FHSS-FSK Modulator Design and Implementation for a Wireless Sensor Transmitter

Gh. Bouzid, H. Trabelsi, Z. Elabed and M. Masmoudi

This study presents a modulator design and implementation for a wireless sensor transmitter. The transmitter architecture presented combines a Binary Frequency Shift Keying (BFSK) modulator, an up conversion mixer, a power amplifier and an 863-870 MHz bandpass filter. The BFSK modulator uses the Frequency Hopping Spread Spectrum (FHSS) technique operating in the European ISM band 863-870 MHz. This modulator is intended for short-range wireless applications, such as the wireless sensors network. The modulator generates a 7 MHz wide single-sideband frequency hopped spread spectrum waveform. This modulator is designed using the Direct Digital Frequency Synthesizer (DDFS), which enables us to generate BFSK signal with the hopping frequencies. Low power DDFS architecture is presented. It uses a smaller lookup table for sine and cosine functions compared with existing systems using a minimum additional hardware. The evaluated Spurious Free Dynamic Range (SFDR) of the proposed modulator is -88 dBc. A modulator IC has been designed in AMS 0.35 μm standard CMOS process technology with a layout chip area of 0.16 mm^2. A 20-bit frequency control word gives a tuning resolution of 41.29 Hz at 43.4 MHz sampling rate. This modulator consumes 47.7 μW with a 3V supply at 43.4 MHz. (*Trends in Applied Sciences Research 4 (1): 1-13, 2009;* **doi:** *10.3923/tasr.2009.1.13*)

Reduced-Order Sliding Mode Flux Observer and Nonlinear Control of an Induction Motor

O. Asseu, Z. Yeo, M. Koffi, T.R. Ori, G.L. Loum, T.J. Zoueu and A. Tanoh

This study describes an innovative strategy to the problem of non-linear estimation of states for electrical machine systems. This method allows the estimation of variables that are difficult to access or that are simply impossible to measure. Thus, as compared with a full-order sliding mode observer, in order to reduce the execution time of the estimation, a reduced or third-order discrete-time extended sliding mode observer is proposed for on-line estimation of rotor flux, rotor resistance and torque in an induction motor using a robust feedback linearization control. Simulations results on Matlab-Simulink environment for a 1.8 kW induction motor are presented to prove the effectiveness and high robustness of the proposed nonlinear control and observer against modeling

uncertainty and measurement noise. (*Trends in Applied Sciences Research 4 (1): 14-24, 2009; **doi**: 10.3923/tasr.2009.14.24*)

Forest Harvesting Problem in the Light of the Information Measures

P. Rupšys and E. Petrauskas

This study presents a new characterization on optimal harvesting problem. By relying on both Gompertz shape stochastic growth model and the Shanon, Tsallis, Kullback, Fisher information measures, the solution of biologically optimal rotation problem is presented and exemplified. As an present experience a real data set is used from the repeated measurements on permanent sample plots of pine stands in Lithuania. All results are implemented in symbolic algebra system MAPLE. (*Trends in Applied Sciences Research 4 (1): 25-35, 2009; **doi**: 10.3923/tasr.2009.25.35*)

Artificial Neural Network as a Clinical Decision-Supporting Tool to Predict Cardiovascular Disease

Beatrice Fidele, Jayrani Cheeneebash, Ashvin Gopaul and Smita S.D. Goorah

The aim of the study is to use artificial intelligence tools as a clinical decision support in assessing cardiovascular risk in patients. A two-layer neural network using the Levenberg-Marquardt algorithm and the resilient backpropagation have been used in the proposed artificial neural network. It has been shown how this network is efficient in predicting cardiovascular risk in individual patients by using the Long Beach dataset. The use of this new network seems to better address the prediction of cardiovascular disease at an individual level. (*Trends in Applied Sciences Research 4 (1): 36-46, 2009; **doi**: 10.3923/tasr.2009.36.46*)

Predictive Determination of the Trajectory of an Electric Discharge

Z. Yeo, M. Koffi, O. Asseu, A. Tanoh, D. Konan and B. Koffi

Some discharge models suppose that the discharge is developed mainly according to an electric field's line. In this study, a computer program is built in order to carry out accurate determination of the electric field's lines. Finite element method is implemented to solve the Laplace equation and then the electric field is derivate.

Field's lines are built by successive jumps and their parameters are calculated by a polynomial approximation. Results are successfully compared to empirical formula established by earlier researches in rod to plane geometry. The field's lines and what could be a discharge line for an aerial insulator are also investigated and discussed. (*Trends in Applied Sciences Research 4 (1): 47-55, 2009;* ***doi:*** *10.3923/tasr.2009.47.55*)

Investigation of Failure and Corrosion in Pipelines and Tanks used in Ice-Cream Factory: The Case Study

R. Bazargan-Lari and Y. Bazargan-Lari

This study describes the reasons of failure and corrosion in pipelines and tanks used in ice-cream factory located in Soltanabad Industrial Region, Shiraz (Iran). The present research shows that the chloride level of the water is an important factor in determining the resistance of stainless steel due to crevice corrosion. Laboratory research shows that for the majority of natural, raw and potable water with pH in the range 6.5 to 8; crevice corrosion of 304/304L is rare below about 200 ppm of chlorides. Also crevice corrosion of 316 to 316L with the same pH is rare below about 1000 ppm of chlorides. Chemical analysis of the water of industrial region shows that it contains 386.36 ppm chlorides. So, the stainless steel pipeline type 304, which is used in the factory did not have any resistance against the crevice corrosion and rapidly corroded from those points which were more susceptible such as welded zone. Since the pipes were corroded around the welded zones, metallographic studies were conducted in this area which revealed that the welds were not of high quality and contained holes in the welded zones as well as imperfections such as lack of diffusion and incomplete penetration. Finally preventing methods of pipelines corrosion is discussed. (*Trends in Applied Sciences Research 4 (1): 56-61, 2009;* ***doi:*** *10.3923/tasr.2009.56.61*)

Simulating Fatigue Propagation Life of Martensitic Steel

O.O. Ajayi and J. Ikotun

The linear elastic fracture mechanics equation together with that for stress intensity factor range K, was used to develop a fatigue propagation life model, after substituting parameters of material constants. The model was then employed in creating simulation software which can be used at any time to generate data, make design consideration and predict response to variable loading. This became useful in predicting the life of metal from the point of crack initiation; investigate

behaviour to changes in crack sizes and also determine adequate damage tolerance for the metal. *(Trends in Applied Sciences Research 4 (1): 62-67, 2009;* ***doi:*** *10.3923/tasr.2009.62.67)*

Proximate Composition, Mineral Elements and Anti-Nutritional Factors of *Anisopus mannii* N.E. Br. (Asclepiadaceae)

A.B. Aliyu, A.M. Musa, M.S. Sallau and A.O. Oyewale

Biochemical studies with a view to assess the nutritional potentials of *Anisopus mannii* were carried out by evaluating the proximate composition, mineral elements and anti-nutritional content of the plant. The results showed that the total oxalates, free cyanides, tannins and total cyanides were found to be present at 0.70 ± 0.5, 6.50 ± 0.41, 10.55 ± 0.01 and $12.41\pm7.19\%$, respectively. However, concentration of phytate was very low ($0.017\pm0.00\%$). Proximate compositions of the plant showed a rich source of crude protein ($8.40\pm0.17\%$), fats ($8.67\pm0.63\%$), carbohydrates ($72.57\pm0.68\%$) and total ash ($10.36\pm0.22\%$). The plant was also found to contain the following essential minerals: potassium (1700 mg/100 g), calcium (1280 mg/100 g), iron (156 mg/100 g), vanadium (102 mg/100 g), chromium (53.90 mg/100 g), zinc (0.874 mg/100 g), copper (1.43 mg/100 g) and manganese (36.60 mg/100 g). The results of this research indicated that *Anisopus mannii* has nutritional qualities that could provide the users with additional nutrients for enhanced curative process of ill health. *(Trends in Applied Sciences Research 4 (1): 68-72, 2009;* ***doi:*** *10.3923/tasr.2009.68.72)*

Application of Young Slits Technique: Measurement of the Phase of the Diffracted Field in Optical Domain

D.K. Konan, B.K. Koffi, A. Tanoh, M. Koffi, Z. Yeo, K. Konan and R.K. N'guessan

This study presents a new technique to measure the phase difference between two diffracted fields: The field diffracted by a reference object and the field diffracted by an unknown object. For that we use the interferential technique of Young slits. We measured the phase difference between the diffracted fields of two rods of resin. And knowing the phase of the diffracted field of the reference object helps deducing the phase of the field diffracted by the sample. This setup is simple and it is very strong in the presence of disturbances because both objects are illuminated with the same incident beam. Moreover, this technique allows us

measuring the phase of the diffracted field on a wide range of angle so that a high resolution of the image can be obtained. (*Trends in Applied Sciences Research 4 (2): 73-78, 2009; **doi**: 10.3923/tasr.2009.73.78*)

The Effect of Storage Method on the Vitamin C Content in Some Tropical Fruit Juices

V.O. Ajibola, O.A. Babatunde and S. Suleiman

Loss in vitamin C contents of some fruit juices namely, orange, lemon, lime, pineapple, paw-paw and carrot stored under different conditions was investigated. The juice from the fruit samples were extracted, stored at room temperature ($29\pm1°C$) in plastic bottles and in the refrigerator ($4\pm1°C$) for 4 weeks. The juices were all analysed for their vitamin C content by oxidation and reduction method. Results revealed that the rate at which vitamin C is lost during storage depends on the type of fruit and the storage method employed. The citrus fruits were found to follow a similar pattern of loss, while other fruits differ from this and among themselves. Loss of vitamin C correlated with pH only for pineapple, pawpaw and carrot, however, this cannot be said to be the controlling factor. *Bacillus subtilis* and *Candida* sp. were isolated from all the juices under both storage conditions, except for orange juice. (*Trends in Applied Sciences Research 4 (2): 79-84, 2009; **doi**: 10.3923/tasr.2009.79.84*)

The Application of Factor Analysis and Artificial Neural Networks in Predicting Spring Precipitation by Means of Climatic Parameters of the Upper Levels of Atmosphere

M.H. Nokhandan, G.A.F. Ghalhary and M. Mousavi-Baygi

This research aims to study the relationship between climatic large-scale synoptic patterns of the upper levels of atmosphere and rainfall in Khorasan-e Razavi Province. Artificial neural networks and factor analysis were used in this study to predict rainfall in the period between April and June in the province. At the first the relationship between average regional rainfall and the changes in synoptic patterns including the temperature of 700 mb level, the thickness between 500 and 1000 mb levels and the relative humidity of 300 mb level were analyzed. In the selection of these regions, we have considered the effect of synoptic patterns in these regions on the rainfall in the northeast region of Iran. Then, artificial neural

networks model for the period 1970-1997 were taught. Finally, the rainfall in the period 1998-2007 has been predicted. The results show that artificial neural networks can predict rainfall with reasonable accuracy in all years. The root mean-square error of the model was 5 mm. (*Trends in Applied Sciences Research 4 (2):85-97, 2009; **doi**: 10.3923/tasr.2009.85.97*)

Adaptive Control of Chaotic Rössler System via Synchronization

H. Fatehi Marj, R. Asgharian and N. Pariz

In this study, using synchronization approach, chaos control for Rössler system is investigated. Based on essential structure of synchronization approach and using bifurcation diagram, periodic Rössler systems or master systems for both period-one and period-two orbits are found. Adaptive nonlinear feedback method is used to synchronize chaotic slave system with periodic master ones. Stability conditions are discussed analytically based on Lyapunov theorem and numerical simulation results are presented. The proposed method could control the chaotic system with unknown parameters very well. (*Trends in Applied Sciences Research 4 (2): 98-106, 2009; **doi**: 10.3923/tasr.2009.98.106*)

Methoxy Poly (Ethylene Glycol)-*b*-Poly (D, L-lactide) Films for Controlled Release of Ibuprofen

T. Phromsopha and Y. Baimark

Biodegradable films of methoxy poly (ethylene glycol)-*b*-poly (D, L-lactide) diblock copolymers (MPEG-*b*-PDLL) containing drug were prepared by solution casting of MPEG-*b*-PDLL and drug in dichloromethane. Ibuprofen was used as a poorly-water soluble model drug. Influences of MPEG-*b*-PDLL/drug ratio and film thickness on ibuprofen-loaded film characteristics and drug release behaviors were investigated. The hydrogen bonding between MPEG-*b*-PDLL and drug were detected from FTIR analysis. From FTIR and differential scanning calorimetric results indicated that the ibuprofen was well distributed throughout the MPEG-*b*-PDLL film matrices. The drug release rates increased as the drug ratio increased and the film thickness decreased. The drug release from the films occurred by drug diffusion mechanism. (*Trends in Applied Sciences Research 4 (2): 107-115, 2009; **doi**: 10.3923/tasr.2009.107.115*)

Some Chemical and Morphological Properties of Juvenile Woods from Beech (*Fagus orientalis* L.) and Pine (*Pinus nigra* A.) Plantations

M. Akgül and A. Tozluoğlu

In this study, carefully selected test materials were taken from juvenile wood *Pinus nigra* and *Fagus orientalis* growing naturally in Turkey. The aim of this research is to determine the chemical and morphological properties of the wood fiber of the *Pinus nigra* and *Fagus orientalis* and the suitability of these properties for pulping. Eight sample trees were taken as four pieces for each species which were collected from Duzce-Dariyeri-Yaylagol region. The test samples were taken from certain parts of tree stems. In these tests, fiber length, fiber diameter, lumen dia cell wall thickness were measured. The felting power, elasticity coefficient, rigidity coefficient, Runkel's proportion, Muhlsteph's proportion and F-ratio were calculated from the wood fiber morphological properties and the effects of these properties on pulp strength properties were investigated. According to the results of this study, it was found that the pine and beech are/aren't suitable for pulping. (*Trends in Applied Sciences Research 4 (2):116-125, 2009; doi: 10.3923/tasr.2009.116.125*)

A Comparative Study of Neural Networks and Non-Parametric Regression Models for Trend and Seasonal Time Series

Dursun Aydin

In this study, we will investigate and compare the performance of some forecasting methods for time series with both trend and seasonal patterns. The forecasting performance has been compared with six models and these include: Auto Regressive Integrated Moving Average (ARIMA), Smoothing Spline Model (SSM), Regression Spline Model (RSM), Additive Regression Model (ARM), Multi-Layer Perceptron (MLP) and Radial Basis Function (RBF) network models. The SSM, RSM and ARM are called as non-parametric regression models, whereas MLP and RBF are known as artificial neural network models. For these models, we conducted a comparison based on actual data sets, the number of tourist coming to Turkey. The empirical results obtained have shown that MLP performed better than other models. In addition, the SSM can be considered as an alternative to MLP. (*Trends in Applied Sciences Research 4 (3): 126-137, 2009; doi: 10.3923/tasr.2009.126.137*)

Spatial Association of Copper Mineralization and Faults/Fractures in Southern Part of Central Iranian Volcanic Belt

R. Derakhshani and A. Mehrabi

To provide guides for exploration of porphyry copper mineralization at a district scale, we examine the spatial association between known copper deposits and strike-slip faults/fractures in South central Iranian volcanic belt. Studying of aerial photographs and preparing of photogeological map of the study area, beside various image processing techniques, helped us to reveal faults/features of this area. Field reconnaissance and local detailed mapping followed to corroborate the evidence. The integration of remote sensing and field checking resulted in preparing geological map of the area. After converting the map to the raster one, buffers around the faults/fractures are extracted. Then the spatial associations between the porphyry copper deposits and strike-slip faults/fractures are quantified using weights of evidence modeling. The porphyry copper occurrences are associated spatially with strike slip faults/fractures within distances of 1 km. In addition, based on these observations local strike slip faults/fractures related to regional strike slip faults systems are the most important foci for emplacement of copper-bearing porphyritic intrusions in the study area. Taking advantages of GIS, remote sensing technology and weights of evidence modeling, it is detected that the most concentrated place of porphyry copper in southern part of central Iranian volcanic belt is among the faults/fractures and through 1 km around them.

Investigation on Bulk Density of Deposited Sediments in Dez Reservoir

H. Samadi Boroujeni, M. Fathi-Moghadam and M. Shafaei-Bejestan

In this study, the bulk density of fine sediments deposited behind Dez dam (near dam body) in Iran has been quantified by field investigation (one borehole closed to power intakes) and available empirical methods. Dez dam is located in the Southwest of Iran, completed in 1963, with the height of 203 m and original reservoir volume of 3315 million m^3 (MCM). The result of bathymetry survey in 2003 show that the storage volume of the reservoir has been reduced to

2600 MCM by sedimentation and sediment level at upstream of the dam body has been raised to 256 m, i.e., only 14 m below the hydropower intake at elevation of 270 m. The field data from a deep borehole at bottom of reservoir close to the hydropower intakes have been collected and analyzed. Results show that the empirical methods proposed by Lane and Miller underestimate the bulk density of sediments by about 43 and 46%, respectively. This shows that the empirical methods can not be applied for predicting bulk density of fine sediments. A new set of equations is developed for predicting the bulk density of fine sediments. (*Trends in Applied Sciences Research 4 (3): 148-157, 2009; **doi**: 10.3923/tasr.2009.148.157*)

Evaluation of Horizontal and Vertical Illuminance Models against Measured Data in Iran

S. Shekari. S and R. Golmohammadi

This study was undertaken to evaluate performance of three models of horizontal and two models of vertical illuminance based on measured data in Iran. Measurement of horizontal and South oriented vertical illuminance was carried out at three stations of Eshtehard, Hamadan and Kerman over 15 days at one hour intervals between 12 July and 1 August 2007 from 9 a.m. to 3 p.m. Synchronically calculation of solar altitudes and global horizontal illuminance carried out utilizing equations proposed by Illuminating Engineering Society of North America (IESNA) for measuring period. Two localized models entitled Solar altitude model and IESNA model in conjunction with the model of Robledo was adopted to predict horizontal illuminance. Also for predicting of South oriented vertical illuminance, a localized model based on IESNA equations in conjunction with a model of Ruiz were taken in to account. Mean measured and predicted horizontal values by three models found to be 96 KLx and 107.3-108.7 KLx, respectively. Among three horizontal models the model of IESNA (MBD = -1.26, RMSD = 10.25) performed best and the model of solar altitude performed worst. Mean measured and predicted values of vertical illuminance by two vertical models found to be 33.59 and 25.71-32.19, respectively. The IESNA model (MBD = -1.4, RMSD = 0.2) performed better than the model of Ruiz. Respective mean monthly predicted horizontal and vertical illuminance exceeded 63 KLx for 50 and 0.96% of working year indicating high daylight availability on horizontal and vertical planes in Iran. (*Trends in Applied Sciences Research 4 (3): 158-166, 2009; **doi**: 10.3923/tasr.2009.158.166*)

Daylight Availability and Energy Conservation in Industrial Parks of Tehran

S. Shekari S. and R. Golmohammadi

This study presents results of a study on estimation of daylight availability on horizontal and south oriented vertical surfaces as well as energy saving in industrial parks of Tehran by daylighting. Beyond our natural affinity for daylight, it is much more effective than electric lighting at entraining the circadian system because the circadian system responds only to high levels of blue light, such as those found in daylight. Horizontal and vertical illuminances were calculated for three established stations by equations of Illuminating Engineering Society of North America. Synchronically illuminances were measured over 15 days between 12 July and 1 August 2007 to confirm calculated data. The correlation of measured and calculated values was reasonable ($r = 0.703$). Regression models were developed between measured and calculated values ($r^2 = 0.8$). Horizontal and vertical illuminances were predicted for 11 industrial parks of Tehran during a working year (294 days) by fitted models. The minimum, maximum, mean and SD of predicted horizontal values found to be of 12.45, 108.12, 66.48 and 24.71 KLx, respectively. Considerable frequency of occurrence of horizontal illuminance in all places (9.7%) was related in values more than 100 KLx. Additionally it was revealed that in 55% of working year daylight could be sufficient for maintaining indoor standard illuminance of 500 Lx. Results of this study suggest high daylight availability and high potentiality of energy conservation in Iran. (*Trends in Applied Sciences Research 4 (3): 167-174, 2009; **doi**: 10.3923/tasr.2009.167.174*)

Utilization of Local Raw Materials for the Production of Commercial Glasses

Omar A. Al-Harbi and Mohammad M. Khan

The main objective of this study was to prepare transparent soda-lime-silica and borosilicate glasses utilizing locally available raw materials. Major source of oxides for the preparation of different various glass batches are silica sand, limestone, magnesite, clay, feldspar, granite and nepheline syenite. The mean chemical composition of soda-lime-silica glasses consisted of SiO_2 (70.72%), CaO (10.78%) and Na_2O (16.67%) and that of borosilicate glass consisted of SiO_2 (71.83%), Na_2O (5.30%) and B_2O_3 (13.26%). The Coefficient of Thermal

Expansion (CTE) ranged from 93.64 to 110.78×10^{-7}°C for soda-lime-silica glass and from 44.85 to 73.25×10^{-7}°C for borosilicate glass in the Temperature range of 25-300°C. A strong correlation was observed between the batch and among other glass parameters such as chemical composition, melting temperature, color, density, microhardness, chemical suitability and coefficient of thermal expansion. The multivariate analysis of major oxides and the different properties of prepared glasses suggest that most of these properties depended on the composition of glasses. The properties of the prepared glasses highlighted the potential of local raw materials for glass industry in the Kingdom. (*Trends in Applied Sciences Research 4 (4): 176-187, 2009;* ***doi:*** *10.3923/tasr.2009.176.187*)

Trends of Rotational Speed on Engine Performance for Four Cylinder Direct Injection Hydrogen Fueled Engine

M.M. Rahman, M.K. Mohammed and R.A. Bakar

This study was addressed the effect of speed on engine performance for four cylinder direct injection hydrogen fueled engine. GT-Power was utilized to develop the model for direct injection engine. This model was employed one dimensional gas dynamics to represent the flow and heat transfer in the components of engine model. Sequential pulse injectors were adapted to the inject hydrogen gas fuel within the compression stroke. Air-fuel ratio was varied from rich limit (AFR = 27.464) to a lean limit (AFR = 171.65). The rotational speed of the engine was varied from 1000 to 6000 rpm. The obtained results seen that the engine speed are greatly influence on the Brake Mean Effective Pressure (BMEP), Brake Specific Fuel Consumption (BSFC). It can also be seen that the decreases of BMEP with increases of engine speed, however, increases the brake specific fuel consumption. The brake thermal efficiency increases nearby the richest condition and then decreases with increases of engine speed. The optimum minimum value of BSFC occurred within a range of AFR from 38.144 ($\phi = 0.9$) to 49.0428 ($\phi = 0.7$) for the selected range of speed. The higher volumetric efficiency emphasizes that the direct injection of hydrogen is a strong candidate solution to solve the problem of the low volumetric efficiencies of hydrogen engine. Maximum brake torque speed for hydrogen engine occurs at lower speed compared with gasoline. The present contribution suggests the direct injection fuel supply system as a strong candidate for solving the power, torque and abnormal combustion problems. (*Trends in Applied Sciences Research 4 (4): 188-199, 2009;* ***doi:*** *10.3923/tasr.2009.188.199*)

207

The Effect of Frequency on the Cyclic Strain Accumulation of Plain Stainless Steel Pressurized Cylinders Subjected to Dynamic Bending Moment

S.J. Zakavi, M. Zehsaz and M.R. Eslami

The aim of this study is to evaluate the effect of frequency on the ratchetting behavior of plain stainless steel pressurized cylinders that may be used in the power plant components. The cylinder is subjected to an internal pressure (calculated as the design pressure for each cylinder) and alternately bending moments at different frequencies typical of seismic events. Ratchetting of the cylinder wall has been observed and recorded in the hoop direction. The nonlinear isotropic/kinematic (combined) hardening model is used to evaluate the ratchetting. Finite element analysis which models the cylinders under above mentioned loads and combined hardening model is applied to investigate the ratchetting. Stress-strain data and material parameters have been obtained from several stabilized cycles of specimens that are subjected to symmetric strain cycles. The results show that initially, the calculated rate of ratchetting is large and then decreases with the increasing of cycles. Also, the ratchetting data using FE analysis show the hoop strain ratchetting decreases with the increasing of frequencies and spacing from the resonant frequency. (*Trends in Applied Sciences Research 4 (4): 200-215, 2009; doi: 10.3923/tasr.2009.200.215*)

Effect of Milling Parameters on Frictions when Milling Hastelloy C-22HS: A FEM and Statistical Method

K. Kadirgama, M.M. Noor, M.M. Rahman, K.A. Abou-El-Hossein, B. Mohammad and H. Habeeb

This study was developed the Finite Element Model (FEM) and Response Surface Method (RSM) to investigate the effect of milling parameters on frictions when milling Hastelloy C-22HS. This study gain better understanding of the friction distribution in metal cutting process. The RSM was used to minimize the number of simulation. The contour plot from RSM shows the relationship between input variables including the cutting speed, feed rate and axial depth and responses including the friction coefficient, friction angle, friction stress and friction force. Feed rate, axial depth and cutting speed play major role to generate high friction coefficient, friction angle, friction stress and friction force. When all the variables at highest value the friction stress become larger, on the other hand reduce the feed rate and increase other variable, it cause high friction coefficient, angle and force. The combination of numerical analysis and statistical method are very useful

to analysis the distribution of friction in milling. It is suitable to use middle value of cutting speed, feed rate and axial depth when milling same type of materials. (*Trends in Applied Sciences Research 4 (4): 216-228, 2009; doi: 10.3923/tasr.2009.216.228*)

Geologically-Constrained Fuzzy Mapping of Porphyry Copper Mineralization Potential, Meiduk District, Iran

R. Derakhshani and A. Mehrabi

In this study the theory of fuzzy sets is developed for geologically-constrained predictive mineral potential mapping. The application of the theory of fuzzy sets involves multi-class predictor patterns of geological features. Using the spatial association between known copper deposits and structural features of the study area which is provided by weights of evidence modeling, maps of fuzzy membership value for strike-slip fault fractures, batholithic pluton margins, pluton centroids, lithologic formations and hydrothermal alteration units are provided. After combination of these layers, zones of porphyry cupper potential are provided by using fuzzy gamma operator. This method for geologically-constrained predictive mineral potential mapping indicates that the predicted favorable zones for porphyry copper in the study area comprise 4 areas: good potential (0.35%), moderate potential (0.87%), weak potential (31.9%) and non potential for porphyry copper deposits (66.88%) where some well-known deposits like Meiduk and Sara are located in the favorable potential area. So, the application of the theory of fuzzy sets to mineral potential mapping provides a quantitative yet subjective technique for predicting mineral potential where a number of mineral deposits are known. Also, the application of the theory of fuzzy sets in the generation of geologically-constrained predictive maps of mineral potential can be useful to guide further exploration in the search for undiscovered mineral deposits in the study area. (*Trends in Applied Sciences Research 4 (4): 229-240, 2009; doi: 10.3923/tasr.2009.229.240*)

Influence of Co-Doped Bimetallic Impurities on the Metastable Zone Width and Induction Period for Nucleation of KDP from Aqueous Solutions

S.A. Begum and J. Podder

The results of the influence of co-doped bimetallic Mg(II)-Ni(II), Mg(II)-Co(II), Mg(II)-Li(I) impurities on metastable zone width and induction period for the nucleation of KDP crystals are discussed in this study. In order to grow bulk

crystals with faster growth rates along all the crystallographic directions, the solubility, metastable zone width, induction period and interfacial energy etc., are necessary to know to optimize the growth conditions. Metastable zone width, induction period and interfacial energy have been determined. Interfacial energy has been estimated using the experimentally determined induction period values based on the classical nucleation theory for a spherical nucleus. The presence of co-doped bimetallic Mg(II)-Ni(II), Mg(II)-Co(II), Mg(II)-Li(I) impurities is found to enhance the metastable zone width, induction period, interfacial energy and also minimizes the formation of secondary nucleation. This phenomenon may be attributed due to the absorption of impurities on the surfaces of the growing nuclei. *(Trends in Applied Sciences Research 4 (4): 241-247, 2009;* ***doi:*** *10.3923/tasr.2009.241.247)*

Trends in Middleware Abstarction for Context Dissemination in Mobile Ad-Hoc Network

V. Hakami and M. Dehghan

Context dissemination completes the value chain of contextual information procurement and is identified as a precondition to actual context use by enlarging the visibility scope of context sources beyond the local acquisition or fusion entity and towards a network neighborhood. When leveraged for context-aware services in MANETs (Mobile Ad-hoc NETworks), an often-stated goal is to cater for personalized refinement and constant monitoring of a high volume of heterogeneous data with lower chance of longevity. Context-aware middleware abstractions pave the way by masking the physical distribution of data and by working out the appropriate logic for identifying the most relevant subset of context for use by an application component. This study compiles the state-of-the-art trends in programming abstractions built around the notion of context and present an exhaustives a detailed survey of their relevant middleware incarnations. Also, some key design considerations are identified for MANET-based context dissemination and the study investigates how these requirements have been approached from a variety of directions by the reviewed systems. *(Journal of Applied Sciences 9 (1): 1-14, 2009;* ***doi:*** *10.3923/jas.2009.1.14)*

Moving Chain: A Surround-and-Push Method in Object Pushing Using Swarm of Robots

A. Khozaee and A. Ghaffari

In this research, a new approach to develop an object pushing system with a swarm of mobile robots is introduced. This is an attempt to design and develop a

system for a swarm of robots and their behaviors to surround and push an object. The robot behaviors are devised in such a way that the robots would easily develop a swarm formation as an orbit around the object and push it toward the desired goal. Roughly speaking, a rotating orbit of robots around the object is developed first. The object is moved toward the goal as the orbit moves to the desired goal configuration. Based on this idea, using a simple decision making, each robot can easily determine its proper action to push the object while remaining in the robot formation. Fuzzy controllers are used to develop behaviors in each robot. Each robot makes decision and behaves individually without any direct communication with others. Based on this individually behavior the group cooperation will perform. The main characteristics of the developed system are independency of the method to the object kinematics and its shape. Moreover, as a result of a swarm system, the method is not dependent on the number of robots in the system. Simulation results are given to support the proposed approach. *(Journal of Applied Sciences 9 (1): 15-26, 2009; doi: 10.3923/jas.2009.15.26)*

Supply Chains Based on Common Platforms: Analysis of Time Savings Gained by Commonality

M.A. Shafia, M.G. Ariyanezhad, M. Fathollah and F. Taham

Sharing common resources is amongst critical factors creating competitive advantages in business and manufacturing. In today's competitive and dynamic environment, application of the resource sharing approach has become the focal point of attention for business managers. By resource sharing and through common platform guidelines, the possibility of producing an extended variety of products using the least variable production elements is provided. Meanwhile, today's manufacturing industries are trying hard to plan and manage an effective foundation for creating a value stream from the point of supplying resources to the stage of delivering the final product to the customer. Standardizing and sharing product components and common platforms is of great assistance to this effort. This study presents a mathematical model to contribute to making the decision of choosing the best combination of common components and analyze the time effects of commonality approach and its possible consequential savings as one of the key performance indicators of a supply chain based on common platform. *(Journal of Applied Sciences 9 (1): 27-37, 2009; doi: 10.3923/jas.2009.27.37)*

211

Integrate Kano's Model and IPA to Improve Order-Winner Criteria: A Study of Computer Industry

Yu-Cheng Lee, Cheng-Chien Cheng and Tieh-Min Yen

The aim of study is to establish a new methodology of IPA to improve order-winner criteria and win orders. Importance-performance analysis (IPA) model has been widely used as the primary tool for market research and business improvement. However, traditional IPA model has important hidden assumption, that is performance and satisfaction have a linear relationship. Under these assumptions, if the quality characteristics cannot meet the above-mentioned assumption, the IPA model will not accurately analyze the importance and priority ranking for improvement, leading to wrongful decision making. This study puts forth a new decision making and analysis methodology that will, on one hand, exploit the Kano's Model to establish nonlinear relationship between quality characteristics and customer satisfaction, when quality characteristics are functional and dysfunctional. On the other hand, the analysis will adjust the importance of quality characteristics according to the effect of quality characteristic improvement on customer satisfaction. The modified IPA model takes the nonlinear relationship between quality characteristics and customer satisfaction into consideration, not only boosting effectiveness of the IPA model, but also retaining the simple decision making pattern of traditional IPA models. Finally, the study takes a case of industrial computers in Taiwan to address the application and effect of IPA methodology modified by Kano's model. *(Journal of Applied Sciences 9 (1): 38-48, 2009;* **doi:** *10.3923/jas.2009.38.48)*

Automatic Adjustment of Television Sets Using an Uncalibrated Camera with a Novel Fuzzy Test Pattern and an Adaptive Alignment Algorithm

A. Peiravi and S. Toosizadeh

In this study we present the results of experimental research on an automatic adjustment system for television sets that relies on an inexpensive, uncalibrated camera to measure the geometric attributes of the TV screen and by using a closed-loop structure, sends adjustment signals which are generated by a computer to the television's internal EEPROM. Also several image processing tools have been utilized to measure the geometric parameters of the TV screen through the output images obtained by the camera. Control strategies are used to adjust and stabilize these parameters. We have already proposed and published

a novel fuzzy test pattern and an adaptive alignment algorithm which are both used in the present research. This approach is implemented in real-time in a manufacturing house. *(Journal of Applied Sciences 9 (1): 49-58, 2009;* ***doi:*** *10.3923/jas.2009.49.58)*

Study on the Exigency Demands of Residential Buildings' Users

Răzvan Giuşcă, Raluca Giuşcă and V. Corobceanu

The aim of the study is to emphasize the actual demands of residential buildings' users and to explore new methods, yet less used, that could improve the buildings environmental comfort. The residential buildings, constructed by man in order to function as shelter where multiple processes of the social and material life takes place, are influenced by many factors that have to be taken under consideration when projecting, constructing, using and post-using them. All aspects emphasized in this study should be first considered in the processes of their interaction and interdependency and then to be systemically approached and analyzed. During the second half of the twentieth century, the urban population knew an incredible growth. This growth led to an exponential increase of the energy consumption and a more than alarming exceeding of noxious gases in the air and wastage. There was a time when the energy consumption was considered an indication of the quality of life. Therefore, from the point of view of the energy consumption, many differences appeared between the developed countries and the developing ones. At the same time a person living in one of the developed countries has energy consumption twenty-five times greater than one living in a poor country. A popular idea was that we can fight poverty with increased energy consumption. However, the facts showed a disturbing reality energy wastage. *(Journal of Applied Sciences 9 (1): 59-68, 2009;* ***doi:*** *10.3923/jas.2009.59.68)*

Commonality and its Measurement in Manufacturing Resources Planning

M.A. Wazed, Shamsuddin Ahmed and Nukman Yusoff

The main objectives of this research are to study the commonality indices in manufacturing resource planning reported in literatures since 1980 and some useful insights including advantages and disadvantages of using commonality in manufacturing/production environment. It is observed that in designing a new family of products/processes or analyzing an existing family, commonality indices can often be used as a starting point. Systematic understanding and effective use

213

of commonality and commonality indices can help managing inventory levels, uncertainties and cost dimensions.

Hybrid Genetic Algorithm for Vehicle Routing and Scheduling Problem

K. Ghoseiri and S.F. Ghannadpour

This study aims to solve Vehicle Routing Problem with Time Windows (VRPTW), which has received considerable attention in recent years, using hybrid genetic algorithm. Vehicle Routing Problem with Time Windows is an extension of the well-known Vehicle Routing Problem (VRP) and involves a fleet of vehicles set-off from a depot to serve a number of customers at different geographic locations with various demands within specific time windows before returning to the depot eventually. To solve this problem, this study suggests a hybrid genetic algorithm combined with Push Forward Insertion Heuristic (PFIH) to make an initial solution and λ-interchange mechanism to neighborhood search and improving method. The proposed genetic algorithm uses an integer representation in which a string of customer identifiers represents the sequence of deliveries covered by each of the vehicles. Part of initial population is initialized using Push Forward Insertion Heuristic (PFIH) and part is initialized randomly. A λ-interchange mechanism interchanges the customers between routes and generates neighborhood solution. At the end, in order to prove the validity of the suggested model, fourteen instances of Solomon's 56 benchmark problems-selected randomly- are solved and compared with the other meta-heuristic methods. The results indicate the good quality of the method.

Obtaining and Characterization of the Polymer Concrete with Fly Ash

M. Harja, M. Bărbuţă and L. Rusu

The aim of this study is investigation of properties of polymer concrete with fly ash as filler for obtaining new composite building materials. Polymer concrete realized of epoxy resin, fly ash and crushed fine and coarse aggregates has been prepared for assessing the influence of fly ash and resin dosage over its properties. Density, microstructure, compressive strength, flexural strength and split tensile strength were studied for different combinations determined on the design of experiments

concept. The experimental results confirm the possibility of using fly ash to produce polymer concrete at a potentially lower cost and without compromising its structural integrity. The use of fly ash as a filler in polymer concrete is very promising because it improves the physical properties of the material and particularly its compressive and flexural strength. *(Journal of Applied Sciences 9 (1): 88-96, 2009;* ***doi:*** *10.3923/jas.2009.88.96)*

A Genetic Algorithm for Scheduling Flexible Manufacturing Cells

M.T. Taghavifard, M. Heydar and S.S. Mousavi

In this study, scheduling of Flexible Manufacturing Cells (FMC) is taken into consideration. This type of production system combines the merit of job shop and flow shop production systems. FMS Scheduling belongs to the class of problems that are known as NP-hard. This study presents a genetic algorithm-based technique to schedule machines and Automated Guided Vehicle (AGV), simultaneously. To generate schedules from a given chromosome, four Priority Dispatching Rules (PDR) are considered. Maximum completion time or makespan is defined as the objective function. The algorithm was coded and many randomly generated problems were solved. The obtained results were compared with optimum values obtained from the most comprehensive mathematical formulation in the literature. The experimental results show that the proposed method performs well in terms of efficiency and quality of solutions. For further study, the researchers will consider this problem in multi-objective environment. *(Journal of Applied Sciences 9 (1): 97-104, 2009;* ***doi:*** *10.3923/jas.2009.97.104)*

An Investigation of Efficiency of Outlet Runoff Assessment Models: Navroud Watershed, Iran

H. Mojaddadi, M. Habibnejad, K. Solaimani, M.Z. Ahmadi and M.A. Hadian-Amri

This research has been carried out for investigation and comparison of the amount of precision and correctness of SCS unit hydrograph, GRAY, G.I.U.H and Gc.I.U.H models in determination of the shape and dimensions of outlet runoff hydrograph in Navroud watershed with 266 km^2 area, located in Giulan Province of Iran and use of these models for the similar watersheds and without any data. To investigate the amount of efficiency of above-mentioned methods, first 6 equivalent rainfall-runoff events were selected and for each,

hydrograph of outlet runoff were calculated. Then the models were compared with together, for peak time, base time, peak flow and volume of outlet runoff and the most efficient model in estimation of hydrograph of outlet flow for similar regions was proposed. Comparison of calculated hydrographs obtained from models under research and observed hydrographs of selected events showed that SCS unit hydrograph method had the most direct agreement in three parameters of peak time, base time and volume of direct runoff. On the other hand, the geomorphoclimatic instantaneous unit hydrograph, with the highest mean relative error of 16%, had highest harmony in estimation of peak flow direct runoff. *(Journal of Applied Sciences 9 (1): 105-112, 2009;* ***doi:*** *10.3923/jas.2009.105.112)*

A Non-Parametric Statistical Approach for Analyzing Risk Factor Data in Risk Management Process

S.M.H. Mojtahedi, S.M. Mousavi and A. Aminian

The aim of this study is to propose one practical approach to use non-parametric bootstrap technique in risk management processes especially for analyzing risk factor data, because of the fact that in most decision making cases data sizes and expert's comments are too small for analyzing risk factor data or often there are no parametric distributions on which significance can be estimated; therefore, standard statistical techniques do not always provide answers to complex risks questions. The non-parametric bootstrap is a powerful technique for assessing the accuracy of a parameter estimator in situations where conventional techniques are not valid and also non-parametric bootstrap technique is extremely valuable in situations where data sizes are too small. Bootstrap technique for decreasing the SD of risk factor data is described as well. Confidence intervals for risk factors are also obtained by means of bootstrap resampling technique. To make it more understandable, an application example is also provided. It can be concluded from the example that bootstrap will produce more accurate results in comparison with conventional techniques. *(Journal of Applied Sciences 9 (1): 113-120, 2009;* ***doi:*** *10.3923/jas.2009.113.120)*

The Effect of Dry Machining on Surface Integrity of Titanium Alloy Ti-6Al-4V ELI

G.A. Ibrahim, C.H. Che Haron and J.A. Ghani

In this study, surface integrity generated when machining Ti-6Al-4V-ELI alloy with coated cemented carbide tools under dry condition was investigated. The surface

roughness values recorded when machining Ti-6Al-4V-ELI with coated carbide tools was lower at higher feed rate and generally, these curves consist of three stages. The machined surface generated consists of well-defined uniform feed marks running perpendicular to the tool feed direction. Surface damages on the machined surface generated observed after machining are deformation of feed marks and re-deposited workpiece material. The thin layer of disturbed or plastically deformed layer was formed immediately underneath the machined surface and it was found when cutting operation at cutting speed of 95, feed rate of 0.35 mm rev^{-1} and depth of cut of 0.10 mm and at the end of tool life. *(Journal of Applied Sciences 9 (1): 121-127, 2009;* **doi:** *10.3923/jas.2009.121.127)*

Appraisal of the Geostatistical Methods to Estimate Monthly and Annual Temperature

M.H. Mahdian, S. Rahimi Bandarabady, R. Sokouti and Y. Norouzi Banis

Three geostatistical methods were evaluated for estimation of monthly and annual temperature. These methods consist of Thin Plate Smoothing Splines (TPSS) with and without co variable, Weighted Moving Average (WMA) and Kriging (ordinary and cokriging). Moreover, the elevation was used as co variable. Cross Validation technique was used for comparison of the above-mentioned methods. Based on the results obtained in this study, regression coefficients between elevation and monthly or annual temperature was greater than 0.8. Variography analysis shows good spatial correlation for monthly and annual temperature in these regions. The TPSS method with power of 2 and with elevation as co variable was recognized as the most precise method in estimating monthly and annual temperature. Mean absolute error values for annual and monthly temperature was calculated 1.02 and 1.45°C, respectively). Also, the Cokriging method is ranked as the second method in estimating temperature with MAE = 1.5°C in this study. *(Journal of Applied Sciences 9 (1): 128-134, 2009; doi: 10.3923/jas.2009.128.134)*

Application of Analytical Hierarchy Process for the Evaluation of Climate Change Impact on Ecohydrology: The Case of Azraq Basin in Jordan

Yasin A. Al-Zu'bi

This study is related to ecohydrology which incorporates the use of ecosystem properties as a management tool in implementing a program of water resource

management. The methodology adopted to assess the impact of climate change on ecohydrology in Azraq basin is based on water balance equation, US Soil Conservation Service Method (SCS), Penman-Monteith model, statistical correlation with meteorological data and Analytical Hierarchy Process (AHP). Scenarios are developed to reflect the extent of variations in both temperature and rainfall. Climate changes are addressed at three levels; local, national and regional. The study concluded that under the condition of increased temperatures and precipitation fluctuations, the overall mean annual recharge for the Azraq basin would decrease. Both results of AHP analysis and stochastic model indicated that the expected significant impact of climate change on ecohydrology will be at local level in the long term. *(Journal of Applied Sciences 9 (1): 135-141, 2009;* **doi:** *10.3923/jas.2009.135.141)*

Effects of Intermediate Anchors on End Anchored Carbon Fibre Reinforced Polymer Laminate Flexurally Strengthened Reinforced Concrete Beams

M.Z. Jumaat and A. Alam

This research presents the results of an experimental study to look into the effects of intermediate anchors on end anchored CFRP laminate strengthened beams. Three beams of $125 \times 250 \times 2300$ mm in dimensions were cast. Out of these, one beam was left un-strengthened and acts as the control beam and another two beams were strengthened with CFRP laminates. Both strengthened beams were end anchored to prevent premature end peeling. From the strengthened beams, one beam was intermediate anchored in the shear span to prevent premature shear failure. The anchorage lengths provided by the end and intermediate anchors were of 200 and 40 mm, respectively. The results showed that the intermediate anchors in shear span zone prevented premature shear failure. Result also showed that the strengthened beams with intermediate anchors had significant effects on failure loads, failure modes, strain characteristics, deflections and cracking patterns over the end anchored strengthened beam. *(Journal of Applied Sciences 9 (1): 142-148, 2009;* **doi:** *10.3923/jas.2009.142.148)*

Chemical Constituents of Oil-Cured Tropical Bamboo *Gigantochloa scortechinii*

R. Salim, R. Wahab, Z. Ashaari and H.W. Samsi

The chemical constituents of oil-cured 3 years-old tropical bamboo *Gigantochloa scortechinii* were investigated in this study. The bamboo splits were oil-cured

218

using organic palm oil at temperature of 140, 180 and 220°C for duration of 30 and 60 min. The bamboo splits were then grinded into small particles and air-dried prior to the chemical analysis to obtain the compositions: holocellulose, hemicellulose, cellulose, lignin and starch. Untreated samples were used as control for comparison. The results obtained showed an overall reduction in the chemicals constituents after treatments compared to the control. Significant changes were however noted after the bamboo samples underwent treatment at temperature above 180°C. The holocellulose content decreased slightly from 81.4 to 79.7% for treatment conditions at 220°C for 30 min. On the other hand holocellulose content diminished significantly when the sample was treated at 180°C for 30 min and further treatment resulted in 72.7% holocellulose content at 220°C for 60 min treatment. The hemicellulose content of bamboo ranged from 24.1 to 27.8% when treated at 140 and 220°C for 30 to 60 min, respectively. The cellulose content of heat-treated samples ranged 47.4 to 55.2%. Starch contents were largely reduced from 4.1 to 1.9% for control to oil-cured samples at 220°C for 60 min. *(Journal of Applied Sciences 9 (1): 149-154, 2009;* ***doi:*** *10.3923/jas.2009.149.154)*

Multiple Regression Model for Compressive Strength Prediction of High Performance Concrete

M.F.M. Zain and S.M. Abd

A mathematical model for the prediction of compressive strength of high performance concrete was performed using statistical analysis for the concrete data obtained from experimental work done in this study. The multiple non-linear regression model yielded excellent correlation coefficient for the prediction of compressive strength at different ages (3, 7, 14, 28 and 91 days). The coefficient of correlation was 99.99% for each strength (at each age). Also, the model gives high correlation for strength prediction of concrete with different types of curing. *(Journal of Applied Sciences 9 (1): 155-160, 2009;* ***doi:*** *10.3923/jas.2009.155.160)*

The Relationship Between Psychological Climate and Organizational Commitment

A.Z. Nammi and Maryam Zarra Nezhad

The aim of this study is to investigate the existence of relationships between components of psychological climate including autonomy, trust, pressure,

cohesion, support, recognition, fairness and innovation and teachers, commitment to school, teaching occupation and work group. The study was conducted in one of the biggest cities (Ahvaz) in Iran, using a sample consisting of 170 teachers. Two methods were applied: Correlation analysis and multiple regression analysis. Support was found for the existence of statistically significant relationships between psychological climate and components of organizational commitment. The result of multiple regression analysis showed that trust, innovation support, fairness and recognition have significant effects on the explanation of variance of organization commitment. *(Journal of Applied Sciences 9 (1): 161-166, 2009;* **doi:** *10.3923/jas.2009.161.166)*

Gender Differences in Creative Perceptions of Undergraduate Students

H. Naderi, R. Abdullah, H. Tengku Aizan, J. Sharir and V.K. Mallan

This study investigated the difference between gender-role identity and creativity of students at Malaysian Universities. The respondents were 153 undergraduate Iranian students (48 females, 105 males; aged 19 to 27 years) in Malaysia Universities. All students were given a Khatena-Torrance Creative Perception Inventory Test (KTCPI). The instrument comprised two subscales, namely, Something About Myself (SAM) and What Kind of Person Are You (WKOPAY)? Each subscale had fifty items. The results revealed no significant difference between female and male students' overall creative perception. Further examination revealed that male students score higher in the WKOPAY subscale $(t = 2.578, p = 0.011)$, while females scored higher than males in the initiative factor $(t = 3.566, p = 0.000)$ and males scored higher than females in the environmental sensitivity factor $(t = -2.216, p = 0.028)$ in the SAM subscale. Further replications on similar samples are needed. *(Journal of Applied Sciences 9 (1): 167-172, 2009;* **doi:** *10.3923/jas.2009.167.172)*

Reliability Improvement of the Analog Computer of a Naval Navigation System by Derating and Accelerated Life Testing

Ali Peiravi

The reliability of the analog computer of the naval navigation system was improved by the application of derating and accelerated life testing. Spice circuit analysis and temperature profile analysis were performed based on which part derating scheme was developed. Afterwards a systematic approach for accelerated life testing was

designed to discover the weaknesses of the system under test and the fixes to the system were performed to improve its reliability. Since many mechanisms of failure were present in the product being tested, the PMRL model was used for multiple failure modes in modeling the failure times obtained from accelerated life tests. A significant reduction in mean time to failure and improvement in reliability was achieved. The predictive calculations for the mean time to failures were carried out using MIL-HDBK-217F for the Naval Sheltered and the Naval Unsheltered working conditions per the real operating conditions of the system and were compared with the results obtained from our experimental and modeling work. *(Journal of Applied Sciences 9 (1): 173-177, 2009;* ***doi:*** *10.3923/jas.2009.173.177)*

Theoretical Study and Finite Element Simulation of Tearing in Hydroforming Process

S.A. Zahedi, A. Shamsi, A. Gorji, S.J. Hosseinipour and M. Bakhshi-Jouybari

An axisymmetric analysis was developed to investigate the tearing phenomenon in cylindrical Hydroforming Deep Drawing (HDD). By theoretical and finite element simulation methods, the critical fluid pressures which result rupture in the workpiece were studied. The results showed that the theoretical pressure path is an upper limit of the tearing path. The effects of anisotropy, drawing ratio, sheet thickness and strain hardening exponent on tearing diagram were also investigated. It is shown that die profile radius is effective on blank profile radius. *(Journal of Applied Sciences 9 (1): 178-182, 2009;* ***doi:*** *10.3923/jas.2009.178.182)*

Factors Affecting the Success of Fisheries Co-Management as Perceived by Guilan's Fishermen

M.S. Allahyari

This study was intended to draw the factors affecting the success of fisheries co-management as perceived by Guilan's fishers, Iran. A sample of 136 fishers was selected through multistage cluster sampling technique. To identify the effective factors to success fisheries co-management, a self-designed questionnaire was developed to gather data. For determining the validity of questionnaire, the face and content validity was used. Reliability for the instrument was estimated at 0.77. According to factor analysis, the effective factors for the success of fisheries co-management process were categorized into nine groups that those

factors explained 67% of the total variance of the research variables. The results also indicated that Common goal, Sustainable fishing and Lack of bureaucracy had the most effects on the success of fisheries co-management, respectively. *(Journal of Applied Sciences 9 (1): 183-187, 2009;* **doi:** *10.3923/jas.2009.183.187)*

Self-Hypnosis in Attenuation of Asthma Symptoms Severity

M. Zobeiri, A. Moghimi, D. Attaran, M. Fathi and A.A. Ashari

According to probable effects of psychological stress on exacerbation of asthma symptoms, utilizing complementary therapies such as hypnosis may be an effective treatment for reduction of asthma symptoms severity. Forty asthmatic patients were randomly allocated to self-hypnosis and control groups. Person's subjective perception of dyspnoea in both groups was assessed in 4 different stages via modified MRC scale (Modified Medical Research Council Dyspnoea Scale; range 0-4). Also, the Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV_1) were measured through spirometry twice a time, once prior to and again at the end of this one month study period. Only 72.5% of the patients completed the trial. The median change in dyspnoea symptom scores was greater in self-hypnosis group than control group (p = 0.004). There was no significant difference in FVC, FEV_1 and FEV_1% within each group and between them. According to the results, self-hypnosis can improve symptomsbut does not seem to change lung function in asthmatic patients, at least in short periods of time. *(Journal of Applied Sciences 9 (1): 188-192, 2009;* **doi:** *10.3923/jas.2009.188.192)*

Relationship Between Maternal Distress with Fetus Growth Rate: Mediator Role of Heart Rate

M. Shafizadeh and M. Mehdizadeh

The aim of present investigation was to study the relationship between mothers' distress and fetal growth. In this correlational study, 110 pregnant women selected randomly and completed Depression Anxiety Stress Scale (DASS) before ultrasound measurement of fetus. The results of structural equation model have shown that the overall model has been accepted (χ^2 = 36.4, df = 24, p>0.05). In fact, by increasing mothers' stress and anxiety, the fetus heart rate was increased and it decreased the height, weight, head circumference and width

and femur length of fetus. Therefore, one of the environmental variables that have negative effect on the fetus growth is mother distress, because it can stimulate the fetal autonomic nervous system through the mediating of heart rate. *(Journal of Applied Sciences 9 (1): 193-196, 2009;* **doi:** *10.3923/jas.2009.193.196)*

Electrical Investigations of $YBa_2Cu_3O_{(7-x)}$ ($0 \le x \le 0.5$) Tunnel Junctions

B. Chouial and B. Hadjoudja

In this study, we investigate superconducting tunnelling junctions based on high T_c $YBa_2Cu_3O_{(7-x)}$ ($0 \le x \le 0.5$) superconductors. Prepared junctions were characterised at different temperatures and several voltage ranges. It was found that the measured current-voltage as well as conductance characteristics exhibited good superconducting behaviour. Many properties such as the zero voltage anomaly and gap anisotropy were put into evidence. *(Journal of Applied Sciences 9 (1): 197-200, 2009;* **doi:** *10.3923/jas.2009.197.200)*

Fast Adaptive Update Rate for Tracking a Manoeuvring Target with a Phased Array Radar, Using IMM and MRIMM Algorithms

H. Benoudnine, M. Keche, A. Ouamri and M.S. Woolfson

In this study, a new fast method for selecting the next update time in two maneuvering target tracking algorithms, namely the Interacting Multiple Models (IMM) algorithm and the Multi Rate Interacting Multiple Models (MRIMM), will be presented. Both IMM and MRIMM are used here to predict and estimate the target's possible states and to select the correct next update time. The idea is to assign to each model in the IMM and MRIMM algorithms an appropriate rate and to weight these rates by the models' probabilities to obtain the rate to use. The resulting algorithms are named, respectively, the Fast Adaptive IMM (FAIMM) algorithm and the Adaptive MRIMM (AMRIMM) algorithm. Using Monte Carlo simulations, the performances of these algorithms are compared to that of the Adaptive IMM algorithm that uses Van Keuk criterion to select the next update time and to that of the IMM algorithm and MRIMM that use a constant update time. *(Journal of Applied Sciences 9 (2): 201-213, 2009;* **doi:** *10.3923/jas.2009.201.213)*

Analysis of Drivers for Development of Common Platform Throughout Supply Chain Management (Concepts, Drivers and Case Study in Auto Industry)

M.A. Shafia, M. Fathollah and H. Ghazanfari

In this research, we studied the causes and effects of the factors that determine the trend of employing Common Platforms (CP) in Supply Chain Management (SCM) of automotive industries. Moreover, we proposed a framework for analyzing Supply Chain Based on Common Platforms (SCBCP) in industries. The research methodology of this study is based on fact finding approach. Therefore, presenting the definitions and concepts of pertinent subjects, a conceptual model is developed for determining various aspects and finding facts regarding SCBCP in automotive industry. Critical factors and important facts in SCBCP have been identified by developing and analyzing the conceptual model. In addition, a triple performance criterion for the evaluation of SCBCP is developed. This study is one of the first to present a framework for SCM based on CP. The main research questions behind this study concern the following three main aspects: understanding, describing and guiding how we can apply supply chain based on common platform in auto industry. *(Journal of Applied Sciences 9 (2): 214-225, 2009;* ***doi:*** *10.3923/jas.2009.214.225)*

Petrochemistry of the Reduced, Ilmenite-Series Granitoid Intrusion Related to the Hired Gold-Tin Prospect (Basiran), Eastern Iran

M.H. Karimpour, C.R. Stern, A. Malekzadeh Shafaroudi, M.R. Hidarian and A. Mazaheri

Doing research, two suites of Oligocene-Miocene granitoids, one relatively oxidized (magnetite-series) and the other relatively reduced (ilmenite-series), were identified at Hired, Eastern Iran. Since Au-Sn mineralization is associated only with the relatively reduced ilmenite-series suite. It became interested to study the petrochemistry and petrophysics of these intrusive rocks. The magnetic susceptibility of the magnetite-series granitoids is greater than 300×10^{-5} SI. This suite includes meta-aluminous, medium-K to high-K series gabbros to diorites containing magnetite, hornblende and biotite. The magnetic susceptibility of the ilmenite-series granitoids are less than 60×10^{-5} SI. This suite includes meta-aluminous, high-K to shoshonitic diorites to granites, containing, biotite, muscovite and tourmaline. Both the ilmenite and magnetite series suites are strongly enriched in large ion lithophile elements (LILEs = K, Th, Rb, Ba) and depleted in high field strength elements (HFSE = Nb, Sr, Ti, Hf). Chondrite-normalized Rare Earth

Element (REE) plots indicate strong enrichments of light relative to heavy REE, with $(La/Yb)_N$ between 7-24. Ilmenite suite granitoids have pronounced negative europium anomalies. Stockwork mineralization is found within and nearby the relatively reduced ilmenite-series granites. Based on their mineral assemblages (arsenopyrite, pyrrhotite, tourmaline, pyrite, gold and quartz), the ore-bearing fluids that generated these stockwork veins was also reduced. This and the spatial relationship of mineralization with the ilmenite suite granitoids, indicates that the ore fluids originated from reduced granitoid magmas. Hired Au-Sn deposit is a reduced-intrusion related gold system. *(Journal of Applied Sciences 9 (2): 226-236, 2009; **doi:** 10.3923/jas.2009.226.236)*

A Model for Stakeholder-Oriented Benchmarking Process

K. Mohajeri, M.D. Nayeri and M.M. Mashhadi

Despite the strategic orientation of most benchmarking processes in the past researches, this study provides a new approach to benchmarking in accordance with nowadays stakeholder-oriented business climate which stresses on performance improvements that benefit all stakeholder groups. So the purpose of this study is to propose a benchmarking process model addressing the key role of stakeholders in managing and measuring organization's performance. This model presents a stakeholder-oriented view to performance improvement through benchmarking tool using value based concepts. Based on reviewing the literature, an exploratory approach is used to design the process model of benchmarking and it is supported and tested through a case application in an Iranian business school. The presented model which includes 10 steps was successfully implemented in improving the value drivers of selected case. Hence it seems that the model can be of use to various industries and businesses to improve their value creation capabilities. On this basis, future researches should be focused on more case studies from various industries and businesses and more perfect realization of stakeholder orientation claims of suggested approach. *(Journal of Applied Sciences 9 (2): 237-247, 2009; **doi:** 10.3923/jas.2009.237.247)*

Gaussian Radial Basis Adaptive Backstepping Control for a Class of Nonlinear Systems

F. Farivar, M. Aliyari Shoorehdeli, M.A. Nekoui and M. Teshnehlab

This study proposes a Gaussian Radial Basis Adaptive Backstepping Control (GRBABC) system for a class of n-order nonlinear systems. In the neural backstepping controller, a Gaussian radial basis function is utilized to on-line

estimate of the system dynamic function. The adaptation laws of the control system are derived in the sense of Lyapunov function, thus the system can be guaranteed to be asymptotically stable. The proposed GRBABC is applied to two nonlinear chaotic systems which have the different order to illustrate its effectiveness. Simulation results verify that the proposed GRBABC can achieve favorable tracking performance by incorporating of $GRBF_{NN}$ identification, adaptive backstepping control techniques. *(Journal of Applied Sciences 9 (2): 248-257, 2009; **doi:** 10.3923/jas.2009.248.257)*

The Investigation and Explanation of Local Model of Effective Internal Factors on Stock Price Index in Tehran Stock Exchange with Fuzzy Approach

Alireza Pakdin Amiri, Morteza Pakdin Amiri and Mojtaba Pakdin Amiri

The goal of this research was an investigation and explanation of local model of internal effective factors on stock price index in Tehran Stock Exchange (ISE) with fuzzy approach. Based on, it was reviewed literature of stock price index in special. The statistical population and sample were 500 and 150 elements, data collection instruments were documents, interviews and specially questionnaire with reliability of 0.85 as nonexprimental survey research, to explanation of local model with emphasize on fuzzy and using SPSS v.15 and FuzzyTech v.5.61 software. The results showed in the entire internal factors, managerial, marketing and structural variables have the most effect on stock price index. Finally, it is presented concluding, discussion, implications for managers and directions for further research. *(Journal of Applied Sciences 9 (2): 258-267, 2009; **doi:** 10.3923/jas.2009.258.267)*

Multi Criteria Decision Analysis and Geographic Information System Framework for Hazardous Waste Transport Sustainability

S. Monprapussorn, D. Thaitakoo, D.J. Watts and R. Banomyong

This study introduces a combination of Multi Criteria Decision Analysis (MCDA) and Geographic Information System (GIS) approaches to the hazardous waste transport problem. There are risks associated with a truck being involved in an accident during shipment of hazardous materials (HAZMAT) and/or hazardous wastes. The level of impact posed to surroundings depends on many factors such as population density, No. of sensitive locations, proximity to rescue units and

security. It is essential that all of the related factors and criteria involved be considered prior to making decisions about route selection. Certain routing criteria and standards for HAZMAT transport have been developed in many developed countries such as the United States, Canada and European countries with the purpose of risk avoidance during shipment of these materials. However, a lack of a comprehensive framework for the selection of HAZMAT and/or hazardous waste routes that the transporter can use for aiding their decisions is a major concern in most developing countries. The purpose of this study is to develop a framework for making optimum hazardous waste transport routing choices by incorporating multiple factors and sub-factors. Factors and sub-factors are divided into three main categories; economic, environmental and societal (exposure and emergency response) issues that are in line with the sustainability paradigm. The proposed framework can contribute to the thought processes of governmental policy-makers and carriers when they evaluate possible routes and are making their decision in order to minimize damage from transporting hazardous waste. *(Journal of Applied Sciences 9 (2): 268-277, 2009; **doi:** 10.3923/jas.2009.268.277)*

Tele-Visual Servoing of Robotic Mamipulators; Design, Implementation and Technical Issues

I. Hassanzadeh and H. Jabbari Asl

In this study, a new architecture for tele-visual servoing of a robotic manipulator is presented. An overview of methods employed for controlling robotic manipulators using a camera is illustrated. Image-based and position-based approaches are considered. Matlab®, Simulink® and xPC Target® toolbox are used to design a novel user-friendly toolkit called Tele-Visual Servoing Toolkit (TViST) for tele-visual servoing of robotic manipulators. TViST has hardware in the loop (HIL) property, i.e., simulation and implementation of the system are performed in the same environment. Stability analysis of visual servoing systems in presence of time delay is discussed by Lyapunov theorem. Furthermore, effects of robot dynamic on performance of the system are evaluated. In terms of low level control, proportional and H-infinity controllers are implemented as well. As a case study, a 5DOF Gryphon manipulator is considered. Simulations for various mentioned matters are done to validate the theoretical issues. Experimental results for the manipulator employing a virtual camera and a real camera are presented to illustrate and verified the practical performance. *(Journal of Applied Sciences 9 (2): 278-286, 2009; **doi:** 10.3923/jas.2009.278.286)*

Land Use Scenarios and Optimization in a Watershed

D. Nikkami, M. Shabani and H. Ahmadi

The main objective of this research is to study the optimized combination of land allocation to different land uses like rangeland, orchard, irrigated farming and dry farming for minimized soil erosion and maximized people's net income in Kharestan watershed located in the Northwest of Eghlid, Fars province, Iran. A multi-objective Linear Programming (LP) model was applied in three different land use scenarios including existing land uses plus land management (Scenario 1), existing land uses with some degree of land management (Scenario 2), and proper land uses plus land management (Scenario 3). The amount of soil loss and net benefit in each land use were computed and used as inputs to formulate the objective functions and governing constraints in optimization problem. The problem was solved using the simplex method with the help of LINGO software package and the optimal solution was ultimately determined. The results showed that in the optimized condition, while rangelands experience no change, the area of orchards should be increased from 561 to 2115 ha (377%), irrigated farms should be reduced from 871 to 237 ha (73%) and dry farming lands should be decreased from 1050 to 129 ha (88%). Also, by existing land management, land use optimization decreases soil erosion by 3.7% and increases net income by 163%. In existing land use some land management implementation, decreases soil erosion by 37% and increases net income by 206%, while in proper land uses and management, soil erosion decreases by 53% and net income increases by 208%. Sensitivity analysis showed that the area of orchards and rangelands are the most sensitive parameters and their changes have the highest effect on the amount of net income and soil erosion. *(Journal of Applied Sciences 9 (2): 287-295, 2009;* ***doi:*** *10.3923/jas.2009.287.295)*

Development of Heuristics for Multi-Product Multi-Level Capacitated Lotsizing Problem with Sequence-Dependent Setups

M. Mohammadi, S.M.T. Fatemi Ghomi, B. Karimi and S.A. Torabi

This study considers the problem of multi-product multi-level capacitated lotsizing and sequencing problem with sequence-dependent setups. A Mixed Integer Programming (MIP) formulation of the problem is proposed which is impractical to solve in reasonable computing time for non-small instances. Reducing the dimensionality of the problem and allowing to solve larger instances, a modified

mathematical model is developed which ignores majority of combinations. The ability to quickly find integer-feasible solutions for non-small instances is another aspect of this paper. Hybrid methods that mixes rolling-horizon approach and heuristic are developed. Heuristic is used to determine binary variables of current period. To test the accuracy of hybrid methods, a procedure for obtaining a lower bound on the optimal solution is developed. The trade-offs between objective values and computing times are also provided. *(Journal of Applied Sciences 9 (2): 296-303, 2009;* **doi:** *10.3923/jas.2009.296.303)*

Mobile Multimedia Control Model for Fire Disaster of City Building

X. Li, R. Salleh and O. Zakaria

In this study, we focus on combination of GIS and 5G wireless mobile multimedia networks to propose a real-time fire disaster processing model-Mobile Multimedia Control Model (MMCM) so that a quick response can be taken once fires over to reduce destroy, especially peoples life. In the end of the study, two models will be compared. *(Journal of Applied Sciences 9 (2): 304-311, 2009;* **doi:** *10.3923/jas.2009.304.311)*

Comparison of Reconstructive Methods Using Different Filters to Study Cardiac Wall Motions in Gated Single Photon Emission Computerized Tomography

D. Shahbazi-Gahrouei, A. Arabpour, F. Rastgoo and N. Yaghoobi

The aim of study is to comparison of two reconstructive methods using different filters to study the five cardiac wall motions via Gated single photon emission computerized tomography imaging was done through Gated SPECT (with a two-day protocol) and quantitative coronary angiography (QCA) on 25 patients (16 males, 9 females, mean ages, 54.08 year). Angiography was performed on patients about 1 to 5 days before scanning. Regional wall motion was determined through two methods: using Gated SPECT, FBP and OSEM reconstructive methods and changes in frequency and spectrum slope in Metz, Butterworth and Ramp, it creates 42 sets. Motion disorders were classified in four groups. This data was compared and evaluated to data which was gained from QCA method in which motion disorders were classified in to four groups, too. The result reveals that in order to study function of each WM, the accurate and precise method is as

follows (r = 0.7): For antero-basal wall OSEM reconstructive method with Ramp 2-8 filter and FBP reconstructive method with Metz 5-9 and Butterworth 0.35-9 filters is an accurate method. Applying OSEM with Ramp 4-8 filter and FBP with Metz 4.5-9 and Butterworth 0.35-9 filters for postero-basal wall is a suit method. OSEM with Ramp 2-8 filter and FBP with Metz 4-9 and Butterworth 0.30-9 filters for antero-lateral is a sufficient method. For apex wall, OSEM with Ramp 4-8 filter and FBP with Metz 4.5-9 and Butterworth 0.35-3 filters is a reliable method. Finally, applying OSEM with Ramp 2-8 filter and FBP with Metz 4.5-9 and Butterworth 0.35-9 filters for diaphragmatic wall is an accurate method. Electrocardiographic Gated single photon emission computed tomography (EGS) supplies worthwhile functional data to cardiologists. Exercising two physical factors of reconstructive methods and filtration in Gated SPECT, significant information can be obtained about cardiac wall motions. It suggests using an appropriate reconstructive method and filtration for studying cardiac wall motions by non-invasive and economical Gated SPECT method supplies maximum results. *(Journal of Applied Sciences 9 (2): 312-319, 2009;* **doi:** *10.3923/jas.2009.312.319)*

A New Genetic Algorithm Recommender System for Achieving Customer-Seller Win-Win Quiescent Point

A.A. Niknafs, A. Niknafs and M.E. Shiri

In this study, a new algorithm for considering the benefits of both customer and seller is proposed which is based on a win-win strategy in trade negotiations. This approach causes both sides to achieve a win-win quiescent point. In traditional commerce, this is done by negotiations between seller and customer. In this proposed method the preferences and needs of customer and seller are captured through the user interface. The algorithm compromises these two groups of factors and offers one or more recommendations that are satisfactory to both sides as much as possible. Although the system is designed based on the typical framework of collaborative filtering, yet it considers additional factor to item and customer that is the seller. The genetic algorithm is considered as a useful method for finding the best solutions for this problem. A simple example of e-negotiation between seller and customer is simulated and implemented using C No. and SQL server. The main application of the algorithm is in sophisticated ecommerce projects like tenders and contracts. The experiments results show the feasibility of the system and both customer and seller satisfaction. *(Journal of Applied Sciences 9 (2): 320-326, 2009;* **doi:** *10.3923/jas.2009.320.326)*

Irreversibilities in Duct Geometries of Rhombic and Circular with Constant Wall Heat Flux and Laminar Flow

H. Taherian and H. Mirgolbabaei

In this study, a second law comparison of irreversibility is used to determine the optimum duct geometry which minimizes losses for a range of laminar flows with constant wall heat flux condition. Water as a working fluid is considered. The duct geometries used are rhombic with various angle of bevel and circular. Hydraulic diameters are used for the different geometries. The rhombic geometry with the angle of $90°$, when the frictional contributions of entropy generation become important is the best. Also power required to overcome fluid friction in the mentioned duct is smallest. *(Journal of Applied Sciences 9 (2): 327-333, 2009;* ***doi:*** *10.3923/jas.2009.327.333)*

Wireless Spectrum Combination Protocol for 4G Networks

X. Li, R. Salleh and O. Zakaria

This research studies on multimedia applications which are now mainly achieved by wired and fixed internet users will also be widely achieved by mobile internet users in 4G networks as well. 3GPP2 has proposed a solution through integrating CDMA2000 network and WLAN network with fixed internet network for the issue. This kind of integration does not consider the wireless spectrum disparity and utilize them efficiently to get higher data rates for mobile internet users. In this study, we propose a new protocol to combine the two networks wireless spectrum. In the end, we simulate and quantitatively demonstrate the new protocol performance. *(Journal of Applied Sciences 9 (2): 334-340, 2009;* ***doi:*** *10.3923/jas.2009.334.340)*

Study of the Effects of Natural Disasters on Gross Domestic Product in Iran

H. Sadeghi, S. Emamgholi Sefiddasht and M. Zarra Nezhad

The aim of this study is to investigate the effects of occurred natural disasters in Iran on Iran's Gross Domestic Product (GDP). An Auto Regressive Distributed Lags (ARDL) model has been applied during 1978-2004 in order to investigate the effects of disasters on Iran's GDP in short term and long term. The estimation results of the model suggested the existence of long-term equilibrium

between non-oil GDP and explanatory variables. The findings of the research showed that both the short-term and long-term estimated models indicate the negative effects of these disasters on the Iranian economy, particularly on per capita investment and per capita GDP. Negative impact of natural disasters on per capita GDP was, in the first stage, due to the decline in physical capital. During the renovation period, the Iranian government allocated the budget to remedy the damages incurred to the infrastructures, residential and industrial units and product capacity in order to raise the per capita GDP. The results also showed the relatively slow speed of adjustment to the disequilibria, with only 17% of any deviation being corrected each year. *(Journal of Applied Sciences 9 (2): 341-347, 2009;* **doi:** *10.3923/jas.2009.341.347)*

Salinity Causes Increase in Proline and Protein Contents and Peroxidase Activity in Wheat Cultivars

M. Goudarzi and H. Pakniyat

In a pot experiment, 15 cultivars of Iranian wheat (*Triticum aestivum* L.) were evaluated at glasshouse for proline and protein concentrations, peroxidase (POD) activity, SSI and STI in response to salinity (NaCl and Na_2SO_4 in 1:1 ratio). A Completely Randomized Design (CRD) with factorial treatments in three replications was used. Using three salt treatments: 1.26 (control), 6.8 and 13.8 dS m^{-1}. Salinity caused increase in proline and protein and POD activity in wheat genotypes in two salinity treatments. Kavir, Niknejad and Marvdasht showed high increase in some of studied traits compared with Ghods, Zarin and Cross Adl (sensitive cultivars). Based on studied traits other genotypes may be considered as semi-tolerant cultivars. Furthermore, tolerant cultivars showed higher STI and lower SSI compared with non-tolerant cultivars. Result showed that salinity tolerances are associated with higher accumulation of proline and protein concentration and higher POD activity in wheat. *(Journal of Applied Sciences 9 (2): 348-353, 2009;* **doi:** *10.3923/jas.2009.348.353)*

Development of Mechanistic-Empirical Flexible Pavement Design in Iran

M. Ameri and A. Khavandi

Recent advances in flexible pavement design have prompted agencies to move toward the development and use of Mechanistic-Empirical (M-E) design procedures. Mechanistic-Empirical (M-E) design combine the elements of mechanical modeling and performance observation in determining the required

232

pavement thickness for a set of design condition. In this study, a Mechanistic-Empirical (M-E) design procedures and algorithm based on KENLAYER software with regard to Iran climatic and traffic conditions is developed. This study also explores present relationships and diagrams based on effective variable on pavement design to facilitate design process. *(Journal of Applied Sciences 9 (2): 354-359, 2009; doi: 10.3923/jas.2009.354.359)*

The Psychometric Properties of Death Obsession Scale in Freshman Undergraduate Students

Gholamreza Rajabi

The validation, reliability and factor structure of the Death Obsession Scale (DOS) among freshman undergraduate students in Shahid Chamran University of Ahwaz investigated in present study s included 200 freshman undergraduate students (140 males and 60 females) which were selected randomly. The DOS reliability by Cronbach's alpha statistics was 0.91 that indicate its high internal consistency. All items correlations with total score were significant, which supported its item and content validity. The DOS concurrent validity coefficient measured with Padua obsessive-compulsion inventory and was been significant ($r = 0.43$) also, DOS construct validity was determined via principal component analysis (Promax Rotation) that resulted in two-factors solutions (death rumination and dominance and death idea worry), that account for 53% of the variance and confirmatory factor analysis confirmed two-factor model. There is a significant gender difference in student sample too. Finally, the results confirmed DOS reliability and validity as a useful tool for both of research and clinical goals among normal and abnormal population. *(Journal of Applied Sciences 9 (2): 360-365, 2009; doi: 10.3923/jas.2009.360.365)*

Influence of Alkaline and Enzymatic Treatments on the Properties of Doum Palm Fibres and Composite

F. Zbidi, S. Sghaier, M.B. Nejma and M. Zidi

In the presents study, an analysis of the influence of alkaline treatment for different concentrations as well as that of the enzymatic treatment on the morphology and on the mechanical properties of the leafstalk doum palm fibres is detailed to improve the hydrophobicity, the compatibility fibre/matrix and the composite mechanical resistance. The fibre surface topography has been characterized by SEM. And the obtained images show that the alkaline treatment gives porous

fibres and the biological treatment gives smooth surfaces. The results confirm that both treatments eliminate the fibre residual impurities and influence their properties. A tensile test series were carried out to study the effect of the treatments on the mechanical features of the leafstalk doum palm fibres. The chemical treatment for a concentration of 1.5 N has improved considerably the mechanical properties. The composites used were made of doum palm fibres as reinforcement for epoxy resins. The composite mechanical properties have been studied from flexural tests. This study presents the results of an experimental investigation in order to select the best mechanical characteristics of epoxy resin/doum palm fibres. *(Journal of Applied Sciences 9 (2): 366-371, 2009; **doi:** 10.3923/jas.2009.366.371)*

A Feasibility Study of Micor-Hydroelectric Power Generation at Sapchari Waterfall, Khagrachari, Bangladesh

M.A. Wazed and Shamsuddin Ahmed

The main objective of this research is to study the Sapchari waterfall in the Khagrachari district of Bangladesh as an initiative for harnessing power from micro-hydro. It is found that with the head and flow rate available encircling the year, Sapchari waterfall should be sustainable for micro hydro power plant. The effect on the ecosystem of the area is very less, the ecotourism will increases hopefully and both the way of living and the living standard of this vicinity will be ameliorated after such installation. *(Journal of Applied Sciences 9 (2): 372-376, 2009; **doi:** 10.3923/jas.2009.372.376)*

Investigation of Tribological Properties of Brake Pads by Using Rice Straw and Rice Husk Dust

Ibrahim Mutlu

In the present study, investigation of new materials to replace the asbestos has started to be considered. Brake pads used in automotive industry contain materials composed of more than ten different ingredients. In this study, the use of Rice Straw Dust (RSD) and Rice Husk Dust (RHD) has been investigated for assessing the tribological properties of brake pads. RSD and RHD both have silica in them which gives the pad materials a ceramic like behavior. To obtain RSD and RHD, rice straw and rice husk were grained after they have been dried. Different amounts of RSD and RHD were included in the brake pad mix along with the other regular ingredients. These newly formulated brake pads have been tested under Friction Assessment and Screening Test (FAST). Friction coefficient, wear

234

rate and Scanning Electron Microscope (SEM) for friction surfaces were examined to assess the performance of these samples. *(Journal of Applied Sciences 9 (2): 377-381, 2009; **doi:** 10.3923/jas.2009.377.381)*

Investigation of Using Cedar Pine Cone Dust and Boric Acid in Brake Pads

I. Mutlu

In this study, the use of cedar (cidrus) pine cone (CPC) dust along with boric acid (BA) has been investigated for assessing the effect on friction coefficient. CPC has resin in it. BA is a boron production which is widely used in boron glass production and in ceramic industry for increasing the heat resistant and forming abrasion resistant. Newly formulated brake lining material with five different ingredients has been tested under Friction Assessment and Screening Test (FAST). Friction coefficient, wear rate and scanning electron microscope (SEM) for friction surfaces were examined to assess the performance of these samples. *(Journal of Applied Sciences 9 (2): 382-386, 2009; **doi:** 10.3923/jas.2009.382.386)*

Macroeconomic Policies and the Best Environmental-Oriented Policy in Agricultural Sector of Iran (Case of Soil Erosion)

S. Hosseini, M. Ghorbani, M. Torshizi and N. Zargham

This study investigated how the appropriate environmental policy may change during a long-term macroeconomic planning and under different policy weights. For this purpose, a simple general equilibrium model has been established. Results showed that choosing the appropriate policy is depend on preferences of government; so that when weight of environmental factors in policy making is less than 40% (weight of economic factors is more than 60%), lowland food production subsidies policy is preferable policy and when weight of environmental factors is more than 40%, upland food production tax policy is appropriate policy. Base on results of this study, as the weight of environmental and economic factors changed in this study, one can think about changing the weight of any of economic factors. For example, if PPI doesn't have any importance in policy making, it can be eliminated and if government wants to give more attention to consumer prices than producer prices, policy maker can set the weight of CPI more than that of PPI in ranking. *(Journal of Applied Sciences 9 (2): 387-391, 2009; **doi:** 10.3923/jas.2009.387.391)*

Leakage Tolerant, Noise Immune Domino Logic for Circuit Design in the Ultra Deep Submicron CMOS Technology for High Fan-in Gates

A. Peiravi, F. Moradi and Dag T. Wisland

In this study, the results of research carried out in order to develop and present a new logic for the design and development of leakage-tolerant and noise immune circuits in the ultra deep submicron CMOS technology are presented. We present novel domino logic to overcome the increasing static power consumption due to leakage power and to improve noise-immunity for high fan-in gates and compare it with standard domino logic. A noise metric and ISO-delay conditions are used to compare present proposed logic with conventional domino logic for various high fan-in OR gates. The results show remarkable improvement in noise immunity while drastically reducing power consumption. *(Journal of Applied Sciences 9 (2): 392-396, 2009; doi: 10.3923/jas.2009.392.396)*

Quicksort Algorithms: Application of Fixed Point Theorem in Probabilistic Quasi-Metric Spaces at Domain of Words

S. Shakeri, M. Jalili, R. Saadati, S.M. Vaezpour and Lj. Ciric

This research applied on a probabilistic quasi-metric version of a fixed point theorem to obtain the existence of solution for a recurrence equation associated to the analysis of Quicksort algorithms. Actually, we will establish ther results in the more general framework of probabilistic quasi-metric spaces because, in this context, the measurement of the distance from a word x to another word y, automatically indicates if x is a prefix of y or not, while the Baire metric does not provide this information. Finally, will be applied our methods to prove the existence (and uniqueness) of solution for some recurrence equations associated to the asymptotic complexity analysis of Quicksort algorithms and Divide and Conquer algorithms, respectively. *(Journal of Applied Sciences 9 (2): 397-400, 2009; doi: 10.3923/jas.2009.397.400)*

Materialized View Selection in Data Warehousing: A Survey

C.A. Dhote and M.S. Ali

This study presents the critical survey of the methodologies to select materialized view in more efficient way. In this study, we are summarizing all these

methodologies with critical analysis. Advanced solutions are particularly focusing the evolutionary optimization methods. We have analyzed and compartmentalized the available literature on the basis of relevant evaluation parameters. Important books, Ph.D thesis, links, etc. are also given in study. To work out this study we have gone through more than fifty research papers. This study may be helpful to the researchers, who are working in the domain of the Data Warehouse focusing on the materialized view selection. *(Journal of Applied Sciences 9 (3): 401-414, 2009; **doi**: 10.3923/jas.2009.401.414)*

Kernel Density Analysis of Maritime Fishing Traffic and Incidents in Canadian Atlantic Waters

J. Shahrabi and R. Pelot

In this study, fishing vessel activities and incidents that occurred within Canadian Atlantic Waters are mapped and examined using Kernel density technique that is used as the advance hot spot technique. This technique precisely identifies location, spatial extent and intensity of incidents hot spots. Recent studies have shown that geospatial information is of fundamental importance to maritime risk analysis providing efficient risk management and geo-information systems represent a powerful new technology that can address many information needs of risk managers and decision makers working with geographically referenced data. This study used the increased capabilities offered by Geomatics techniques and geographic information system to identify hazardous locations for maritime traffic in Canadian Atlantic waters. This research uses spatial analysis to examine risks associated with maritime commercial fishing vessels activities and incidents. The objective of this study is to investigate incident hot spots and ultimately to identify hazardous regions by using a density-based hot spot identification technique. This study examines activities and incidents associated with fishing vessel traffic in the waters of the four Canadian Coast Guard (CCG) SAR statistical areas in the Atlantic region including Cape Breton, Bay of Fundy, SouthWestern Shore and Eastern Shore. In this study the statistical advantage of Kernel density technique was shown. Since the Kernel density method generalizes incidents for the entire study area it also gives a better indication regarding hot spot areas. As a result the value of density estimates at any specific location is developed. The results of this study can help the Coast Guard to deploy resources in order to maximize response capability specifically in these hazardous locations. These methods are also appropriate for finding local concentrations of fishing incidents and the probability of fishing incidents relative to fishing activity. *(Journal of Applied Sciences 9 (3): 415-426, 2009; **doi**: 10.3923/jas.2009.415.426)*

Using Concept Maps as a Method of Assessment in Work-Energy Subject

D. Erduran-Avci, P. Unlu and R. Yagbasan

The purpose of this study is to analyze the concepts of work-energy subject in 7th grade science course and the relations among them. Concept maps were used as a method of assessment and relationships between concepts of work-energy topic were examined using this way. The research was performed by contribution of 50 students within a period of 7 weeks. Each student formed his/her concept map related to the topic. These maps were assessed according to Novak's score system. The assessment was made with two raters and g coefficient was found as 0.97. Additionally work-energy achievement test was applied at the end of this process. Results obtained from the concept maps and the results of the test were compared. As a result, the correlation between the two assessment methods was computed as 0.416. The relationships between the concepts were examined deeply. Serious defects were determined in the linking words in the concept maps of the students. *(Journal of Applied Sciences 9 (3): 427-437, 2009;* ***doi:*** *10.3923/jas.2009.427.437)*

Experimental Study of Crack Growth Behavior and Fatigue Life of Spot Weld Tensile-Shear Specimens

M. Shariati and M.J. Maghrebi

In this study, the experimental behaviors of the fatigue crack growth are studied and the fatigue lives of tensile-shear (TS) specimens are determined. To achieve this, many TS specimens are prepared by the welding mild steel sheets of 1 and 1.5 mm thickness and then tested under constant amplitude loading using a servo-hydraulic fatigue testing machine (INSTRON 8802). The fatigue crack growth and the crack length are measured simultaneously by an optical microscope with 100X magnification. The experimental results indicate that the fatigue life of specimens decreases with any increase in load level. Also the crack initiation and propagation firstly occurs in plate with less thickness. According to the experimental observations when a high level loading is applied to the spot weld joints, the nugget suddenly pull-out and cannot withstand the fatigue loading. *(Journal of Applied Sciences 9 (3): 438-448, 2009;* ***doi:*** *10.3923/jas.2009.438.448)*

A Two-Layer Channel-Aware Scheduling Algorithm for IEEE 802.16 Broadband Wireless Access Systems

R. Ghazizadeh, P. Fan and Y. Pan

In this study, a two-layer channel-aware scheduling algorithm, named Adaptive Credit-Based Fair Queuing (ACFQ) Based on Credit-Based Fair Queuing (CBFQ) is introduced. The proposed algorithm adapts the error-free CBFQ with the multi-rate nonideal environment considering the Adaptive Modulation and Coding (AMC) at the radio link layer and provides packet-level Quality of Service (QoS) over the wireless fading channel. It is shown that the introduced AMC architecture and compensation model in two-layer scheduling provide fair sharing while ensuring high bandwidth efficiency. Furthermore, the proposed scheduler exhibits very low complexity, thus suitable for practical implementation. *(Journal of Applied Sciences 9 (3): 449-458, 2009; **doi:** 10.3923/jas.2009.449.458)*

Classification and Diagnostic Prediction of Cancers Using Gene Microarray Data Analysis

Alireza Osareh and Bita Shadgar

In this study, we aim to develop an automated system for robust and reliable cancer diagnoses based on gene microarray data. Amongst various utilized statistical classifiers, support vector machines outperform other popular classifiers, such as K nearest neighbours, naive Bayes, neural networks and decision tree, often to a remarkable degree. We choose a set of 9 publicly available benchmark microarray datasets that encompass both binary and multi-class cancer problems. Results of comparative studies are provided, demonstrating that effective feature selection is essential to the development of classifiers intended for use in gene-based cancer classification. In particular, amongst various systematic experiments carried out, best classification model is achieved using a subset of features chosen via information gain feature ranking for support vector machine classifier. *(Journal of Applied Sciences 9 (3): 459-468, 2009; **doi:** 10.3923/jas.2009.459.468)*

Measuring Customer Satisfaction Using a Fuzzy Inference System

A.Y. Darestani and A.E. Jahromi

This study presents a new method called FCSMM (Fuzzy Customer Satisfaction Measurement Method) for measuring individual customer satisfaction using a fuzzy inference system. The main advantage of this method is its simplification in evaluation of Customer Satisfaction Index (CSI) based on simple linguistic statements collected from experienced people. In contrast with assumptions used in other methods such as linear regression principles and predefined criteria weights, the aforementioned statements form the FCSMM computational structure. Since the drivers of satisfaction and dissatisfaction and performance indexes can be simultaneously applied, concurrent direct and indirect customer satisfaction measurement is provided by the model. A set of average indexes is proposed for calculation of total CSI and average satisfaction index for each driver. Other analytical tools are applied to analyze results of this method. An example is provided in this study to demonstrate the implementation process of FCSMM. *(Journal of Applied Sciences 9 (3): 469-478, 2009;* ***doi:*** *10.3923/jas.2009.469.478)*

Presentation of Giresun City Traffic Noise Pollution Map Via Geographical Information System

E. Kalipci and Ş. Dursun

Noise, which is a factor of sound pollution, is investigated in this study because it has negative effects on the people health. It is easily possible to plan the cities according to the necessity of the future, to investigate the sources of the noise, to determine the noise areas and to learn what precautions should be taken by means of the noise pollution maps. In this study done for this reason; the noise maps in Giresun city centre during mornings, afternoons and evenings are prepared by combining the measured noise values with the coordinates that are determined by Geographical Information System (GIS) receivers on the measurement points on Netcad 4.0 computer programme. Thanks to the noise pollution maps prepared, it is evidently carried out that the noise pollution level on the coastal motorway regarded as an international road is highly over the value which is declared in the instructions and it is almost at a level that threatens people' health. Reducing on the noise pollution level is remarkably seen because of decreasing of both the residential areas and commercial shops, getting away from the coastal line as going away from the city centre to the southern part of the city. Increasing on the noise

pollution level is unfortunately observed in the regions since there are plenty of commercial shops, a lot of vehicles and people activities. Determining the present noise pollution situation in Giresun, the precautions to reduce the noise pollution are already found out. Putting in use of these determined precautions immediately will be extremely beneficial for keeping people's health living in Giresun city centre by reducing the noise pollution level. *(Journal of Applied Sciences 9 (3): 479-487, 2009;* **doi:** *10.3923/jas.2009.479.487)*

Design and Implementation of a Novel High Performance Content Processor for Storage Disks Using an Exact String Matching Architecture

A. Peiravi and M.J. Rahimzadeh

In this study, a high performance content processor for storage disks is proposed which could be easily installed in any host as an interface between the hard disk and the system bus. Moreover, a novel and powerful exact string matching architecture is presented using which we can search for several thousand strings at high rates. The average database size and associated software support systems are growing at rates that are greater than the increase in general purpose processor performance. Also, at the physical level there is a remarkable growth in disk storage performance. However, with the ever-increasing amounts of information available, the ability to accurately and quickly search and retrieve desired information has become a critical issue. We have implemented the proposed architecture on a Xilinx XC4VFX100 Field Programmable Gate Array (FPGA) and shown that the system can search for over sixteen-thousand 32 byte strings with a speed near the maximum stated in ATA-7 standard. Present design implementation has a much better performance as measured in Throughput/(LogicCells/Char) when compared with the best existing designs. *(Journal of Applied Sciences 9 (3): 488-496, 2009;* **doi:** *10.3923/jas.2009.488.496)*

A Dynamic Ex ante Input Demand Model with Application to Western Canadian Agriculture

G. Chabokrow, R. Gray and M. Ghorbani

This research tries to study a dynamic Ex ante input demand model with application to western Canadian agriculture. The dynamic Ex ante input demand model combines the cost of capital adjustment and Ex ante output choice to create a dynamic model that is theoretically and empirically appealing. The four

input empirical model provided a tractable means of estimating a dynamic Ex ante input demand system combined with an Ex ante supply function. The application to Western Canadian agriculture resulted in model that was dynamically stable and consistent with profit maximization. The results show that agricultural capital (machinery and buildings) is a quasi-fixed input, with significant adjustment costs and a slow rate of adjustment. Technological change and machinery investment are energy and material-using for western Canadian agriculture. There is some indication that agricultural wealth lowers the discount rate within the sector has a positive effect on capital investment. *(Journal of Applied Sciences 9 (3): 497-504, 2009;* **doi:** *10.3923/jas.2009.497.504)*

The Visualization of Three Dimensional Brain Tumors' Growth on Distributed Parallel Computer Systems

Norma Alias, Mohd Ikhwan Safa bin Masseri, Md. Rajibul Islam and Siti Nurhidayah Khalid

The main aim of this study is to visualize the brain tumors' growth in three-dimensional and implement the algorithm on distributed parallel computer systems. The Partial Differential Equations (PDE) to solve the mathematical problem will be discussed in this study. The growth of the brain tumor through angiogenic process is described as parabolic model in partial differential equations. The discretization of the three-dimensional parabolic equations for the brain tumor's growth mathematical model using a numerical finite-difference method will be implemented from the earlier study of two dimensional model and thus a parallelization of algorithm simulation to computational resources based on high-performance computing systems will be used to generate the growth of the brain tumor in three dimensional. The study also includes an observation of the behaviour of the cells graphically and Parallel Virtual Machine (PVM) is used to communicate the platforms involved in the computational clusters. A comparison of sequential and parallel algorithm will be discussed and this study will address the major issues of the parallel computers performance in terms of efficiency, effectiveness, speedup and temporality. *(Journal of Applied Sciences 9 (3): 505-512, 2009;* **doi:** *10.3923/jas.2009.505.512)*

A New Approach for Modeling Spatio-Temporal Events in an Earthquake Rescue Scenario

A.R. Vafaeinezhad, A.A. Alesheikh, A.A. Roshannejad and R. Shad

This study explores the advantages of modeling spatio-temporal events in an earthquake scenario. For this purpose, the theory of Time Geography is assessed

and extended such that rescue team can act more efficiently. Heuristic programming in an activity based manner is exercised to manage team activities in space and time. Rescue team is forced to perform several tasks in an earthquake event; this study focuses on modelling the activities of life-detecting, collapse-lifting and injured-transporting. In order to assess the model, a case study was simulated through normal and suggested methods. The comparisons between them have done through three different scenarios; fixed numbers of members, fixed number of members with 5 h work limitation and finally variable number of members with no time constraint. The statistical analysis on the results show an average of 27.22% improvement in groups' activities. This model can be implemented on Spatio-Temporal Geospatial Information System (GIS) and other researchers can develop it to manage the entire rescue team activities. *(Journal of Applied Sciences 9 (3): 513-520, 2009; doi: 10.3923/jas.2009.513.520)*

Supply Chain Demand Forecasting; A Comparison of Machine Learning Techniques and Traditional Methods

J. Shahrabi, S.S. Mousavi and M. Heydar

In this study, supply chain demand is forecasted with different methods and their results are compared. In this research traditional time series forecasting methods including moving average, exponential smoothing, exponential smoothing with trend at the first stage and finally two machine learning techniques including Artificial Neural Networks (ANNs) and Support Vector Machines (SVMs), are used to forecast the long-term demand of supply chain. By using the data set of the component supplier of the biggest Iranian's car company this research is then implemented. The comparison reveals that the results producing by machine learning techniques are more accurate and much closer to the actual data in contrast with traditional forecasting methods. *(Journal of Applied Sciences 9 (3): 521-527, 2009; doi: 10.3923/jas.2009.521.527)*

Development and Test of Fixed Average K-means Base Decision Trees Grouping Method by Improving Decision Tree Clustering Method

Jai-Houng Leu, Chih-Yao Lo and Chi-Hau Liu

New analytical methods and tools which were called FAKDT (Fixed Average K-means base Decision Trees) on human performance have been developed and

they make us look at the Enterprise in different aspects in this study. Decision Tree Clustering Method is one of the data mining methods that have been applied widely in different fields to analyze a large amount of data in recent years. Generally speaking, in the human resource incubation of an enterprise, if employees of high learning potential, high stability and high emotional quotient are selected, the return of investment in human resources will be more apparent. If employees of the above mentioned traits can be well utilized and incubated, the industry competitiveness of the enterprise will be enhanced effectively. From the personality specialty point of view, its function is to predict the efficiency of the personal achievement in correlation to his some implying personality specialties (blood group, constellation, etc.). The main purpose of this research is to get the useful information and important message about human performance from their historical records with this method. The Decision Tree Clustering Method data mining skills were improved and applied to get the critical factors that affect the human traits for its feasibility in this study. *(Journal of Applied Sciences 9 (3): 528-534, 2009;* **doi:** *10.3923/jas.2009.528.534)*

Development and Validation of Mathematics Courseware Usefulness Evaluation Instrument for Teachers

N. Sahari, A.A. Abdul Ghani, H. Selamat and A.S. Md. Yunus

The primary purpose of this study was to develop an instrument for evaluating the usefulness of mathematics courseware and to provide psychometric evidence of validity and reliability. Throughout four phases of this study, 696 participants were involved and six types of MCs were used. Each participant was required to evaluate the courseware heuristically and complete the Mathematics Courseware Usefulness Evaluation Instrument (MCUE). Based on the theoretical perspective, a hypothesized model with three factors which were usability, functionality and efficiency, five sub-factors and seven criteria were proposed. This study presents some empirical evidence of whether the evaluation model and its underlying metrics are reliable and valid for determining the usefulness of Mathematics Courseware. A pool of evaluation metrics were collected based on the MC preliminary evaluation survey, related articles on MC reviews and based on several existing evaluation instruments. Through several experiments, we validate an eight-dimension usefulness attribute involving Ease of use, Attractiveness, User control, Concept presentation, reinforcement, assessment, accuracy and learning support material and 56 metrics. *(Journal of Applied Sciences 9 (3): 535-541, 2009;* **doi:** *10.3923/jas.2009.535.541)*

Laboratory Scale Effect of Aquifer Thickness on Dispersivity of Porous Media

H. Moazed, E. Maroufpour, H.A. Kashkouli and J.M.V. Samani

In the present study, the dependence of dispersivity on the thickness of aquifer has been investigated. The physical model used in the study consisted of a rectangular Plexiglas tank with inner dimensions of 720 mm length, 100 mm width and 1200 mm height. Sodium chloride with an electrical conductivity (EC) of 14 dS m^{-1} was selected as conservative contaminant. Porous media used in the experiments consisted of homogeneous coarse and medium sand particles. The experiments were performed in two different stages. In the first stage, 10 experiments in the aquifer with coarse sand particles and eight experiments in the aquifer with medium sand particles with constant thickness of 100 mm and flow velocities ranging from 4.5×10^{-5} to 11.25×10^{-5} m sec^{-1} were performed. In the second stage, experiments with thicknesses of 200-1000 and 100 mm layer distance were performed. The flow velocity in the second stage was maintained at 9.0×10^{-5} m sec^{-1} for each simulated aquifer, based on the previous studies. Results of the study indicated that: (1) the dispersivity values obtained for coarse and medium sand particles with 100 mm thickness were in the range of 0.25-0.65 and 0.11-0.33 cm, respectively and the mean values of dispersivity for both aquifers were in the range of 0.01 to 1.0 cm which are in agreement with the findings of other researchers, (2) the dispersivity values obtained for aquifers with coarse and medium sand particles and thicknesses of 200-1000 mm were in the range of 0.31-0.63 and 0.14-0.46 cm, respectively, which are in agreement with the findings of others as well, (3) the dispersivity of sandy porous media is independent of particle size and (4) in homogeneous sandy aquifers with coarse and medium particle size, the dispersivity is independent of aquifer thickness.

Psychological Disorders of Elderly Home Residents

A. Etemadi and K. Ahmadi

This study aims at knowing old age problems especially for those living at elderly homes and extending counseling services to the vast and new field of geriatrics in Iran. In this study 120 old people who lived at governmental and private elderly

homes in Tehran, Iran were randomly enrolled and studied using SCL90 and Beck Depression Inventory. The results showed that signs of depression and somatization disorders were the most common ones among the elderly in elderly homes. In all studied clinical scales, the rate of psychological symptoms was more among women than men. The most important worries of the elderly were economic status, social relations, dissatisfaction with old age, lack of favorite activities and their family members' treatment. Since living at an elderly home means staying away from family support and that it is considered reproachable, attending to psychological and emotional needs of the elderly home residents is essential. *(Journal of Applied Sciences 9 (3): 549-554, 2009;* **doi:** *10.3923/jas.2009.549.554)*

Identification of Ionic Conductances in a Reentry Model of Ventricular Myocardium Cells

Z.S. Dastgheib, A. Azemi, M. Khademi, M. Shajiee, M. Arvaneh, H. Gholizadeh and V.R. Sabzevari

In this study, a new method will be introduced to find ionic conductance parameters of ventricular cell channels that are part of a reentry loop. These parameters play a significant role in generation and dispersion of a normal action potential and hence ECG signal and formation of a reentry. The dangerous phenomenon reentry, occur when an electrical impulse travels in a circle within the heart, rather than moving outward and then stopping. Depending on the timing, this can produce a sustained abnormal rhythm, a self-limiting burst of supraventricular tachycardia, or a dangerous ventricular tachycardia. Here, a detailed Luo-Rudy model has been used for modeling ventricular myocardium cells and construction of a one-dimensional ring for reentry simulations. The proposed method is based on using Genetic Algorithms to identify the unknown parameters. The advantage of the proposed method over Least Squares parameter estimation approach is provided. *(Journal of Applied Sciences 9 (3): 555-560, 2009;* **doi:** *10.3923/jas.2009.555.560)*

A New Algorithm for Optimum Design of Mechanical Draft Wet Cooling Towers

A. Ataei, M.H. Panjeshahi and M. Gharaie

The present study describes the designing of a thermally and economically optimum mechanical draft counter-flow wet cooling tower. The design model

allows the use of a variety of packing materials in the cooling tower toward optimizing heat transfer. The design model incorporated the cooling tower factors to achieve the optimum design. The main factors included: the diameter of the water droplets, the liquid to gas mass ratio, the height of rain zone, packing zone and spray zone, the air and water velocity inside the tower and the frontal area. Once the optimum packing type is chosen, a compact cooling tower with low fan power consumption is modelled within the known design variables. The optimization model is validated against a sample problem. The suggested design algorithms of cooling tower are computed using Visual Studio.Net 2003 (C++). *(Journal of Applied Sciences 9 (3): 561-566, 2009;* ***doi:*** *10.3923/jas.2009.561.566)*

Extension Methods and Organizational Characteristics for Supporting Sustainable Water Resource Management in Agriculture of Iran

A.R. Ommani, M. Chizari, C. Salmanzadeh and J.F. Hossaini

The primary purpose of this research was to identify extension methods and organizational characteristics for supporting Sustainable Water Resource Management (SWRM) in agriculture of Iran. The total population of agricultural extension experts (N = 110) of Agricultural-Jihad Organization of Khuzestan Province of Iran considered as population of study. A mailed questionnaire was used to collect the data. The response rate of questionnaire was 78% (N = 86). Appropriate descriptive statistics such as mean scores, standard deviations and correlation coefficient were used. The findings show that extension experts had positive perceptions about SWRM in agriculture. Extension experts believed that among extension methods, on-farm education, problem solving methods and workshop had very high importance for supporting SWRM in agriculture. Also, ranking based on the perceptions of extension experts indicated that the three most important organizational characteristics of extension system for supporting SWRM in agriculture were: considering local groups, participatory management and considering job qualification. It is concluded that appropriate extension methods and organizational characteristics for supporting SWRM needs to be accurately implemented for the extension system development. *(Journal of Applied Sciences 9 (3): 567-572, 2009;* ***doi:*** *10.3923/jas.2009.567.572)*

An Introduction of a New Spark Advanced Control Algorithm Using Boost Simulation and Cylinder Pressure

Z. Oveisi, S.S. Mohtasebi, V. Esfehanian and A. Keyhani

Generally in this study, a closed-loop control algorithm is used to present suitable ignition timing at different engine operating conditions and neural network is used for estimating the peak pressure position of cylinder with only five points entries of cylinder pressure curve and then the optimum ignition timing of engine is obtained. After that, engine model in Boost software environment is used and peak pressure position of cylinder is obtained in optimum ignition timing and different speeds and loads of engine and is used for training neural network and so average value of that position is considered as the target value of controller. With comparison of several neural networks with different neuron numbers in hidden layer, optimum neural network model with structure 5-5-1 and 99.89% simulation accuracy is obtained. Net entries are five points of cylinder pressure curve and the number of hidden layer neurons is five. Also, a neuron in the output layer is used to find the peak pressure position of the cylinder. Since the control method is based on the cylinder pressure, all the equations related to the engine in this field were studied and a program for getting cylinder pressure based on crankshaft angle is written in Matlab engineering software environment. Finally, all of algorithm steps and written equations in Matlab were solved and results in engine speed of 2000 rpm with wide open throttle showed that the control algorithm can suitably keep the peak pressure position of the cylinder constant in 15.89° after top dead center while target value of the controller was 16°. Thus, the ignition timing is very close to MBT value which is equal to the peak pressure position of 16°. *(Journal of Applied Sciences 9 (3): 573-577, 2009;* ***doi:*** *10.3923/jas.2009.573.577)*

An Entity-Relationship Model for Forest Management Unit Case Study: Kheiroud Forest

S.Z. Goushegir and J. Feghhi

The principle objective of this research was to design conceptual data model for Hyrcanian forest. The data model is based on E-R diagram as useful tool for designing the data used in data model. As a result a forest conceptual data model describes system elements and their relationships in Hyrcanian forest unit. It can be used as a primary core of a more comprehensive forest information system.

Finally, this study indicates the advantages of designing conceptual data model for Hyrcanian forest management. *(Journal of Applied Sciences 9 (3): 578-582, 2009;* ***doi:*** *10.3923/jas.2009.578.582)*

Modeling of Optical Properties of Normal and Tumor Tissue Using Reflectance Spectra for Appropriate Dosimetry in Photodynamic Therapy

N. Naghavi and M.H. Miran Baygi

The evolution of photodynamic therapy (PDT) to a fully developed treatment modality requires the development of appropriate dosimetry to ensure proper quality control during treatments. The parameters measured for PDT quality control are drug accumulation and penetration depth. In this study, a model has been developed based on reflectance spectroscopy to help understanding light propagation from light delivery system to tissue and vice versa. This model can be used to determine the depth of tissue necrosis during PDT and to evaluate and improve the dosimetry. *(Journal of Applied Sciences 9 (3): 583-587, 2009;* ***doi:*** *10.3923/jas.2009.583.587)*

Comparative Efficacy of Some Geostatistical Methods for the Estimation of Spatial Variability of Topsoil Salinity

R. Sokouti and M.H. Mahdian

The present research was conducted to analyze spatial changes in soil salinity distribution as an aspect of soil degradation and to compare the efficacy of different Geostatistical methods in its estimation and the preparation of maps of the spatial distribution of soil salinity. To estimate soil salinity of non-sampled areas, the methods of Kriging, Co-Kriging and Weighted Moving Average were applied in Geographical Information System (GIS) medium. To evaluate the efficacy of the methods, the cross-evaluation approach with two statistical parameters of mean bias error and mean absolute error was taken in practice. Results indicated the high precise of Kriging method with regression coefficient of 0.98 for the estimation of salinity rates in the areas, for where no data were available before. Estimation error for this method was 1.31 and biass was -0.34 dS m^{-1} which indicates high accuracy of Kriging method to estimate topsoil salinity and its precise. *(Journal of Applied Sciences 9 (3): 588-592, 2009;* ***doi:*** *10.3923/jas.2009.588.592)*

Ingot Fabrication of Base Material for Solar Cell CuInSe$_2$

A.H. Soepardjo

Research on base material fabrication for solar cell was done using the vertical Bridgman furnace method and the final products are ingots of CuInSe$_2$. The ingots were then characterized by using optical and electrical characterization methods. Optical characterization includes measuring with X-ray Diffraction (XRD) to determine the parameter value of lattice crystal and using Energy Dispersive Spectroscopy (EDS) to determine the material composition. Extension coefficient, dielectric constant and refraction index were also measured by using elipsometer. Electric characterization was used to classify the type of the material using galvanometer. *(Journal of Applied Sciences 9 (3): 593-596, 2009;* ***doi:*** *10.3923/jas.2009.593.596)*

Evaporation Losses from Sprinkler Irrigation Systems under Various Operating Conditions

A. Bavi, H.A. Kashkuli, S. Boroomand, A. Naseri and M. Albaji

The sustainability of irrigated agriculture depends upon consistently achieving high irrigation application efficiency. In semi-arid areas, the portion of water that might be lost due to wind and evaporation would be significant. Thus a proper understanding of factors affecting spray losses (Ls) in sprinkler irrigation is important for developing water conservation strategies. The objectives of this study include: characterize Ls under different weather conditions and operating pressures for semi-portable hand move sprinkler system in western south of Iran (Khuzestan Province); propose adequate predictive equations by using multiple regression and Suggest several recommendations for helping about design and management for sprinkler irrigation system in semi-arid areas. The results showed that wind velocity and vapor pressure deficit were the most significant factors affecting the evaporation losses. Exponential relationships between the evaporation losses and both wind velocity and vapor pressure deficit have been found. For the operating pressures used in this study the least effect on evaporation was found. Combined losses from a sprinkler system for a given set of operation conditions have been estimated by using the results obtained from the experiments. Combined losses ranged from 4.4 to 8.9% of the applied water. *(Journal of Applied Sciences 9 (3): 597-600, 2009;* ***doi:*** *10.3923/jas.2009.597.600)*