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Adaptive Control of a Double-Electromagnet Suspension System

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In this study, an adaptive controller is presented that addresses the coupling effects between two groups of electromagnetic trains. The main application of DEM (Double Electro-Magnet) is rapid rail transportation. Since the number of passengers are stochastic, the mass of the train will be variable too. On the other hand, due to the variation of the DEM parameters (such as coil inductance) in a real environment, the system is to be controlled in a proper manner. The proposed method in this study overcomes all of these problems. The module, based on some reasonable assumptions of nonlinear mathematical model, is modeled as a double-electromagnet system. The proposed algorithm has a satisfying performance in tracking in presence of unknown changes in the mass. The advantage of the proposed algorithm in comparison to non-linear controllers is that knowing the mass changes is not necessary. It is also important to make sure that a control system is robust against measurement noises, because all sensors collect noise from the environment. Due to the presence of input and output perturbation, the new proposed algorithm shows satisfying performance. The results show that the proposed method is less sensitive to perturbation in the input. (*Journal of Applied Sciences* 9 (7): 1201-1214, 2009; *doi*: 10.3923/jas.2009.1201.1214)

Effects of Globalization on Lowland and Upland Villages in Anatolia: Case Study on Serpil and Akbelenli Villages

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This study investigates the effects of globalization on rural communities and was conducted in two villages, one upland and the other lowland, located in Turkey's Western Mediterranean region. These are namely the villages of Serpil and Akbelenli, both located in Eğirdir District of Isparta Province. The Rapid Rural Appraisal (RRA) technique was utilized throughout the study and included such tools as interviews, observations and secondary data analysis. The results emerging from the study indicate that globalization has had varying effects on upland and lowland villages. In the village of Serpil, a low basin, (1) resources are sufficient for the rural community to live on; (2) there is no issue of migration either to or from the village due to rural poverty; (3) modern communication tools are widely used in the village; (4) villagers are in close contact with the outside world

through the use of the internet; (5) villagers take fairly good advantage of the beneficial consequences of globalization. On the other hand, in the village of Akbelenli, a high basin, (1) resources are not adequate to provide subsistence to the uplands villagers; (2) the younger generation is relocating to cities and rural areas become gradually abandoned; (3) modern mass media and computer tools are not utilized due to rural poverty; (4) opportunities that globalization provides for gathering information are not taken advantage of; (5) at its present state, the rural community is unable to attain a basic grip on the information age. The primary reason why these two villages are different from each other has to do with the fact that their geographic locations and the amount of resources available to the villagers are so distinct. Therefore, in Turkey, actions aimed at rural development should be taken in consideration of this distinction between upland and lowland villages. (*Journal of Applied Sciences* 9 (7): 1215-1226, 2009; doi: 10.3923/jas.2009.1215.1226)

Applying Design Research Method to IT Performance Management: Forming a New Solution

Mohammad Abooyee Ardakan and Kaveh Mohajeri

The main purpose of this study is to apply an uncommon research methodology (Design Research) in the field of IT performance management. This study addresses the questions of what IT performance management field can learn from design approach and whether this perspective can be beneficial to design and implement managerial solutions that are understandable, approachable and effective to the many human beings, groups and organizations who work in IT departments or are affected by them. Thus, a detailed literature review is conducted on Design Research method as the underlying procedure of designing the proposed system. The concept of Design, the relationship between Design and Research and the general methodology of Design Research is investigated as well as the role of that in the field of management which is focused. Then, as a case application of the method and to assess the utility of selected research method in IT management scope, the IT performance management system is suggested, developed theoretically and practically in one of Iranian governmental organizations and finally evaluated. On the other side, the process and steps of Design Research method is reviewed and future research opportunities is recognized to work on soft approaches for designing managerial solutions. (*Journal of Applied Sciences* 9 (7): 1227-1237, 2009; doi: 10.3923/jas.2009.1227.1237)

Variability of Clays from Gounioubé Deposit (Ivory Coast)

J.Y.Y. Andji, A. Abba Toure, G. Kra and J. Yvon

The aim of this study is to estimate, from the statistics (PCA), the variability of the clays from the deposit of Gounioubé, in order to choose the different grades convenient for a given application and eventually correct the defective ones. Indeed, most of industrial minerals are used in fields where benefit is taken from variable properties that, directly or not, govern their applications. So, fourteen samples of kaolin clays from Gounioubé deposit (Ivory Coast), have been studied by chemical, crystallographic (X-Ray Diffraction (XRD)), spectroscopic (IR, UV, EPR), particle size and textural analysis. (*Journal of Applied Sciences 9 (7): 1238-1247, 2009; doi: 10.3923/jas.2009.1238.1247*)

Dynamical Joint Energy and Spinning Reserve Dispatch Considering Transmission Network Constraint

M. Asadi Bazardeh and M. Rashidi-Nejad

This study is dealing with ancillary services procurement and pricing in the new environment of electricity market. Spinning reserve is one of the most important ancillary services needed for satisfying reliability requirements as well as desired level of security in power systems. In deregulated power markets, generally two methods for energy and spinning reserve dispatching are addressed the so-called sequential dispatch and joint dispatch. It can be said that the sequential dispatch method may not be even feasible as well as optimal because of the coupling between spinning reserve and energy capacity. Therefore, in this study, a new method is proposed for dynamical joint energy and reserve dispatch that can solve the bottling of reserve problem by considering transmission limits. A genetic algorithm as an evolutionary optimization technique is used to solve such a complicated and non-convex problem. The proposed methodology is applied to a typical IEEE 30-bus system, while simulation studies show the effectiveness of joint energy and spinning reserve dispatch in comparison with the sequential dispatch. (*Journal of Applied Sciences 9 (7): 1248-1257, 2009; doi: 10.3923/jas.2009.1248.1257*)

Stable Direct Adaptive Control as Nonlinear Hybrid Controller for Flexible Manipulator

M. Naeimi, M. Teshnehlab, M. Aliyari Sh and M. Aliasghary

Stable direct adaptive control has been developed in this study to control the flexible motion of a single-link robotic manipulator. The controller has been

designed based on a simplified model of the arm, which only accounts for the first elastic mode of the beam. The controller consists of three parts: linear feedback, a nonlinear sliding mode (SMC) and an adaptive Fuzzy-Neural Network (FNN) controller. (*Journal of Applied Sciences* 9 (7): 1258-1266, 2009; doi: 10.3923/jas.2009.1258.1266)

Total Discount Policy and Two Warehouses Strategy to Store Raw Materials with Economic Order Quantity Model

Ata Allah Taleizadeh, S. Mokaram, N. Shafii and M. Zarei

This study introduced an Economic Order Quantity (EOQ) model with payment in advance to purchase high-price raw materials. We relax and change some assumptions that were considered in earlier researches. At first we considered transportation cost as a linear function. Total discount policy is considered instead of incremental discount one. Also we developed model based on two warehouses strategy to store raw material in which holding cost is different for each of warehouses. We show that the model of this problem is shown to be a mixed-integer-nonlinear-programming type and in order to solve it, a simulated annealing approach is used. At the end, a numerical example is given to demonstrate the applicability of the proposed methodology in real world inventory control problems. (*Journal of Applied Sciences* 9 (7): 1267-1275, 2009; doi: 10.3923/jas.2009.1267.1275)

Structural Health Monitoring Using Distributed Macro-Strain Response

N.H.M. Kamrujjaman Serker and Z.S. Wu

In this study, a damage identification technique based on the distributed Macro-Strain (MS) response measurements is presented. The fundamental concept of the proposed technique is that the ratio of the strain measured at a target location and a reference location of a beam-like structure is constant for a given condition of the structure. The proposed damage identification technique was verified using the laboratory experimental results. In addition, noise was added to the measured response to simulate the real field condition. The proposed technique was able to identify damage in a noise-polluted environment. The proposed technique was also applied for the health monitoring of a highway bridge in Japan. Long-gage distributed sensors were deployed to collect the traffic induced strain responses. Results from the onsite

experiment show the potentials of the proposed technique for practical application. (*Journal of Applied Sciences* 9 (7): 1276-1284, 2009; doi: 10.3923/jas.2009.1276.1284)

Comprehensive Analysis of a High-Q, Low Motional Resistance, Very High Frequency MEMS Resonator

F. Babazadeh and S.H. Keshmiri

In this study, design and simulation of an IC-compatible microelectromechanical resonator for use in VHF range of a wireless communication system as a base element in integrated micromechanical resonator based oscillators and front-end filters is reported. This resonator can be implemented using thick polysilicon technology. The resonator with new design and structure reduces vibrating micromechanical series motional resistance R_x by increasing electrode-to-resonator overlap area through use of scale up of the motionless dimension of the device; while maintaining the resonant frequency. Quarter-wavelength supporting and attaching to nodal points of the resonator is required to maximize quality factor of the device. Resonant frequencies around 71 MHz, quality factor of 9912 and motional resistances R_x on the order of 480 Ω were obtained by this design. (*Journal of Applied Sciences* 9 (7): 1285-1292, 2009; doi: 10.3923/jas.2009.1285.1292)

Arab Women Viewpoints with Respect to Their Participation in Social Development in the Society

F. Rokni and A. Poladian

This study, with particular emphasis on women, investigates the roles of women in lasting social developments and the levels of their participation in various forms, in Bahrain. The outcome of this research study indicates factors affecting women to be more active and progressive or being hindered in their struggles need deliberation. The main objective of this research was to study the elements, facilitating or deterring, involved in women participation in social activities from their point of views and by analyzing their viewpoints, deal with their participation in social, cultural and legal activities in their societies. To be able to proceed with the study and research it would be possible to propose the following pivotal questions and seek answers in order to fully understand and appreciate the fundamental elements compelling them to participate in social activities. (*Journal of Applied Sciences* 9 (7): 1293-1300, 2009; doi: 10.3923/jas.2009.1293.1300)

Teaching Anxiety and the Mathematical Representations Developed through WebQuest and Spreadsheet Activities

Murat Peker and Erdogan Halat

The purpose of this study was to find out the effects of mathematical representations developed through WebQuest and spreadsheet activities on the teaching anxiety level of the pre-service elementary school teachers in mathematics. The number of pre-service elementary school teachers involved in this study was seventy three. Thirty five of the participants were in the experimental group and thirty eight of them were in the control group. Whereas the participants in the experimental group developed WebQuest activities during seven weeks of mathematics instruction, the others in the control group did spreadsheet activities in the classroom. The researchers used a Likert-type questionnaire, the Mathematics Teaching Anxiety Scale (MATAS) including twenty three items as pre- and post-tests to investigate teaching anxiety level of the participants in mathematics. After the collection of the data, the researchers used the independent samples t-test and ANCOVA to analyze the quantitative data. The study indicated that there was a statistically significant difference found in terms of teaching anxiety level between the groups favoring the one who developed WebQuests. In other words, developing WebQuest activities reduced the teaching anxiety levels of the pre-service elementary school teachers more than doing spreadsheet activities in mathematics. (*Journal of Applied Sciences* 9 (7): 1301-1308, 2009; *doi*: 10.3923/jas.2009.1301.1308)

3 Dimensional Analysis of Linear Vibrations of the Rubber Dam

M. Shafai-Bejestan and E. Safaei

In this study, dynamic characteristics of a rubber dam, such as vibration frequencies and the corresponding mode shapes are computed by using finite element software produced by ANSYS, Inc. A three-dimensional model is utilized to compute the vibration modes and the frequencies of a double-anchor rubber dam both in presence and the absence of external water and the results are compared with other results which have been obtained previously. Natural frequencies of the vibrations of a single-anchor rubber dams in the cases without external pressure, with external water pressure and with parallel flow pressure are considered. A computer simulated model of these structures is analyzed and then the effect of the internal pressure, external water head and parallel flow velocity on

the vibrations of the rubber dam is studied the results are compared with the case that the dam is not impounding water and finally after comparing these results with the previous analytical and numerical results, the reasons of some little differences have been expressed. (*Journal of Applied Sciences 9 (7): 1309-1316, 2009; doi: 10.3923/jas.2009.1309.1316*)

The Application of Laser Velocity Meter in Detecting Incipient Cavitation and Measurement its Intensity, Inside Axial Flow Pumps

H.A. Tash, M. Sadeghi, M.T. Shervanitabar and M.M. Etefagh

Though the cavitation as a damaging phenomenon of hydraulic devices, has been drawing the interest of many researchers, almost very few investigations have been done on the cavitation measurement inside axial flow pumps. The present study is one of the leading ones which consider this phenomenon inside this widely used type of pumps. Oscillations of the structure of the pump were used to measure the cavitation. An average energy method for identification cavitation occurrence and measurement its intensity has been developed. This is called Logarithmic Cavitation Intensity (LCI). A statistical analysis was undertaken in a both time and frequency domains and the LCI was proved as a proper criterion for defining the cavitation intensity. Though being very robust, the introduced method is very simple and does not require time consuming calculations. This causes LCI method to be feasible by simple hardware with low sampling frequency, resulting in reducing the computational time as well as hardware complexity and cost. (*Journal of Applied Sciences 9 (7): 1317-1323, 2009; doi: 10.3923/jas.2009.1317.1323*)

Performance Evaluation of a Passive Direct Methanol Fuel Cell

S.L. Ho, S.K. Kamarudin, W.R.W. Daud and Z. Yaakub

The design, fabrication and performance evaluation of a passive direct methanol fuel cell (DMFC) operated at ambient condition with an active area of 7.5 cm^2 is studied in this research. The fuel cell is air-breathing and passive without any external pumps or auxiliary devices. Oxygen is taken from the surrounding air and methanol is stored in a built-in reservoir at the anode side. It was tested with methanol of various concentrations, ranging from 1 to 5 M. It was found that cell performance improved with higher methanol concentrations. Power density of 3.5 mW cm^{-2} was achieved with 4 M methanol at a voltage

of 0.2 V. This study also presents the performance of the cell tested for different types of design assemble and current collector. The main contribution of this study is the ideas and possibilities in fabrication of micro DMFC in component assemble point of view in order to enhance the power performance and all the possibilities was proofed with data from experiments. (*Journal of Applied Sciences* 9 (7): 1324-1330, 2009; *doi*: 10.3923/jas.2009.1324.1330)

Finite Element Analysis of Thickness Effect on the Residual Stress in Butt-Welded 2.25Cr1Mo Steel Plates

F. Vakili-Tahami and A.H.D. Sorkhabi

In this study, a numerical method is presented to study the thickness effect on the residual stress states in butt-welds in 2.25Cr1Mo plates. Using finite element based software ANSYS, coupled thermal-mechanical three dimensional (3D) finite element models have been developed. The finite element models are employed to evaluate the transient temperature and the residual stress fields during welding. Also, in this study the variations of the physical and mechanical properties of the material with temperature have been taken into account. Results show that by increasing plate thickness, the residual stresses increase and the residual stress affected zone (distance with significant amount of residual stress) becomes larger. It has been shown that the longitudinal residual stress in weld axis, change from compressive to tensile stress by increasing plate thickness. (*Journal of Applied Sciences* 9 (7): 1331-1337, 2009; *doi*: 10.3923/jas.2009.1331.1337)

Detection of Ground Water Changes Using Geographic Information System (A Case Study: Arak Plain, Iran)

K. Solaimani and S. Sadeghi

The aim of this study is to investigate the detection using hydrometric data and GIS technique for the central part of Iran because of the water shortage for agricultural and industrial activities. In many parts of Iran, the pressure of agricultural development is causing a surface-water scarcity. That means groundwater resources recharge will be effected for this reason which caused a major problems in future. The study area of Mayghan is located in Central Iran with 2854.63 km² as a part of Arak plain and near to 110 km² as a playa. Before 1951, there was no evidence of deep well in this area and the related activities were depended on the low stream rivers, aqueducts and wells. According to the hydrometric records of the regional water organization 3161 wells added to the injection wells, between

1970 and 2004. The qualitative increasing of these wells can be calculated as annually growth of 94 for the study area which are totally pumping about 531.5/million/m³ with annual increasing of 15.63/million/m³. The growth of annual demands for water supply has caused some environmental problems since there was no sufficient water intrusion to the aquifer plain which causes constantly the height of ground water reservoir declination as shown in related graphs. In this study, groundwater data were analysed using ArcGIS, statistical methods, geographic information techniques of Arc view and Ilwis. (*Journal of Applied Sciences* 9 (7): 1338-1343, 2009; doi: 10.3923/jas.2009.1338.1343)

Developing and Solving a New Model for the Location Problems: Fuzzy-Goal Programming Approach

M. Amiri, A. Kazemi, J.S. Sadaghiani, A. Yaghoubi and H. Mashatzadegan

This study surveys facility location problems and their objectives. For this aim, this problem is solved in the three phases. First, finding the least number of distribution centers (DCs), second, locating them in the best possible location, that this expresses the quality of the DCs locations which is evaluated by studying the value of appropriate attributes affecting the quality of location, so the value of each location is determined by using multi attribute decision making models and finally, finding the minimum costs of locating the facilities. Then regarding the obtained value the functions are formed and with using fuzzy-goal programming, the locations of DCs are determined. In the last phase, locating some agency in a real-world for a cooler factory is determined via., lingo software. (*Journal of Applied Sciences* 9 (7): 1344-1349, 2009; doi: 10.3923/jas.2009.1344.1349)

Medical Students' Educational Adjustment and Motivation Power in Compare With Other Academic Majors: A Prospective Study

K. Ahmadi, A. Fathi-Ashtiani, A. Ghaffari and F.H. Hossein-Abadi

The aim of this comparative-descriptive study was evaluation of the effect of academic majors on educational adjustment and motivation power between four academic majors: Engineering, Human Sciences, Medical Sciences and Paramedical Sciences. It is hypothesized that educational adjustment and motivation power varies amongst different academic majors' students. One hundred students from 4 majors, Engineering, Human Sciences, Medical Sciences

and Paramedical Sciences, were selected through random sampling. Data were collected using the Bell's Questionnaire of Adjustment and Academic Motivation Power Scale. Chi square, independent samples t-test (Mann-Whitney test if necessary) and analysis of variance were used to analyze data. Results showed that only in terms of educational adjustment there was a meaningful difference between medical students and other academic majors. Based on this result, medical school is a stressful period of physician training. Many medical students experience substantial distress which contributes to poor academic performance, academic dishonesty, cynicism and substance abuse. Medical educators need to be aware of the manifestations, causes and consequences of student distress. (*Journal of Applied Sciences* 9 (7): 1350-1355, 2009; doi: 10.3923/jas.2009.1350.1355)

Error Compensation of Complex Three-Dimensional Surfaces Machined on Computer-Numeric-Control Grinding Machine Tools

M. Raoufinia, Y.V. Petrakov, A. Ataei, R. Parand and K. Abou-El-Hossein

This study discusses the development of a method for compensating profile errors, resulting from the deviation of the actual grinding wheel radius from the calculated one. The study also elaborates on a control strategy that may be followed to minimise the profile error and allow the use of a four-axis grinding machine instead of five-axis one to perform the same machining task. This approach can be completely justified when the reduction in the machining cost is achieved as a result of grinding the gauge profile on a four-axis CNC machine tool instead of the five-axis one. When a number of five segments are chosen, the first control program is established for the first mean radius (170 mm) of the first segment. When the grinding wheel radius reaches 150 mm as a result of wheel dressing, a new control program that will consider a new nominal radius of 160 mm will be activated. (*Journal of Applied Sciences* 9 (7): 1356-1361, 2009; doi: 10.3923/jas.2009.1356.1361)

Factors Affecting the Wheel Rutting on Rural Roads

A. Parsakhoo and S.A. Hosseini

In this study, the wheel ruts frequency and dimensions were investigated according to geographical aspects, longitudinal gradient and surfacing layer of rural roads in Denji Kola village, Mazandaran Province, Iran. Ruts were divided into shallow

and deep wheel ruts. Results showed that the ruts length and area were significantly affected by longitudinal gradient of rural roads ($p < 0.0001$). Ruts length in longitudinal gradient class 8-12% was significantly more than other classes ($p < 0.05$). The mean of rut length in this class was 8.19 m. The deep ruts frequency in longitudinal gradient class 0-4% was more than shallow ruts, whereas the number of shallow ruts was more than deep ruts in other classes. The effects of geographical aspect on ruts length ($p < 0.0001$), ruts width ($p = 0.0019$) and ruts area ($p < 0.0001$) was significant. Although, the ruts width and depth on gravel-grassed surface was more than other surfacing layer, the number of ruts in this surfacing layer was less than bare soil and graveled surfacing layer. Thus, thickness layer of gravel which has been covered by grass is the best mixture for surfacing layer of rural roads. (*Journal of Applied Sciences 9 (7): 1362-1367, 2009; doi: 10.3923/jas.2009.1362.1367*)

Poultry Feed Brands Selection Using Profile Analysis

E.U. Ohaegbulem and F.N. Nwobi

The application of profile analysis in the performances of three brands of poultry feed in a farm was considered. Analysis showed that the profiles were not parallel, implying that the performances of the brands were unequal. Contrasts following profile analysis performed using Scheffe's method showed that the profile of TRAP FEEDS was significantly different from those of the other two brands. Consequently, the highest performing brand was selected. (*Journal of Applied Sciences 9 (7): 1368-1372, 2009; doi: 10.3923/jas.2009.1368.1372*)

Sewage Water Irrigation and Growth Response of *Leucaena leucocephala* Inoculated With *Glomus intrarradices* and Application of Organic Matter

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The aim of this study is to evaluate the growth response of *Leucaena leucocephala* inoculated with *Glomus intrarradices* and application of organic matter and the actual level of contamination with heavy metals Cu, Cr, Zn and Pb in soil irrigated with sewage and clean water. Sewage water is used for irrigation, which creates both opportunities and problems. This is an option to reduce the stress on limited fresh water and help meet the nutrient requirement of

crops, but also produces contamination. In the irrigation District 018, Tulancingo, Hidalgo, Mexico, forage for cattle has been irrigated with residual water for several years. To evaluate the level of contamination of two plots, one hectare was irrigated with residual water and another with clean water. In soil the contamination of Cu, Cr and Ni are below the established limits for contaminants. Pb was not found. A comparison of soil irrigated with clean water or sewage water indicated that Cu is nearly twice as concentrated in soil irrigated by contaminated water; Ni is slightly greater; Cr is more abundant. Soil was collected for a greenhouse experiment with *Leucaena leucocephala* (guaje) to observe its growth with inoculation of *Glomus intrarradices* with different amounts of vermicompost. Later a factorial experiment 7×2 completely randomized design with five replications in the greenhouse was established. The variables measured were plant height, stem diameter, root volume, dry weight of biomass and dry weight of roots. The experiment lasted 180 days from planting until harvesting. It is concluded that the inoculation with *Glomus intrarradices* increased the absorption by *Leucaena leucocephala* in nutrient adsorption. (*Journal of Applied Sciences* 9 (7): 1373-1377, 2009; doi: 10.3923/jas.2009.1373.1377)

The Accuracy of SST Retrievals from NOAA-AVHRR in the Persian Gulf

A. Ahmadabadi, A. Fathnia, M. Karimi Ahmadabad and M. Farajzadeh

In the present study, sea surface temperature of the Persian Gulf was estimated using NOAA-14- AVHRR data during the period of 1996-2000. The Persian Gulf, despite being a major economic and political region has not systematic marine measurement in particular that of sea surface temperature. In order to estimate sea surface temperature in areas where no data was available, an attempt has been made to use AVHRR (Advanced Very High Resolution Radiometer) data from NOAA (National Ocean and Atmosphere Administration) satellite 14. After computing SST from AVHRR data with the use Murty, Gowda and national center of remote sensing Australia algorithms were assessed with *in situ* Boushehr buoy sea surface temperature and a linear correlation was formulated to estimate sea surface temperature with a residual mean error of ± 0.43 and $R^2 = 0.994$. Finally, this modified formula was tested in 2 months (September and December 1999) of NOAA-14 AVHRR images and Sea Surface Temperature (SST) was computed in the Persian Gulf. Considering this amount of error, time series temperature can be created with this method. (*Journal of Applied Sciences* 9 (7): 1378-1382, 2009; doi: 10.3923/jas.2009.1378.1382)

Genetic Variability of Some Morpho-Physiological Traits in Durum Wheat (*Triticum turgidum* var. *Durum*)

M. Maniee, D. Kahrizi and R. Mohammadi

The present investigation was carried out to (i) study some agro-physiologic traits and (ii) to estimate genetic variability parameters for the studied traits in 12 advanced durum wheat genotypes along with the two local checks (Zardak and Sardari). Statistical analysis showed significantly differences among the genotypes based on the studied traits. Genotypic and phenotypic coefficients of variations were high for number of tiller (NT), Leaf Dry Weight (LDW), Stem Dry Weight (STW), Spike Length (SL) and Leaf Area Duration (LAD). Heritability estimates were high for Plant Height (PH), LDW and SL. High genetic gain was observed for grain yield, NT, Peduncle Length (PL), LDW, STW, Spike Dry Weight (SPW), SL and LAD. Correlation analysis showed the grain yield was significantly correlated with traits LP, SPW, SL and Relative Growth Rate (RGR). High heritability estimates associated with high genetic advance as percent mean (GG) were obtained in characters i.e., LDW, PH, SL and LAD, whereas low heritability and high genetic advance was observed for the grain yield. (*Journal of Applied Sciences* 9 (7): 1383-1387, 2009; doi: 10.3923/jas.2009.1383.1387)

A Comparison of Emotional Intelligence and Behavior Problems in Dyslexic and Non-Dyslexic Boys

M. Narimani, S. Sadeghieh Ahari, N. Homeily and H. Siahpoosh

The objective of the study was to compare emotional intelligence and behavior disorders in dyslexic and non-dyslexic boys. A random sample of 15 dyslexic boys were compared with matched controls, all aged 11-15 years. A causal comparative research method was employed and data was collected through administration of self report measures of emotional intelligence and behavior disorders. Results of the study revealed that emotional intelligence is correlated with behavior problems ($r = -0.54$, $p < 0.05$). Furthermore, dyslexic children scored lower on emotional intelligence and higher on behavior problems than their normal counterparts. As well as being congruent with earlier research, the present findings point to the importance of emotional intelligence in school achievement and behavioral health. (*Journal of Applied Sciences* 9 (7): 1388-1392, 2009; doi: 10.3923/jas.2009.1388.1392)

Preliminary Study of Aspartate Aminotransferase Activity in Gingival Crevicular Fluids During Orthodontic Tooth Movement

M.A.W. Rohaya, Z.A. Shahrul Hisham and K. Khazlina

This study investigated the potential of Aspartate aminotransferase (AST) as a biological marker to monitor tooth movement by determining its activity in the Gingival Crevicular Fluid (GCF). Six adolescents and seven adults participated in the study. For each subject, an upper first premolar received tipping force (50-75 g) while the opposing premolar served as control. GCF was collected before force application and weekly for 4 weeks. The activity of AST was determined spectrophotometrically (30°C, 340 nm). AST activity in the GCF of test teeth in all subjects was highest at week 1 and reduced gradually in the next 3 weeks. There was a significant difference in the activity between the test and control teeth in all the subjects throughout the study ($p < 0.05$). There was no significant difference in AST activity between the adult and adolescent subjects ($p > 0.05$). In conclusion, AST appears to have the potential to serve as a biological marker to monitor orthodontic tooth movement. (*Journal of Applied Sciences* 9 (7): 1393-1396, 2009; doi: 10.3923/jas.2009.1393.1396)

Nonlinear Contraction Theorems in Fuzzy Spaces

M. Mohamadi, R. Saadati, A. Shahmari and S.M. Vaezpour

In this study, fuzzy metric and normed space are considered and some fixed point theorems in these spaces are proved. In this study at first two fixed point theorems in nonlinear case in the fuzzy metric spaces are proved then an nonlinear contraction theorem in the fuzzy normed spaces is proved. (*Journal of Applied Sciences* 9 (7): 1397-1400, 2009; doi: 10.3923/jas.2009.1397.1400)

Impact of Sewage Sludge as Organic Manure on Some Soil Properties, Growth, Yield and Nutrient Contents of Cucumber Crop

A.H.A. Hussein

The present study was conducted in two field experiments with two soil types (sandy and calcareous soils) under greenhouse conditions at the Agricultural and Veterinary Training and Research Station of KFU, Al-Hassa area. The objective

of the present study was to investigate the effects of different rates of sludge on some soil properties, growth, yield and nutrients status of leaves and fruits of cucumber plant. The experimental soils have sandy and sandy loam textures. All experimental plots (6 m² area) cultivated with cucumber. Soil application of sewage sludge, at rates of 0 (control, with no sewage sludge), 25, 50, 75, 100 and 125 t ha⁻¹ was used in the present study. Sewage sludge was mixed with top 30 cm surface layer of each plot, two month before planting of cucumber. The experiments were conducted in a randomized complete block design with 3 replications. The experimental plots received the same agricultural practices as recommended. The obtained results revealed that application of sewage sludge significantly altered the chemical properties of soil. Soil Electrical Conductivity (EC), soluble cations (calcium, magnesium, sodium and potassium), soluble anions (chloride and sulphate), available phosphorous and micronutrients (iron, manganese, copper and zinc) and heavy metals (cadmium, cobalt, lead and nickel) were increased in sandy and calcareous soils with increasing sewage sludge application rate. While, the soil reaction (pH) and HCO₃⁻ contents were decreased as a result of sludge application. Also, application of sewage sludge improved physical properties of sandy and calcareous soils. It decreased the soil bulk density and increased saturation water content, porosity and organic matter content. Application of sewage sludge improved leaves and fruit contents of macro- and microelements of cucumber plant grown in sandy and calcareous soils. Also, the number of fruits and yield of cucumber were increased with increasing the rates of sewage sludge application. The highest level of application of sludge has a highest effect on the yield of cucumber plants. Generally, application of sewage sludge by mixing it with top 30 cm soil layer was found to be more effective in improving soil physical, chemical and fertility conditions. Moreover, using of sewage sludge as organic manure is considered as a source of nutrients that required for plant which led to increase the growth and the yield of cucumber crop. (*Journal of Applied Sciences* 9 (8): 1401-1411, 2009; doi: 10.3923/jas.2009.1401.1411)

High Sensitivity and Noise Immune Method to Detect Impedance Cardiography Characteristic Points Using Wavelet Transform

Maria Rizzi, Matteo D'Aloia and Beniamino Castagnolo

In this study, a real-time fast parallelized processing technique for C-point locations is presented. Singularity detector adopting a multiscale wavelet transform is used for impedance cardiography signal processing. Both theoretical analysis and experimental results show the method reliability and sensitivity. Moreover, the

Algorithm noise immunity has been tested adding Gaussian noise with a variable variance to the real ICG signal. Test results with minimum interferences from noise and artefacts have been obtained. (*Journal of Applied Sciences* 9 (8): 1412-1421, 2009; **doi:** 10.3923/jas.2009.1412.1421)

Total Quality Management and Knowledge Sharing: Comparing Malaysia's Manufacturing and Service Organizations

Weng-Choong Cheah, Keng-Boon Ooi, Pei-Lee The, Alain Yee-Loong Chong and Chen-Chen Yong

The aim of this study was to examine the difference between Malaysian manufacturing and service organizations with regard to the multidimensionality of TQM practices and the relationship of these practices to knowledge sharing behavior from middle management employees' perspective. The empirical data for this study were collected from 208 middle management employees from Malaysian manufacturing and service organizations with a response rate of 62.01% (129 respondents) from the manufacturing firms and 37.98% (79 respondents) from the service firms. The finding indicated there was no significance difference between Malaysian manufacturing and service organizations in the level of TQM practices and knowledge sharing. The multiple regression analysis also indicated a stronger relationship for manufacturing firms than for service firms between TQM practices and knowledge sharing, particularly in relation to teamwork. Results should be an interest to the TQM managers and practitioners in Malaysia. This finding increased our understanding on the applicability of TQM practices and the association of these practices to knowledge sharing in both Malaysian manufacturing and service organizations. This study has contributed towards advancing the TQM literature with a better understanding of the perception of middle management employees of TQM practices and its association with knowledge sharing in both Malaysian manufacturing and service organizations. (*Journal of Applied Sciences* 9 (8): 1422-1431, 2009; **doi:** 10.3923/jas.2009.1422.1431)

WebML and .NET Architecture for Developing Students Appointment Management System

M.H.N.M. Nasir, S.H. Hamid and H. Hassan

This study presents the application of Web Modeling Language (WebML) in a Student Appointment Management System (SAMS) to help students and lecturers

arrange meetings in an effective and efficient way in a university or college environment. WebML is well designed for web applications and .NET four-tier architecture offers maximum functionality and flexibility in a heterogeneous, web based environment. Each WebML elements is transformed accordingly to Hypertext model as known as site views of SAMS is believed to work best in implementing an appointment management system and turning the traditional management approach into current web technology. Comparisons with existing similar systems are presented based on three typical quality attribute requirements for web applications: usability, performance and maintainability. The usability of SAMS is measured by applying the Goal-Question-Metrics (GQM) approach in questionnaires to collect users' opinions on the system, especially the interface, while the maintainability of this system is measured using the cyclomatic complexity technique. From the survey it is proven that SAMS fulfils the usability requirements as the results show that 67% of lecturers and 75% of students were satisfied with the overall system. (*Journal of Applied Sciences* 9 (8): 1432-1440, 2009; doi: 10.3923/jas.2009.1432.1440)

Fuzzy Causal Ordering of Events in Distributed Systems

Luis A. Morales Rosales, Saul E. Pomares Hernandez and Gustavo Rodriguez Gomez

Event ordering is an important research subject in Distributed Systems (DS). Event ordering addresses the problem of establishing a certain order among the events that occur in DS according to some particular criteria. The types of event orderings used for DS are no order, FIFO, causal, Δ -causal, total and causal-total. They mainly differ in the degree of asynchronous execution allowed. One of the most important orderings is the Causal Order (CO), which is based on Lamport's happened-before relation. It establishes that the events must be seen in the cause-effect order as they occur in the system. However, for certain applications, for example multimedia synchronization, where some degradation of the system is allowed, ensuring the CO based on Lamport's relation is rigid and negative affect the performance of the system. In this study, it is introduced a new ordering for DS in order to achieve a more asynchronous execution than the CO, this new ordering is called Fuzzy Causal Order (FCO). Besides, it is defined the Fuzzy Causal Relation (FCR) and Fuzzy Causal Consistency (FCC), the FCR establishes logical dependencies based on the precedence of events and by considering some kind of distance between their occurrences. With the notion of distance was possible to establish a cause-effect measure between two events a and b that indicates how long ago an event a happened before an event b. Through the FCC it was possible to determine how good the performance of the system is at a given moment. The usefulness of the FCO, FCR and FCC is showed by

applying them to the concrete problem of intermedia synchronization in DS. (*Journal of Applied Sciences* 9 (8): 1441-1449, 2009; doi: 10.3923/jas.2009.1441.1449)

Controlling Chaotic Rössler System via Synchronization, Using Bifurcation Parameter to Choose Desirable Periodic Orbit

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. Nonlinear and linear feedback methods are used to synchronize chaotic slave system with periodic master systems. Stability conditions are discussed analytically and numerical simulation results are presented. (*Journal of Applied Sciences* 9 (8): 1450-1457, 2009; doi: 10.3923/jas.2009.1450.1457)

Solar Combi-Systems a New Solution for Space Heating in Buildings

A. Ataei, M. Kh. Assadi, R. Parand, N. Sharee, M. Raoufinia and A.H. Kani

In the present study, the thermal load of a residential building is determined in two sample cities, Karadj and Hamedan. Then, the suitable solar combi-system and the underfloor heating system are designed for the units of the buildings. Furthermore, in response to the building energy demand and also by studying the expense-efficiency diagram, the efficiency of solar combi-system and the number of flat-plate solar collectors are determined. In continue, regarding the effect of the shade of the collector rows and the restriction of the roof space, a hybrid system is suggested. Finally, the annual energy saving in fuel consumption and reduction in social costs are studied and the payback period is determined. (*Journal of Applied Sciences* 9 (8): 1458-1465, 2009; doi: 10.3923/jas.2009.1458.1465)

Prediction of the Mechanical Behavior of Open-End and Ring SPUN Yarns

B.A. Sami and H. Naïma

The objective of this study is to predict the mechanical behaviour of yarns under various levels of strain, by using only their technical parameters. The study of the

yarn response to tensile test and relaxation test at different strain levels has permitted us to propose an analytical model predicting the entire stress-strain response of yarn. We have used the rheological approach to propose this analytical model. This model permitted to describe the viscoelastic behaviour of ring and open-end spun yarns during traction and relaxation. In order to characterize the coefficients of the proposed model, traction and relaxation tests were performed for 44 yarns. The neuronal approach is used to study the correlation between the mechanical coefficients of the analytical model and the technical parameters of the spinning mill. This allowed us to predict the yarns mechanical behaviour. (*Journal of Applied Sciences* 9 (8): 1466-1473, 2009; **doi**: 10.3923/jas.2009.1466.1473)

Dynamics Response of Railway Under a Moving Load

M. Zehsaz, M.H. Sadeghi and A. Ziaei Asl

In this study, a new method for the dynamic analysis of railway, as a beam with limited length, lying on a viscoelastic bed and subjected to a moving load is presented. The dynamic analysis was carried out for Pasternak-viscoelastic bed having shear layers. The aim was to obtain deflection, slope, bending moment and shear forces of the beam under moving load. By utilizing the theory of dynamic response of Timoshenko beam and using modal superposition method, the governing equations of motion were obtained. Given the fact that conventional methods are incapable of showing discontinuities in shear diagram and break point in moment diagram which arise from the concentrated moving load, this study introduces a new method based on summing modes for handling the aforementioned discontinuities. A main advantage of this method is in the accurate and efficient evaluation of the bending moment and shear force of a beam under moving loads. Numerical results are presented to show the rapid convergence of responses using the proposed method. (*Journal of Applied Sciences* 9 (8): 1474-1481, 2009; **doi**: 10.3923/jas.2009.1474.1481)

n-Approximately Weak Amenability of Banach Algebras

H. Najafi and T. Yazdanpanah

We introduce new notions of approximate amenability for a Banach algebra A . A Banach algebra A is n -approximately weakly amenable, for $n \in \mathbb{N}$, if every continuous derivation from A into the n -th dual space $A^{(n)}$ is approximately inner. First we examine the relation between m -approximately weak amenability and

n-approximately weak amenability for distinct $m, n \in \mathbb{N}$. Then we investigate $(2n+1)$ -approximately weak amenability of module extension Banach algebras. Finally, we give an example of a Banach algebra that is 1-approximately weakly amenable but not 3-approximately weakly amenable. (*Journal of Applied Sciences* 9 (8): 1482-1488, 2009; doi: 10.3923/jas.2009.1482.1488)

Change of Pore Water Pressure Inside the Foundation of Alavian Earthfill Dam, Iran: A Comparison Between Observed and Predicted Values

Mohammad H. Aminfar, Bahman Farahmand Azar, Hosein Ebadi and Hamid Ahmadi

Investigation of dam behavior during the construction and service phases is a very useful tool to control, to correct and to optimize the design process and to provide required contrivances during these phases. The aim is to prevent the probable damages and destructions and to maximize the commercial efficiency of the project. Because of mentioned reasons, installation of suitable instrumentations for analysis of effective parameters in performance and stability of dam during different periods is inevitable. In this study, behavior of pore water pressure inside the foundation of Alavian dam (Iran) is studied. Plaxis is used to model the dam and the predicted results are compared with the measured ones. Then, the effect of foundation and cut-off wall permeability on the distribution of pore water pressure inside the foundation is investigated. (*Journal of Applied Sciences* 9 (8): 1489-1495, 2009; doi: 10.3923/jas.2009.1489.1495)

Development of a New Method for Tunnel Site Rating from Groundwater Hazard Point of View

H. Katibeh and A. Aalianvari

In this research, considering the experiments of tunnel inflow due to 10 different tunnels in Iran and adopting idea from site geomechanics rating like RMR, a new method has been developed for rating the tunnel site to evaluate the potential of tunnel inflow according to the preliminary investigation data. This method is called Site Groundwater Rating (SGR). Considered parameters in this method are: joint frequency, joint aperture, karstification, crashed zone, schistosity, head of water above tunnel, soil permeability and annual raining. Using these parameters and following SGR method, tunnel site can be categorized into six rates as follow: no

risk, low risk, moderate risk, risky, high risk and critical. The method has been checked out with the observed groundwater inflow of Ghomroud tunnel and also, implied to rate the Amirkabir tunnel site in Iran. (*Journal of Applied Sciences* 9 (8): 1496-1502, 2009; doi: 10.3923/jas.2009.1496.1502)

Single-Stage Grid Connected Photovoltaic System with Reactive Power Control and Adaptive Predictive Current Controller

M.B. Bana Sharifian, Y. Mohamadrezapour, M. Hosseinpour and S. Torabzade

In this study, a new type of grid connected photovoltaic (PV) system with Maximum Power Point Tracking (MPPT) and reactive power simultaneous control system is presented. System has two controlling loops to obtain the maximum power from the PV array and also has Reactive Power Control (RPC). In order to decrease the complexity, cost and the number of converters, a single-stage PV system is applied. Using RPC and MPPT controllers, reference current is calculated and the current with low THD (<5%) is injected to grid through Adaptive Predictive Current Control (APCC) and Current Controlled Voltage Source Inverter (CCVSI). The operation of the system is classified in to two day and night modes. In day mode MPPT and RPC control is accomplished and in night mode RPC control is accomplished like STATCOM operation. Reactive power control is continuously performed correctly with appropriate speed in two inductive and capacitive modes in both day and night modes. Thus, System Utilization Factor (SUF) increases to 100% which is just 20% for common PV systems. Mathematical modeling of the system and the results of simulations in MATLAB/SIMULINK software are presented to investigate the correctness of the results. (*Journal of Applied Sciences* 9 (8): 1503-1509, 2009; doi: 10.3923/jas.2009.1503.1509)

A-MathS Multimedia Courseware for Effective Mathematic Learning: Matching Instructions to Student's Learning Style

Nor Azan Mat Zin

The objectives of this study were to design, develop and evaluate an adaptive multimedia courseware (A-MathS) for teaching mathematics, based on learning styles. The courseware consisted of diagnostic modules and instructional modules. The diagnostic modules provided data for adaptation of instructions based on user's learning style and knowledge level in the given topic of percentage. The

instructional modules were designed based on four dominant learning styles; global-visual, global-verbal, analytical-visual and analytical-verbal. Methodology used was based on Robyler's Instructional Design (ID) model for computer-aided instruction. Evaluation of the courseware involved usability and the effectiveness aspects. The usability study on the courseware was a case study involving 35 Form 1 secondary school students, using the quasi-experimental pre and post-tests approach, observation, as well as survey questionnaire. Findings indicated that samples using matching A-MathS modules showed a significant rise in their post-test achievement ($p = 0.000$). This experimental group obtained a significant mean gain score of 10.5 compared to the low mean gain score of 1.8 for the mismatched group. Results from the study indicated that matching students' learning styles to instructions using A-MathS multimedia courseware is effective in enhancing students' learning gains. (*Journal of Applied Sciences* 9 (8): 1510-1516, 2009; **doi**: 10.3923/jas.2009.1510.1516)

Physicochemical Characterization of the Waters of the Coastal Rivers and the Lagoonal System of Cote d'Ivoire

K.V. Kouame, O.B. Yapo, V. Mambo, A. Seka, A.S. Tidou and P. Houenou

The aim of this study is to evaluate physicochemical parameters in the lagoonal system and coastal rivers of Côte d'Ivoire to appreciate their spatial variation. Water samples were collected at 16 stations for phosphorus, nitrogen, pH, salinity, temperature and conductivity analyses. Sampling was carried out during two seasons, characterizing the water of the lagoonal system of Côte d'Ivoire, October 2006 for wet season and March 2007 for dry season. These samples were collected in four rivers and two lagoons. It was found that, the phosphorus concentrations (1.77 mg L^{-1}), as well as the ammonia-nitrogen (0.65 mg L^{-1}) and nitrate-nitrogen concentrations (1.09 mg L^{-1}) were high throughout the area, indicating extensive pollution. Although, the nitrite-nitrogen concentration was relatively low, it is at the upper end of what might be considered normal, thereby indicating an anthropogenic origin. The highest concentrations of nutrients obtained in the area of Azito in the Ebrié lagoon are indicative of high stress on a lagoonal system from a particular industrial pollution. The study revealed also that the dilution of the water of the lagoonal system during the dry season by the oceanic water reduces considerably the concentrations of nutrients and increases conductivity and water salinity. (*Journal of Applied Sciences* 9 (8): 1517-1523, 2009; **doi**: 10.3923/jas.2009.1517.1523)

An Expert System Realization of Adaptive Autonomy in Electric Utility Management Automation

A. Fereidunian, M.A. Zamani, H. Lesani, C. Lucas and M. Lehtonen

Earlier we introduced a novel framework for implementation of Adaptive Autonomy (AA). This study presents an expert system realization of the AA framework, referred to as Adaptive Autonomy Expert System (AAES). The proposed AAES is based on the extracted rules from the Expert's Judgment on proper Levels of Automation (LOA) for various environmental conditions, modeled as Performance Shaping Factors (PSFs). Decision fusion method is used as expert system inference engine, where 8 decision fusion methods are developed as prospective ones. The AAES is realized in the practical case of electric power Utility Management Automation (UMA) for the Greater Tehran Electricity Distribution Company (GTEDC). The practical list of PSFs and the judgments of GTEDC's experts are used as the expert system rule base in this research. The results of implementing the proposed AAES to GTEDC's network are evaluated according to two criteria: average error and error margin. Five out of 8 decision fusion methods are proven to be suitable inference engines, due to both criteria. Evaluation of the results shows that the proposed AAES can estimate proper LOAs for GTEDC's UMA system, which change due to the changes in PSFs; thus providing a dynamic (adaptive) LOA scheme for UMA. (*Journal of Applied Sciences* 9 (8): 1524-1530, 2009; doi: 10.3923/jas.2009.1524.1530)

Modeling the Transient Response of the Thermosyphon Heat Pipes

R. Parand, B. Rashidian, A. Ataei and Kh. Shakiby

This study presents a theoretical investigation of the thermosyphon heat pipe behavior in transient regime. The advantage of the transient lumped model will be taken to simulate the response of the heat pipe. The transient thermal behavior of the heat pipe has been developed in order to obtain an analytic expression of the system response. A computer simulation program based on the lumped method was developed to estimate temperature of the heat pipe as well as the time needed to reach steady state condition. This program can be considered as a simple tool for modeling and designing heat pipe in transient regime. An influence analysis of the heat pipe response to various operating conditions has been shown. The results from this model were found to be in general agreement with the other numerical models. (*Journal of Applied Sciences* 9 (8): 1531-1537, 2009; doi: 10.3923/jas.2009.1531.1537)

Determination of Ratio of Unsaturated to Total Fatty Acids in Edible Oils by Laser Raman Spectroscopy

S. Farid Uddin Farhad, K.M. Abedin, M. Rafiqul Islam, Aminul I. Talukder and A.F.M.Y. Haider

In this study, a homemade laser Raman spectrometer was used to examine the Raman spectra of different edible oils, such as canola, corn, soybean, sunflower, palm and coconut oils. To avoid severe fluorescence effects which tend to mask the weak Raman lines, Raman bands in the 2800-3200 cm^{-1} region resulting from unsaturated and saturated carbon bonds in the fatty acids were chosen and measured the TUSFA/TFA (total unsaturated fatty acid/total fatty acid content) ratios of the various samples. Good correlation of the ratios of TUSFA/TFA of different edible oils with that calculated from manufacturers data was obtained, enabling us to measure unsaturation/total fatty acids ratio quickly and easily for any unknown oils and hence the measure the degree of possible adulteration. (*Journal of Applied Sciences* 9 (8): 1538-1543, 2009; doi: 10.3923/jas.2009.1538.1543)

Assessment of Artificially Induced Pressure Sores Using a Modified Fractal Analysis

S. Moghimi, M.H. Miran Baygi, G. Torkaman and A. Mahlooji Far

In this study, a guinea pig model has been developed for generation and monitoring of pressure sores. A system with pressure sensors and a suitable feedback was used for inducing pressure sores. High-frequency ultrasound images were taken from the wound site after tissue was released from the applied pressure for a 21 days period. Fractal properties of the selected windows were calculated, which leads to proposing a Modified Fractal Signature (MFS). The MFS proved to be an efficient measure for assessing the pressure sores. Exploiting the proposed idea, the progression of necrotic tissue could be studied. It is shown that this measure is also capable of evaluating the healing process of pressure sores. (*Journal of Applied Sciences* 9 (8): 1544-1549, 2009; doi: 10.3923/jas.2009.1544.1549)

Effects of the Detector-Collimator on the Gamma-Ray Response Function for a NaI(Tl) Detector in a Constant Time of Counts

H. Tavakoli-Anbaran, H. Miri-Hakimabad and R. Izadi-Najafabadi

This study describes the effects of the detector-collimator on the gamma-ray response function for NaI(Tl) detectors with 2"×2", 3"×3" and 5"×5" dimensions.

In present study we have used five different detector-collimators and three gamma ray sources (^{241}Am , ^{137}Cs and ^{60}Co). In all states, the time of counts and detector-source-distance were constant. We measured the gamma-ray response function, full width at half maximum (FWHM) and energy resolution in the full energy peak with and without detector-collimators. Then we perceived that the detector-collimator was very important in gamma ray spectrometry because, in the best state, FWHM and energy resolution decrease about 55%. In the end we obtained the best detector-collimator for each of the three NaI(Tl) detectors. (*Journal of Applied Sciences* 9 (8): 1550-1555, 2009; doi: 10.3923/jas.2009.1550.1555)

Precise Formulation of Electrical Capacitance for a Cylindrical Capacitive Sensor

P. Azimi and H. Golnabi

In this study, a more precise formulation of electrical capacitance for a cylindrical capacitive sensor is reported. By using different theoretical models such as Coulomb law, Gauss law and Laplace equation the electrical capacitance is calculated. Based on the given models the relation between the capacitance and the geometrical parameters (e.g., cylindrical length) is formulated and by using suitable software capacitance variation is computed and compared for different methods. In Coulomb method, the electrical potential is first solved numerically by using Mathematica and then the electrical capacitance is computed. It is found that the active capacitor length is crucial parameter in the calculations and therefore variation of this parameter is considered in our calculations. It is noted that the capacitance value is very sensitive to the length according to the method and it is deviated sharply for small length (about 20 cm) from the Gauss approximation. By comparing obtained results one recognizes that there is a pronounced error difference using approximated laws in short capacitor length range while for long length a negligible difference is noted between the tested models. (*Journal of Applied Sciences* 9 (8): 1556-1561, 2009; doi: 10.3923/jas.2009.1556.1561)

Predictive Infiltration Rate Mapping with Improved Soil and Terrain Predictors

H.R. Motaghian and J. Mohammadi

This study addresses the issue of incorporating soil and terrain covariates into predictive mapping of Infiltration Rate (IR) values in a semi-arid region in Iran. Besides, multiple linear regression of IR values against some soil and terrain

variables, three geostatistical models including ordinary kriging, ordinary cokriging and simple kriging with varying local means were used. A 10 fold validation approach was used with the mean MAE and RMSE as validation indices to judge the prediction quality. The best prediction model was ordinary cokriging followed by simple kriging with varying local means. These methods were best in combination with some soil and terrain covariables. (*Journal of Applied Sciences* 9 (8): 1562-1567, 2009; *doi*: 10.3923/jas.2009.1562.1567)

Investigation of Production of Ethanol from Cotton Linter and Waste Textile

Hossein Aliee and Maryam Teimori

In this study, ethanol production from cotton linter and waste of blue jeans textiles was investigated. In the best case, alkali pretreatment followed by enzymatic hydrolysis resulted in almost complete conversion of the cotton and jeans to glucose, which was then fermented by *Saccharomyces cerevisiae* to ethanol. If no pretreatment applied, hydrolyses of the textiles by cellulose and β -glucosidase for 24 h followed by simultaneous saccharification and fermentation (SSF) in 4 days, resulted in 0.140-0.145 g ethanol g⁻¹ textiles, which was 25-26% of the corresponding theoretical yield. A pretreatment with concentrated phosphoric acid prior to the hydrolysis improved ethanol production from the textiles up to 66% of the theoretical yield. However, the best results obtained from alkali pretreatment of the materials by NaOH. The alkaline pretreatment of cotton fibers were carried out with 0-20% NaOH at 0, 23 and 100°C, followed by enzymatic hydrolysis up to 4 days. In general, higher concentration of NaOH resulted in a better yield of the hydrolysis, whereas temperature had a reverse effect and better results were obtained at lower temperature. The best conditions for the alkali pretreatment of the cotton were obtained in this study at 12% NaOH and 0°C and 3 h. In this condition, the materials with 3% solid content were enzymatically hydrolyzed at 85.1% of the theoretical yield in 24 h and 99.1% in 4 days. The alkali pretreatment of the waste textiles at these conditions and subsequent SSF resulted in 0.48 g ethanol g⁻¹ pretreated textiles used. (*Journal of Applied Sciences* 9 (8): 1568-1572, 2009; *doi*: 10.3923/jas.2009.1568.1572)

Evaluation of the Uptake and Accumulation of Metals by Some Commonly Irrigated Vegetables in Soils Treated with Different Concentrations of these Metals

M. Haliru, V.O. Ajibola and E.B. Agbaji

The uptake of some trace elements namely, chromium, nickel, cadmium and lead by some vegetables commonly irrigated were studied under glasshouse conditions.

Experiments were conducted in plastic pots using some selected vegetables, lettuce (*Lactuca sativa*), okra (*Abelmoschus esculentus*) and pepper (*Capsicum annum*) grown on sandy loam soils treated with different concentrations of these metals. The treatments investigated include zero application (control), 10, 50 and 100 $\mu\text{g dm}^{-3}$ metal applications. In general, each plant showed similar growth responses and tolerance but different metal uptake patterns in the same metal contaminated media for 8 weeks. The enrichment factor of each metal in the different parts of the vegetables was highly varied. However, the fruits of pepper were more enriched with these metals than the okra fruits. Despite the concentration of metals used, the plants were still capable of controlling the metal uptake, no matter the concentration of metal solution applied to the soil. (*Journal of Applied Sciences* 9 (8): 1573-1577, 2009; doi: 10.3923/jas.2009.1573.1577)

Reinvestigation of Relationship Between Macroeconomic Indexes and Energy Consumption in Iran

M. Ghorbani, H. Mansoori and S. Hamraz

In this study, attempted to investigation the relationship between energy consumption in economic sectors and macroeconomic indexes of Iran for 1970-2000 by using Vector Error Correction Model (VECM). Result showed that a long run relationship existence between total energy consumption, price index and gross national product. With respect to results stabilization energy price policy in economical growth conditions will encourage energy demand dimension. So, government must change energy price policy towards variable pricing based on amount of consumption especially in peak and load duration. (*Journal of Applied Sciences* 9 (8): 1578-1582, 2009; doi: 10.3923/jas.2009.1578.1582)

Evaluation of Two *Lupinus* Species Native from Central Mexico in Relation with Solubilization of Nitrogen, Phosphorus and Potassium in an Andosol

Angel Alderete-Chavez, Vicente Espinosa Hernández, Nancy De la Cruz-Landero, Enrique Ojeda Trejo and Hortencia Brito Vega

In Mexico there are few studies about lupine native species. In the oriental slope of the Sierra Nevada Mexico 5 species of *Lupinus* growing in soil andosol were identified and seeds of the plants were collected. The *Lupinus* species play an important ecological role by providing favorable conditions for the restauration of

soils in forest areas after fire, in agriculture acidification of soil and solubilization of nutrients. Data about the performance of *Lupine* native species and the characterization of its behavior during the growing cycle and the extraction of Nitrogen (N), Phosphorus (P) and Potassium (K) is not available. The present research was realized to explore the capacity of two species *Lupinus leptophyllus* and *Lupinus montanus*. An exploratory study under greenhouse conditions was realized to obtain the tendencies in the concentration of C, N, P and K available in the soil through time. For the two species there were an increase in the percentage of nitrogen and phosphorus at 120 days and for potassium at 80 days. (*Journal of Applied Sciences* 9 (8): 1583-1587, 2009; **doi:** 10.3923/jas.2009.1583.1587)

Influence of Al Dopant on the Optical and Electrical Properties of Zinc Oxide Thin Films Prepared by Spray Pyrolysis

A. Alaeddine, I. Rachidi, F. Bahsoun, Y. Mohanna, O. Bazzi and F. El Haj Hassan

Pure and aluminum doped ZnO transparent thin films were prepared by spray pyrolysis. ZnO thin films are formed by decomposition of $(\text{Zn}(\text{CH}_3\text{CO}_2)_2 \cdot 2\text{H}_2\text{O})$ to ZnO. The aluminum doping, Al/Zn of 4/96, was achieved by the addition of $\text{AlCl}_3 \cdot 2\text{H}_2\text{O}$ in methanol solution of the chemical complex $(\text{Zn}(\text{CH}_3\text{CO}_2)_2 \cdot 2\text{H}_2\text{O})$. The films are transparent ($> 80\%$ optical transmission) in the near UV, VIS and near IR ranges. X-ray diffraction analysis indicates that the crystallites of both ZnO and ZnO:Al thin films are preferentially oriented along the c-axis, [002] direction of the hexagonal compact structure of type. The electric properties (electrical conductivity and electrical mobility) and the optical property (transmittance) of aluminum doped ZnO films have been measured. The results have been compared to those obtained with undoped ZnO thin films. The doping modifies the structure and the morphology of the obtained films and it increases the optical transmittance and the electrical conductivity. (*Journal of Applied Sciences* 9 (8): 1588-1592, 2009; **doi:** 10.3923/jas.2009.1588.1592)

Effects of Persica Mouthwash on Oral Microbiota of Cleft Lip and Palate Patients During Fixed Orthodontic Treatment

H.H. Jajarm, A. Jahanbin, N. Mokhber, S. Gooyandeh, A. Mansourian and J.M. Beitollahi

The aim of this study was the evaluation of Persica mouthwash on oral microbiota in cleft lip and palate patients before and 6 weeks after fixed orthodontic

treatment. In this clinical trial, a convenience sample of seventeen bilateral or unilateral cleft lip and palate patients aged 13-23 years old were selected. Before placing fixed standard edgewise orthodontic appliances, a sample of sublingual saliva was taken from the patients. The patients were asked to use either the Persica mouthwash or not to use any mouthwash for a 6 week period. Oral microbiota included *Candida albicans*, *Staphylococci*, *E. coli*, Enterobacteriaceae, Gram positive bacilli, *Viridanse streptococci* and *Streptococci mutans* were assessed before and immediately following the experiment. This study showed that after 6 weeks in 44.4% of cleft lip and palate patients who used Persica mouthwash the level of *Candida albicans* increased compared with 0.0% of patients who were not Persica users (p-value = 0.03). Comparison of other microorganism changes after 6 weeks in 2 groups was not statistically significant (p>0.05). Persica mouthwash can not alter oral microbiota in cleft lip and palate patients during a six-week period except for *Candida albicans* which can increase the growth of it. (*Journal of Applied Sciences* 9 (8): 1593-1596, 2009; doi: 10.3923/jas.2009.1593.1596)

The Study of Qualitative Factors Influencing on Honey Consumers Demand: Application of Hedonic Pricing Model in Khorasan Razavi Province

M. Ghorbani and N. Khajehroshanaee

In this study, surveyed the consumers demand for qualitative factors of honey by using the Hedonic Pricing (HP) model and a cross section data of 360 consumer in Mashhad. Results showed that the kind (without wax), packing, color (dark), scent (scented) and protraction of honey have direct effect on honey price and sweetness (much) and existence of remains (dust and so on) have negative effect on it. This study has recommended the applied research for making honey without wax, with suitable and interesting packing, dark color, scented, less and normal sweetness, much protraction and any pollution (like dust and remains). (*Journal of Applied Sciences* 9 (8): 1597-1600, 2009; doi: 10.3923/jas.2009.1597.1600)

A Review on Positioning Techniques and Technologies: A Novel AI Approach

O. Motlagh, S.H. Tang, N. Ismail and A.R. Ramli

There are variety of positioning techniques applied to tracking of mobile objects such as mobile robots, handheld devices carried by human subject, etc. With the

advent of new technologies, new strategies have emerged from combination of algorithms and those technical capabilities. This study is dedicated to a review of past and current approaches to positioning, including their advantages and shortcomings. More focus is given on trilateral radiolocation especially for indoor human motion tracking. A solution is sought to resolve the problem of algorithm failure with applicability to all areas of positioning and tracking including trilateration when less than three reference points are available. (*Journal of Applied Sciences* 9 (9): 1601-1614, 2009; doi: 10.3923/jas.2009.1601.1614)

Seismic Analysis of Underground Spaces to Propagation of Seismic Waves (Case Study: Masjed Soleiman Dam Cavern)

S. Balideh, K. Goshtasbi, H. Aghababaei, N. Khaji and H. Merzai

This research has been carried out with the purpose of studying wave propagation in elastic environments as well as its simulation on the basis of numerical and analytical methods. The results obtained have been used as a case study dynamic modeling the Masjed-Soleiman's cavern. Therefore, first the relationship between the model's optimum mesh size and the frequency and the input wave amplification was determined so that the results obtained could be used to verify the numerical model developed for analyzing the cavern dynamically. Then, strains obtained from the wave's propagation of earthquake in Masjed Soleiman were studied under free field boundary conditions. The results obtained show that the power house cavern of Masjed Soleiman was resistant with regard to the record applied. (*Journal of Applied Sciences* 9 (9): 1615-1627, 2009; doi: 10.3923/jas.2009.1615.1627)

Geochemistry, Mineralization and Alteration Zones of Darrehzar Porphyry Copper Deposit, Kerman, Iran

R. Derakhshani and M. Abdolzadeh

The goal of this study is focused on alteration, mineralization and geochemistry of Darrehzar porphyry copper deposit which is situated in the Central Iranian Tectono-Volcanic Belt. This deposit is associated with an Oligocene granodiorite stock which intruded Eocene Volcano-Sedimentary and Cretaceous carbonate rocks. Four distinct types of hypogene alterations are recognized at Darrehzar: potassic, phyllic, argillic and propylitic. Copper mineralization was accompanied

mainly by phyllic and to a lesser extent potassic, alteration. In the potassic alteration zone, enrichment of K and depletion of Na, Ca, Mn and Fe took place. These changes attended replacement of plagioclase and amphibole by K-feldspar and biotite, respectively. Potassic alteration was associated with a major addition of Cu, as evident from the occurrence of disseminated chalcopyrite and bornite in this zone. Phyllic alteration was accompanied by depletion of Na, K, Fe and Ba and enrichment of Si and Cu. Losses of Na, K and Fe reflect sericitization of alkali feldspar and destruction of ferromagnesian minerals. The addition of Si is consistent with widespread silicification, which is a major feature of phyllic alteration, as well as the addition of Cu mobilized from the potassic zone. Petrographic studies of this porphyry copper deposit indicate that granodiorite association is mainly composed of plagioclase, quartz, orthoclase, biotite, sericite. The main mineralization-related alteration episodes (potassic, phyllic, argillic, propylitic) have been studied in terms of mass transfer and element mobility during the hydrothermal evolution of the Darrehzar copper deposit. (*Journal of Applied Sciences* 9 (9): 1628-1646, 2009; doi: 10.3923/jas.2009.1628.1646)

Use of Dynamic Models to Assess Impact of Changing Tea Prices on Family Income of Smallholders in Kenya

E.K. Nyaga and W. Doppler

This research aimed at understanding the effect of changing tea prices on welfare of smallholders in Kenya. A total of 60 tea farmers were interviewed. After data collection and preliminary analysis, multivariate cluster analysis was done to classify the families into two groups. Based on findings of statistical analysis of resources and living standards of the families, a strategy of changing the tea prices was formulated. Raising the prices of tea was hypothesized to increase family income. Ten year dynamic models were applied to measure the impact of this strategy on family income. Two types of data were used. The first set was averages from statistical analysis of survey data and the second set of data was prices of tea for a period of 12 years obtained from the local tea factory. Analysis of these prices indicated fluctuation and since the main objective was to test the impact of fluctuation on family income, future random prices were created using the 12 years prices. Optimal family income was first calculated using tea prices obtained from the survey and later recalculated using random prices. Results indicated that fluctuation in tea prices has low effect on stability of family income among the tea smallholders in the survey region. (*Journal of Applied Sciences* 9 (9): 1647-1657, 2009; doi: 10.3923/jas.2009.1647.1657)

Analysis of Capacitive Microelectromechanical System Accelerometer Proposed with Voltage Reference in Read-Out Circuit

M.A. Miskam, O. Sidek and A.Z. Ruhaifi

This study, present the analysis of the capacitive in-plane linear comb drive microelectromechanical system (MEMS) accelerometer using system-level simulation techniques, Finite Element Method (FEM) and simple analytical modeling. The silicon on insulator high aspect ratio micromachining (SOI-HARM) process is use to fabricate the device. The behavior of the device will be simulated using DC operating point analysis, mechanical resonance frequency analysis, vary analysis, DC transfer analysis and transient analysis. The results agree well with the results obtained by Architect, FEM and analytical analysis. The design methodology and circuit implementation of bandgap reference for MEMS accelerometer also will be described. A low variation in voltage reference is proposed and simulated using Silterra 0.13 μm CMOS technology. The voltage reference is operated with a supply voltage of 2.5 V to achieve an output reference of 1.17949 V. The circuit has achieved a very small variation in reference voltage of about ± 0.36 mV resulting from temperature changes between -50 to 100°C and maximum PSSR of -49.03 dB. (*Journal of Applied Sciences* 9 (9): 1658-1667, 2009; doi: 10.3923/jas.2009.1658.1667)

A New Lyapunov-Based Design Scheme for Adaptive Friction Compensation

A. Yazdizadeh, S.M. Noorbakhsh and R. Barzamini

A new method for adaptive friction compensation in mechanical control systems is developed. The design is based on Lyapunov technique and attempts to compensate for frictional force by estimating the unknown Coulomb friction coefficient. The contribution of this paper is to generalize the Friedland and Park's method and show that it is possible to include their scheme as a special case of the proposed method. More specifically, it is shown that for asymptotic stability of the error dynamics the constraint on the velocity is removed in both cases of time varying (without any constraint on frequency) and time invariant friction coefficient. Furthermore, an analytical procedure is developed for designing a general nonlinear friction estimator. Simulation results confirm the advantages of the proposed methods for a simple single-mass system as well as a more complicated system such as a two-link planar rigid robot manipulator. (*Journal of Applied Sciences* 9 (9): 1668-1676, 2009; doi: 10.3923/jas.2009.1668.1676)

An approach to Determine the Revenue Share of Each FACTS Device under Deregulated Environment

M. Majidi Qadikolai and S. Afsharnia

Under deregulated environment, transmission networks are operated close to their constraints. In this situation, FACTS devices can be useful in secure system operation. The obtained benefits of these devices have not been quantified and distinguished. In this study, for the first time, a method is proposed to calculate the revenue share of each FACTS device in the network by considering the role of FACTS devices in congestion management, reliability improvement and voltage profile improvement. Moreover, this method provides suitable economic signals for optimal FACTS devices expansion planning. To verify the proposed method, a 9-bus power system has been simulated in MATLAB/Simulink and Optimization Toolboxes. (*Journal of Applied Sciences* 9 (9): 1677-1685, 2009; *doi*: 10.3923/jas.2009.1677.1685)

Analysis and Correlation Studies on Gluten Quantity and Quality During Production

D.N. Abang Zaidel, N.L. Chin, Y.A. Yusof and R. Abd Rahman

Three factors, mixing times (5-11 min), salt (2-8%) and water levels (61.4-65.4% for strong flour and 57.5-61.5% for weak flour) were investigated during dough mixing for the production of gluten in terms of its quantity and quality and its correlation. Quantity of gluten was measured by weighing the wet gluten content obtained from doughs washed under running tap water. The wet gluten was dried using air oven drying method to obtain the dry gluten content. In terms of quality, volume expansion analysis was performed by frying the wet gluten and measuring its volume expansion using mustard seed displacement method. The extensibility of gluten was determined using a tensile test attached to an Instron 5566 machine. Results show that gluten quantity and quality measurements gave good correlations with positive coefficient of correlation (R) which are stronger for strong flour ($0.60 < R < 0.80$) than for the weak flour ($0.30 < R < 0.50$). These correlations can be used in the gluten based industry to improve the production of gluten with respect to both the quantity and quality. (*Journal of Applied Sciences* 9 (9): 1686-1694, 2009; *doi*: 10.3923/jas.2009.1686.1694)

An Extension of Multi-Response Optimization in MADM View

M. Bashiri and T.H. Hejazi

Multiple Response Surface (MRS) is the useful way to satisfy more than one output characteristic. It's originated from statistical approach to estimate relations between inputs and output variable called Response Surface Methodology (RSM). This study reviews important Multi-Response Optimization (MRO) methods and uses Multiple Attribute Decision Making (MADM) methods such as VIKOR, PROMETHEE II, ELECTRE III and TOPSIS in converting multi-response to single response in order to analyze the robust experimental design. Finally, numerical results and comparison of MADM methods are shown. (*Journal of Applied Sciences* 9 (9): 1695-1702, 2009; doi: 10.3923/jas.2009.1695.1702)

A Volume Decomposition Model to Determine Machining Features for Prismatic Parts

M. Houshmand and D.M. Imani

Selection and development of machining features are the core activity in process planning. Usually the machining features development is done by experts according to elementary volumes. Performing this process by experts develops a limited machining features and the optimum solution may be missed. In this study a new method is developed to generate machining features and analyzes them to extract feasible features. The feasible solution is based on technical limitation of parts without any expert's judgments. Also it uses a set covering optimization technique to extract optimum one. Finally, the numerical results are presented and performance of the proposed method is tested by some candidate parts. (*Journal of Applied Sciences* 9 (9): 1703-1710, 2009; doi: 10.3923/jas.2009.1703.1710)

An Efficient Δ -Causal Algorithm for Real-Time Distributed Systems

S.E. Pomares Hernandez, E. Lopez Dominguez, G. Rodriguez Gomez and J. Fanchon

The study presents an efficient Δ -causal algorithm for the transmission of real-time continuous media (e.g., audio and video) in distributed systems. The Δ -causal algorithm is oriented to be used in real-time collaborative applications, such as

Teleconferencing and Teleimmersion. The Δ -causal algorithm ensures causal delivery of messages with time constraints in partial-reliable and asynchronous networks without using global references. To achieve this, the algorithm introduces an original Forward Error Correction (FEC) mechanism and a method to calculate the message lifetime based on relative time points. One interesting aspect of the FEC mechanism is that the redundant data sent is dynamically adapted according to the behavior of the system. Finally, it is shown that the Δ -causal algorithm is efficient in terms of the overhead (causal history) attached per message. (*Journal of Applied Sciences* 9 (9): 1711-1718, 2009; doi: 10.3923/jas.2009.1711.1718)

Effects of Impregnation with Timbercare Aqua to Surface Roughness of Some Varnishes

A. Togay, Y. Kılıç and M.H. Çolakoglu

This study has been performed for determining the impacts of impregnation with Timbercare Aqua (TA) to surface roughness of some varnishes. For analysis, measurements were performed in the vertical direction of fibers by using Mitutoya SurfTest-301 stylus scanner device. Roughness values were determined with $\pm 0.01 \mu\text{m}$ sensitivity where scanning length (l_t) was 12 mm and sampling length was (λ_c) 2.5 mm according to TS 971 and ISO 4288 standards. As a result, Surface roughness (R_a) mean value was measured as highest in oak ($3.359 \mu\text{m}$), in waterborne interior space varnish ($2.465 \mu\text{m}$) and TA and one layer application ($3.320 \mu\text{m}$). For the combination of wood, type of varnish and impregnation process, surface smoothness was lowest in combination of Scotch pine and polyurethane varnish and one layer impregnation ($0.433 \mu\text{m}$) and highest in combination oak and interior space varnish and one layer impregnation with TA ($6.502 \mu\text{m}$). R_a was measured highest on the surfaces impregnated with TA. So, it can be said that TA has an increasing effect on the surface roughness of woods. (*Journal of Applied Sciences* 9 (9): 1719-1725, 2009; doi: 10.3923/jas.2009.1719.1725)

Relationship Between Socio Cultural Attitudes, Appearance and Body Dissatisfaction among Students of Islamic Azad University

G. Pasha and F. Golshekeh

This study examined the relation between socio cultural attitudes, appearance and body dissatisfaction in males and females students. In this study 331 student

(156 boys and 155 girls) were selected via., stratified random sampling. Tools for measurement were body dissatisfaction and body mass index. As expected, girls showed higher body dissatisfaction and total SATAQ-3. The SATAQ-with four subscales (pressures, importance and internalization-general and internalization-athlete boys. In addition, for girls the strongest predictor of body dissatisfaction was importance, pressure, internalization general, whilst for boys the strongest predictor was pressure and importance. (*Journal of Applied Sciences 9 (9): 1726-1732, 2009; doi: 10.3923/jas.2009.1726.1732*)

Efficiency Differences Across High Schools in Niğde, Province of Turkey

A. Ergülen and I. Torun

This study investigates efficiency differences among high schools in Niğde Province of Turkey assuming both constant returns and increasing returns technology in empirical educational production function. The analysis was based on Data Envelopment Analysis (DEA) using linear programming. In addition, to determine whether outliers affects efficiency scores, the Jackknifing method and Spearman rank correlation coefficients were employed. The evidence provided by both of the tests showed that the DEA results are consistent. The results obtained from the DEA analysis imply that all the schools subject to the analysis appear to have had adequate resources, if fully utilized. When the constant (variable) returns technology is employed, the total inefficiency is about 38 (31%) and out of the 35 schools, about 89 (74%) were found to be inefficient. The results that the number of efficient schools has increased when variable returns technology is assumed imply that scale economies are important in education and the use of increasing returns technology in education production function is more appropriate. (*Journal of Applied Sciences 9 (9): 1733-1739, 2009; doi: 10.3923/jas.2009.1733.1739*)

A Tabu Search Approach to Hybrid Flow Shops Scheduling with Sequence-Dependent Setup Times

M.B. Abiri, M. Zandieh and A. Alem-Tabriz

This study describes a Tabu Search (TS) algorithm approach to the scheduling of a sequence-dependent setup times hybrid flow shop. The details of a TS approach are described and implemented. The results obtained are compared with those computed by Random Key Genetic Algorithm (RKGA) presented earlier. From

the results, it was established that TS outperformed RKGA. (*Journal of Applied Sciences 9 (9): 1740-1745, 2009; doi: 10.3923/jas.2009.1740.1745*)

A Novel Inertial Technique to Measure Very High Linear and Rotational Movements in Sports, Part I: The Hardware

Abbas Meamarbashi

In sports biomechanics, videography provided an indirect measurement method for measuring sport movements. However, these techniques are expensive, bulky and not portable. A novel inertial data logger designed to record the linear and rotational movements in three axes at 200 Hz and save the data on a memory card. A custom PC software was developed to measure the kinematics parameters (linear and angular accelerations and velocities) and compute the kinetic parameters (force, torque, angular momentum, impulse and angular power) of the attached limb during performance. The current system is applicable in sports that involve high linear and rotational kinematics and high impact contact. Evaluation of the sensor module at 500 °/sec showed very good validity and reliability of angular velocity ($r = 0.954$, $p < 0.0001$; Cronbach's Alpha = 0.973) and angular acceleration ($r = 0.905$, $p < 0.0001$; Cronbach's Alpha = 0.960), respectively as compared to values obtained at 300 and 210 °/sec. It is able to measure angular velocity up to $\pm 100,000$ °/sec and linear acceleration up to $2,452$ m/sec². This is light, cheap, reliable, robust and accurate system to measure high kinematic and kinetic parameters in the field. This approach is in contrast to current high-tech videography systems that are expensive, bulky and cumbersome. This novel technique is suitable in Soccer, Rugby, American Football, Tennis, etc. to evaluate the player's performance in the field. (*Journal of Applied Sciences 9 (9): 1746-1751, 2009; doi: 10.3923/jas.2009.1746.1751*)

Optimization of a Detector Collimator for Use in a Gamma-Ray Backscattering Device for Anti-Personal Landmines Detection

H. Tavakoli-Anbaran, H. Miri-Hakimabad and R. Izadi-Najafabadi

In the present study, a new detector collimator has been designed to detect the buried anti-personal (AP) landmines for use in gamma-ray backscattering device, with Monte Carlo method. The new detector collimator is made by lead and it has the cylindrical shape with 11.2 mm in height, 12.6 mm in inner radius, 13.3 mm in

outer radius and 0.7 mm in thickness of the shielding layers around detector. The mass of the designed detector collimator is also 7.24 g. (*Journal of Applied Sciences* 9 (9): 1752-1757, 2009; *doi*: 10.3923/jas.2009.1752.1757)

Developing a Knowledge-Based Spatial Decision Support System for Urban Landuse Allocation

H. Heydari Main and M. Saadi Mesgari

Landuse planning problems are categorized as complicated locational decision-making problems. This complexity makes us unable to solve such problems with common methods. It seems using intelligent systems such as expert systems and integrating those with decision support systems can help us to overcome with urban landuse planning problems. In this study, first it will be shown why a knowledge-based spatial decision support system is suitable for solving urban planning problems and EALUA that has been designed and developed by researcher with aforesaid architecture for encounter with urban problems will be introduced. Finally, result of using EALUA will be evaluated. (*Journal of Applied Sciences* 9 (9): 1758-1763, 2009; *doi*: 10.3923/jas.2009.1758.1763)

Influence of Sand/Cement Ratio on Mechanical Properties of Palm Kernel Shell Concrete

H. Mahmud, M.Z. Jumaat and U.J. Alengaram

An experimental investigation was carried out to improve the mechanical properties of Palm Kernel Shell Concrete (PKSC) by varying sand content and incorporating mineral admixtures, to achieve strength of 35 MPa. The mineral admixtures included 10% silica fume as additional cementitious material and 5% class F fly ash as cement replacement material. Sand to cement ratio (s/c) was varied between 1.0 and 1.6 and superplasticizer was added to all mixes to provide adequate workability. Twenty-eight days saturated density and compressive strength of the concrete were in the range of 1850-1960 kg m⁻³ and 28-38 MPa, respectively. Increase in sand content has positive influence on the mechanical properties of concrete. When the sand to cement ratio was increased from 1.0 to 1.6, increase in 28 day compressive strength by about 24% was noted for a small density increase of about 4%. The other mechanical properties such as flexural and splitting tensile strengths were found in the range of 2.76-4.76 and 1.9-2.61 MPa, respectively over a period of 90 day. The static modulus of elasticity was in the range of 8-11 GPa. These results confirm that the combined use of maximum

sand to cement ratio of 1.6 and mineral admixtures have significant influence on the mechanical properties as compared to the previous research findings. The addition of silica fume resulted in cohesive mix and use of a superplasticizer can provide slump in the range of 65-105 mm. However, an increase of s/c ratio beyond 1.6 is likely to increase the concrete density above 2000 kg m^{-3} . (*Journal of Applied Sciences* 9 (9): 1764-1769, 2009; doi: 10.3923/jas.2009.1764.1769)

An Application of Fuzzy Numbers Ranking in Performance Analysis

A. Hatami-Marbini, S. Saati and A. Makui

Data Envelopment Analysis (DEA) is a mathematical optimization technique that measures the relative efficiency of Decision Making Units (DMUs) with multiple input-output. In traditional DEA models, the data of different DMUs are assumed to be measured by precise values. But, in many real applications there are some imprecise data which represented by fuzzy numbers. In this study, an application of ranking fuzzy numbers is introduced and CCR model with fuzzy inputs and outputs in DEA is extended to propose an innovative version of fuzzy DEA (FDEA). In fact, we transform a fuzzy DEA model to a conventional crisp model by applying ranking fuzzy numbers method. Three numerical examples including an application to bank branches assessment at capital city of Iran are finally applied using the proposed fuzzy CCR model to show its applications and the differences from the other fuzzy DEA models. (*Journal of Applied Sciences* 9 (9): 1770-1775, 2009; doi: 10.3923/jas.2009.1770.1775)

Non-Simultaneous Market Timing in Mutual Funds

Juan C. Matallín-Sáez

The objective and contribution of this study is to analyse market timing over non-simultaneous periods. This approach considers that decisions on portfolio risk could affect the fund return in subsequent periods and not only the simultaneous period. Robust estimates of changes in beta are computed by Kalman filtering. Initial results for a sample of Spanish mutual funds do not evidence market timing ability in general, although a higher number of funds, particularly larger funds, present negative timing. The study shows how the evidence of negative timing is more robust and persistent for a longer term window. For shorter terms the evidence is driven by an omitted benchmark bias from negative timing of small cap stocks. A comparison of these results with those

achieved by a set of passive benchmarks following a buy and hold strategy demonstrates that the long term evidence of negative timing in mutual funds is the result of management contrary to a buy-and-hold strategy. (*Journal of Applied Sciences 9 (9): 1776-1780, 2009; doi: 10.3923/jas.2009.1776.1780*)

Microbiostratigraphy of the Tarbur Formation, Zagros Basin, Iran

I. Maghfouri-Moghadam, R. Zarei-Sahamieh, A. Ahmadi-Khalaji and Z. Tahmasbi

The Tarbur Formation is a predominately carbonate lithostratigraphic unit that outcrops in Zagros basin, between main Zagros reverse fault and high Zagros and east of Sabzpushan faults. This Formation was studied from microbiostratigraphic point of view at four measured sections, in the north of Khorram Abad (Robot section) in the east of Khorram Abad (Chamsngar section) in the east of Shirz (Sarvestan section) and in the south east of Semirum (Balghar section). Microbiostratigraphical data mainly based on foraminifera which among them, species of *Loftusia* have more variety and abundance, so the species of *Loftusia* from the measured sections are used to determine the age of successions. It is analogous to *Omphalocyclus-Loftusia* assemblage zone but according to the distribution of the index species of *Loftusia* the age of Tarbur Formation is Early-Middle Maastrichtian at Sarvestan section and Middle Maastrichtian for Balgar, Robot and Chamsangar sections. (*Journal of Applied Sciences 9 (9): 1781-1785, 2009; doi: 10.3923/jas.2009.1781.1785*)

Forecasting Precipitation with Artificial Neural Networks (Case Study: Tehran)

M.H. Gholizadeh and M. Darand

Artificial Neural Networks (ANN), which emulate the parallel distributed processing of the human nervous system, have proven to be very successful in dealing with complicated problems, such as function approximation and pattern recognition. Rainfall forecasting has been a difficult subject due to the complexity of the physical processes involved and the variability of rainfall in space and time. Artificial Neural Networks (ANN), which perform a nonlinear mapping between inputs and outputs, are one of the techniques that are suitable for rainfall forecasting. Multiple perceptron neural networks were trained with actual monthly precipitation data from Tehran station for a time period of 53 years. Predicted

amounts are of next-month-precipitation in the next year. The ANN models provided a good fit with the actual data and have shown a high feasibility in prediction of month rainfall precipitation. Combination neural networks with Genetic algorithm showed better results. (*Journal of Applied Sciences 9 (9): 1786-1790, 2009; doi: 10.3923/jas.2009.1786.1790*)

A Cash Flow Oriented EOQ Model with Deteriorating Items Under Permissible Delay in Payments

Kuo-Lung Hou and Li-Chiao Lin

This study develops an inventory model to determine an optimal ordering policy for deteriorating items with delayed payments permitted by the supplier under inflation and time discounting. This study applies the discounted cash flows approach for problem analysis. Mathematical models have been derived for obtaining the optimal cycle time and optimal payment time for item so that the annual total relevant cost is minimized. The present value of the annual total relevant cost in this inventory system is developed first, then an optimal number of replenishment, cycle time and order quantity are obtained by a solution procedure. Finally, a numerical example is given to illustrate the results. (*Journal of Applied Sciences 9 (9): 1791-1794, 2009; doi: 10.3923/jas.2009.1791.1794*)

Stability of the Cubic Functional Equation in Menger Probabilistic Normed Spaces

S. Shakeri, R. Saadati, Gh. Sadeghi and S.M. Vaezpour

In this study, the stability of the cubic functional equation: $f(2x+y)+f(2x-y) = 2f(x+y)+2f(x-y)+ 12f(x)$ in the setting of Menger probabilistic normed spaces is proved. (*Journal of Applied Sciences 9 (9): 1795-1797, 2009; doi: 10.3923/jas.2009.1795.1797*)

Use of Plastic Primer Container Covers as Effective Plug Molds for Pulsed-Field Gel Electrophoresis

Kah Heng See, Kek Heng Chua and S.D. Puthuchery

Plug molds used for PFGE can be expensive to purchase and often physically and experimentally inflexible. The use of plastic primer container covers as plug molds for Pulsed-Field Gel Electrophoresis (PFGE) is reported in this study. These

plastic covers are cheap, effective and easy-to-use for processing samples for electrophoresis. Besides, the broad surface and flat area in the mold promotes faster cooling and the agar sets quickly at room temperature. Plugs are also easily removed with a spatula. These containers can be easily cleaned for re-use or disposed of as waste. Twenty samples can be prepared in one container. The PFGE results obtained by using these plastic primer-container covers as plug molds are similar to the PFGE results obtained by using commercial plug molds. (*Journal of Applied Sciences* 9 (9): 1798-1800, 2009; **doi:** 10.3923/jas.2009.1798.1800)