



**Engineering
Sciences Sector**

**Faculty of
Engineering**

Faculty of Engineering

Dep. : Computer Engineering

Name : **Amir Fuad Atiya**



Title : Tourism Demand Forecasting Using Machine Learning Methods

Authors : Nesreen Kamel, Amir F. Atiya, Neamat El Gayar, and Hisham El-Shishiny

Published In : ICGST International Journal on Artificial Intelligence and Machine Learning

ISSN 1687-4846

Impact Factor

Abstract :

Tourism demand forecasting has attracted the attention of researchers in the last decade. However, most of research focused on traditional quantitative forecasting techniques, such as ARIMA, exponential smoothing, etc. Although these traditional methods have achieved certain levels of success in the tourism research, it would be useful to study the performance of alternative models such as machine learning methods. This is the topic considered in this paper. The goal is to investigate how different machine learning models can be applied in the tourism prediction problem and to assess the performance of seven well known machine learning methods. Furthermore, we investigate the effect of including the time index as an input variable. Specifically, we consider the tourism demand time series for Hong Kong inbound travel.

Keywords:

Tourism Forecasting; Machine Learning.

Faculty of Engineering

Dep. : Computer Engineering

Name : **Amir Fuad Atiya**



Title : A Comparative Study of the Pickup Method and its Variations Using a Simulated Hotel Reservation Data

Authors : Athanasius Zakhary, Neamat El Gayar and Amir F. Atiya

Published In : ICGST International Journal on Artificial Intelligence and Machine Learning

ISSN 1687-4846

Impact Factor

Abstract :

Detailed forecasts are major inputs to modern Hotel Revenue Management Systems. Accurate forecasts are crucial to improve rate and availability recommendations for rooms. The data used for hotel demand forecasting are based on current booking activities (Reservations), historical information regarding daily arrivals or rooms sold.

Bookings are recent data that if used adequately can make the forecasting process more responsive to demand shifts. Very little work has been done on forecasting techniques using reservation data. In this paper, we examine in more details a popular forecasting model that uses reservation data, referred to in the literature as the .pickup. method. In particular, we present a new framework for the pickup technique with 8 different variations and compare the results of these variations using a variety of simulated hotel reservations data.

Keywords:

Tourism Forecasting; Machine Learning.

Faculty of Engineering**Dep.** : Electrical Power and Machines**Name** : **Hisham M. Soliman****Title** : A particle swarm optimization- based deadbeat on- line speed control for sensorless induction motor drives**Authors:** E. H.E.Bayoumi and H.M..Soliman**Published In** : Electromotion, 15 141-120, (2008)**ISSN** 0021-8669**Impact Factor** 0.45**Abstract :**

Particle swarm optimization (PSO) is utilized to derive a deadbeat speed control for sensorless induction motors (IM) drive system. The accuracy of the rotor speed estimation is sensitive to motor parameters variations. To alleviate the computation burden of such parameters, they are divided into two groups: on-line and off-line. Rotor flux angular speed is estimated using Proportional Integral (PI) flux observer (estimator). The observer is on-line designed to cope with the updated parameters. A PI current controller is similarly designed. Both controller and observer are tuned to achieve a deadbeat performance. The method guarantees accurate and precise steady-state speed estimation in addition to high dynamic performance. A comparative study is done between the proposed design and the conventional PI current controller and flux observer with/without parameters update. The results show the superiority of the proposed design under zero and very low speed operations.

Faculty of Engineering**Dep.** : Aerospace**Name** : **Hani Mohammed Negm****Title** : Thermoacoustic Random Response of Shape Memory Alloy Hybrid Composite Plates**Authors** : Hani Mohammed Negm**Published In** : Aircraft**ISSN** 0021-8669**Impact Factor** 0.45**Abstract** :

Random dynamic response and thermal buckling of a shape memory alloy hybrid composite plate subjected to combined thermal and random acoustic loads are investigated. A nonlinear finite element model was developed using the first-order shear-deformable plate theory, von Kármán strain-displacement relations, and the principle of virtual work. The thermal load was assumed to be a steady-state constant-temperature distribution, whereas the acoustic excitation was modeled as a white-Gaussian pressure with zero mean and uniform magnitude over the plate surface. To account for the nonlinear temperature dependence of material properties, the thermal strain was stated as an integral quantity of the thermal expansion coefficient with respect to temperature. The static nonlinear equations of motion are solved by the Newton–Raphson iteration technique to obtain the thermal postbuckling deflection, whereas the dynamic nonlinear equations of motion were transformed to modal coordinates and solved by employing.

Newmark implicit integration scheme. Finally, the critical buckling temperatures, static thermal postbuckling deflections, and random dynamic responses of a shape memory alloy hybrid-composite-plate panel are presented, illustrating the effect of shape memory alloy fiber embedding, sound pressure level, and temperature rise on the panel response.

Faculty of Engineering

Dep. : Electronics and Communications Engineering

Name : **Ahmed Ali Abouelsoud**



Title : On Semiglobal Stabilization of Bilinear Systems Subject to Input Time Delay and Magnitude

Authors : A.A.Abouelsoud

Published In : The Mediterranean Journal of Measurement and Control

ISSN 1743-9310

Impact Factor

Abstract :

This paper proposes a state feedback controller to semi-globally stabilize bilinear systems subject to input constraint based on algebraic Reccati Equation (ARE), two cases are considered. First, a bilinear system with no input time delay. Second, a bilinear system with input time delay. The designed controller in both cases is bounded in magnitude. Semi-global asymptotic stability is proven using Lyapunov function in the first case and Lyapunov- Krasovskii function in the second case. Simulation results show robustness of the proposed controller to uncertainty in the time delay.

Keywords:

Bilinear systems; Bounded Control; Time Delay; Lyapunov- Krasovskii function; Semi-Global Asymptotic Stability.

Faculty of Engineering**Dep.** : Electronics and Communication Engineering**Name** : **Ahmed Mohamed Soliman****Title** : History And Progress Of The Kerwin–Huelsman–Newcomb Filter Generation And Op Amp Realizations**Authors** : Ahmed Soliman**Published In** : Circuits Systems and Computers**ISSN** 0218-1266**Impact Factor** 0.13**Abstract :**

The history of Kerwin–Huelsman–Newcomb (KHN) second-order filter is reviewed. A generation method of the KHN filter from passive RLC filter is presented. Two alternative forms of the KHN circuit using operational amplifier are reviewed. The effect of finite gain-bandwidth of the op amps is considered and expressions of the actual ω_0 and Q are given. Two KHN circuits with inherently stable Q factor are also included. Two new partially compensated inverted KHN circuits are introduced. Active compensation methods to improve the KHN and the inverted KHN circuit performance for high Q designs are summarized. Spice simulation results are given. The progress of the KHN realizations using the current conveyor is also summarized briefly.

Keywords:

KHN circuit; active filters; op amps.

Faculty of Engineering**Dep.** : Electronics and Communication Engineering**Name** : **Ahmed Mohamed Soliman****Title** : History And Progress Of The Tow Thomas Bi-Quadratic Filterpart Ii:
Otra, Ccii And Dvcc Realizations**Authors** : Ahmed Soliman**Published In** : Circuits Systems and Computers**ISSN** 0218-1266**Impact Factor** 0.13**Abstract :**

The realization of the Tow Thomas (TT) circuit using the Operational Transresistance Amplifier (OTRA) is reviewed. The circuit employs two OTRA and all passive elements are floating as the original Tow Thomas circuit. The Current Conveyor (CCII) Tow Thomas circuits are reviewed next. The progress in the realization of the TT circuit using CCII is demonstrated clearly by summarizing eight different circuits. . One of the circuits has the advantage of very high input impedance and using all grounded resistors and capacitors. The Differential Voltage Current Conveyor (DVCC) as the active building block in realizing the TT circuit is also considered. Finally current mode TT circuits using balanced output CCII are summarized. Top Spice (level 49), simulation results using technology SCN 05 feature size 0.5 μm from MOSIS vendor: AGILENT are included to demonstrate the magnitude and phase frequency response of the TT circuits. Additional simulation results for the total power dissipation, total harmonic distortion, intermodulation IM3, input and output referred noise spectral densities are also included for comparison purposes.

Keywords:

Tow Thomas Circuit; Operational Transresistance Amplifier; Current Conveyor.

Faculty of Engineering**Dep.** : Electronics and Communication Engineering**Name** : **Ahmed Mohamed Soliman****Title** : CMOS Realization of the Operational Mirror Amplifier**Authors** : A. Soltan, A. H. Madian, A. M. Soliman**Published In** : Wseas Transactions On Electronics**ISSN** 1109-9445**Impact Factor****Abstract :**

The design of a CMOS operational mirrored amplifier (OMA) suitable for high frequency applications is proposed. The CMOS operational mirrored amplifier is developed using class AB operational amplifier and two current mirrors. To obtain a wide bandwidth and high stability, HF feed-forward techniques have been used. These techniques made the proposed circuit suitable for continuous – time analog signal processing. Simulation results for the proposed CMOS operational mirror amplifier circuit using PSpice are presented. Also, a performance comparison with pervious realization using BJT is given.

Keywords:

Operational mirror amplifier; Nullor; Nullator; Darlington pair; CMOS; operational floating amplifier.

Faculty of Engineering

Dep. : Electronics and Communication Engineering

Name : **Ahmed Mohamed Soliman**



Title : New Grounded Capacitor Current Mode Bandpass Lowpass Filters
Using Two Balanced Output ICCII

Authors : Ahmed Soliman

Published In : Journal of Active and Passive Electronic Devices

ISSN 1555-0281

Impact Factor

Abstract :

The Four new grounded capacitor current mode filters with high output impedance and using two balanced output Inverting Current Conveyors (ICCII) are introduced. The circuits are classified to two classes, in class one the input current is injected at port X of the ICCII .In class two the input is applied to port Y of the ICCII. All reported circuits employ grounded resistors also except one minimal passive component circuit which uses one floating resistor. Spice simulation results for all reported circuits using technology: SCN 05 feature size 0.5micronsMOSISVendor: AGILENT are given.

Keywords:

Active filters; Inverting current conveyors.

Faculty of Engineering

Dep. : Electronics and Communication Engineering

Name : **Ahmed Mohamed Soliman**



Title : Kerwin Huelsman Newcomb Filter Using Inverting CCII

Authors : Ahmed Soliman

Published In : Journal of Active and Passive Electronic Devices

ISSN 1555-0281

Impact Factor

Abstract :

A voltage mode Kerwin-Huelsman-Newcomb filter (KHN) using the Inverting CCII (ICCI) is given. The filter has high input impedance, employs two grounded capacitors, six grounded resistors and has independent control on Q and on the gain. A current mode KHN filter is generated from the voltage mode circuit. The current mode circuit has very low input impedance; employs grounded capacitors, grounded resistors and has independent control on Q and on the gain. Spice simulation result is included to demonstrate the practicality of the KHN circuit are given.

Keywords:

Voltage mode; current mode; Inverting Current Conveyor; Filters.

Faculty of Engineering

Dep. : Electronics and Communication Engineering

Name : **Ahmed Mohamed Soliman**



Title : CMOS Realizations of the Operational Mirrored Amplifier

Authors : A. Soltan and Ahmed M Soliman

Published In : Journal of Electrical Engineering

ISSN 1582-4594

Impact Factor

Abstract :

Ahmed Soliman

Keywords:

Operational mirrored amplifier; floating current source; bandpass; highpass; lowpass; dynamic biasing; current mode circuits; voltage-to-current converter; simulated inductor.

Faculty of Engineering**Dep.** : Electrical Power and Machines**Name** : **Hisham M. Soliman****Title** : Robust controller design for active suspensions using particle swarm optimisation**Authors:** H.M..Soliman, M.A.Awadallah and M.Nadim Emara**Published In** : Int. Journal. modeling, identification and control, 15 (1), 66-76 (2008)**ISSN****Impact Factor****Abstract :**

The paper presents a design technique for a fixed-structure PD robust controller of car active suspension systems. The design takes into consideration the uncertainty of system parameters, particularly tyre stiffness and body mass. Robustness is achieved by tuning the controller over a set of operating conditions covering the whole range of system parameters, e.g., body mass and tyre stiffness. Particle swarm optimisation (PSO) is used to attain different performance objectives of the system. Settling time of body displacement is minimised, system damping is maximised, and actuator saturation is avoided via control effort reduction. The design of controller parameters is cast in a multi-objective non-linear optimisation problem, and described to ensure the best possible performance. Simulation results show the superiority of the proposed system relative to the classical passive suspension, and signify robustness of the active controller design.

Keywords:

active suspension; robust control; particle swarm optimisation; PSO.

Faculty of Engineering**Dep.** : Electronics and Communication Engineering**Name** : **Ahmed Mohamed Soliman****Title** : Configurable Analog Block based on CFOA and its Application**Authors** : A. H. Madian, S. A. Mahmoud and Ahmed M. Soliman**Published In** : Wseas Transactions On Electronics**ISSN** 1109-9445**Impact Factor** 0.13**Abstract :**

A proposed configurable analog block (CAB) is presented, simulated and analyzed. The CAB consists of a CMOS current feedback operational amplifier (CFOA), presented by the authors, as the main active block, programmable four MOS nonlinearity cancellation cells, programmable capacitor array and MOSFET switches. Using the CABs, the universal field programmable analog array (FPAA) could be constructed, which can realize many signal-processing functions including variable gain amplifiers, filters. To show the reliability of the proposed CAB, a low-pass, band-pass, high-pass filter structure has been realized using the proposed CAB.

Keywords:

CMOS; current feedback operational amplifier; configurable analog blocks; nonlinearity cancellation; filters.

Faculty of Engineering**Dep.** : Electronics and Communications**Name** : **Mohsen Abdel-Razik Ali Rashwan****Title** : A Compact Arabic Lexical Semantics Language Resource Based on the Theory of Semantic Fields**Authors** : Mohamed Attia, Mohsen Rashwan, Ahmed Ragheb, Mohamed Al-Badrashiny, Husein Al-Basoumy and Sherif Abdou**Published In** : Springer-Verlag Berlin Heidelberg**ISSN** 0302-9743**Impact Factor****Abstract :**

Applications of statistical Arabic NLP in general, and text mining in specific, along with the tools underneath perform much better as the statistical processing operates on deeper language factorizations than on raw text. Lexical semantic factorization is very important in this regard due to its feasibility, high level of abstraction, and the language independence of its output. In the core of such a factorization lies an Arabic lexical semantic DB. While building this LR, we had to go beyond the conventional exclusive collection of words from dictionaries and thesauri that cannot alone produce a satisfactory coverage of this highly inflective and derivative language. This paper is hence devoted to the design and implementation of an Arabic lexical semantics LR that enables the retrieval of the possible senses of any given Arabic word at a high coverage. Instead of tying full Arabic words to their possible senses, our LR flexibly relates morphologically and PoS-tags constrained Arabic lexical compounds to a predefined limited set of semantic fields across which the standard semantic relations are defined. With the aid of the same large-scale Arabic morphological analyzer and PoS tagger in the runtime, the possible senses of virtually any given Arabic word are retrievable.

Keywords:

Arabic, AWN; coverage; language factorization; language resource; lexical compounds; lexical semantics; LR; morphology; morpho-PoS constraining; PoS tagging; semantic fields; semantic mapping; semantic relations; text mining; word net; word senses.

Faculty of Engineering**Dep.** : Electronics and Communications Engineering**Name** : **Mohamed Mahmoud Abdallah****Title** : Beamforming Algorithms for Information Relaying in Wireless Sensor Networks**Authors** : Mohamed Abdallah and Haralabos Papadopoulos**Published In** : IEEE Transactions on Signal Processing**ISSN** 1053- 587X**Impact Factor** 1.291**Abstract :**

We develop beamforming algorithms for information relaying over shared slowly nonselective fading channels in wireless sensor networks. We assume that, prior to beamforming their received data to a destination, the relays preprocess them by either data amplifying or decoding. The beamforming weights are broadcasted by the destination to the relays and are formed based on the individual relay-destination channel coefficients and an m -bit description of the quality of each source-relay channel. For both relay data-preprocessing models, we present methods for optimizing the m -bit quantizer employed at each relay for encoding its source-relay channel quality level, and for choosing the beamforming weights at the destination, so as optimize the destination uncoded bit error rates. As our simulations and analysis reveal, a coarse single-bit description of each source-relay channel coefficient at the destination may suffice, as it results in only a small increase in uncoded bit error rates with respect to the case where full knowledge of the source-relay channel coefficients are exploited at the destination.

Keywords:

Beamforming; cooperative communication; relay networks; sensor networks.

Faculty of Engineering**Dep.** : Engineering Math**Name** : **Said R.Grace****Title** : Oscillation Criteria for Second Order Differential Inclusions**Authors** : R.P.Agarwal,Said R.Grace and D.O'Regan**Published In** : Advanced Studies in Contemporary Math**ISSN** 1229-3067**Impact Factor** 0.1**Abstract** :

Some new Criteria for the Oscillation of Second order Differential inclusion

$$(a(t)y'(t))' \in F(t,y(t)) \text{ for a.e. } t \geq t_0 \geq 0$$

are established.

Keywords:

Oscillation; monoscillation; superlinear; differential inclusion AMS Subject Classification: 34A60.

Faculty of Engineering**Dep.** : Engineering Math**Name** : **Said R.Grace****Title** : On the Oscillation of Second Order Half-Linear Dynamic Equations**Authors** : Said R.Grace, M.Bohner and Ravi P.Agarwal,**Published In** : Difference Equations and Applications**ISSN** 1023-6198**Impact Factor** 0.92**Abstract** :

We obtain some oscillation criteria for solutions to the second-order half-linear dynamic equation

$$(a(x^\Delta)^\alpha)^\Delta(t) + q(t)x^\alpha(t) = 0,$$

when $\int^\infty a^{-1/\alpha}(s)\Delta s = \infty$ or $\int^\infty a^{-1/\alpha}(s)\Delta s < \infty$. These criteria unify and extend known criteria for corresponding half-linear differential and difference equations. Some of our results are new even in the continuous and the discrete cases.

Keywords:

Dinamic equation; half- linear; oscillation; second- order.

Faculty of Engineering**Dep.** : Engineering Math**Name** : **Said R.Grace****Title** : On the Oscillation of Third Order Functional Differential Equations**Authors** : Ravi P. Agarwal, Said R. Grace and M.F. Aktas**Published In** : Indian J. of Pure and Applied Math**ISSN** 0019-5588**Impact Factor** 0.125**Abstract** :

Some new criteria for the oscillation of third order functional differential equations of the form

$$\left(a(t)(x'(t))^a \right)'' + q(t)f(x[g(t)]) = 0$$

and

$$\left(a(t)(x'(t))^a \right)'' = q(t)f(x[g(t)]) + p(t)h(x[s(t)]),$$

where

$$\int_0^{\infty} a^{-1/a}(s) ds < \infty$$

are established.**Keywords**:

Functional differential equation; oscillation; nonoscillation; comparison.

Faculty of Engineering**Dep.** : Engineering Math. & Phys**Name** : **Abdel-Raouf Awad Helaly****Title** : Radiation Conductance and Pattern of Array Antenna on a Non-Confocal Dielectric- Coated Elliptec Cylinder**Authors:** A. Helaly and A. Sebak**Published In** : WSEAS Transactions on Communications**ISSN** 1109-2742**Impact Factor****Abstract :**

The formulation for the radiation pattern and conductance of axial slots array antenna on a dielectric-coated elliptic cylinder is presented. The coating is assumed to be non-confocal. The analytical solution, given here, is based on the eigen function technique and the addition theorem of Mathieu functions. The excited apertures are assumed to generate a TM polarized wave. Accordingly, the obtained series solution is truncated to generate numerical results. Sample of calculated azimuthal radiation patterns and radiation conductance are presented for different antenna and coating parameters. The elliptic cylinder has one extra degree of freedom compared to a circular cylinder to control the radiation pattern and conductance. The computed results show the flexibility of the antenna to control the shape and direction of its radiation pattern by changing the frequency, the excitation, the coating thickness of the cylinder, and the constitutive parameters of The coating.

Keywords:

Axial slot antennas; non-confocal coating; analytical methods.

Faculty of Engineering**Dep.** : Irrigation and Hydraulics**Name** : **Ahmed Emam Ahmed Hassan****Title** : Uncertainty Assessment of a Stochastic Groundwater Flow Model using GLUE Analysis**Authors** : Ahmed E. Hassan, Hesham M. Bekhit, and Jenny B. Chapman**Published In** : Hydrology**ISSN** 0022-1694**Impact Factor** 2.161**Abstract :**

The use of the generalized likelihood uncertainty estimation (GLUE) methodology in analyzing the results of stochastic groundwater models is evaluated. The ability of the GLUE methodology to mitigate the effect of the selection of the input parameter prior distributions on the modeling results is investigated. This is important when no prior information is available or when significantly different priors come from different sources or experts. The different approaches that can be used to implement the GLUE methodology in analyzing the stochastic results of such models and quantifying the uncertainty in model prediction are evaluated. Recent debates about the GLUE methodology and the problem of using “less formal likelihood” functions are discussed in terms of the applicability of such issues to groundwater studies in general and a given field site specifically. These issues are investigated using a density-driven groundwater flow model of a nuclear testing site (Milrow) on Amchitka Island, Alaska. Results of the analysis highlight the subjectivity of the choice of the shape factor associated with the GLUE likelihood measures. However, the arbitrary choice of this factor can be tied to the level of confidence one can place on the available observations. While traditional GLUE applications focus on displaying prediction quantiles, GLUE can be used to develop uncertainty bounds that are qualitatively similar to predictive uncertainty. Interestingly, for the case study shown here the traditional GLUE quantiles and the uncertainty bounds are almost identical. Results also show that the GLUE-based ensemble averaging yields results that are controlled by the data more than by the prior distributions. The GLUE quantiles or GLUE-developed uncertainty bounds provide conditional predictions that are free from the artificial smoothing associated with ensemble averaging.

Keywords:

Monte Carlo; GLUE analysis; Conditioning; Groundwater flow; Numerical modeling.

Faculty of Engineering**Dep.** : Irrigation and Hydraulics**Name** : **Ahmed Emam Ahmed Hassan****Title** : On Mapping Fracture networks onto Continuum**Authors** : Farag E. Botros, Ahmed E. Hassan, Donald M. Reeves, and Greg**Published In** : Water Resources Research**ISSN** 0047-1397**Impact Factor** 2.154**Abstract :**

Discrete fracture network (DFN) and stochastic continuum (SC) are two common modeling approaches used for simulating fluid flow and solute transport in fractured media. Fracture continuum approaches combine the merits of each approach; details of the fracture network are preserved and a computationally efficient grid is utilized for the solution of fluid flow by assigning a conductivity contrast between the grid cells representing the rock matrix and those representing fractures. In this paper, we propose a fracture continuum approach for mapping individual fractures onto a finite-difference grid as conductivity fields. We focus on several issues that are associated with this approach such as enhanced connectivity between fractures that would otherwise not be in connection in a DFN simulation and the influence of grid cell size. To address these issues, both DFN and the proposed approach are used to solve for fluid flow through two-dimensional, randomly generated fracture networks in a steady state, single phase flow system. The DFN flow solution is used as a metric to evaluate the robustness of the method in translating discrete fractures onto grid-cell conductivities on four different regularly-spaced grids; $1\text{ m} \times 1\text{ m}$, $2\text{ m} \times 2\text{ m}$, $5\text{ m} \times 5\text{ m}$, and $10\text{ m} \times 10\text{ m}$. Two correction factors are introduced to ensure equivalence between the total flow of the grid and the original fracture network. The first is dependent on the fracture alignment with the grid and is set to account for the difference between the length of the flow path on the grid and that of the fracture. The other correction is applied for areas in the grid with high fracture density and accounts for the artificial degree of connectivity that exists on the grid but not in the DFN.

Keywords:

Fracture Continuum; Discrete Fracture Network; Stochastic Continuum; Fracture Mapping; Numerical Simulations.

Faculty of Engineering**Dep.** : Irrigation & Hydraulics**Name** : **Ahmed Mohamed Abdel Sattar****Title** : Case Study: 17th Street Canal Breach Closure Procedures**Authors** : Ahmed M. Abdel Sattar, Ahmed Kassem and Hanif Chaudhry**Published In** : Hydraulic Engineering**ISSN** 0733-9429**Impact Factor** 1.004**Abstract :**

Hurricane Katrina on August 29, 2005 resulted in several breaches in the levees and floodwalls protecting New Orleans. Of the 20 breaches, the 17th Street Canal breach caused much of the city flooding. In this case study paper, a 1:50 scale hydraulic model of this breach is built according to Froude similitude relationships to investigate flow through the breach and the neighborhood. It is assumed in the model that the bed is fixed and the levee below the floodwall remains intact during the time needed for closure, which was the case in the 17th Street Canal breach. The model is used first to study the breach and to map the water levels in the vicinity of the breach. Since there are many uncertainties of what we know about the actual breach, a range of conditions have been run as an attempt to bracket what might have happened with respect to flooding depths and initial failed attempts to close the breach. Then, the model is utilized to study various possible methods for breach closure utilizing the procedures developed for cofferdam closure for river diversion, toe dumping, transverse dumping, single- and multi-barrier embankments, etc. Closures at the breach location and at the Old Hammond Highway Bridge are investigated. Results from the case study show that some of these methods could have been utilized for Katrina breaches. However, special care should be considered when extending them to closing other similar breaches with intact sections.

Keywords:

Scale models; Hurricane Katrina; 17th Street Canal breach; breach closure procedures; cofferdam; sandbags; open channel flow; and weir flow.

Faculty of Engineering**Dep.** : Mechanical Design and Production**Name** : **Ayman Mohamed Ashraf Youssef****Title** : Performance Analysis of Manufacturing Systems Composed of Modular Machines Using the Universal Generating Function**Authors** : Ayman M. A. Youssef and Hoda A. ElMaraghy**Published In** : Manufacturing System**ISSN** 0278-6125**Impact Factor** 0.032**Abstract :**

The modularity and reconfigurability of the building blocks of modern manufacturing systems have to be considered when evaluating their performance. This paper proposes a model for evaluating system availability and expected production rates for manufacturing systems that are composed of unreliable modular machines with multiple functionally parallel production units. These units are treated as independent modules, where the breakdown/stoppage of one unit does not necessitate the failure/stoppage of the whole machine and its production. The considered systems are multi-state manufacturing systems (MSMS) that can handle multiple parts simultaneously, and their structure is that of nonbuffered flow lines allowing paralleling of identical multi-state modular machines (MSMM) in each production stage. In spite of the inherent computational complexity of the proposed analysis, due to the large number of system states, it was made possible by the use of the universal generating function (UGF) technique, which proved efficient for large MSMS. The proposed model was applied to a number of case studies for demonstration and verification. The case studies were based on a family of engine front covers. The results show that machines with a larger number of modules, usually thought of as having lower availability, provided higher overall system availability in the case of machines with multiple spindles. Based on the new analysis and results, it is recommended that system designers favorably consider machines with multiple spindles rather than increasing the number of machines in parallel. These results provide an important support for the use of modular/reconfigurable equipment compared with traditional equipment, in spite of the higher cost.

Keywords:

Manufacturing Systems; Modular Machines; Performance Analysis; Universal Generating Function.

Faculty of Engineering**Dep.** : Mechanical Design and Production**Name** : **Abdel-Rahman A.F. Ragab****Title** : Prediction of Fracture Limit Curves in Sheet Metals Using a Void Growth Coalescence Model**Authors** : Abdel-Rahman Ragab**Published In** : Journal of Materials Processing Technology**ISSN** 0924-0136**Impact Factor** 0.82**Abstract :**

The prediction of the forming limit curve at fracture (FLCF) is of industrial importance, particularly in sheet metal stretching where a successful process is controlled by fracture instead of necking. In this work an analytical model is proposed to predict FLCF for sheet metals which are biaxially stretched under various loading paths. The model considers growth and coalescence of voids nucleating at inclusions in a sheet metal matrix characterized by strain hardening and normal anisotropy. The fracture incident is detected by formation of shear bands between growing spheroidal voids. The dependence of FLCF on strain-hardening exponent, initial void volume fraction as well as anisotropy is indicated. The predictions are compared with few experimental results existing in the literature, for some alloys of steel and aluminum. The comparison indicating fair agreement suggests that the presented model is a preliminary one requiring further refinement.

Keywords:

Void Fracture limit curves; Ductile fracture growth; Shear bands.

Faculty of Engineering**Dep.** : Mining, Petroleum and Metallurgical**Name** : **Randa Mohamed Abdel-Karim****Title** : Correlation between the degree of sensitization and stress corrosion cracking susceptibility of type 304H stainless steel**Authors:** A. Abou-Elazm, R. Abdel-Karim, I. Elmahallawi and R. Rashad**Published In** : Corrosion Science**ISSN** 0010-938X**Impact Factor** 1.895**Abstract :**

Austenitic stainless steel 304H is extensively used in the super heater tubes of power boiler due to its superior mechanical properties at elevated temperatures. However, its relatively high carbon content increases the susceptibility to sensitization and subsequent stress corrosion cracking. This work is concerned with investigation of the sensitization and stress corrosion cracking (SCC) of austenitic stainless steel grade 304H. Electrochemical potentiokinetic reactivation (EPR) test was used to evaluate the degrees of sensitization (DOS) of the studied alloy at various temperatures and periods of time. DOS increased with increasing sensitization time and temperature. This was confirmed by microstructure examination after EPR test. Boiling magnesium chloride (MgCl₂) test was used to evaluate the susceptibility of 404H stainless steel to stress corrosion racking. DOS and test stress level had negative effects on time to failure in boiling MgCl₂. The correlation between DOS and SCC was also discussed.

Keywords:

Stainless steel; 304H; Boiler tubes; Super heater tubes; DOS.

Faculty of Engineering***Dep.*** : Electronics***Name*** : **Emad El-Kashef*****Title*** : Novel Decomposition Method for Zircon***Authors:*** Emad El-Kashef***Published In*** : Journal of Electrical Engineering***ISSN*** 1582-4594***Impact Factor******Abstract :***

Zircon is one of the most stable chemical compound due to the strong bond between zirconia and silica in its molecule. Therefore, any extraction for zirconium metal or other useful zirconium compounds must start with the breakdown of such bond. The breakdown of zircon using the alkali fusion method is a well-known techniques and can be more favorable than using traditional chlorination breakdown if less drastic reaction conditions have been obtained. For such reason, the presence work study the fusion of zircon with equimolar ratio of KOH and NaOH as an alternative for using NaOH and Na₂CO₃. The influence of varying experimental conditions on the zircon fusion has been studied. These variables included the amount of alkali used, the temperature of the reaction, and the reaction duration. Using 20% excess of alkali mixture at 550 °C with only 60 min reaction time was favorable to get 96% zircon decomposition.

Keywords:

Zircon decomposition; Alkali fusion; Zirconia.

Faculty of Engineering

Dep. : Mining, Petroleum, and Metallurgical Engineering

Name : **Mahmoud Abu El Ela Mohamed Aly**



Title : Waterflood boosts oil production from field in Egypt

Authors : Mahmoud Abu El Ela and Ismail Mahgoub

Published In : Oil & Gas Journal

ISSN 0030-1388

Impact Factor 0.095

Abstract :

The primary goal of waterflooding is to displace oil with water in an efficient manner that maximizes the profitable recovery of oil from a reservoir. Billions of barrels of additional reserves have been generated through Waterflooding.

A cost-effective waterflooding plan allowed Khalda Petroleum Co. (an international joint-venture company) to improve oil recovery from the Tut field in Egypt's western desert. With waterflooding, producing rates from the field increased to 4,000 bo/d up from 500 bo/d with primary recovery methods.

Keywords:

Waterflooding; Secondary Recovery Method; Enhanced Oil Recovery.

Faculty of Engineering**Dep.** : Mining, Petroleum, and Metallurgical Engineering**Name** : **Mahmoud Abu El Ela Mohamed Aly****Title** : Changing feed conditions push Egyptian gas plant to upgrade CO2 membrane system**Authors** : Mahmoud Abu El, Ismail Mahgoub**Published In** : Oil & Gas Journal**ISSN** 0030-1388**Impact Factor** 0.095**Abstract :**

Changing feed operating conditions at Khalda Petroleum Co.'s Salam gas processing plant in Egypt's Western Desert led the company to make changes to its membrane system for removing CO2.

The plant feed operating conditions had changed over time. An increase in feed flow rate and feed CO2 content combined with membrane permeability variations—due to natural membrane aging and use—required adjustment in system operating conditions to fulfill KPC targets of maximizing system hydrocarbon recovery and meeting acceptable CO2 sales-gas specification.

This article will present the flexibility of membrane systems when such changes occur and describe how performance of a two-membrane-stage system was optimized

Keywords:

Membrane; CO2 Removal system; Gas Sweetening; Natural Gas.

Faculty of Engineering**Dep.** Mining, Petroleum, and Metallurgical Engineering**Name** **Mahmoud Abu El Ela Mohamed Aly****Title** : Mercury Monitoring and Removal at Gas Processing Facilities: Case Study of Salam Gas Plant**Authors** : Mahmoud Abu El Ela, Ismail Mahgoub, Mostafa Nabawi and Mohamed Abdel Azim**Published In** : SPE Projects, Facilities & Construction**ISSN** 1471-4175**Impact Factor****Abstract :**

Presence of mercury in natural gas can cause catastrophic failures of aluminum heat exchangers in gas-processing plants. In addition, the release of mercury can have serious health and environmental consequences. Recently, a number of methods for detecting mercury content in natural gas have been developed, and several techniques to remove mercury from the gas stream have been investigated.

Khalda Petroleum Company, an international joint venture company in Egypt, has recently found mercury as a naturally occurring component of hydrocarbons in the Egyptian Western Desert. Since then, Khalda Petroleum Company has concentrated on measuring and removing the mercury from its produced gas. A mercury removal unit was installed at the Salam gas-processing plant. The mercury contents of the gas at the inlet and outlet of the Salam mercury removal unit have been continuously monitored.

This paper gives a short overview of the biochemical effects of mercury, the corrosion mechanism of mercury and aluminum, analysis techniques for mercury in natural gas, and mercury removal techniques from natural gas. It also covers process design, field-analysis procedures, and the performance of Salam mercury removal unit.

Keywords:

Mercury Problems in Natural Gas; Mercury Removal System; Mercury Monitoring; Gas Processing; Treatment, Natural Gas.

Faculty of Engineering

Dep. : Mining, Petroleum, and Metallurgical Engineering

Name : **Mohamed Helmy Sabouh**



Title : Thermal heavy-oil recovery projects succeed in Egypt, Syria

Authors : Mahmoud Abu El Ela, Mohamed Samir, Helmy Sayyouch, and El Sayed El Tayeb

Published In : Oil & Gas Journal

ISSN 0030-1388

Impact Factor 0.095

Abstract :

To increase oil recovery from existing fields, operators in both Egypt and Syria have started producing heavy oil with thermal enhanced oil recovery processes.

In Egypt's Issaran oil field, cyclic-steam stimulation has increased oil production to 4,000 b/d from 50 b/d under primary recovery.

In Syria's Oudeh and Tishrine oil fields, pilot cyclic-steam stimulation has increased production to about 850 b/d from 550 b/d in Oudeh and about 2,500 b/d from 750 b/d in Tishrine. Each field's pilot has five 25-MMbtu steam generators. The pilots include 14 wells in Oudeh and 23 wells in Tishrine.

Keywords:

Development of oil fields; Thermal enhanced oil recovery; Steam injection.

Faculty of Engineering**Dep.** : Structural Engineering**Name** : **Maged Ezzat Georgy****Title** : Using Genetic Algorithms in Optimizing Construction Material Delivery Schedules**Authors** : Maged E. Georgy and Sameh Y. Basily**Published In** : Construction Innovation**ISSN** 1471-4175**Impact Factor****Abstract :**

Construction materials are one of the most important resources in any construction project, as they consume about forty to sixty percent of the total budget of the project. Managing materials typically helps to improve the project financial performance. An appropriate ordering and delivery of materials, on one hand, ensures that the right quantities of materials are present on site when required, while on the other hand, prevents large costs associated with storing the materials from occurring. This paper introduces part of a study for optimizing the delivery and inventory of materials in construction projects. A newly devised approach that employs genetic algorithms for the optimization of material delivery schedules and their associated inventory control is presented. The objective function for such algorithm is to minimize the total costs associated with material deliveries. In addition, a computer system has been developed to examine and validate the adopted approach. This system was evaluated using a selected case study of a recent project in Egypt, where the results showed the system to produce material delivery plans that have reduced costs compared with their actual counterparts.

Keywords:

Construction Material; Order; Delivery; Schedule; Inventory Control; Optimization; Genetic Algorithms (GA).

Faculty of Engineering**Dep.** : Structural Engineering**Name** : **Maged Ezzat Georgy****Title** : Evolutionary Resource Scheduler for Linear Projects**Authors** : Maged E. Georgy**Published In** : Automation in Construction**ISSN** 0926-5805**Impact Factor** 1.664**Abstract :**

Linear projects, such as, highways, tunnels, and pipelines, represent a class of construction projects typically characterized by their repetitive, but rather few, activities. As common in any construction undertakings, the proper management of construction resources plays a vital role in the successful execution of such projects. This is even more evident for the case of linear projects. Thus, the paper presents a genetic algorithm-based system for performing the necessary task of resource scheduling in linear projects under the linear scheduling method (LSM) scheme. Resource scheduling, particularly through the resource leveling process, is performed via minimizing either the day-to-day fluctuations in resource usage or the daily deviations from the average resource usage. This process further encompasses optimizing the rate of progress and buffer for each project activity. Implementation of the study was conducted in CAD environments using AutoLISP programming. For validation purposes, a comparison with another contemporary study in resource scheduling/leveling under the LSM scheme is carried out. An actual highway construction project is used in this comparison, where the presented approach shows broadly satisfying results.

Keywords:

Linear project; Linear scheduling method; Resource scheduling; Resource leveling; Genetic algorithms; CAD; AutoLISP programming.

Faculty of Engineering**Dep.** : Structural Engineering**Name** : **Maged Ezzat Georgy****Title** : Sustainable Construction Management: introduction of the operational context space (OCS)**Authors** : Mohamed A. Matar, Maged E. Georgy, and Moheeb E. Ibrahim**Published In** : Construction Management and Economics**ISSN** : 0144-6193**Impact Factor****Abstract** :

Sustainable construction is an emerging field of science that aims at incorporating the general sustainable development concepts into conventional construction practices. While the foundation of knowledge in this field is continuously expanding, sustainable construction is not yet standard industry practice. One major technical barrier that hinders enacting sustainable construction is the absence of an application framework that integrates both sustainability and construction practices at an operational level. This paper introduces a three-dimensional operational context space (OCS) platform that addresses this integration problem. The three dimensions are: (1) project life cycle phases, (2) project executing entities, and (3) sustainability performance parameters. Such OCS facilitates the association of responsibility, by assigning each sustainability requirement to a specific entity (or entities) during specific project phase(s), and further provides a numerical assessment for construction projects using sustainability as a criterion. Steps of constructing the OCS and how it could be employed in the evaluation and benchmarking of a project's environmental performance are elaborated on.

Keywords:

Sustainability; Sustainable Construction; Environmental Impact; Integration; Benchmarking.

Faculty of Engineering**Dep.** : Structural Engineering Department**Name** : **Mohamed Mahmoud Mahdy Marzouk****Title** : A superiority and Inferiority Ranking Model for Contractor Selection**Authors** : Mohamed Marzouk**Published In** : Construction Innovation: information, process, and management**ISSN** 1471-4175**Impact Factor****Abstract :**

Contractor selection is carried out in order to choose a competent and capable contractor to do the work. To help in this selection, baselines are established to ensure that the contractors have the required skills, resources, and abilities to execute the project. Contractor selection is a multiple criteria decision making wherein several criteria are required to be evaluated simultaneously. This paper aims to propose a decision-making model. The proposed model utilizes superiority and inferiority ranking (SIR) method and it provides six preference structures in order to compare the performance of alternatives' criteria. As such, it can represent discrete or continuous criteria. The preference structures utilize indifference and preference thresholds to capture the characteristics of functions that represent the specified criteria. The model provides two aggregation procedures (simple additive weighting and technique for order preference by similarity to the ideal solution) to generate superiority and inferiority flows. The proposed model is generic and can be used as a tool to evaluate alternatives in several applications such as value engineering, optimum organization structure, and constructability analysis. It enables its users to define the criteria that are deemed important for evaluation. The proposed multiple criteria decision making (SIR method) is novel to construction. This ranking method can be utilized as a successful tool in contractor selection problem.

Keywords:

Procurement; Decision making; Contracts; Supplier evaluation.

Faculty of Engineering**Dep.** : Structural Engineering Department**Name** : **Mohamed Mahmoud Mahdy Marzouk****Title** : Special-Purpose Simulation Model for Balanced Cantilever Bridges**Authors** : Mohamed Marzouk, Hisham Said, and Moheeb El-Said**Published In** : Bridge Engineering**ISSN** 1084-0702**Impact Factor** 0.438**Abstract :**

Construction of bridges' decks involves different types of resources that interact in a cyclic manner. Further, the construction operation inherits uncertainties and a variety of demands. Contractors have to select the construction method that suits project constraints including: project conditions, technical, financial, and time constraints. There are several construction methods that can be used to construct bridges' decks. This paper presents a special-purpose simulation model that aids government agencies and/or their representative in planning the construction of bridges' decks using cast-in-place and precast balanced cantilever techniques. The pouring of concrete in cast-in-place balanced cantilever techniques can be executed either by using pump station and pump line, or truck mixers, whereas, the precast balanced cantilever technique is carried out using two methods: 1) placement by an independent lifting apparatus; and 2) placement with the help of a beam and winch carried by the bridge deck itself. The developments made to model these methods are detailed in the paper. The proposed special purpose simulation model utilizes STROBOSCOPE as a simulation engine and is coded utilizing Visual Basic 6.0. All actual project data are fed to the developed model in order to carry out the what-if analysis.

Keywords:

Bridge construction; Computer models; Computer aided simulation.

Faculty of Engineering**Dep.** : Structural Engineering Department**Name** : **Mohamed Mahmoud Mahdy Marzouk****Title** : Handling Construction Polluations using Multi-Objective Optimization**Authors** : Mohamed Marzouk, Magdy Madany, Azza Abou-Zied and Moheeb El-Said**Published In** : Construction Management and Economics**ISSN** 1144-6193**Impact Factor****Abstract :**

Quantitative assessment of emissions associated with construction projects should be carried out during the planning phase of the projects. This is important to detect and highlight any excesses of residuals during the construction phase. A newly developed framework is proposed to handle construction pollution using multiobjective optimization. The approach, utilized by the proposed framework, is based on calculating the generated pollution for each activity involved in the project, as a result of dust, harmful gases and noise. The results of the quantitative assessment are integrated in a utility function that expresses the amount of total pollution. Then, evolutionary genetic algorithms (GAs) are used to carry multi-objective optimization, considering three objective functions (project duration, project cost and total pollution). The proposed application considers the dynamic nature of construction activities including different types of relationships and the change of activities' criticality. An actual case study is worked out to demonstrate the practical use of the proposed framework and to investigate the sensitivity of its parameters.

Keywords:

Built environment; Genetic algorithms; Optimization.

Faculty of Engineering**Dep.** : Systems & Biomedical Engineering**Name** : **Abdalla Sayed Ahmed Mohamed****Title** : Modeling and Analysis of Glucose- Insulin Oscillatory System**Authors** : Fadhil Al-Akwaa, Khaled Wahba and Abdalla Sayed Ahmed Mohamed**Published In** : Bioinformatics and Medical Engineering**ISSN** 1687-4811**Impact Factor****Abstract :**

Diabetes mellitus is a disease in the glucose-insulin endocrine metabolic regulatory system in which the pancreas either does not release insulin or does not properly use insulin to uptake glucose in the plasma- referred as hyperglycemia. Complications of diabetes mellitus include retinopathy, peripheral neuropathy, and blindness. Many mathematical models were proposed to understand the etiology of this disease.

The proposed model here is used to understand the mechanisms underlying ultradian oscillations of insulin and glucose levels. We show that the Glucose-Insulin, Glucose- Glucagon, and Insulin- Glucagon feedback loops are significantly important to produce these oscillations. The model confirms that the occurrence and properties of the oscillations were found to be critically dependent on the two delays between the insulin concentration and the subsequent effect on glucose production and glucose utilization.

The model is validated via several test inputs (glucose and insulin injections) and its behavior is compared with the experimental data to gain confidence that this model accurately represents the real endocrine system.

Keywords:

Diabetes mellitus; Glucose regulatory system; Ultradian oscillation; Feedback loops.

Faculty of Engineering**Dep.** : Systems and Biomedical Engineering**Name** : **Mohamed Abouelhoda****Title** : CoCoNUT: an efficient system for the comparison and analysis of genomes**Authors** : Mohamed Abouelhoda, Stefan Kurtz, and Enno Ohlebusch**Published In** : BMC Bioinformatics**ISSN** 1471-2105**Impact Factor** 3.78**Abstract :**

Background: Comparative genomics is the analysis and comparison of genomes from different species. This area of research is driven by the large number of sequenced genomes and heavily relies on efficient algorithms and software to perform pairwise and multiple genome comparisons.

Results: Most of the software tools available are tailored for one specific task. In contrast, we have developed a novel system CoCoNUT (Computational Comparative geNomics Utility Toolkit) that allows solving several different tasks in a unified framework: (1) finding regions of high similarity among multiple genomic sequences and aligning them, (2) comparing two draft or multichromosomal genomes, (3) locating large segmental duplications in large genomic sequences, and (4) mapping cDNA/EST to genomic sequences.

Conclusion: CoCoNUT is competitive with other software tools w.r.t. the quality of the results. The use of state of the art algorithms and data structures allows CoCoNUT to solve comparative genomics tasks more efficiently than previous tools. With the improved user interface (including an interactive visualization component), CoCoNUT provides a unified, versatile, and easy-to-use software tool for large scale studies in comparative genomics.

Keywords:

Bioinformatics; Comparative Genomics; Sequence Analysis; Enhanced Suffix Array; Chaining Algorithms.

Faculty of Engineering**Dep.** : Systems and Biomedical Engineering**Name** : **Mohamed Abouelhoda****Title** : A fast algorithm for the multiple genome rearrangement problem with weighted reversals and transpositions**Authors** : Martin Bader, Mohamed Abouelhoda, and Enno Ohlebusch**Published In** : BMC Bioinformatics**ISSN** 1471-2105**Impact Factor** 3.78**Abstract :**

Background: Due to recent progress in genome sequencing, more and more data for phylogenetic reconstruction based on rearrangement distances between genomes become available. However, this phylogenetic reconstruction is a very challenging task. For the most simple distance measures (the breakpoint distance and the reversal distance), the problem is NP-hard even if one considers only three genomes.

Results: In this paper, we present a new heuristic algorithm that directly constructs a phylogenetic tree w.r.t. the weighted reversal and transposition distance. Experimental results on previously published datasets show that constructing phylogenetic trees in this way results in better trees than constructing the trees w.r.t. the reversal distance, and recalculating the weight of the trees with the weighted reversal and transposition distance. An implementation of the algorithm can be obtained from the authors.

Conclusion: The possibility of creating phylogenetic trees directly w.r.t. the weighted reversal and transposition distance results in biologically more realistic scenarios. Our algorithm can solve today's most challenging biological datasets in a reasonable amount of time.

Keywords:

Bioinformatics; Comparative Genomics; Phylogeny; Genome Rearrangement; Reversal Distance.