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دراسة تأثير ألياف البولي بروبلين والألياف الزجاجية على الخواص اللدنة و الصلدة للخرسانة ذاتية الدمك

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خرسانة ذاتية الدمك،
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المادة المضافة،
الألياف الزجاجية،
مقاومة الضغط،
مقاومة الشد.

ABSTRACT

من المتعارف عليه في مجال تقنية الخرسانة أن الخرسانة ذاتية الدمك (Self-Compacting Concrete) المحتوية على الألياف هي أحدى تطبيقات المشاريع الحديثة المدنية المختلفة و المتنوعة.

والهدف الأساسي في هذا البحث هو إضافة بعض المواد المضافة لتحسين بعض خواص الخرسانة ذاتية الدمك باعتبارها تستعمل بكثرة في تنفيذ المشاريع، وخاصة المباني الحديثة التي تكون بها كثافة تسليح عالية و تكون عالية الارتفاع، ويجب الإشارة إلى أن هناك عدة أنواع من الألياف مثل الألياف الحديدية و الألياف الزجاجية و ألياف الكربون.

في هذا البحث ثم دراسة إضافة ألياف البولي بروبلين والألياف الزجاجية إلى الخرسانة وبنسب 0 %، 0.25%، 0.50%، 0.75%، 1% من حجم الخرسانة حيث أجريت عدة اختبارات على الخرسانة الطرية و الصلدة ، منها اختبار حساب مقاومة الضغط و الشد.

و تبين النتائج بأنه عند إضافة مادة الألياف تبدأ مقاومة الضغط في النقصان حيث كانت أعلى مقاومة ضغط في حدود 51 نيوتن / مم^2 عند نسبة ألياف 0 % ، و أقل مقاومة كانت عند 33 نيوتن / مم^2 عند نسبة ألياف 1.0 % ، بينما مقاومة الشد تتناسب طرديا مع الألياف حيث كانت أقل مقاومة شد بدون ألياف عند 3.16 نيوتن / مم^2 بينما أعلى قيمة عند 3.72 نيوتن/مم^2.

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العوازل الحرارية ودورها في تحسين البيئة الداخلية لمباني المناطق الصحراوية

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المناخ الصحراوي ،

العزل الحراري ،

التوصيل الحراري ،

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ABSTRACT

تشير الدراسات إلى أن نسبة الحرارة المنتقلة من الحوائط وأسقف المباني الواقعة في المناخ الصحراوي الجاف بحوالي 60–70% بينما تأتي البقية عن طريق فتحات النوافذ والأبواب ، وبالتالي فأن الحرارة المتسربة من الحوائط والأسقف تمثل الجزء الأكبر المراد التخلص منه عن طريق أجهزة التكييف ، ولذا فإن العزل الحراري يمثل أهمية كبيرة في تخفيض الحرارة المتسربة إلى داخل المبنى وبالتالي التقليل في استهلاك الطاقة الكهربائية المستخدمة في تبريده ، حيث إن الحصول علي الكمية المطلوبة من الطاقة الكهربائية تعتبر من أهم المشاكل التي يعاني منها سكان مناطق الجنوب هذه السنوات.

وتهدف هذه الورقة إلى توضيح أهمية العزل الحراري في المباني التي انشأت في المناخ الصحراوي ودوره في تخفيض الطاقة الحرارية المستخدمة في أغراض التكييف من حيث معرفة العزل الحراري وفوائده والتعرف على مواد العزل الحراري الشائعة الاستعمال وخصائصها ثم معرفة كيفية استخدامها في المباني بطريقة سليمة بحيث تؤدي إلى ترشيد الطاقة . حيث استنتجنا من خلال هذا البحث إلى أن مواد العزل الحراري تمثل أهمية كبيرة في المنشات الواقعة في المناخ الصحراوي الجاف لأنها تؤدي إلى خفض استهلاك الطاقة إذا استعملت في المكان المناسب من المبنى وبالكمية المناسبة.

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تأثير نوع الملدنات الفائقة على التشغيلية والخواص الميكانيكية للخرسانة ذاتية الدمك

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ABSTRACT

تعتبر الخرسانة الذاتية الدمك من الانواع الحديثة وتمتاز هذه النوعية بالانسيابية العالية واللزوجة وليست في حاجة للدمك, وهي قابلة للانسياب تحت تأثير وزنها الذاتي. تنعكس هذه المميزات في أدائية الخرسانة الذاتية الدمك حيث تجعلها قادرة على التشكل والمرور خلال القوالب الإنشائية الضيقة أو المقاطع الإنشائية ذات التسليح المكثف مع تحقيق درجة دمك عالية دون الحاجة إلى استخدام الهزازات اثناء عملية الدمك الخارجي وكذلك بدون حدوث انفصال حبيبي أو نضوح في الخرسانة .

تتناول هذه الدراسة استخدام انواع مختلفة من الملدنات الفائقة (Super plasticizer) المتوافرة في السوق الليبي لإنتاج الخرسانة ذاتية الدمك, حيث تم استخدام 5 أنواع من الملدنات الفائقة المتوافرة في السوق الليبي وهي (FOSROC-AURAMIX 326C) و (SIKA VISCOCRETE-TEMPO 12) و (agel-Fx6) و (agel-Technohyper N) و (ليبيا لكيماويات البناء– ليبومنت أف أف) بنسب متقاربة للحصول على نتائج غير متفاوتة, وذلك لدراسة تأثير هذه الملدنات الفائقة على الخرسانة ذاتية الدمك في حالتيها الطرية والمتصلبة.

حيث وجد أن الخلطة الخرسانية التي تحتوي على الملدن الفائق (FOSROC-AURAMIX 326C) قد أعطت أكبر قطر انسياب مقارنة بالخلطات الأخرى, بينما تبين أن الخلطة الخرسانة ذاتية الدمك التي تحتوي على الملدن الفائق (agel-Technohyper N) قد حققت أفضل النتائج في كل من اختبار صندوق حرف L, و اختبار مقاومة الضغط للمكعبات الخرسانية, واختبار مقاومة الانحناء للمناشير الخرسانية مقارنة بباقي الخلطات.

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Performance of Recycled PVC Aggregates in Concrete – Comparative Study

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Keywords:

Recycled plastic,

PVC plastic,

PVC Concrete properties.

ABSTRACT

Plastic is the most used material in the world due to its easiest manufacturing and shaping, low density, and low cost. Their accumulation poses environmental problems due to no biodegradable. In recent times, researchers have concerned with the reuse of waste and recycled plastic materials in the concrete mix. Many studies have been published for the behavior of concrete having recycled plastic materials. This paper summarizes and compares the published literature studies on PVC recycled as a partial fine and coarse aggregate form replacement in concrete. The characteristics of the material, size and shape, replacement ratio, and the influence of PVC materials on the concrete properties have been discussed. The resultant concrete properties such as slump and workability, density, compressive strength, and durability of the PVC concrete were compared in the available literature. The results are not convergent due to many factors such as replacement of PVC ratio, shape, size, and the case of the PVC waste. In general, concrete containing PVC reduces the density, mechanical properties (compressive strength, splitting tensile strength, and flexural strength), and dry shrinkage as the PVC replacement ratio increase. The lower mechanical strength of concrete may be attributed to weak of ITZ in the interface between the aggregates and cement paste. Resistance of chloride ion penetration is better in PVC mixed concrete than the reference concrete. The PVC concrete may classify the lightweight based on the density of the concrete.

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Effect of Sawdust on The Mechanical Properties of Mortar Using Local Materials

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Keywords:

sawdust;
cement mortar;
sound conductivity;
mechanical properties,
air content.

ABSTRACT

In recent years, there has been a great tendency, especially in the field of structural engineering, to use environmentally friendly materials. Therefore, such these materials should be combined with concrete and cement mortar to obtain an environmental and cheaper structural component that has distinctive properties such as lower thermal and sound conductivity and produce lightweight members. In this study, the sand in the cement mortar of the reference mix was replaced by residues of sawdust for different levels ranging between (5, 10, and 15%) by volume. Two methods were used to cure the specimens of this study; the first by immersing the specimens in water, and the second by exposing them to the air under laboratory conditions. Different tests were conducted in order to assess; the air content of fresh mortar, consistency of fresh mortar, compressive strength, flexural strength, and conductivity. From the obtained results, as the percentage of sawdust increased, a significant improvement in sound conductivity was observed. Although the compressive and flexural strength decreased with increasing the percentage of sawdust (up to 15%), this decrease can be considered acceptable for several construction applications. Moreover, the increasing in the percentage of sawdust was noted to be accompanied by an increasing in the percentage of air content. This allows obtaining a lightweight cement mortar with suitable mechanical properties which can be used for various constructions.

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Experimental Study of Drowned Hydraulic Jump Characteristics Through Different Counterflow Dimensions

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Keywords:

Hydraulic Jump, Energy Dissipation, Counterflow, Froude Number

ABSTRACT

Hydraulic jump is a phenomenon that occurs whenever the flow profile changes from supercritical to subcritical. In this transition, the water surface suddenly raised, surface rollers are formed, intense mixing occurs, air is entrained, with a considerable amount of water energy is dissipated. This paper presents the results of an experimental investigation on the characteristics of the formed drowned hydraulic jump on a horizontal slotted bed, (counterflow). In the current study, the counterflow was used as an energy dissipation method. Experiments were carried out to study the effect of different counterflow dimensions, represented in slot position, inclination angle of slot and slot width on both the length and the submergence ratio of the drowned jump. Graphical presentations were given, describe the relations between the percentage reduction in the length of the hydraulic jump and Approach Froude number due to variation of slot dimensions, for a Froude number ranges from 8.74 to 13.45. The results show that both the percentage reduction in the jump length and the submergence ratio increase as Froude number increases.

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Sustainable Concrete with Low Carbon Footprint

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Keywords:

sustainability,
carbon footprint,
embodied energy,
life cycle assessment.

ABSTRACT

There is increasing concern around the world which has led to attempts to reduce the carbon footprint and the embodied energy of cement and concrete manufacturing through using different types of materials as alternatives mainly for Ordinary Portland Cement (OPC). This study determines the emitted carbon and embodied energy for a concrete structural system of a virtual case study of a three storey building by using six different scenarios for the type of concrete. In addition, the amount of carbon absorbed by the carbonation process has been roughly estimated. A life cycle analysis framework is used to perform an assessment of the whole life for the concrete elements of the building. An inventory of the different types of energies and materials used during the complete life was sourced for the input data to determine the exhausted energy and the associated carbon emissions.

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The Influence of Ageing on Asphalt Mastic Properties Incorporating Calcium Carbonate

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Keywords:

Asphalt mastic,
Viscosity,
Complex shear modulus,
Phase angle,
Ageing.

ABSTRACT

The ageing of asphalt mastic is one of the key factors determining the lifetime of an asphalt pavement. The challenge created by proper selection of asphalt materials motivate researchers to investigate material properties that can further enhanced performance of asphalt pavement. The study investigated the ageing properties of asphalt mastics incorporating calcium carbonate ($CaCO_3$) combined with Ordinary Portland Cement (OPC). The empirical tests, which include penetration and softening points, were conducted to ascertain the asphalt mastics consistency. The rheological properties of mastics in terms rotational viscosity and Superpave rutting parameter using 60/70 asphalt binder blended with 5, 10, 15, 20 % of $CaCO_3$+OPC were calculated to evaluate asphalt mastics properties subjected to different aged conditions. Rotational viscometer (RV) was used to evaluate the properties of mastics. The dynamic shear rheometer (DSR) was used in temperature sweep test to measure the complex modulus (G*) and phase angle (δ). ANOVA statistical analysis was used to analyze the results .The test results showed that all asphalt mastics exhibited higher viscosity compared to the base binder. The addition of various content of $CaCO_3$+OPC increased the G* and decreased the δ significantly, indicating an increase in binder elasticity and stiffness, hence a better resistance to deformation.

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Track No. 3: Chemical & Oil Engineering

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Simulation of Butanol Production through Hydrogenation of Butanal: Effects of Different Reactor Schemes and Operating Conditions

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Simulation,
butanal hydrogenation,
butanol, packed bed reactor,
reactor configuration,
operating condition.

ABSTRACT

The simulation was performed to evaluate the impact of by-passing the second liquid phase reactor in the series due to the catalyst blockage problem leading to the shutdown in a butanol production plant. Butanal hydrogenation for the production of butanol was simulated using the Aspen Plus software package. The process thermodynamics was described by NRTL property model while the kinetic of the main and side reactions was represented by Pseudo-homogeneous model. The attested packed bed reactor model was subsequently used to simulate butanal hydrogenation at different reactor configuration, reactor operating conditions and reactor size. The targeted final total conversion was 99.5% of butanal. The butanal conversion increased with the increase of reaction temperature and residence time. On the other hand, the reactor pressure only affected the performance of the vapour phase reactor but not the liquid phase reactor. Conclusively, the idea of bypassing liquid phase reactor for hydrogenation of butanal in the series could be adopted to achieve the total targeted conversion, provided the plant is allowed to operate at a more severe operating condition. In the modified configuration I, the last reactor should operate at 166.5℃ and 16 bar whereas, in the modified configuration II, the reactor should operate at 285℃ and 30 bar, considering the safety factor.

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Evaporation Process Control using MIMO MPC

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Chemical process Control, Proportional-Integral Controller, Model Predictive Control, MATLAB / Simulink

ABSTRACT

In the processing industry, controllers play a crucial role in keeping our plants running—virtually everything from simply filling up a storage tank to complex separation processes, and to chemical reactors. There are some important issues when we design a control system. In the first place, we need to identify the role of various variables. We need to determine what we need to control, what we need to manipulate, what are the sources of disturbances, and so forth. However, chemical processes are highly non-linear in nature, especially when they have multiple inputs – multiple outputs (MIMO) variables with complex interactions. Evaporators usually operate before a major drying process, which require more energy and is difficult to control. It is therefore important to achieve good control in the evaporation stage so that the drying process is operating with steady inputs. In this paper three of main evaporated process variables such as Liquid level in separator, operation pressure, and the product concentration are first controlled using PI controller in the presence of a variables step changes and a load disturbance. Advanced controllers such as model predictive control that is used for a wide range of application in the process industry. The potential utilization of such advanced predictive controllers is to design control systems that give effective control in this multivariable environment. Model predictive control is applied to the evaporated process with same mentioned conditions for variable step changes and load applied in case of PI controller. The objective of this paper is to present and illustrates in a comparatively study to the results obtained by PI controller, the use of MPC in providing an effective control for a MIMO evaporator plant in the presence of step and load disturbances change. The sum of the integral of absolute error (IAE) is used as a criterion for evaluating the controller's performance.

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Simulation of Butanol Production through Hydrogenation of Butanal: Effects of Different Reactor Schemes and Operating Conditions

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reactor configuration,
operating condition.

ABSTRACT

The simulation was performed to evaluate the impact of by-passing the second liquid phase reactor in the series due to the catalyst blockage problem leading to the shutdown in a butanol production plant. Butanal hydrogenation for the production of butanol was simulated using the Aspen Plus software package. The process thermodynamics was described by NRTL property model while the kinetic of the main and side reactions was represented by Pseudo-homogeneous model. The attested packed bed reactor model was subsequently used to simulate butanal hydrogenation at different reactor configuration, reactor operating conditions and reactor size. The targeted final total conversion was 99.5% of butanal. The butanal conversion increased with the increase of reaction temperature and residence time. On the other hand, the reactor pressure only affected the performance of the vapour phase reactor but not the liquid phase reactor. Conclusively, the idea of bypassing liquid phase reactor for hydrogenation of butanal in the series could be adopted to achieve the total targeted conversion, provided the plant is allowed to operate at a more severe operating condition. In the modified configuration I, the last reactor should operate at 166.5℃ and 16 bar whereas, in the modified configuration II, the reactor should operate at 285℃ and 30 bar, considering the safety factor.

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Lammps as Nano-scale Lab to Estimate Fluid Thermal Properties from Molecular Dynamics

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Molecular dynamics; water thermal properties; specific isochoric & isobaric thermal capacities; dynamic viscosity, thermal conductivity; Prandtl Number; Volumetric thermal expansion coefficient; Lammps.

ABSTRACT

On the one hand the complexity of nano-scale thermofluid system considered as an expensive to investigate experimentally, on the other there are available discrete models such as Molecular Dynamics model offers an affordable and accurate choice for researchers to perform nano-scale investigation to look at different fluid aspects. In this paper we demonstrate how engineers can benefit from the Molecular Dynamics simulation to estimate water thermal properties. Lammps software was used in this study to calculate water thermal properties. The atomistic model type of water which has been used is the four-site transferable intermolecular potential water molecules (TIP4PEW). The thermal properties of water to be estimated are thermal conductivity, viscosity, density, specific isochoric and isobaric heat capacities, Prandtl Number, and Volumetric thermal expansion coefficient. Results compared to experimental data, and showed very good agreement. That prove the usefulness of molecular dynamics simulation as an engineering research tools to investigate thermal properties of any fluid. This study suggests Lammps as an excellent simulation tools to perform computational studies of Thermofluid properties and consider Lammps as a cost affordable nanoscale lab, since it is an opensource software. The accuracy of Lammps depends on the quality of the force field. The results of these study were compared to experimental published water properties at temperatures of 288, 300, 312 and 324 K and pressure 1 atm.

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Application of the TDS Technique in Gas Reservoirs

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Keywords:

TDS technique,

Pressure,

Derivative,

Wellbore storage.

ABSTRACT

Tiab's Direct Synthesis (TDS) is a direct technique to interpret transit well pressure tests. It is analysis of pressure and pressure derivative without type-curve matching. This method uses log-log Plot of the pressure and pressure derivative versus time to compute reservoir parameters such as permeability, wellbore storage, skin factor, and average reservoir pressure.

The main objective of this study is to apply TDS technique for gas reservoirs "long test", and show the advantage of TDS technique, where this technique is particularly useful when the late-time infinite acting radial flow is not observed, which is called "short test".

Two cases are presented in the study to analyze pressure data using TDS technique, a build -up test is conducted on the well (4U11) from Faregh field and well (5A5) from Gialo field.

Based on the results and comparing between the long and short test; the results were converged, which indicates that TDS can be used if some flow regimes are not available. The technique is useful method for analyzing pressure test.

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Effect of Crude Oil Pollution on Some Geotechnical Properties of Disturbed Sandy Soil

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Keywords:

Crude Oil

Specific Gravity

Permeability

Shear Strength

Maximum Dry Density

ABSTRACT

Recently, the effects of soil pollution with crude oil have received much attention from many researchers. Most of the results showed contradictions in their results because of adding crude oil to the soil. Some of the results showed an increase in the maximum dry density while other results indicated a decrease as well as for the shear resistance. The present study seeks further research to evaluate the physical and mechanical properties of loose sandy soils contaminated with crude oil obtained from the Nalut region in southwestern Libya.

The soil samples used in this research were classified according to the Unified Soil Classification System (USCS) as poor graded sandy soil (SP.) And were classified (A-3) according to the American Association of Highway and Transportation Officials for Classifying Soil System (AASHTO).

The contaminated material is crude oil from Abu Al-Tifl field located in Gallo city. The soil was polluted in a laboratory by manually mixing the soil with the pollutant material in percentages (10, 7, 4) of the dry soil weight after the soil was well mixed with the pollutant and after confirming the uniformity of the distribution The pollutant was in the soil and left for three days in closed containers to study the effect of crude oil on the physical and mechanical properties of the soil by conducting conventional tests to measure these properties and through the results of laboratory tests showed that crude oil has a great effect on some properties and little effect on other properties. As the increase in the pollutant percentage in the soil led to a slight effect on the specific gravity, while there is a significant effect on the permeability coefficient as it decreased with the increase in the percentage of pollutant, the optimum water content also decreased and the maximum dry density increased with the increase in the percentage of pollutant, while the value of the California Bearing Ratio (CBR) increased at 4% and then starts to decrease as the crude oil increases.

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Transient Pressure Analysis and Productivity Index Estimation in Horizontal Wells

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Keywords:

Productivity,

horizontal wells,

Pressure,

test,

flow

ABSTRACT

The Analysis of pressure build-up tests in horizontal wells are known as complicated due to changing of flow regimes, formation thickness, well horizontal length….etc. The main objective of study is presents an interpretation method for horizontal well pressure transient testing that is applied to a buildup test from a horizontal well The use of transient well testing for determining reservoir parameters and productivity of horizontal wells has become common because of the upsurge in horizontal drilling. Initially, horizontal well tests were analyzed with the conventional techniques. During the last decade, analytic solutions have been presented for the pressure behavior of horizontal wells. New flow regimes have been identified, and simple equations and flow regime existence criteria have been presented for them [1]. The flow regimes are now used frequently to estimate horizontal and vertical permeability of the reservoir, wellbore skin, and reservoir pressure. Where result of The Giger-Reiss-Jourdan and Joshi was considered more representative result as compared with actual the productivity index and flow rate for isotropic and anisotropy reservoir. One objective of this work is to recall the proper way to use these formulae and to recall the assumptions made that may limit their use.

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Track No. 4: Electrical & Computer Engineering

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A Novel Denoising Method Based on Discrete Linear Chirp Transform

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Keywords:

Discrete linear chirp transform,
Denoising,
Chirp signals,
Nonstationary signal filtering.

ABSTRACT

Denoising of chirp based signals is a challenging problem in signal processing and communications. In this paper, we propose a suitable denoising algorithm based on the discrete linear chirp transform (DLCT), which provides local signal decomposition in terms of linear chirps. Analytical expression for the optimal filter response is derived. The method relies on the ability of the DLCT for providing a sparse representation to a wide class of broadband signals like chirp signals. Simulation results show the efficiency of the proposed method, especially for mono-component chirp signals.

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Optimized Maximum Loadability of Power Systems using an Enhanced Dynamic JAYA Algorithm

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Keywords:

JAYA algorithm, maximum loadability limit, Power system optimization, Voltage stability.

ABSTRACT

The problem of Maximum Loadability of power systems is addressed in this paper using a proposed dynamic JAYA algorithm. The maximum loadability problem is a typical optimization problem in which the maximum loadability point is to be determined optimally. Voltage stability of power systems is maintained by determining the estimated margin between the system operating point and the maximum loadability limit. The basic JAYA algorithm has been introduced to solve foremost optimization problems with small-scaled nature. However, when applied to large-scale, nonlinear and non-convex constrained problems, it showed a poor convergence characteristics. In order to deal with these weaknesses, the original algorithm has been improved by adding some dynamic features to its convergence behavior. The modified algorithm has been presented and validated when applied to well-known typical power systems. The obtained results were compared to the results achieved by other equivalent optimization techniques.

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Optimum Backoff in CSMA-CA for Ad-Hoc Vehicles Network in Motorway

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Keywords:

Ad-hoc Networks;
Routing protocols;
Network Simulator.

ABSTRACT

With current technological developments, wireless networks are becoming popular. VANET is a type of MANET that allows data to be transferred between nearby vehicles. These types of communications can help prevent accidents and investigate post-crash accidents or traffic jams by allowing vehicles to share and broadcast safety information with other vehicles to alert drivers. VANETs offer many possibilities for many new applications**.** This paper provides an evaluation of mobility influence on the initial backoff contention windows performance. The study evaluates basic performance metrics such as packet delivery ratio, throughput and average end-to-end-delay by using the network simulator (NS-2). They propose four dynamic value initial backoff of contention windows mechanisms to alleviate network performance degradation due to high mobility. The nodes are running in the same direction and at constant speeds in terms of a varying number of initial backoff of contention windows and to determine the influence routing protocol.

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Database for Arabic Speech Commands Recognition

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Keywords:

Speech Recognition,
Arabic Speech Command Recognition,
Wavelet Time Scattering,
Support Vector Machine (SVM),
Long Short-Term Memory (LSTM),
Mel-Frequency Cepstrum Coefficients (MFCC),
K-Nearest Neighbor (KNN).

ABSTRACT

Technology is all around us and it's changing rapidly, expanding Internet access has had huge impacts on everyday lives as people do everything on their phones and computers. The widespread growth in the use of digital computers, have an increasing need to be able to communicate with machines in a simpler manner. One of the main tasks that can simplify communication with machines is speech recognition. In this work, we introduce the Arabic speech commands database that contains six Arabic control order words and Arabic spoken digits. The created database is used to analyze and compare the recognition accuracy and performance of three recognition techniques which are, Wavelet Time Scattering feature extraction with Support Vector Machine (SVM) classifier, Wavelet Time Scattering feature extraction with Long Short-Term Memory (LSTM) classifier, and Mel-Frequency Cepstrum Coefficients (MFCC) feature extraction with K-Nearest Neighbor (KNN) classifier. Finally, the experimental results show that the most accurate prediction of the database commands was 98.1250% given by Wavelet Time Scattering feature extraction and LSTM classifier and the fastest training time for the database was 144 minutes given by MFCC and KNN classifier.

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Decision-Making Rules in Cooperative Cognitive Radio Networks: Evaluation and Comparison

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Keywords:

Cognitive radio,
cooperative spectrum sensing,
decision rules,
energy detection.

ABSTRACT

Cognitive radio CR is a communication technology developed to solve the problem of spectrum scarcity. Energy detection based on cooperative spectrum sensing represents a solution to enhance the throughput of CR since the information about primary signal presence are collected using many sensing nodes with different channel conditions. Each node reports its own reports to the network centre to make its decision. However, the throughput cannot be maximized unless efficient decision rules are used to combine the collected information and produce right final judgment. In this paper, a centralized cooperative spectrum sensing scheme is used, and basic decision rules are presented. New decision-making rule based on statistical average of the node reports is proposed. Closed form expressions for probability of detection and false alarm probability for the different decision rules are given. Comparison on the throughput performance of each decision rule is studied simulated via a system model and MATLAB programming. Fading channel is assumed for data transmission, while the reporting channels are assumed to be free of errors.

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Investigation of Renewable Electricity Generation from Solar-Hydrogen Hybrid System in Tripoli

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Keywords:

photovoltaics,
electrolyzer,
hydrogen,
Global warming potential,
Fuel cell.

ABSTRACT

This paper presents a stand-alone solar hydrogen plant to cover the daily electricity demand of a residential unit in Tripoli- Libya. Solar power was obtained through International Global Radiation and photovoltaic (PV) panels, while hydrogen was acquired via water electrolysis. This renewable solar-hydrogen community has demonstrated and clarified that it is possible to be fully reliant on renewable electricity daily. This paper also compares the financial feasibility of supplying the residential unit with electricity using hydrogen, diesel generators, gasoline generators and the grid. Actual economic data from Az-zawiya oil refining company and General Electricity Company of Libya is used. The establishment of an integrated solar-hydrogen power plant to provide daily electrical residential requirements in Tripoli is demonstrated. The data calculation of this development is undertaken using Photovoltaic Geographical Information System (PVGIS) software tool that provides a free and open web access to solar radiation and temperature data and to PV performance assessment tools for any location in Europe and Africa, as well as large part of Asia and America to model the radiance and the amount of sunlight (PVGIS) and excel for mdeling the hydrogen demand and production. Capacity and the efficiency of the solar-hydrogen plant to provide a community of electricity for a year without any shortages or deficiency is investigated.

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An Energy Efficiency Evaluation of MIMO Based LTE RANs with DTX Operation

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Keywords:

Energy Efficiency, MIMO radio access networks, Energy Consumption Gain, Power consumption model, DTX.

ABSTRACT

This paper presents a system level evaluation of the energy consumption of a 4G LTE radio access network RAN when upgrading the access base stations from SISO to MIMO base stations. A macro only cell deployment scenario is evaluated, and the power consumption of the base stations is estimated by a parametric power consumption model. The impact of the discontinuous transmission feature (DTX) on the energy consumption of 2x2 and 4x4 MIMO radio access network with reference to the SISO radio access network is analyzed. A non-full buffer FTP traffic model is used in the analysis. Our results show that, without DTX, the 2x2 MIMO deployment consumes the least amount of energy. No energy savings are observed when more than 2 transmit antennas is used. When DTX is enabled, and at high values of offered traffic, the 4x4 MIMO deployment becomes the most energy efficient deployment option among the SISO and 2x2 MIMO deployments.

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Maximum Area Aggregation Approach For Cumulant-Based Probabilistic Optimal Power Flow studies

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Keywords:

Maximum Area Aggregation (MAA), Monte Carlo Simulation (MCS), Optimal Power Flow, Probabilistic Optimal Power Flow (P-OPF), Probability Density Functions (PDFs).

ABSTRACT

The paper introduces a Maximum Area Aggregation (MAA) approach for Cumulant-Based Probabilistic Optimal Power Flow (P-OPF) studies. The Maximum Area Aggregation (MAA) approach relies on the Cumulant Method (CM) to produce Probability Density Functions (PDFs) in the limited and the original cases, and then combines these PDFs to generate the final PDF for all system variables. The probabilities that system variables reach their limits are computed and the maximum probability is extracted and used to find the final PDF by aggregating the PDFs (the original PDFs and the limited ones). The proposed approach is verified against Monte-Carlo Simulation (MCS) consisting of 10,000 samples and compared with the original Cumulant Method (CM). The results of MAA approach demonstrate significant improvements when compared with traditional CM results.

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Face Recognition with Symmetrical Face Training Samples Based on Histograms of Oriented Gradients

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Keywords:

face recognition; symmetry; histogram of oriented gradients

ABSTRACT

Face recognition technology is one of the advanced technologies that help to recognize and identify human faces using an image or video clip. Although many face recognition techniques have been proposed in the literature, a robust face recognition system is still a challenging task. It is known that, in general, increasing the number of training images also increases the performance of face recognition systems. In this paper, a new set of training samples is generated from the original samples, using the symmetry property of the face and the recognition performance is improved. The proposed method has three main stages: generating new images, feature extraction and classification. the symmetry property of the face is used to generate new images, the Histograms of Oriented Gradients is used for feature extraction and the Euclidean distance is used for classification. The proposed method is tested and evaluated using AR dataset which is widely used for testing and comparing the accuracy of face recognition systems. The experimental results show that the proposed method has a recognition accuracy rates higher than the traditional methods.

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Comparative Study of the Electromagnetic Performance of Yokeless and Segmented Armature YASA Machine with Different Rotor Pole Combinations

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Keywords:

PM machines, axial flux machines, YASA machine, electromagnetic performance .

ABSTRACT

In this paper, a conventional axial flux yokeless and segmented armature YASA machine is designed and then simulated. It has been proved that, this machine has a high torque density and has been utilized for wind generation and electric vehicle applications. With 12 stator segments, different rotor pole combinations are designed. To maximize the machine torque, the topology is optimized by means of three-dimensional finite element analysis (3D-FEA). The electromagnetic performance for different pole combinations is then analysed and compared. It has been found that the machine with 16 and 14 rotor poles both have high torques. However, the machine with 14 rotor pole has better torque quality and back EMF compared with the other rotor pole combinations.

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Design of a Non-Isolated Solar PV Inverter for Household Applications

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Keywords:

PV,
H-inverter,
MOSFET,
DC-link and
AC grid.

ABSTRACT

Solar energy is taken into consideration as the promising alternative for the future energy demands to reduce carbon dioxide (CO_2) emissions from fossil fuel resources and to slow the depletion of limited energy resources. This paper presents a method on how to design a DC/AC inverter suitable for photovoltaic applications with focuses on minimizing the power losses and the cost.

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Quick-Response Fuzzy-Controlled Induction Motor Drive

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Keywords:

Fuzzy controller,
rule base,
indirect field oriented control,
induction motor drive,
speed control.

ABSTRACT

High performance motor drives require high accuracy, fast response, wide range of control, robustness and immunity from the effect of parameter variations. Three phase motors have a complex and highly nonlinear mathematical model associated with interactive parameters. This makes designing a conventional controller for such a system is a hard task. Researchers are paying more attention to fuzzy logic controllers (FLCs) since they can be employed to control complex or nonlinear systems even without knowing their mathematical model. The main task of this paper is to design and implement an FLC for indirect field orientated control of a three phase induction motor drive. The proposed controller is a proportional-derivative (PD) FLC. It uses the speed and its derivative as input and the electromagnetic torque as output. The input and output are coupled with simple linguistic if-then rules. The spread of each input and output is adjusted using a gain block to achieve the best performance in a trial-and-error process. Also, an incremental counter is attached to the output of the controller to yield the desired electromagnetic torque. The design was implemented and tested using MATLAB/SIMULINK. Finally, the simulation results and figures were presented.

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Electricity Load Profiling for Coastal Housing Complexes based on the Measurements of Flats Actual Load

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Keywords:

Electricity consumption;
Load profiles;
Domestic buildings;
Appliances;
Occupancy;
Dwelling characteristics;
Metering Equipment.

ABSTRACT

In this paper, a methodology for estimating end-use load shapes using the hourly whole-house metered load data, the household demographic survey data and the weather data (temperature) is presented. End use load shapes presents a method of generating realistic electricity load profile data for some of city of Tripoli domestic buildings. This method could help in predicting the daily load profile from individual flats to community. The results obtained show that the overall methodology provides an effective means for end-use load shape modeling and estimation.

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Track No. 5: Information Technology

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إنشاء المنزل الذكي باستخدام برنامج المحاكاة Packet Tracer 7.3 و لوحة الاردوينو Arduino board

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انترنت الأشياء (IoT) ،

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لوحة الاردينو (Arduino Board)،

المنزل الذكي (Smart Home).

ABSTRACT

المنزل الذكي Smart Home هو الذي يمكن التحكم فيه آليا من خلال أنظمة ذكية و التي تحتوي على أجهزة تحكم متطورة يتم تركيبها في المنزل ويتم التحكم بها عن طريق شاشات اللمس المثبتة على الجدار أو جهاز iPad أو بواسطة الهاتف الذكي Smart Phone حيث تتم عملية التحكم والمراقبة لجميع الأجهزة الكهربائية والإلكترونية مثل الإضاءة و أجهزة التكييف والتلفاز والكاميرات والأبواب الكهربائية. كما أن نظام المنزل الذكي يخبر عن أي تغيير يحدث في المنزل بواسطة الرسائل النصية SMS أو الاتصال أو أي طريقة يفضل المستخدم استخدامها. كما بإمكان المستخدم إضافة كاميرات المراقبة ومجسات الاستشعار للحركة وذلك لنظام الأمن والحماية بالمنزل[1]. في هذه الورقة البحثية سوف يتم التطرق الى تقنية الشبكات اللاسلكية Wi–Fi وتقنيات انترنت الاشياء IoT حيث أن هاتين التقنيتين لابد من استخدامهما لانشاء وتطبيق المنزل الذكي Smart Home. حيث تم تصميم وتطبيق المنزل الذكي باستخدام برنامج المحاكاة Packet Tracer 7.3 ولوحة الاردوينو Arduino board.

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The Virtual University: Trends and Challenges in Libya Elmergib University as Case Study

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Keywords:

Information Communication Technologies (ICTs), e-learning, virtual university, e-university, challenges of e-learning.

ABSTRACT

E-Learning is playing a significant role in education to improve student's skills and teach them new ways for managing their knowledge and information. Recently few public universities in Libya have initiated limited attempts to use e-learning alongside traditional classroom. However, different obstacles are preventing successful adoption of this technology. It is obvious that effective ICT implementation should focus on understanding individual faculty needs. Then a thorough investigation is conducted in relation to the importance of implementing electronic education at Libyan universities, and including faculty members in every step of the planning and implementation of up-to-date technologies, as well as the challenges and solutions of ICT implementation. This paper focused on the overall scenario of virtual universities by narrative review of past researches.

The present research aimed to highlight challenges that hinder effective implementation of e-learning in Libya and recommend possible solutions to tackle them. A total of 70 respondents voluntarily participated in this research. They consisted of academic staff (N=8), professors in charge of e-learning (N=2), and undergraduate students (N=60). The method was used to collect data is a survey instrument. Data was then analyzed and reported quantitatively and qualitatively. This provided in-depth understanding to the current status of e-learning in Libyan universities and highlighted major hindrances of its successful application. Based on this analysis, the study proffered many recommendations that should be considered in order to fully benefit from e-learning technologies and the possible of converting Elmergib university to virtual university.

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Performance Evaluation of LSB Technique into visual Objects based on Steganography

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Keywords:

Steganography,
LSB,
RGB.

ABSTRACT

Steganography is an important field of research in recent years to embed a range of data, it is the science that hide information in cover medium without being accompanied by any effect or distortion in that medium. Nevertheless, most of the modern researches focus on hiding information in image according to its popularity. This paper studies the Least Significant Bit (LSB) (1-LSB, 2-LSB and 3-LSB) with one or RGB color based Steganography, The LSB algorithm has experimented on Bitmap 24 bits format as cover image to generate a stego images. The aim of this paper is to carry out various types of image steganography technique for purpose of identifying various principles of image steganography in terms of visual effectiveness and efficiency. However, the algorithm that has been chosen for this purpose is discussed in details in this paper. The visual effectivity of the stego were measured by comparing the histograms of the stego and cover images. In this study we used Mean Squared Error MSE calculation and discussed the implementation of this algorithm in detail. The results from experiments prove that algorithm is not affected by different visual characteristics of the cover images in so doing, the perceptual distortion to the cover image is nearly negligible and unlikely to be detected by simple visual inspection.

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Developing a mobile game app themed about Libyan culture using Unity engine

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Keywords:

Mobile Computing, Mobile Games, Mobile App Development, Unity Engine.

ABSTRACT

This paper presents the design and implementation of an educational game App using Unity engine. The game aims to provide informative experience of Libyan traditions while keeping players entertained. Also, the game attempts to document Libyan fading traditions while being amusing and enjoyable. This game will be very first Libyan games to be launched into Google Play Store.

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Comparison of BER Performance of Cooperative Wireless Systems Based on D-OSTBC, D-EOSTBC and DF Relaying Protocol

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pair relays cooperation;
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D-OSTBC,
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decode and
forward technique

ABSTRACT

The end-to-end bit error rate (BER) performance analysis of cooperative wireless communication networks based on distributed orthogonal space time block coding (D-OSTBC) (Alamouti) scheme, distributed extended orthogonal space time block coding (D-EO-STBC) and decode-and-forward (DF) relaying protocol, are addressed. There are two main relaying techniques which are amplify-and-forward (AF) and decode-and-forward (DF). Opposed to that in conventional multi-input multi-output (MIMO) systems, cooperative systems, the antennas are distributed among different terminals, which easy to establish cooperative MIMO. This paper will deal with three system models of wireless communications. The first model is conventional single-input single-output (SISO) system, which consists of one source and one destination. The second model is cooperative MIMO based on two relays and D-OSTBC (Alamouti) scheme. This system consists of one source, two relays and one destination. The third model is cooperative open loop MIMO based on four relays and D-EO-STBC technique. This system consists of one source, four relays and one destination. All these schemes are based on DF protocol and analyzed over flat fading channels. Also, QPSK digital modulation scheme is used for all schemes. MATLAB simulations confirm that the BER performance of cooperative SISO is the worst, whereas, the best BER performance is achieved by the system with four relays and based on D-EO-STBC techniques.

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Classifying Various Bacteria Genera by Transfer Learning Model

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Keywords:

bacteria classification, deep learning, convolution neural network, transfer learning, computer Vision

ABSTRACT

Bacteria Classification using computer-aided methods makes the identification and recognition processes more automatic and thus greatly reduces the time needed for classification. In this paper, we explored an approach to automating the process of classifying bacteria with the use of deep Convolutional Neural Network (CNN). CNNs is one of deep machine learning methods that mimics the connectivity pattern between visual cortex neurons. It can extract hierarchical image feature representations based on multi-layer processing. The 'transfer learning' approach was used to retrain a famous convolutional neural network model with a dataset of 152 images of 7 different bacteria species. The retrained model has been able to recognize and classify all 7 different species of bacteria with very high accuracy.

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An Extensive Study on Online and Mobile Ad Fraud

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Online Ad Fraud, Mobile Ad Fraud, Advertising Ecosystem, Detection, Prevention.

ABSTRACT

The advertising ecosystem faces major threats from ad fraud caused by artificial display requests or clicks, created by malicious codes, bot-nets, and click-firms. Currently, there is a multibillion-dollar online advertisement market which generates the primary revenue for some of the internet's most successful websites. Unfortunately, the complexities of the advertisement ecosystem attract a considerable amount of cybercrime activity, which profits at the expense of advertisers. Web ad fraud has been extensively studied whereas fraud in mobile ads has received very little attention. Most of these studies have been carried out to identify fraudulent online and mobile ads clicks. However, the identification of individual fraudulent displays in mobile ads has yet to be explored. Additionally, other fraudulent activity aspects such as hacking ad-campaign accounts have rarely been addressed. The purpose of this study is to provide a comprehensive review of state-of-the-art ad fraud in web content as well as mobile apps. In this context, we will introduce a deeper understanding of vulnerabilities of online/mobile advertising ecosystems, the ad fraud's well-known attacks, their effective detection methods and prevention mechanisms.

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Design of New Secret Key to Increase the Security of LSB Algorithm

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cryptography,
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ABSTRACT

Nowadays, information security has become a big challenge for the world due to the rapid growth of Internet users day after day. Unauthorized access to confidential data can have serious implications such as financial loss, etc. One of the best techniques for secure communication is secret writing. Hiding data is very important nowadays as data travels over multiple insecure networks. To avoid this problem, encryption is used that hides data, but in some cases encryption cannot provide full security because the message is still available for encryption analysis. Encryption focuses on making the message unreadable to any unauthorized person who might intercept it. On the other hand, hiding information is a means of hiding the existence of a message to allow secure communication in a completely undetectable manner. Hide information and encryption are two different ways to hide data.

In this paper the researcher suggests how to hide the message using the least significant bit algorithm inside an image and encrypt it in a new way, by modifying the DES algorithm, the researcher generated subkeys from the DES algorithm and used them to specify the masking mechanism in the digital image.

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Internet of Things for Libya Healthcare System: Challenges and Issues

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Keywords:

Internet of Things, Artificial Intelligence, Machine learning.

ABSTRACT

This paper proposes a system based on the Internet of Things to Human Activity Recognition by monitoring and processing smartphone sensors remotely. A machine learning algorithm could be used to determine the activity done during the day. Meanwhile, it is expected to give a feedback during and after the activity is performed, using the machine learning method with remote visualization and intelligent decisions. All in all, it is hoped that the outcome of this proposed work will be beneficial for government officials, health policy makers, and healthcare providers in the area of the healthcare industry.

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Enhancement of VoIP Performance in MANET using Fuzzy Logic

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VoIP,
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ABSTRACT

Voice over Internet Protocol (VoIP) application is a vital technology that is quickly growing in the Mobile ad hoc Network (MANET). Packet loss is a factor that can significantly affect the Quality of Service (QoS) for VoIP performance. Due to the dynamic nature of MANET, it is a challenging task to maintain the desired packet loss rate. This paper aims to enhance the performance of VoIP in the MANET using a fuzzy logic model. The input for the model is VoIP packet loss and the outputs are the optimal parameters of MANET (node number, pause time, maximum speed, and maximum connection). Network Simulator (NS2) was used to perform all simulations. Matlab was used to implement the proposed fuzzy model. Moreover, the performance of the model was evaluated using NS2, and the results show that our proposed fuzzy model offers a significant enhancement in terms of the VoIP packet loss rate (P.LR).

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استراتيجية الابتكار ودورها في تحسين أداء المؤسسات: حالة دراسية بشركة النسيم للصناعات الغذائية

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الابتكار التسويقي،
تقييم الأداء.

ABSTRACT

إنّ ما يميز بيئة الأعمال الحالية لأغلب المؤسسات هو التغير الدائم والمستمر ولعل ذلك يعود لعدّة عوامل تتمثل في ثورة التطوير والتغيير والتكنولوجيا الهائلة في جميع المجالات الإقتصادية والصناعية والتنافسية بين المؤسسات، إضافة إلى التغير السريع والمتميز في حاجات ورغبات وأذواق المستهلكين، ممّا يجعل الابتكارات الجديدة ضرورة استراتيجية لكل مؤسسة تسعى إلى النجاح والبقاء، ومن هذا المنطلق لاحظ البحّاث مشكلة الدراسة حيث إنّ الابتكار في مجال الانتاج والخدمات يعد إحدى الوسائل الاستراتيجية الهامة التي تساهم في تحسين أداء المؤسسة وكذلك بقائها ونموها وزيادة قدراتها على تحقيق أهدافها الاستراتيجية، وكانت مشكلة الدراسة تتلخص في ما إذا كانت استراتيجية الابتكار تلعب دوراً فعّال في تحسين أداء المؤسسات، حيث صيغت في السؤال التالي: ما مدى إدراك إدارة شركة النسيم لتأثير استراتيجية الابتكار في تحسين الأداء؟ وكان الهدف من هذه الدراسة التركيز على تحديد مفهوم الابتكار وماهيته وبصفة عامّة التركيز على ابتكار المنتجات الجديدة وأهميتها في تحسين أداء المؤسسة ومدى الحاجة إلى اللجوء لاستراتيجية الابتكار التنافسية في كل المجالات الإنتاجية والخدمية، كما هدفت الدراسة إلى إبراز دور استراتيجية الابتكار وتحديد أبعادها وتأثيرها على تحسين أداء المؤسسة واعتمدت الدراسة منهج الوصف التحليلي للوصول إلى نتائج الدراسة واعتمد البحاث على الاستبيان كوسيلة لجمع المعلومات من عينة الدراسة التي كانت عينة عشوائية من العاملين بشركة النسيم وكذلك من المستهلك النهائي لمنتجاتها في مناطق محددة، وتم استخدام التحليل الاحصائي بواسطة برنامج SPSS للوصول إلى النتائج التي كان أهمها وجود علاقة طردية موجبة بين إتباع سياسة الابتكار وتحسين الأداء في شركة النسيم للصناعات الغذائية، وكان من ضمن أهم التوصيات في هذه الدراسة ضرورة إتباع التخطيط الاستراتيجي وإتباع استراتيجية الابتكار لمواكبة تجارب منظمات الأعمال المتميزة .

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تقدير الكلفة الخفية لإنحراف خيوط الصوف الخالص المستخدم في صناعة السجاد (شركة الإنماء للصناعات الصوفية بني وليد)

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ABSTRACT

تعتبر صناعة الغزل والنسيج من اقدم الصناعات التي عرفها الانسان والتي تأثرت بالتطور التكنولوجي السريع الحاصل في تطور طرق ووسائل الانتاج والذي جاء تلبية لتطور رغبات واحتياجات المستهلك. انه من الطبيعي في حال التحدث عن رغبات واحتياجات متطورة واساليب وطرق انتاج حديثة ان تكون هناك وسائل وطرق قياس مواكبة لهذا التطور لتحديد مدى مطابقة المنتجات لما تم التعارف عليه باسم المواصفات القياسية.

هدفت هذه الدراسة الى تقدير التكلفة الخفية لعمليات انتاج خيوط الصوف الخالص المستخدمة في صناعة السجاد المنسوج ذات الرقم المتري 8/1 والمنتجة من قبل شركة الانماء للصناعات الصوفية - بني وليد، وذلك عن طريق اخذ عينات من خيوط الصوف ووزنها لغرض تحديد مطابقة رقم الخيط للمواصفات الليبية ومن ثم تطبيق انموذج تاجوشي لتقدير التكلفة الخفية الناتجة عن انحراف هذه العينات عن المواصفات القياسية. ولقد توصلت الدراسة الى ان هناك فقد كبير في كميات الصوف الخالص والمستخدم في انتاج خيوط الصوف نتيجة انحراف العينات عن القيمة المستهدفة في المواصفة وبناء على هذه النتائج فان الدراسة توصي بتركيز البحث في جميع مراحل الانتاج لتقدير التكاليف الكلية واستخدام التقنيات الحديثة لتطوير عمليات مراقبة الانتاج.

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دراسة أثر استخدام استراتيجيات التنفيذ المختلفة للمشروعات الانشائية على أداء الاطراف الرئيسية في مشاريع الانشاءات باستخدام نموذج الأداء العام

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ABSTRACT

تهدف هذه الورقة البحثية إلى دراسة تأثير اختلاف استراتيجيات تنفيذ المشروعات الانشائية على أداء المسوقات (**Drivers**) (أصحاب المصلحة) أثناء مراحل المشروع، وعلى الرغم من وجود مجموعة من الخيارات لاستراتيجيات تنفيذ المشروعات، إلا أن العديد من مشروعات البناء محلياً لا تلبي توقعات مالكيها نظراً لاستخدامهم –تقليدياً–استراتيجية واحدة لتنفيذ العقود الانشائية وهي: (التصميم، العطاء، التنفيذ). حيث أن مالكي المشروعات عادة ما يطمحون إلى نتائج مرضية للمشروع من ناحية الوقت والتكلفة ورضى مستخدمي المشروع وذلك بالتدخل والإشراف المباشر على كل أطراف للمشروع المختلفة. هذا البحث هو دراسة لتشجيع الخبراء المحليين للمساهمة في فتح الآفاق على الاستراتيجيات المختلفة والمساهمة لتحسين مخرجات المشروعات الهندسية. حيث تم تكوين نموذج محاكاة باستخدام نموذج الأداء العام (**General Performance Model**) والمستخدم في العديد من البحوث العالمية المماثلة ذات العلاقة لدراسة القرارات الاستراتيجية ولتقييم التفاعلات بين العديد من المتغيرات الداخلة في تنفيذ المشروعات. تم عرض النموذج في ورشة عمل تضم ممارسين للمهنة لتحديد تأثير كل استراتيجية على أداء المسوقات. حيث اتضح ان هناك تأثير متفاوت للاستراتيجيات المختلفة على كل الأطراف المشاركة في المشروع الانشائي والهندسي (المسوقات) حيث وجد أن استراتيجية التصميم–العطاء–الانشاء لها تأثير إيجابي على أداء مدير المشروع. بينما استراتيجية التصميم–الانشاء تؤثر إيجابيا في أداء كل من المنفذ والمصمم/الاستشاري.

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Track No. 7: Mechanical & Industrial Engineering

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Cyclic Voltammetry Studies of PEO Processes in Alkaline and Silicate/Phosphate Electrolytes and Resulting Coatings

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Cyclic,
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ABSTRACT

A cyclic voltammetry (CV) method was employed to clarify the electrochemical behaviour of Al in alkaline silicate/phosphate electrolytes over a voltage range of 0 to 550V and study the growth process of plasma electrolytic oxidation (PEO) coatings on rectangular shape Al foil samples. The non-linear behaviour of the current – voltage curve reflects a combination of three processes, including dissolution, passivation and formation of PEO coating under discharge conditions. Different thickness distributions of oxide layer and residual aluminium along the sample length were observed. Similarly, the total Al consumed for the coating process at the edge of sample was more than in the middle. Silicate additions obstruct anodic dissolution of Al, which enhanced the oxide growth. While phosphate, in addition of promoting alpha phase formation it is also enhancing strong metal passivation and allow the breakdown voltage to be easily obtained. Breakdown voltage depends on the concentration and electrolyte composition. Under the studied conditions, we can also conclude that the sparking voltage decreases when electrolyte resistivity decrease which is consistent with Ikonopisov equation. However, which's more surprising and unexpected in K electrolyte, is the earlier emission starting prior to the current starts increasing. There are a number of considerations used to determine the breakdown voltage such as reaching of maximum voltage, rapid voltage fluctuation. However, the appearance of visible sparking is not a criteria for detecting the dielectric breakdown as concluded in our study although many literatures considered this as criteria.

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Effects of a Curved Surface of the Blade on the Performance Characteristics of Axial Flow Rotors

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Keywords:

Three-dimensional turbomachinery flow,

axial fan,

non-radial stacking,

structure meshing.

ABSTRACT

The benefit of using a Computational Fluid Dynamics (CFD) technique is to predict the effects associated with non-radial stacking (NRS). Three-dimensional (3D) flow field for NRS blades of an axial turbomachine is studied. The non stacking line of the fan is provided by a curved surface by means of enlarging blade airfoil only at the base of the fan blade. The effectiveness of the NRS on the axial fan rotor of low-aspect-ratio was studied in two separate case studies a standard blade (SB) and a curved blade (CB).

In developing a complete structured hexahedral mesh for the entire computational domain, comparative studies of CB and SB were conducted at the design and off-design flow rates. The structured mesh technique minimizes cell counts, cell skewness, and enables cost-effective CFD investigation.

The results are presented in the form of local radial velocity, local ideal and total pressure rise of the outlet as well as the static pressure on the blade suction side. Specifically, it is pointed out that in the design point the CB rotor exhibits the highest efficiency for the most part of the entire span, whereas SB exhibits the lowest efficiency along the entire span. While in the off-design point, the CB rotor exhibits the highest efficiency at the blade hub only.

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Dimensions Effect of the Rotating Fluid Zone on the Results when CFD Modeling of Friction Stir Welding

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Friction Stir Welding (FSW),

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ABSTRACT

This study aims to investigate the influence of the shape and size of rotating fluid region on the results of computational fluid dynamic (CFD) model of friction stir welding (FSW). Accordingly, 3D time-dependent CFD based model was used to simulate friction stir welding of aluminum alloy AA2014-T6. A rotating fluid region was proposed to represent the Thermo-mechanical affected zone (TMAZ) in the model where the temperature distribution within the materials being welded together has been critically analysed. By using different shapes and dimensions for the fluid region, a number of numerical experiments has been carried out. The results revealed that the thermal profile for the circular zone indicates the best agreement among the other with the experimental thermal profile. Additionally, a semi-empirical equation was developed to calculate the maximum temperature based on the dimensions of TMAZ.

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Risk-Based Maintenance (RBM) Approach for Identifying the Optimum Time of Whole Shutdown (SD) for Gas Liquid Recovery Unit; Processing Columns as a Case Study

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Planned Shutdown (SD), Risk-Based Maintenance (RBM), Failure Analysis, and processing columns.

ABSTRACT

Pieces of equipment for any a processing unit, which run continuously under severe conditions usually exposed to undesirable failures such as a corrosion, leakage and other reasons due to over pressure and fluctuated temperatures. These failures could be resulted in huge risk of the unit. Therefore, these pieces of equipment should be subjected to risk-based maintenance approach in order to conduct planned shutdown event without taking the recommended periods of the original equipment manufacturers into account, which may not be represented the optimum solution of planned shutdown scheduling in the long-term due to operating conditions that differ from a unit to another. The purpose of this work is to determine optimum interval of planned shutdown for unit based on processing columns to avoid an unplanned estimation of shutdown, mitigate risk, extend critical equipment life, maximise uptime, decrease maintenance cost, reduce production losses and improve reliability of system. The results of risk-based maintenance application in gas liquid recovery unit demonstrated that interval of planned shutdown could be increased based on the risk assessment related to processing columns.

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Frequency Response Function (FRF) Technique for the Diagnosis of Suspension System

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ABSTRACT

Some of the common faults associated with suspension components are damaged or leaking shock absorbers, spring weakness, wearing down of the pivot and bushing. To investigate these problems, a seven degree-of-freedom (7-DOF) model has been developed, for a full vehicle, using MATLAB. In the simulation, the suspension faults have been considered via the damage caused to the shock absorbers (dampers) and the faults were seeded by reducing the damper coefficient by 25%, 50% and 80%.

Frequency Response Function (FRF) technique was used to develop conditioned monitoring tools for suspension faults and detects the level of damping coefficients. To validate the model and evaluate the FRF technique stated in this study, experimental investigation was carried out on 4-post-test rig at the University of Huddersfield in order to measure the FRFs of the suspension for different damping setting.

The results demonstrate that, the shape of the frequency response depends on the damping coefficient (c), since low damping coefficients lead to good isolation properties of the vehicle mass in the mid- to high frequency range, but also leads to high amplitudes of the acceleration in the range of the natural frequency of the vehicle body (sprung mass). Therefore, FRFs analyses provide an effective monitoring of the suspension and to detect the level of change in damping coefficients.

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SCARA Robot Links Length Optimization by Using MATLAB and Verification with SimMechanics and Solidworks

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Solidworks Motion Study, MATLAB/SimMechanics, SCARA Robot, Link length optimization.

ABSTRACT

This paper aims for optimizing links length that consumed the minimum energy, for a customized SCARA robot. Nine link length combinations are tested and simulated. This research is a part of a project of designing a robotic arm for a packing task. Kinematic and dynamic studies are performed for a 2R robotic arm. The results of kinematic study which are angular displacement, angular velocity and angular acceleration for each joint are determined and exported to the dynamic study to obtain the torque and power consumed. The dynamic study is performed with the aid of MATLAB code, MATLAB/SimMechanics and Solidworks are used to simulate and analyze the dynamic of the robotic arm. The energy consumed for each link length combination using the three methods is calculated.

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تخفيض الاحمال الكهربائية باستبدال السخانات الكهربائية بأنظمة تسخين المياه بالطاقة الشمسية

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ABSTRACT

تواجه ليبيا في الوقت الراهن طلباً متزايداً على الطاقة فقد بلغ الحمل الأقصى للشبكة العامة إلى 6000 ميجاوات وتعتمد فيه محطات توليد الطاقة الكهربائية اعتماداً كلياً على استخدام أنواع الوقود المختلفة المشتقة من النفط في حين أنها تمتلك اهم المصادر الطبيعية والمتمثلة في شدة الاشعاع الشمسي بساعات سطوع مرتفعة طيلة أيام السنة والتي يمكن استغلالها كمصدر بديل للطاقة وذلك بتوظيف التقنيات المتاحة والتي تقوم بتحويل ضوء الشمس إلى طاقة كهربائية أو حرارية لسد العجز الحاصل في الطلب على الطاقة والمساعدة في تخفيف الاحمال الكهربائية التي تعاني منها كافة شرائح المستهلكين. يهدف هذا البحث إلى إدخال بعض أنواع انظمة تسخين المياه بالطاقة الشمسية في القطاع المنزلي، من أجل تقليل الحمل على الشبكة العامة للكهرباء، ومدي جدوى استخدام هذه الانظمة في التطبيقات المنزلية عن طريق تسخين المياه بواسطة المجمعات الشمسية المتمثلة في مجمعات الألواح الشمسية المسطحة ومجمعات الأنابيب الزجاجية المفرغة بديلاً عن السخانات الكهربائية والتي تُعد من أكبر الأجهزة المنزلية استهلاكاً للطاقة.

وتعرض هذه الورقة ايضاً نبذة للتعريف بهذه التقنيات وكيفية تحويل الطاقة ومميزاتها وطرق اختيار الأنسب منها والقوانين التي تحدد الكفاءة والأداء الحراري والمعادلات التي تحسب الكميات التي توفرها هذه الأجهزة من طاقة حرارية يمكن توظيفها والاعتماد عليها من ضمن مشروعات ترشيد استهلاك الطاقة واستغلالها بشكل أمثل على الصعيد المحلي للمساعدة في حل ازمة الطلب المتزايد على الكهرباء وإيفاء الشركة العامة للكهرباء بتزويد كافة المستهلكين على مدار الساعة باحتياجاتهم من الطاقة الكهربائية. حيث أظهرت النتائج حسابياً ان الاستغناء عن 400000 سخان كهربائي يمكن أن يوفر 720 ميجاوات وهو ما يعادل توليد محطة كاملة. وبينت الدراسة حسابياً احتياجات الاسرة من الماء الساخن يومياً وسنوياً ومقدار كميات الطاقة اللازمة لتسخين هذه المياه عند استخدام السخان الكهربائي وكذلك بعد استبداله بمنظومة المجمع الشمسي. واتضح انه بعد حساب تكلفة اجمالي الاستهلاك الكهربائي للسخان الكهربائي وفقاً لسعر تعريفة الاستهلاك (المنخفضة) للكيلو وات ساعة هو 334.88 ينار ليبي/سنة فأنه يمكن تحديد فترة استرداد ثمن المجمع الشمسي **(Pay-back period)** في حال الاعتماد عليه واستبداله بالسخان الكهربائي خلال فترة لا تتعدي العامين.

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Study the Performance and Behavior of the Hybrid System

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ABSTRACT

The hybrid power generation system is considered one of the cleanest technologies to generate energy, environmentally friendly and does not emit any pollutants. The hybrid system is a mixture of renewable energy sources, as it consists of the two most important sources of renewable energy, solar or wind energy and hydrogen energy. The hydrogen gas production by alkaline electrolysis cell is one of the cleanest methods, the fuel cell (PEM) type is a clean device that generates energy by using hydrogen gas as a main fuel and is considered an environmentally friendly device that only produces pure water and heat. Preparing an accurate mathematical model is an important process to study the behavior of this system and how it works. The performance of system has been studied by operating it with different loads of current density, the modeling process showed satisfactory results. The operating process of system at different temperatures showed good results and clear improvements in system behavior, the operating power of the alkaline electrolysis cell decreases with increasing temperature, because the temperature effects on the reverse and activation voltage when the process of breaking the covalent bond to split the water molecule, the power of fuel cell is increases with increase the temperature. The pressure improves the performance of the both cells but not significantly and with small values, the voltage and power of the both cells is increases with increasing the value of the operating pressure, but this increase is considered very small. However, the system must not be operated at temperatures higher than (95℃) in order to preserve the manufacturing materials of the both cells. Also, keeping the amount of water in the alkaline electrolysis cell from reaching the steam stage, and keep the humidity of electrolyte membrane and the operating life of the fuel cell.