results indicate that MC improves the MAPK implementation compared to PEPA. This study showed that MC, with its biological characteristics, could improve the implementation regarding biological processes including MAPK.

**Keyword:** MAPK; MAPK cascade; Membrane Computing; P-Lingua

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## The oscillation of lasota-wazewska model with a variable probability of death of red blood cell

**Hussain Ali Mohamad, Ehab Jafar Jassim**

**Abstract** In this paper, the Lasota-Wazewska model of survival of red blood cell in humans was studied, in which the probability of death of red blood cells was adopted as a function using nonlinear delay differential equation of the first order. Some conditions were established to guarantee that the number of red blood cells oscillates about the equilibrium. The results are supported by some illustrative examples.

**Keyword:** Delay Differential Equation, Difference Equation, Lasota – Wazewska model, Oscillation.

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## Food Security in Terms of Economic Affordability of Food: Analysis, Opportunities and Prospects

Nadiia Stezhko, Ahmed J. Obaid

**Abstract** This article analyzes the access of population of Ukraine to food and the real financial opportunities of its citizens. Empirical coefficients of elastic demand for basic foodstuffs according to the average income of the population per household were determined. The average annual indicators of change in total income and food expenditure per household were calculated. These calculations showed that the indicator “Economic affordability of food” almost a third does not ensure food security of the population of Ukraine. Based on the methodology presented in this research, the necessary total income of the population to ensure food security by the indicator “Economic affordability of food” and scenarios for its provision by changing the structure of food costs, coefficients of elasticity of demand for household income and resources and other variables were determined.

**Keyword:** Delay Differential Equation, Difference Equation, Lasota – Wazewska model, Oscillation.



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# Track 3

## Mathematics and Information Theory



## Characterization Of Fuzzy Soft Tri- $\alpha$ -open set In Fuzzy Soft Tri-topological Spaces

Asmhan F. Hassan , Azhaar A. Farhan

**Abstract.** In this paper, we investigate the properties of Fuzzy Soft Tri- $\alpha$ -open set (or Fuzzy Soft  $\tau_1\tau_2\tau_3$ - $\alpha$ -open set) in a Fuzzy Soft Tri-topological spaces, A detailed study is carried out on properties of Fuzzy Soft Tri- $\alpha$ -interior, Fuzzy Soft Tri- $\alpha$ -closure of Fuzzy Soft sets and Fuzzy Soft Tri- $\alpha$ -neighborhood of a Fuzzy Soft point which are fundamental for further research on the theory of Fuzzy Soft Tri-topological spaces (w.r.t. Fuzzy Soft Tri- $\alpha$ -open set).

**Keyword:** Fuzzy Soft set, Fuzzy Soft Tri-topological space, Fuzzy Soft  $\tau_1 \tau_2 \tau_3$ - $\alpha$ -open set (or Fuzzy Soft Tri- $\alpha$ -open set), Fuzzy Soft  $\tau_1 \tau_2 \tau_3$ - $\alpha$ -interior, Fuzzy Soft  $\tau_1 \tau_2 \tau_3$ - $\alpha$ -closure, Fuzzy Soft  $\tau_1 \tau_2 \tau_3$ - $\alpha$ -neighborhood

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## Study Equivalence Between the Solution of Integral Equations and Ordinary Differential Equations

Muntaha Khudair Abbass

**Abstract.** This paper aims to study the types of linear integral equations, like Fredholm integral equation (FIE) and Volterra integral equation (VIE). Also Equivalence between Integral Equations and ordinary Differential Equations was studied. It was shown that there is relation between Reduction an Integral Equations to ordinary Differential Equations and vice versa. Some types of kernel of integral equations like iterated kernel, and Resolved kernel are mentioned by given some examples of these kernels. An analytical and numerical methods for solving the Fredholm integral equation was the method of successive approximations. Some examples about solving fredholm integral equation, Volterra integral equation are mentioned

**Keyword:** Differential Equations, kernel, Volterra integral equation, Fredholm integral equation., successive approximation.

## Large-Maximal submodules

Amira A. Abduljaleel , Sahira M. Yaseen

**Abstract.** The goal of this research is to introduce the concept of Large-maximal submodule, also we will consider some properties of it, such that a proper submodule  $N$  of an  $R$ -module  $M$  is said to be Large-maximal (L-maximal) submodule of  $M$  if there exists a submodule  $K$  of  $M$  such that  $N < K \leq M$ , then  $K$  is essential submodule of  $M$  ( $K \leq_e M$ ).

**Keyword:** maximal submodules, L-maximal submodules.

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## Computing the reliability of a complex network using two techniques

Fouad Hamza Abd Alsharify, Zahir Abdul Haddi Hassan

**Abstract.** . To find the reliability of any complex network, we need to convert it into a simple network to facilitate the process of reliability calculation. In this paper we simplify a complex network into a simple network by using two techniques, in the first technique “reduction method” the complex network was converted into a parallel network, while in the second technique “delta - star method”, the complex network has been transformed into a series network. The 2nd technique is based on the 1st technique in finding the reliability of a subnetwork. At the end of the research, a comparison between these two methods was made.

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## A new method using the Forward Backward technique with Contra Harmonic mean formula

Mahmood D. Jasim

**Abstract.** We introduce a new method for solving Initial Value Problems (IVPs) in Ordinary Differential Equations (ODEs), by making a mixing between the Forward (Predictor) – Backward (Corrector) technique and used it in the Contra Harmonic mean formula, this new method give us a parallelism in numerical calculations and it is more accurate than the old classical Runge – Kutta formula of the same order.

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## Entropy and Stress-Strength Model of Lower Order Statistic of Doubly Truncated Inverted Gamma Distribution

Salah H. Abid and Fadhil J. Kadhim

**Abstract.** Interest in phenomena is one of the most prominent scientific concerns of humans in general, and researchers and scientists in particular. From this standpoint came the interest to derive new probability distributions for representing the actual data taken from those phenomena more flexibly. In this paper, we present the distribution of lower order statistic from doubly truncated Inverted Gamma distribution (LOS DTIGD). The  $r$ th raw moments function form derives for new density. Stress-strength reliability, Shannon and relative entropies have also been discussed.

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## Tr-Rationally Closed Submodules and RCLS-Modules

Zahraa Moad Abd Al-Majeed , Mahdi Saleh Nayef

**Abstract.** : In this paper , we introduce two concepts . Firstly , the, concept of Tr-rationally closed ,a sub module  $H$  is called Tr-rationally closed if  $W/H$  is Tr -torsion free . And second , the concept of Rcls-module ,  $W$  is called Rcls-module if every Tr-rationally closed sub module in  $W$  is a direct summand . Several properties about these two concepts have been given . In addition , we discussed these notions with other related concepts .

**Keyword:** Closed , Y-closed , rationally closed , Tr-torsion , Tr-torsion free , Cls-module , Extending , Rationally extending .

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## Modified Chimp Optimization Algorithm Based On Classical Conjugate Gradient Methods

Noor Maan Abdul Jabbar , Prof. Dr. Ban Ahmed Mitras

**Abstract.** : In this paper, a new hybrid algorithm was proposed for the chimp algorithm using another traditional efficient algorithm called the Conjugate Gradient Algorithm called (CGA). The algorithm CG works to optimize the randomly created elementary

characteristic traditional algorithm above. The test was applied to (10) high-efficiency optimization functions with different dimensions and frequency. The results of the hybrid algorithm were excellent, encouraging, and superior to the original algorithm. The hybrid algorithm achieved optimal solutions by reaching to a minimum value  $[(f)]_{\min}$  for most of these functions

**Keyword:** Optimization, Chimp Optimization Algorithm, Swarm Intelligence, Conjugate Gradient Methods, Meta-Heuristic Algorithms.

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## Estimate the median lethal dose using the exponential model

Haneen Jawad Abood ,Iden Hasan Hussein

**Abstract.** : In this research, biological assays for testing toxins in the disinfection jungles Roanstar are studied on a group of fish. The dose-response relationship was estimated using an exponential model, applied the MLE method to estimate the parameters of the exponential distribution. The Fisher's information was used and the cumulative distribution function to estimate the median lethal dose  $[(LD)]_{50}$  which extracted confidence limits for it at specific time intervals

**Keyword:** response, exponential model, fisher information, median lethal dose.

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## Bayesian Estimation of Stress-Strength $P(T < X < Z)$ for Dagum Distribution

Ali Mutair Attia and Nada Sabah Karam

**Abstract.** : . In this paper, the reliability formula is derived for the stress-strength model of the probability  $P(T < X < Z)$  for a component's strength  $X$  falling between two stresses  $T$  and  $Z$ , based on Dagum Distribution with unknown parameter  $\beta$  and known and common parameters  $\lambda$  and  $\delta$ . Bayesian estimation is discussed to estimate the reliability under complete data by using Gamma prior based on two loss function (weighted and quadratic

loss functions), and the comparison between these estimators based on a simulation study using mean square error criteria (MSE) for each of the small, medium and large samples. The most important conclusion is that this comparison confirms that the performance of the estimator according to the weighted loss function works better for the most experiments studied

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## Reliability Estimation of a Component exposed to k Stresses for Gompertz-Frechet distribution

**Sarah A. Jabr and Nada S. Karam**

**Abstract.** : In this paper, the reliability of the stress-strength model is derived for probability  $p(\max(Y_1, Y_2, \dots, Y_k) < X)$  of a component having its strength  $X$  exposed to  $k$  independent stresses  $(Y_1, Y_2, \dots, Y_k)$  and also as a special case  $k=2$ . when  $X$  and  $Y_1, Y_2, \dots, Y_k$  flowing Gompertz-Fréchet distribution with unknown shape parameters  $\theta, \lambda$  and known parameters  $\alpha, \beta, \gamma$ . Different methods used to estimate reliability  $R$  and Gompertz-Fréchet distribution parameters which are Maximum Likelihood, Least square, Weighted Least square, Regression and Ranked set sampling methods, and the comparison between these estimators by simulation study based on mean square error criteria (MSE). The comparison confirms that the performance of the maximum likelihood estimator works better than the other estimators.

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## Some Entropies and Stress-Strength model for Exponentiated Inverted Gamma Phenomena

**Salah H. Abid and Fadhil J. Kadhim**

**Abstract.** . Since Gupta et al. (1998) [8] suggested the Exponentiated class of distributions, a lot of published papers based on this class to derive new distributions for representing set(s) of real data more flexibly. In this paper, we present Exponentiated Inverted Gamma distribution (EIGD). The  $r$ th raw moments function form derives for new densities. Stress-strength reliability, Shannon and relative entropies have also been discussed.

## Fuzzy Homotopy Analysis Method For Solving Fuzzy Riccati Differential Equation

Hadeer A. Sabr , Basim N. Abood and Mazin H. Suhhiem

**Abstract.** . In this work, we have used fuzzy homotopy analysis method to find the fuzzy series solution (fuzzy semi-analytical solution) of the first order fuzzy Riccati differential equation. The fuzzy approximate-analytical solutions that we obtained during this paper are accurate solutions and very close to the fuzzy exact-analytical solutions. Some numerical results are given to illustrate the method. The obtained numerical results are compared with the exact solutions.

**Keyword:** Fuzzy homotopy analysis method, Fuzzy Riccati differential equation, Fuzzy series solution.

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## J-Small Semiprime Submodules

Nuhad S. Al-Mothafar , Rafid M Al-Shibani

**Abstract.** . Let  $R$  be a commutative ring with identity and  $Y$  be an unitary  $R$ -module. We say a non-zero submodule  $S$  of  $Y$  is a  $J$ -small semiprime if and only if for whenever  $i \in R, y \in Y, (y)$  is small in  $Y$  and  $i^2 y \in S + \text{Rad}(Y)$  implies  $iy \in S$ . In this paper, we investigate some properties and characterizations of these class of submodules

**Keyword:** Semiprime submodules, Small semiprime submodules,  $J$ -Semiprime submodules,  $J$ -Small semiprime submodules

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## Exponential- "Generalizing Uniform Distribution Using the Quantile Function" (E- GUQD)

S. R. Hussein and K. Ab. Al-Kadim

**Abstract** Our study suggested a new distribution through the use of the cum. dis. function for the exp. dis., as well as the cum. dis. function for the uni. dis. in addition to the quantitative function of the unified generalization using the quantitative function.

Therefore it is covered different mathematical and statistical properties .of this distribution.

**Keyword:**Cumulative Distribution, Exponential, Generalized Uniform Distribution

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## Design a Fractional Chaotic Logistic Dynamical System

**Adil K Bagheedh, Salah H Abid and Sadiq A Mahdi**

**Abstract** In the present article, a new procedure to design a continuous fractional chaotic dynamical system with delay time from a logistic map by using sampled data representation of continuous time Caputo fractional models. An exact expression for the solution of the constructed method is found. In addition, the latest chaotic attractor that results is seen. Finally, using the MATLAB software, all theoretical results were numerically confirmed in this study.

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## Bayes Pre-Test Shrinkage Estimators of Scale Parameter for Maxwell Distribution under Squared Loss Functions

**Dr. Waleed Rodeen and Sakina Aziz**

**Abstract** The Maxwell distribution is a lifetime model, and it is used in many applications of physics and chemistry. In this paper, we suggest and study the pre-test Shrinkage Bayesian estimators of scale parameter for Maxwell distribution The equation of risk function and relative risk with respect classical estimator for the proposed estimators under squared error loss function (SELF). Using simulations, these estimators are compared in terms of the relative risk, which is accounted using the programming language R and the numerical results that showed performance of our estimators are compared with Bayesian classical estimator.

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## Distributive Rings and Some Domains

**Shahad Mohammed Moteea , Muthana A.Mahmood**

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**Abstract :** In this paper, we study many relationships about Distributive ring and other domain such as Dedekind domain and Noetherian domain. We prove if any divisible module over a ring  $T$ , then  $T$  is Distributive ring. Also we satisfy if  $T$  is invariant ring have multiplication ideal this imply  $T$  is a Distributive ring. Finally, we study strongly duo ring and related to Distributive ring.

**Keyword:** Dedekind domain, Distributive ring, Bezout ring, Multiplication module, Strongly duo ring.

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## New Technique for Finding the Maximization to Transportation Problems

**Haleemah Jawad Kadhim, Mushtak A. K. Shiker, Hussein A H Al-Dallal**

**Abstract :** Transportation problems (TP) are one of the important problems in linear programming problems (LPP) that generally address the problems of transporting and distributing goods with the aim of achieving the largest profit or the lowest cost depending on the type of problem addressed. In this research study, a new technique was proposed to solve transportation problems with an objective function of the type of maximization that is used to achieve the highest possible profit. This technique was obtained by relying on a published research paper that deals with the same problem but with an objective function of the miniaturization type. The efficiency of this new technique was tested in terms of the type of results obtained when it was used to solve many transportation problems in life, and some of them were mentioned in this paper. After that, the solution results were compared using the proposed technique with the use of the three well-known classical methods which are NWCM, LCM, and VAM. Whereas, the results using the new technique were the required results that represent the optimal solution or close to the optimal solution

**Keyword:** Operations Research, Optimization Problems, Transportation Model, Maximization of Transportation Problems, IBFS, VAM

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## Compatibility and Edge Spaces in Alpha - Topological Spaces

**Balqees K. Mahmoud, Yousif Y. Yousif**

**Abstract** This research presents the concepts of compatibility and edge spaces in  $\alpha$ -topological spaces, and introduces the  $\alpha$ -topology combinatorially induced by the  $\alpha$ -topology. Furthermore, studies the relationship between the  $\alpha$ -topology on  $V \cup E$  and the relative  $\alpha$ -topology on  $V$ .

**Keyword:** compatibility, edge spaces, combinatorial extension..

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## Good Characteristics of The New Spectral Conjugate Gradient Method for Unconstrained Optimization

**Ahmed Hussien Sheekoo , Ghada M. Al-Naemi**

**Abstract** The spectral conjugate gradient (SCG) method is an effective method to solve large-scale nonlinear unconstrained optimization problems. In this work, we propose a new SCG method in which performance is numerically analyzed. We established the descent property and global convergence conditions based on assumptions through the strong Wolfe-Powell line search. Numerical results were performed using benchmark functions widely used in many conventional functions to evaluate the efficiency of the proposed method.

**Keyword:** Spectral conjugate gradient, Unconstrained optimization, Global convergence, Sufficient descent condition, Strong Wolfe-Powell line search.

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## Proposed Ranking Function to Solve the Fuzzy Project Management and Network Problem

**Huda Fadhil Abbass ,Idean Hassan AL-kanani**

**Abstract** .In this paper, we create a relationship between network model and project management by using data of cost to the residential project. we solved these data by using the crisp network method(real data). After that, by using the same data we convert it to fuzzy data then the fuzzy data tested by trapezoidal membership function to be sure its belong to the duration  $[0,1]$ ,Proposed ranking function had solved the fuzzy network problem to the fuzzy data .

**Keyword:** Project Network ,Ranking Function, Fuzzy Numbers, Critical Path Technique.

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## Even Power Weighted Generalized Exponential Distribution

Rana Hadi Mutlk , Dr. Awatif Rezzoky Al-Dubaicy

**Abstract** . In this search ,derivation a new even-power weighted generalized Exponential distributions with some statistical properties are discussed, such as [cumulative dist, probability generating function, moment generating function, reliability, and Entropy functions] and other properties The scale parameter for this dist. has been estimated, using two methods, [method of moment and maximum likelihood].and simulation study has been to compare by MSE criteria, for the performance of the two estimation

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## A New Technique for Finding the Optimal Solution to Assignment Problems with Maximization Objective Function

Haleemah Jawad Kadhim, Mushtak A. K. Shiker , Hussein A H Al-Dallal

**Abstract** The assignment problems (AP) are an important part of linear programming problems (LPP) that deal with the allocation of different resources for different activities based on one to one. The assignment problem is established in a variety positions when decision makers need to determine the optimal allocation and this means assigning only one task to one person to achieve maximum profits or imports or achieve less time or less cost based on the type of problem. In this work, a new technique has been provided to find an optimal solution for the assignment problems of maximization objective function. Comparing the proposed technique results with the Hungarian method indicates that the new technique has easier and less steps to find the optimal solution and thus the time is reduced and the effort is largely reduced.

**Keyword:** . Linear Programming Problems. Mathematical Model. Maximization of Assignment Problems. Hungarian Method. Optimal Solution

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## Some Relations On Fuzzy $\delta g$ -open Set in Fuzzy Topological Space on Fuzzy Sets

**Prof. Dr. Munir A AL-Khafaji and Ahmed A AL-Mayali**

**Abstract** : The aim of introduce and study the notion of a fuzzy  $\delta g$ -open set , and the relationships between it and (fuzzy regular  $g$ -open set , fuzzy  $\Delta g$ -open set, fuzzy  $\gamma g$ -open set, fuzzy  $\theta g$ -open) in fuzzy topological space on fuzzy set .

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## **A New Projection Technique with Gradient Property to Solve Optimization Problems**

**Hussain Ali Mueen and Mushtak A.K. Shiker**

**Abstract** : In this study, a new gradient projection technique has been proposed that consists of three boundaries with achieving the unadulterated descent feature. In this technique, we worked on combining the conjugate gradient algorithm with projection techniques to obtain a new algorithm for solving a wide range of unconstrained optimization problems. We have established global convergence with some hypotheses, and it has become clear to us through our results that the new formula is good and promised.

**Keyword**: . Linear Programming Problems. Mathematical Model. Maximization of Assignment Problems. Hungarian Method. Optimal Solution

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## **Using a New Modification of Trust Region Spectral (TRS) Approach to Solve Optimization Problems**

**Hussain Ali Mueen and Mushtak A.K. Shiker**

**Abstract** . A trust- region spectral (TRS) technique is important strategy to solve optimization problems. In this work, a new modification of (TRS) is introduced by using a new trust- region radius (TRR). We proved the global convergence of the new algorithm. The numerical experiment were made by comparing the proposed algorithm with famous algorithms depending on the number of iterations, time required to find the solution and functions evaluation. Based on these results, we can conclude that the proposed algorithm is better than the three algorithms that were compared with.

**Keyword:** Optimization problem. Line search method. Global convergence. Trust-region method. Trust-region spectral.

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## Application of Linear Equation Systems in Banking Auditing

Athraa N ALbukhuttar, Hayder N kadhim, Hussein A ALMasoudi

**Abstract** . In this research, we use the Euler's equation formula that constitutes a linear system and it's application in bank audits. The solution of the systems can be obtained by Novel transformation

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## Some Classes Of Analytic Functions For The Third Hankel Determinant

Mustafa I. Hameed and Muna H. Ali

**Abstract** . We investigated the Hankel determinant  $H_3(1)$  for functionals in the analytic function class and obtained the sharp bound for the third Hankel determinant  $|e_3 e_5 - e_4^2|$  for a subclass of analytic functions in this paper.

**Keyword:** Univalent function, Hankel determinant, Toeplitz determined

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## TD– Spaces And Its Propperties

Bushra Kadhim Awad

**Abstract** . In this work we try to learn – space and reach to relation between – space with  $T_0$  – spaces and  $T_0$  - Alexandroff spaces and then try to get some properties of – spaces and prove them.

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## The Probability Distribution of Time to Extinction: A simulation study

Salah H. Abid

**Abstract** The time to extinction (TTE) is very important topic in some fields of studies; ecology, economics, corporate competition, bacterial sciences and epidemiology. The aim of the present paper is to investigate about the empirical parametric and empirical nonparametric probability distribution of the time to extinction for two related stochastic models; Rosenzweig and Macarthur model and May model. First, we assume the amplitude of  $r$  is a random variable with a continuous uniform probability distribution on a closed interval  $[r_1, r_2]$ . Second, we assume the number of consecutive years during which the amplitude of  $r$  remains constant is a random variable with a discrete geometric probability distribution with parameter  $p$  which is supported on a positive integer  $Z_+$  and  $p \in (0, 1)$ .

**Keyword:** Univalent function, Hankel determinant, Toeplitz determined

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## Primely Compressible Module Relative To A Submodule

Ali Mohammed Al-Silaykhee and Shukur Neamah Al-Aeashi

**Abstract** In this paper, we define a new notion namely Primely Compressible module relative to a submodule  $N$  of  $M$  denoted by (N-Pri-Compressible) also, new generalizations of Primely Compressible relative to a submodule are introduced where a module  $M$  is known as (N-Pri-Compressible) if for all nonzero submodule  $K$  of  $M$  such that contains  $N$ , and  $N$  be a nonzero Prime submodule of  $M$ . there exists a nonzero monomorphism  $f: M \rightarrow K$ . Many connections between these classes and others have been investigated

**Keyword:** Compressible module, Primely Compressible module and Primely Compressible module relative to a submodule

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## Method for Analyzing the Problem of Determining the Dynamics of Changes in the Structures of Temporal Directed Tree

Ali Rashid Ibrahim

**Abstract** . Problem determining the dynamics of changes in the structures of temporal directed tree is one of the central problems of graph dynamics, i.e. the changes in the similarity of temporal directed tree structures, which is the subject of this research. Two types of problems associated with determining the distance or similarity index for a pair of structures of temporal directed tree are identified. A method for solving these problems is proposed, and example of solution is given .

**Keyword:** Temporal directed tree, Maximum common fragment, digraph, Tree, Directed tree, Similarity of directed tree, Isomorphism, Automorphism, Graph dynamics.

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## T-Small Quasi-Dedekind modules

**A Anfal Hasan Dheyab, Suad Naji Kadhim, Mukdad Qaess Hussain**

**Abstract** Let  $Q$  be a left Module over a ring with identity  $R$ . In this paper, we introduced the concept of T-small Quasi-Dedekind Modules as follows, An  $R$ -module  $Q$  is T-small quasi-Dedekind Module if,  $\forall$  , then  $\text{Ker } w \ll_T Q$ . Also, we illustrate it by examples ..and give basic properties

**Keyword:** small Module, quasi-Dedekind , small quasi-Dedekind

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## A Comparison Two Ridge Regression Using LAD method with Simulation

**Tamarah Wathib Mohammad, Dr.Awatif Rezzoky Al-Dubaicy**

**Abstract** The multicollinearity is the one of the important and contained problems in regression analysis, because its effect on model estimators, the problem is that the independent variables are so closely related that the results of the regression are not clear, the aim of this research is to solve the problem of multicollinearity. one of the solutions get of this problem has deal with, which is the ridge regression of least absolute deviation (LAD) estimators, by adding a proposed a ridge parameter which is considered as

contribution to solving the problem of multicollinearity by modify B M Golam Kibria ( $K^{\wedge}_{MED}$ ) then compared it between them. The ( $K^{\wedge}_{CN}$ ) is the best estimator by simulation study and mean square error (MSE) critical

**Keyword:**Least Absolute Deviation, Linear Regression, Ridge Regression, Multicollinearity Errors, Efficiency.

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## Using Fuzzy-ARFIMA Models to Predict Births in Basra Governorate

**Dr. Raissan Abdulimam Zalan and Zainab sami yaseen**

**Abstract** Today's time series analysis is one of the most important statistical methods in forecasting, and it has been used in many economic, industrial, commercial and science fields, by representing time series characterized by long-term memory that helps predict future predictions and make appropriate and accurate decisions. In this research, we study prediction by relying on time series data for births in Basra Governorate. Using fuzzy-ARFIMA models and comparing them with each other using evaluation criteria (AIC& BIC) and (Adjust R-squared) for prediction, which are calculated using Eviews version (10), and Fuzzy-ARFIMA (12,0.104,12) was found. It is the best because it has the lowest values for (AIC & BIC) and the highest value for (Adjust R-squared) , and also the highest forecasting efficiency because it has the lowest values for prediction accuracy scales (MAE& RMSE) and was chosen as the best model for predicting the future of monthly births in Basra

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## Subclass of Harmonic Multivalent Functions (Accept submit)

**Ahmed khalaf Radhi and Shamel Ibrahim Ahmed**

**Abstract** In this paper ,we introduce a new class of multivalent harmonic functions defined by liner operator  $H_p^{\wedge\lambda}$  ,we instigate functions in this class have a variety of properties.

The bounds for coefficients, distortions, convolution, convex combination, and extreme point are all given .

**Keyword:** multivalent functions, harmonic functions, derivative operator, extreme point, convolution and convex combination.

## The Development of interfaces in a Parabolic p-Laplacian type diffusion equation with weak convection

Habeeb A. Aal-Rkhais, Ruba H. Qasim

**Abstract** This work has the objective to analyse the initial growth of interface and structure of nonnegative weak solution for one-dimensional parabolic p-Laplacian type diffusion-convection with non-positive convection coefficient  $c$ . In this situation, the interfaces may expand, shrink or remain stationary relying on the competition between these two factors. In this paper, we concentrate on three regions to classify the behavior of local solutions near the asymptotic interface in the irregular domain. In the first and second regions, the slow diffusion dominates over the convection term with expanding interfaces under some restrictions. In the third region, the slow diffusion dominates over the convection, but the interfaces have a waiting time. In our proof, the rescaling method and blow-up techniques are applied ..

## Jordan Generalized Higher Reverse Derivations On prime $\Gamma$ -Semirings

Auday Hikmat Mahmoud<sup>1</sup>and Hussein Ali Oreibi

**Abstract** The purpose of this research paper is to look into Jordan generalized higher reverse derivations on prime  $\Gamma$ -semirings. We begin by introducing a generalized higher reverse derivations and a Jordan generalized higher reverse derivations in  $\Gamma$ -semirings. For a 2-torsion free prime  $\Gamma$ -semiring  $(M, \wedge)$  in the sense that  $a\lambda \circ \beta c = a \circ \beta \lambda c$  for all  $a, \lambda, c \in M$  and  $\lambda, \beta \in \Gamma$  we prove that every Jordan generalized higher reverse derivations of  $(M, \wedge)$  is a generalized higher reverse derivations of  $(M, \wedge)$ .

**Keyword:**generalized.higher.reverse.derivation,Jordan.generalized.higher,reverse derivation, prime  $\Gamma$  –semiring

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## Ideal nano Topological Spaces with Different Subsets

**Rahma Ibrahim Hussien, Hula M. Salih**

**Abstract :** In this paper, we introduce a new various of sets called A1-In set, B1-In set, A2-In set , B2-In set , P-In set,  $\alpha$  -In set , A\*-In set , PR-Inset and another types of sets in ideal nano topological spaces and study some properties of these sets also we distinguish the relations between them and the related properties .

**Keyword:** A1-In set, B1-In set, A2-In set , B2-In set , P-In set,  $\alpha$  -In set , A\*-In set , PR-Inset.

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## Small-Essentially Pseudo-Injective Modules

**Zainab Raad Shaker , Mahdi Saleh Nayef**

**Abstract :** Let R be associative ring with unit element and X be unitary right R-module . In this work, we introduce the definition of the concept small-essentially pseudo injective module (shortly, S-Ess-pseudo injective). Many properties of this concept are introduced and also we are consider some of their characterizations. Furthermore, we are studied the relation between our concept and some known R-modules and give some results on their endomorphism rings ..

**Keyword:** Injective module; pseudo--injective module; essentially --pseudo injective; S-Ess- pseudo injective; small-essential sub module.

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## Convergence and stability of some random iterative schemes

**Sabah Hassan Malih, Salwa Salman Abed**

**Abstract** In this paper, devoted to prove some random fixed points theorems under Fibonacci sequence, random common fixed points under Fibonacci sequence and stability results of random iteration schemes under Fibonacci sequence

**Keyword:** iterations scheme under Fibonacci sequence, asymptotically nonexpansive random operator, common random fixed points .

## CONVERGENCE OF RANDOM ITERATIVE SCHEME TO A COMMON RANDOM FIXED POINTS

**Sabah Hassan Malih, Salwa Salman Abed**

**Abstract** In the context of uniformly convex separable Banach spaces, we implement an iterations scheme under Fibonacci sequence for approximating common random fixed points of two asymptotically nonexpansive random operators, and define weak and strong convergence results for common random fixed points of asymptotically nonexpansive random operator.

**Keyword:** iterations scheme under Fibonacci sequence, asymptotically nonexpansive random operator, common random fixed points .

## Asymptotic Behavior Criteria for Solutions Second Order Half Linear Neutral Differential Equation

**Sattar Naser Ketab , Banen Wafaa.Abdullah**

**Abstract** In this paper the we study the oscillation and asymptotic behavior of second-order Half linear neutral differential equations. some basic and necessary and sufficient condition are established for every solution of

$$(b(t)[z(t)+\mu k(t)z(\sigma(t))^\alpha]^\alpha)^\alpha+h(t)z^\alpha(\tau(t))=0 ;\mu=\pm 1 , \quad t \geq t_0,$$

to insure the convergence of all nonoscillatory solutions to zero or tends to infinity as ..Some examples are given to illustrate the main results

**Keyword:** asymptotic behavior, Second order half linear neutral differential equations, oscillation of solutions

## Asymptotic Behavior Criteria for Solutions Second Order Half Linear Neutral Differential Equation

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INTERNATIONAL CONFERENCE  
for Physics and Applied Science

(College of Education - Mustansiriyah University)

Baghdad - Iraq

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# Track 4

## Information Technology and Networking



## Wireless Optimization Algorithm for Multi-floor AP deployment using binary particle swarm optimization (BPSO)

Omar S. Naif , Imad J. Mohammed

**Abstract.** Optimizing the Access Point (AP) deployment is of great importance in wireless applications owing the requirement to provide efficient and cost-effective communication. Highly targeted by many researchers and academic industries, Quality of Service (QoS) is an important primary parameter and objective in mind along with AP placement and overall publishing cost. This study proposes and investigates a multi-level optimization algorithm based on Binary Particle Swarm Optimization (BPSO). It aims to an optimal multi-floor AP placement with effective coverage that makes it more capable of supporting QoS and cost effectiveness. Five pairs (coverage, AP placement) of weights, signal thresholds, and Received Signal Strength (RSS) measurements simulated with Wireless Insite (WI) software were considered to work in conjunction with the proposed optimization algorithm. Additionally, the AP deployment results obtained from WI and optimization will be compared with the simulation results of the current AP diffusion within the target building. These comparisons will be based on the most important RSS parameters, path loss (PL) and interference. The comparison results showed a significant improvement in RSS and path loss values of (-11.55) dBm and (11.55) dBm. While the interferences decreased by (7.87 %). Furthermore, the result of performance analysis showed that the proposed algorithm outperforms the current AP deployment by 39.23% in coverage ratio.

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## Design and Performance Thulium Doped Fiber Amplifier in Optical Telecommunication Networks

Zina Abdul Lateef ,Fatima faydhe al-azzwi , Majida Saud Ibrahim

**Abstract.** Thulium-doped optical Fiber enhancers (TDFA) are advanced to cover the optical media transmission Wavelength Division Multiplexing (WDM) information transmission in the envisioned the band (800-1800 nm) with up to 6.5dB increment and noise figure as low as 2.6 dB. We existing the first in-band diode-siphoned thulium-doped fiber amplifier (TDFAs) operational in the wavelength locale and test their appropriateness as high request enhancers in possible coming media transmission frameworks.

**Keyword:** TDFA, WDM, optical, gain, noise figure, amplifier.

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## Real-life Dynamic Facial Expression Recognition: A Review

Sharmeen M.Saleem, Subhi R. M. Zeebaree, Maiwan B. Abdulrazzaq

**Abstract.** In emotion studies, critiques of the use of a static facial expression have been directed to its resulting from poor ecological validity. We conducted a study of studies in the present work, which specifically contrasted recognizing emotions using dynamic facial expressions. Brain imaging experiments and behavioural studies with associated physiological research are also included. The facial motion appears to be connected to our emotional process. The findings of laboratory brain injury experiments also reinforce the concept of a neurological dissociation between static and dynamic expression mechanisms. According to the findings of electromyography studies of dynamic expressions of affective signals, those expressions evoke more extreme facial mimic physiological responses. Studies significantly affirm the essence of dynamic facial gestures.

**Keyword:** Facial behavior analysis, Facial expression recognition, 3D facial surface, 3D facial surface sequences (4D faces).

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## Study for Food Recognition System Using Deep Learning

Nareen O. M.Salim, Subhi R. M. Zeebaree, Mohammed A. M.Sadeeq, A. H. Radie, Hanan M. Shukur, Zryan Najat Rashid,

**Abstract.** Accurate dietary appraisal has been found by literature to be very significant in the evaluation of weight loss treatments. Most current methods of dietary evaluation, however, depend on recollection. The development of a modern computer-based food recognition system for reliable food evaluation is now possible across comprehensive mobile devices as well as rich Cloud services. Fixing the problem of food detection and identification in photos of different kinds of foods. Given the variety of food products with low inter-and high intra-class variations and the limited information in a single picture, the problem is complicated. By propose the overall application of multiple fusion-trained classifiers to achieve increased identification and recognition capabilities on characteristics obtained from various deep models. This paper studied various techniques of food recognition using different approaches and based on several variables, compared their effectiveness. Our study results demonstrate that deep learning overcomes other strategies

like manual feature extractors, standard ML algorithms, as well as DL as a practical tool for food hygiene and safety inspections.

**Keyword:** Food Recognition, Neural Networks, Deep Learning, Classification, Clustering, Feature Selection.

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## Influence of magnetic field on the characteristics of n-typePSi prepared by photo-electro-chemical etching

**Akram A. Khalaf , Ali H. Attallah , Amer B. Dheyab , Alwan M. Alwan**

**Abstract.** In this study, structural, optical, and electrical properties of porous silicon (PSi) substrates and related devices are reported. The (PSi) is prepared by a photo-electrochemical etching in the front-side illumination pathway with and without perpendicular magnetic field (MF). The application of (MF) on the electric charge carrier path led to a modification of the PSi surface morphologies (pores shape, sizes, orientation, and homogeneity) and affected the characteristics of the n-type PSi devices. The (MF) had increased the number of pores, decreased the overlapping process and promoted the orientation of the relatively more defined pores across the PSi surface. The observation of the changes in PL spectra, electrical properties, and charge carrier transport mechanisms could have been resulted from the surface reconstruction and hence; the PSi morphologies by the magnetic field.

**Keyword:** Magnetic field; surface reconstruction; Porous silicon; photo-electro-chemical etching.

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## Machine Learning Challenges for IoT Device Fingerprints Identification

**Vian Adnan Ferman and Mohammed Ali Tawfeeq**

**Abstract.** . The dramatic growth of Internet of Things (IoT) devices in recent years increases the IoT networks' vulnerabilities and introduces new challenges among machine learning (ML) algorithms to detect the networked devices. The creation of a Device Fingerprint (DFP) may depend on extracting the network traffic features related to the

device except for the identities assigned to it. In this paper, Device Fingerprints for 20 IoT devices are created by extracting 30 features during startup operation. Wireshark Network Protocol Analyzer is used to collect network traffic of 8 home IoT devices, meanwhile the traffics of the remaining devices are taken from the captures\_IoT-Sentinel publicly available dataset. Four supervised machine learning algorithms were applied and tested to detect authorized devices and isolate unknown devices, namely: Support Vector Machine (SVM), Decision Tree (DT), Ensemble Random Forest (RF), and Gradient Boosting Classifier (GBC). Random Forest model and Gradient Boosting Classifier both showed better results of about 98.8% as an average of overall accuracy with less difference comparing with the accuracy of Decision Tree. Voting classifier was applied using the three estimators that resulted in high accuracy (DT, RF, and GBC) and achieving 99.5% as an average of overall accuracy.

**Keyword:** Gradient Boosting Classifier, IoT device fingerprint, network traffic, Random Forest, Voting classifier.

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## Forecasting neural networks, such as forecasting sale the plastic injection machine market.

**Hind Khalid**

**Abstract.** . The aim of this research is to show what benefits the use of neural networks in forecasting processes can bring, among its development through out the years considering different kinds of mathematical methods. The software applications that have been developed recently for forecasting processes are neural and AI-based. Data entries from previous months are used in mathematical methods to calculate and predict sales in a company. By the use of these neural and AI-based processes, predictions of whether company sales will go up or down the next month can be made. This research will help to better understand the process behind these predictions and how the developments of neural networks come into place.

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## Early Esophageal Cancer detection using Deep learning Techniques. (Review Article)

**Noor N. Thamir, Faisel G. Mohammed**

**Abstract.** . Esophageal cancer is one of the deadliest diseases for humans, since it is discovered in very advanced stages. As result, pathologists are increasingly relying in image recognition and artificial intelligence tools to aid in the early identification and evaluation of this lesion. We examined a number of papers that dealt with this issue during the time span in order to shed light on the studies that were performed in this area (2017 and 2020). We have looked at experiments that used Convolutional Neural Network (CNN) technologies in the study of endoscopic images to help with early detection or diagnosis of esophageal cancer and its various forms. More research on esophageal malignant growth is required, as well as improving the disease's indicative existence and employing more proven techniques for feature selection/extraction of endoscopic images. The aim of this review is to highlight the research conducted on endoscopic images of the esophagus using deep learning algorithms, including CNN, Support Vector Machine (SVM), Random Forests (RF) and other techniques that were used to design the Computer-Aided Detection (CAD) system. In this review we covered some but not all articles that was of great contact with our master's thesis research in this regard.

**Keyword:** Esophageal Cancer, Endoscopic images, Computer-Aided Detection, Deep Learning, Convolutional Neural Network.

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## Smart Electronic Switching (ON/OFF) System Based on Real-time Detection of Hand Location in the Video Frames

Duaa A. Taban, Ali Al-Zuky, Shaymaa H. Kafi, Anwar H. Al-Saleh, Haidar J.

Mohamad

**Abstract** Human looking forward to living in a modern and comfortable environment like smart houses. In this study, an effective user-friendly smart home prototype designed with low cost. The prototype contains eight of Light Emitting Diode (LED) considered as home appliances and controlled in real-time using eight suggested hand cases. The hand cases have different position regarded to head and shoulder levels. The hand position is detected using a new suggested algorithm programmed in Matlab software. Viola-Jones method used to detect hand in a complex background (hand with a different background) by training computer using positive (hand) and negative (non-hand) image datasets. To make computer training faster and accurate, a new idea depends on a skin detection used before computer training to determine the location and size of all positive images automatically. The LEDs in prototype switched ON/OFF using the suggested hand cases in a fast time. Where the response time of LEDs to hand cases was 0.43 second.

**Keyword:** Viola-Jones method, Arduino, hand detection, smart home.

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## Lora in a campus: Outdoor Environment Accurate Modelling Based on Particle Swarm Optimization at 435MHz

**Ali S. Kurji , Aseel H. Al-Nakkash , Osama Abbas Hussein**

**Abstract** . Path Loss (PL) models are an essential factor affecting the network design and its operation. With different environmental conditions, interpreting the PL characteristics in an open environment is a complex problem. In this work, the propagation of LoRa technology in a campus is investigated in order to propose an accurate PL model. The measurements are taken place in two outdoor regions of the Electrical Engineering Technical College in Baghdad, Iraq. Measured field data correlates with global propagation models, demonstrating that ERICSON model results after an evaluation are likely to produce positive results. Different environment conditions make the global PL models difficult to generalize, yield some errors between the measured and estimated PL. For addressing this downside, Particle Swarm Optimization (PSO) has been based to develop the model parameters, hence matching the model to reality. The ERICSON model's parameters have been improved to the best fit with measured data, and the lowest Root Mean Square Error (RMSE) is gained equals to 3.7168dB and 5.4030dB for the two adopted regions.

**Keyword:** Path loss, LoRa, Propagation models, PSO, Outdoor Environment.

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## Embedded System Improvement for Measuring and Monitoring Fuel Consumption System Automatically over Public IP

**Sadeem Marouf M. Al-Chalabi, Khalid Ahmed Al-Dhahiri, Atheer Marouf M. AL-Chalabi**

**Abstract** . Abstract. As usual, researches and knowledge are constantly evolving; these built prompts to more studies and researches in order to achieve the closest state of optimization. According to our previous (Reference 5). This proposal improves the algorithms by calibrate the flowmeter sensors (YF-S201) separately in order to reduce the manufacture error rate. In addition, a laser sensor (TF mini Lidar) were used instead of an

ultrasonic sensor to measure the fuel volume of the main tank. Also, four voltage sensors (AC) and three clamp meters (SCT-013) were added to the system to indicate the electric in real-time. All these sensors are connected and controlled by two MEGA Arduino Microcontrollers and the information has been stored into the database that could be downloaded and displayed locally or remotely via internet as a GUI using Public IP.

This proposal found that the error rate of calculating the fuel consumed in the generator is (3.8%), this is more accurate by (90%) than previous one. The fuel in the main tank noticed that the accuracy is increased by (3.1%), as well, it produced more security for fuel from leakage or pilfering. The abnormal behavior of generator can be reached immediately by monitoring the voltage and ampere on real-time mode.

**Keyword:** Embedded System, consumption, Sensors, Arduino and GUI.

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## A NEW APPROACH TO STUDY THE CHALLENGES OF E-LEARNING ADVANTAGES AND DISADVANTAGE

**Mohammed Alkaragole, Sulaiman M. Karim, Saadaldeen Rashid Ahmed**

**Abstract** . . In this paper, we have a tendency to tried to explore the challenges in implication of E-Learning and its benefits and downsides. There are some problems for not implementing E-Learning as there's some lacking's of understanding concerning E-Learning to the teacher additionally the scholars and have some issue that bothers to just accept E-Learning instead of ancient learning surroundings, and our main target is to seek out the explanation behind at purpose there's some opinion concerning the challenges for not implementing E-Learning. E-Learning surroundings is principally an online bases platform in academic section mistreatment technology, the aspects of E-Learning surroundings is mistreatment digital tools in courses of study, it presents the ways, tasks, and therefore the connections between a course structure and introduced new assessment in numerous stages. The aim of this study is to spot what challenges or that factors are the explanation for not applying E-Learning normally additionally it'll concentrate on what challenges lecturers and what issues students suffers in learning through virtual policy separately by this it'll helps to seek out the views of E-Learning of lecturers and student each. currently a day's E-Learning is known in academic sites. E-Learning surroundings is principally student targeted. It's essentially virtual resource area, wherever student should get to be liable for their own work, because it may be a self-format study therefore student should have privy to their responsibility. I attempted to explore the challenges in implication E-Learning, because the outcome is affirmative there are some problems for

not implementing E-Learning as there's some lacking's of understanding concerning E-Learning to the teacher additionally the scholars and have some issue that bothers to just accept E-Learning instead of ancient learning surroundings, and my main target is to seek out the explanation behind at purpose there's some opinion concerning the challenges for not implementing E-Learning.

**Keyword:** E-learning, Speech Recognition, Virtual classroom environment, web platform, Digital Learning, Higher Education.

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## Thyroid Disease Classification Using Machine Learning Algorithms

**Khalid salman, Emrullah Sonuç**

**Abstract** . With the vast amount of data and information difficult to deal with, especially in the health system, machine learning algorithms and data mining techniques have an important role in dealing with data. In our study, we used machine learning algorithms with thyroid disease. The goal of this study is to categorize thyroid disease into three categories: hyperthyroidism, hypothyroidism, and normal, so we worked on this study using data from Iraqi people, some of whom have an overactive thyroid gland and others who have hypothyroidism, so we used all of the algorithms. Support vector machines, random forest, decision tree, naïve bayes, logistic regression, k-nearest neighbors, multi-layer perceptron (MLP), linear discriminant analysis. To classification of thyroid disease.

**Keyword:** Machine learning, classification model, Thyroid diseases, Support vector machines, Random forest, Decision tree, Naïve bayes, logistic regression, K-nearest neighbors, Multi-layer perceptron (MLP), Linear discriminant analysis.

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## Comparison of tow two cryptocurrencies: Bitcoin and Litecoin

**Mustafa Lateef Fadhil Jumaili , Sulaiman M. Karim**

**Abstract** . . The increasing daily use of virtual currency (cryptocurrency) is being adopted worldwide for many legal and illegal transactions. Cryptocurrency technology operates on a network that allows people to make payments around the world without any middleman. Since the technology was first developed, it became popular, and the price of cryptocurrencies started to rise and became unstable. In terms of the returns gained from

investing in cryptocurrencies, they have been huge in recent times, but there has always been a question about their existence and reliability. A cryptocurrency is a digital process that relies on the use of an encryption system for security primarily. Despite the challenges and problems facing cryptocurrencies, the success of Bitcoin has led several companies to search for alternative digital currencies. This paper tries to compare two cryptocurrencies - Bitcoin (BTC) and Litecoin (LTC) with respect to their stability and understanding its trends in the recent period.

**Keyword:** Cryptocurrency, Bitcoin, Litecoin, Volatility, IOT, Blockchain.

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## LINK BUDGET ANALYSIS FOR 3U NANOSATELLITE (TIGRISAT) OPERATING AT S-BAND

**Mohammed Mahdi Salih Altufaili, Ameer Najm Najaf, Mohamad J. Al Bermani**

**Abstract** Assessment of link budget estimation for TIGRISAT Low Earth Orbit satellite and its communication with ground station located in Baghdad/Iraq is introduced in this article. Communication link between the satellite and the ground station depends on various propagation parameters and losses which are either constant or variable. Uplink and downlink design parameters were considered. Simulation results show a linear behaviour between isotropically radiated power and received power in uplink and downlink respectively. Simulation outcomes illustrate how the precise amount of dust attenuation over Iraq dwindles the carrier to noise ratios as concerned with uplink and downlink in turn. In order to present high data rates telecommunication between a satellite at LEO and the earth station, this article reviews link budget requirements, besides for futuristic signal impairments consideration for enhancing transceiving performance for Tigrisat [11].

**Keyword:** link budget, dust attenuation, LEO satellites, TIGRISAT, 3U nanosatellite.

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## Speech Recognition using Convolution Deep Neural Networks

**Ayad Alsobhani, Hanaa M A ALabboodi, Haider Mahdi**

**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.

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## Neural Network Based Home Energy Management for Modelling and Controlling Home Appliances under Demand Response

Afiah Najm Abdullah, Ammar Hussein Mutlag, Maytham S Ahmed

**Abstract** Nowadays, the consumption of homes is around 40% of the total world consumption. Furthermore, 21% of the total greenhouse gas emissions are produced by homes. The emergence of smart grids has presented new opportunities for home energy management (HEM) systems for the purpose of reducing energy in the residential sector. Demand response (DR) tool that curtails and shifts demand to enhance the consumption of energy at home. It usually creates optimal schedules for energy consumption by considering load profiles, the cost of energy, level of comfort people, and environmental concerns. The deployment of smart meters, it is possible to control the load by using HEM system with demand response (DR) enabled appliances. Without a proper system, it is difficult to efficiently control the energy in houses. In this work, a Neural Network technique as a controller to control the energy in the building with DR strategy is developed to control and reduce peak demand load. Reduce the electricity cost and power consumption for the appliances while maintaining customer comfort is the motivation of this work. The electrical appliance such as air conditioning (AC), electric water heater (WH), washing machine (WM), and refrigerator (RF) were modeled using the Matlab program. The designed model can make an accurate decision in scheduling and shifting the operation of the electrical appliance at the peak time by scheduling the s domestic household at a specific time with no affecting the customer's preference.

**Keyword:** HEMS, Demand Response (DR), Power consumption, ANN, Smart meters.

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## Automatic COVID-19 pneumonia diagnosis from x-ray lung image: A Deep Feature and Machine Learning Solution

**M. A. Ahmed, Z.T. Al-qaysia, Moceheb Lazam Shuwandy, Mahmood Maher Saliha, Majid Hamid Ali**

**Abstract** . Coronavirus disease 2019 was announced after unidentified pneumonia was discovered in Wuhan, China, and quickly spread around the world (COVID-19). This outbreak has claimed the lives of so many people. It has a long-term negative impact on public health. The goal of this study is to develop an intelligent computer-aided system that can detect positive COVID-19 cases automatically, which can help with daily medical problems. The proposed system is based on the convolution neural network (CNN) architecture and can automatically expose discriminative features on chest X-ray images due to its convolution with rich filter families and weight-sharing characteristics. As a deep feature extractor, the CNN model SqueezeNet was used. The extracted deep discriminative features were fed machine Decision Tree, Random Forest, Neural Network (NN), Naive Bayes, Logistic Regression, and k-nearest neighbor learning algorithms. As a result, the NN classifier with an accuracy of 97.24 per cent, a sensitivity of 0.9724, a specificity of 0.9858, and an F-score of 0.972 provided the most effective results. The high detection performance obtained in this study demonstrates the utility of deep CNN features and an NN classifier approach for detecting COVID-19 cases in CXR images. With the current resources, this would be hugely beneficial in speeding up disease diagnosis.

**Keyword:** COVID-19; Computer aided diagnosis system; Deep learning; Deep feature extraction; Machine learning

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## Applying Support Vector Machine Algorithm on Multispectral Remotely sensed satellite image for Geospatial Analysis

**Fatima Hashim, Hayder Dibs, Hussein Sabah Jaber**

**Abstract** In this research support vector machine (SVM) method apply to classify the satellite image and produce land use and land cover (LULC) map. The used data is the

multispectral Landsat-8 OLI satellite image with a spatial resolution of  $(30 \times 30)m^2$ . However, the Karbala city was the study area. The SVM Applied with the default parameters of Kernel type, gamma in kernel function, penalty parameter and classification probability threshold. The SVM method achieved high accuracy in separating the categories of the study area based on the test samples collected from the study area in the Karbala province, Iraq. The classification training sites were selected based on visual interpretation and Google Earth Program. The image classification carried for six classes of the study area (Urban Area, Vegetation Area, Soil -1, Soil -2, Water Bodies and Roads). The results show a good accuracy of using SVM method based on relying on the capabilities and the precision of each pixel within the categories. The result evaluation was performed using the confusion matrix, the Kappa coefficient and the overall were 0.89 and 90.61% respectively. The SVM method is able to classify the land use and land cover of the study area with good and accurate results.

**Keyword:** COVID-19; Computer aided diagnosis system; Deep learning; Deep feature extraction; Machine learning

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## DEVELOPMENT OF EFFECTIVENESS METHOD OF WIRELESS SEGMENTS IN INFORMATION SYSTEM

**Mohammed Q. Mohammed<sup>1</sup> , Saif Q. Muhamed, Ali Hasan Taresh**

**Abstract** This research aiming is more efficient information system on the basis of the development and practical application of methods and models that enable the preliminary assessment of the feasibility of wireless segments (WS) or the choice of rational structure of WS. Thus, the comprehensive evaluation of the effectiveness of the proposed options for the structure to use the wireless segment in the information system that we consider is the actual problem. To Developing a method of assessing the efficacy of WS in the information system which is the basic method of evaluating options for the structures is the method of WS activity-based costing. By using developed and the proposed methods and models for reducing time-consuming complexity of work with a preliminary assessment of whether to apply a different option structures WS, increase the efficiency of the preparation of recommendations on the choice of rational structure of WS among the options for upgrading or development of IP business or organization. In this paper, methods have been used for assessing the efficacy of RBCs in the information system. The research focused on efficient information system on the basis of the development and practical application

of methods and models that enable the preliminary assessment of the feasibility of WS or the choice of rational structure of WS.

**Keyword:** WS - wireless segment; AP - Access Point; WM- wireless modem; LS local server; CA – cover area

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## Effect of ultrasonic technology on cellulase enzyme activity produced by local bacterial isolate.

**Soad A. Atiya, Iman H. Gatea, Khalid J. Abdulla**

**Abstract** Ultrasound effects were investigated on cellulase activity, produced by the local isolate *Bacillus* sp. Three bacterial isolates were isolated from different agricultural wastes samples. Their effectiveness in cellulose analysis was detected based on the measurement of the decomposition diameter around bacterial growth. The enzyme was extracted after the growth of the best isolation in cellulose lysis. The enzyme activity was measured and the enzyme was subjected to ultrasound intensity of 40 KH, low, medium and high power, and exposure time (10,20,30,40,50,60) min, enzymatic activity was measured after each treatment compared with control (without exposure to ultrasound). It was found that an increase in ultrasonic treatment time significantly increased the cellulase activity, the higher activity at 60(min). the effect of ultrasonic treatment at mid level of ultrasound power, showed higher activity at 20 (min), and the rest treatment lower than control, while at high level the activity decrease with time when compared with control. Protein concentration was estimated, there was no significant difference on protein content after ultrasonic treatment in samples at (10, 20, 30, 40) min while decrease in protein content in samples at (50, 60) min, compared with control.

**Keyword:** Ultrasonic, cellulase, *Bacillus*

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## Text Steganography in Image depending on Radon \_ Barker code Transforms

**Rafal Fadhil Jabbar, Osama Qassim Jumah Al-Thahab**

**Abstract** - With the widespread usage of the internet around the world, both public and private data are now widely disseminated on the internet. The security of these online records is a pressing issue that must be addressed immediately. Text watermarking is a technique for adding watermarks to text documents to help preserve their authenticity and credibility. For many years, text watermarking has been a hot topic of research. This paper describes a new method for embedding text in a picture that uses a radon transform-based Barker code to make the device more reliable and ensure that the text is returned without error. The main advantages of this research are the high security and the big capacity of data to be hiding since the use of radon transform is very helpful in extracting the data. All the image noise does not effect on the stego-image except the paper and salt noise effect on Root Mean Square (RMS) since its value is 0.274 and contract enhancement effect on RMS and Mean Square Error (MSE) by the values 0.586 and 0.343 respectively. Also the SSIM value is very acceptable since there is an obvious similarity between the original image and the stego-image (after stegonagraphy process).

**Keyword:** Barker Code, Radon Transform, Text Watermarking, Image Watermarking.

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## Frequency Domain for Color Image Authentication Proofing

**Sabah Karri,Gaid, Khalid Kadhim Jabbar**

**Abstract** Digital watermarking is the process of embedding data known as a watermark into a multimedia object so that the watermark can later be identified or recovered to claim its object. The use of an embedded watermark would enable the owner of the work hardware to be identified. In the proposed method the Particle-Swarm-Optimization (PSO) algorithm has been applied to embed a binary watermark bit in the optimal color sub-bands, resulting in a less extreme value after the PSO point. The embedding level, which uses Discrete Wavelet Transform (DWT) to embed binary bits in the resulted image in the low-frequency domain, must be able to withstand intended attacks while maintaining high quality, as well as assess image authentication and localize tampering areas (s). Various consistency metrics and watermark removal attacks are used to evaluate the algorithm in an experimental environment. The results show that the model can support imperceptible watermarking as well as high attack resistance

**Keyword** :Watermark, Binary Image, Color Images, Authentication, Frequency Domain, DWT, PSO