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Volume 25, No. 2 **(November, 2013), pp 1 – 10**

Fractional Duffing Oscillator

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Abstract

We solve the linearly damped fractional mechanical oscillator equation using the Laplace transform method. The solution is expressed in terms of the two-parameter Mittag-Leffler function. We considered the effect of damping and of the fractional order on the response function. We observe a significant influence of the fractional derivative on degree of damping.

Keywords: Laplace transforms, Rieman-Liouville fractional integral, Caputo's fractional derivative, Mittag-Leffler function, Fractional differential equation, Damping.

Volume 25, No. 2 **(November, 2013), pp 11 – 20**

Semistate Equations of Duffing Van Der Pol and Bonhoffer Van Der Pol Electronic Circuits With Memristor

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Abstract

In this paper, we derived and solved the Semistate equations obtainable from both memristive extended Duffing Van Der Pol "DVPo" oscillator and extended Bonhoeffer Van Der Pol "BVPo" oscillator respectively. The aim is to characterize and compare the tractability index of these models under passivity assumptions, a key issue for the numerical and experimental simulation of circuit dynamics. We also extend these index analyses to strictly passive circuits including memristors, and a projector-based

tractability index along the image of the leading matrix which was used as mathematical discussion. The solutions obtained showed that the extended BVPo and the extended DVPo equations were of index two models due to their combination of memristors' fluxes and charges, and which also indicate the property of being a chaotic system.
Keywords: Semistate equation , Memristor, Duffing Van Der Pol, Bonhoeffer Van Der Pol, Tractability index, Index characterization, Index two model.

Volume 25, No. 2 **(November, 2013), pp 21 – 24**

Brinkman-Forchiemer Extended Model in Co-Axial Horizontal Cylinders Filled With Porous Material: An Approximate Analytical Approach

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Abstract

An approximate analytical solution is presented for pressure driven flow between co-axial horizontal cylinders filled with porous material. The Brinkman-Forchheimer extension of Darcy equation is utilized to model the fluid flow in the annulus. The result obtained is compared to those obtained from an implicit finite-difference solution of the corresponding time dependent flow problem. It was noticed that the time dependent flow solution yields almost same with steady state values as obtained by using the proposed approximate analytical solution approach.

Keywords: Forchheimer term, Injection, Pressure-driven, Analytical solution.

Volume 25, No. 2 **(November, 2013), pp 25 – 32**

Computational Approach for Reactive Third Grade Fluid Flow through A Non-Darcian Porous Medium

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Abstract

In this paper, a successive approximation method is presented to study the steady flow of a reactive third grade fluid under Arrhenius kinetics through parallel isothermal walls filled with non-Darcian porous medium. Approximate solutions to the strongly nonlinear ordinary differential equations arising from the model are obtained by using Adomian decomposition method (ADM). Parametric study of the solutions are presented and discussed, including the convergence analysis of the series solution.

Keywords: Third grade fluid, ADM, non-Darcian porous medium, reactive fluid.

Volume 25, No. 2 **(November, 2013), pp 33 – 38**

Temperature-Dependent Variable Viscosity of a Laminar Flow in a Channel Filled With Saturated Porous Media

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Abstract

In this paper, we examined temperature-dependent variable viscosity of laminar flow in a channel filled with porous media. We employed Galerkin weighted residual method to solve the resulting non-linear equation. The results show the effects of viscosity parameter, Reynolds number ,Darcy number and Brinkman number on the flow system.

Keywords: Laminar flow, Darcy number, Variable viscosity , Weighted residual method.

Volume 25, No. 2 **(November, 2013), pp 39 – 48**

A Fourth Order Modified Block Backward Differentiation Formula for System of Stiff Initial Value Problems.

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Abstract

***Abstract:** This paper presents a fourth order Modified Block Backward Differentiation Formula (MBBDF) for the numerical solution of stiff ordinary differential equations. This is achieved by constructing a Modified Backward Differentiation formula (MBDF) with continuous coefficients together with the additional methods from its first derivative and are combined to form a single block that simultaneously provide the approximate solutions for the stiff Initial Value Problems (IVPs). The stability property of the (MBBDF) is discussed and the performance of the method is demonstrated on some numerical examples to show the accuracy and efficiency advantages of the method.*

AMS Subject Classification: 65L05 65L06
Keywords: Modified Backward Differentiation Formula, Block method, Initial value problems, Stability.

Volume 25, No. 2 **(November, 2013), pp 49 – 54**

A Family of Zero Stable Block Integrators for the Solution of Ordinary Differential Equations

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Abstract

In this paper, linear multistep technique using power series as the basis function is used to develop the block methods which are suitable for generating direct solution of the special second order ordinary differential equations with associated initial or boundary conditions. The continuous hybrid formulations enable us to differentiate and evaluate at some grids and off – grid points to obtain two different discrete schemes of order four and five respectively, which were used in block form for parallel or sequential solution of the problems. The computational burden and computer time wastage involved in the usual reduction of second order problem into system of first order equations are avoided by this approach. Further more, a stability analysis and efficiency of the block methods are tested on linear and non-linear ordinary differential equations and the results obtained compared favourably with the exact solution.

Keywords: Block Method, Hybrid, Linear Multistep Method, Self – starting.

Volume 25, No. 2 **(November, 2013), pp 55 – 64**

A Financial Option Based Model for Pricing Multiple Grid Compute Cycles

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Abstract

A large corpus of existing literature in grid computing shows the presence of higher concentration of research efforts in grid middleware framework development, grid resource scheduling, grid economy, and grid security. An important aspect of grid computing that is missing is the pricing of grid resources across multiple grids. Existing research efforts in grid computing that priced grid resources, priced only a single grid resource in one grid. However, in a real life scenario, subscribed grid resource users require more than one resource (which are not available in one grid at all time) to complete a computationally intensive job. Two characteristic challenges of the computational grid that make pricing the resources across multiple grids a hard problem are grid resources availability is transient since they only exists as non-storable grid compute cycles (gcc) and grid resources are distributed geographically across dissimilar organizations with diverse resources usage polices. Therefore, a model that price grid resource across multiple grids must guarantee resources availability measured as Quality of Service (QoS). This paper is positioned to present a novel design of a model to price grid resources across multiple grids using the financial option theory from a real option perspective and value the grid resources by treating them as real assets. We integrate our financial option pricing algorithm into GridSim Toolkit Simulator to simulate our grid environment.

Keywords: Option Pricing; Trinomial Tree; Computational Finance; Pricing Factor; Compute Cycles.

Volume25, No.2 **(November, 2013), pp 65 – 72**

Musculoskeletal Magnetic Resonance Imaging Segmentation Using Finite Element Method

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Abstract

This research work presents a method for segmentation of medical images based on a deformable contour (active contour) paradigm. The deformable contour is a novel approach in image segmentation. A type of active contour is the Snake. Snake is a parametric curve defined within the domain of the image. Snake properties are specified through a function called energy functional. This means they consist of packets of energy which expressed as partial Differential Equations. The partial Differential Equation is the controlling engine of the active contour since this project, the Finite Element Method (Standard Galerkin Method) implementation for deformable model is presented.

Keywords: Active Contour,Musculoskeletal,Magnetic Resonance, Imaging Segmentation, Finite Element Method (Standard Galerkin Method), Partial Differential Equation.

Volume 25, No. 2 **(November, 2013), pp 73 – 80**

The Use of Electrical Resistivity Survey in Locating Aquifers in Ilorin Area of Kwara State, Nigeria.

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Abstract

This research involved the use of electrical resistivity survey method for groundwater exploration in Ilorin area of Kwara State, Nigeria. The Vertical Electrical Sounding (VES) using Schlumberger array with maximum spread of 200m and partial curve matching /computer iteration techniques were used to interpret the data obtained with the aim of accurately predicting the depth to basement and aquifer. A total of ninety five VES were carried out and thirteen boreholes constructed. The predicted depths to basement from VES and the actual depths from the drilling log show a good agreement with each other and with results obtained from literature.
The results of the research also confirmed the already known geological units of the western Nigerian Basement Complex Terrain and the drilling exercise was successful.

Keywords: Groundwater, aquifer, iteration, geoelectric measurement and fractured zone

Volume 25, No. 2 **(November, 2013), pp 81 – 88**

Geol-electric Investigation of groundwater conditions: A case study of Ogwashi-Uku in Delta State, Nigeria.

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Abstract

The Ogwashi-Uku community has been grappling with water problems for many decades. This may be probably due to the topography of the area which made the aquifer very deep. The ground water potential of Ogwashi-Uku was therefore evaluated using geo-electric method to ascertain the nature of the problem.

Vertical Electrical Sounding (VES) data which were acquired from four locations evenly distributed showed that the curve types are AK, KH, HKAK and AK. The resistivity of the top soil ranges from 81 ohm-meter – 927 ohm-meter, while of the second and third layers are 96 – 1186 ohm – meter and 150 – 2977 ohm – meter, respectively.

The resistivity of the fourth layer ranges from 405 – 5105 ohm- meter. The study shows that viable aquifer is within 106m – 205m.

Finally, the study shows that the problem of ground water development in the area may have been exacerbated by improper bore hole design, completion and development.

Keywords: topography, aquifer, VES, curve types, top soil, groundwater, exacerbated.

Volume 25, No. 2 **(November, 2013), pp 89 – 94**

Evaluation of power supply outages in Edo State, Nigeria.

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Abstract

This study presents the evaluation of power supply outages in Nigeria, using Benin substation and Irrua Substation 33kv feeders, different causes of power outages and possible solution were highlighted. The obtained average data for a period of one year from 1st June, 2012 to 31th May 2013 are deployed in this analysis. Also, Energy losses from both Benin and Irrua feeder were analyzed, the following results are obtained; morning and evening peak period were determined, causes of outages were highlighted and energy loss (Mw) due to power supply outages. It was observed that the total energy (Mw) consume both in the morning and the evening has close correlation in all the nine areas considered, and open circuit faults occurrence on the transmission lines has the highest occurrence. It was observed that Guinness has the highest energy losses and highest load loss (MW).In addition; it is observed that 68% energy losses are from Benin region, while 32% are from Irrua region feeders.

Keywords: power outages, feeders, transmission, energy losses, and faults.

Volume 25, No. 2 **(November, 2013), pp 95 – 106**

ARIMA Modeling of Students Enrolment in University of Lagos (1965 – 2011)

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Abstract

Time series ARIMA model is applied to students' enrolment data of the University of Lagos from 1962 to 2012 to check the stability and detect relatively small shift in the admission process mean. The descriptive statistics of the data was presented. The data was modeled using ARIMA (0, 1, 1) and (2, 1, 2). The R square for ARIMA (0, 1, 1) is 37.24% and ARIMA (2, 1, 2) is 52.84% for the undergraduate. The postgraduate enrolment ARIMA (0, 1, 1) is 57.73% and ARIMA (2, 1, 2) is 62.73% respectively. The result shows that the undergraduate and postgraduate were out of control due to the common cause such as incremental rate in the admission process. Also, the special-cause plays an important role which is decay in the facilities, inadequate staff and equipments for teaching and research. The model diagnostic check indicates that ARIMA (2, 1, 2) was more fitted than ARIMA (0, 1, 1).

Keywords: Processes, Control charts, Control limits, Assignable causes, Corrective actions.

Volume 25, No. 2 **(November, 2013), pp 107 – 114**

Effect of rain on satellite communication networks in Nigeria: Case study of Warri town.

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Abstract

The uses of data, voice, video information has being on the increase due to industrial evolution and technological advancements. Therefore, the uses of satellite communication become imperative and due to natural phenomenon this system has experienced some drawback such as rain fading attenuation which is examined in this study "Effect of rain in satellite communication networks in Nigeria". Basic climate data were obtained from meteorological center in Nigeria, for period of one year. Also, satellite communication impairments (with a focus on rain attenuation) at Ka and ku band in Nigeria climate were highlighted. Case study of Warri environment, estimation of rain height, slang path, horizontal projection specific attenuation was determined based on the ITU-R prediction methods. The rain attenuation is calculated from different rainfall rates from exceedence percentages of the average year. The rain attenuation increases as rainfall rates increase. However, rainfall attenuation is strongly dependent on the operating frequency and the local rain rates. The rain height obtained is 0.381 Km and the specific attenuation obtained is 3.22 dB/km based on Warri town.

Keywords: rain attenuation, rain height, slang part, rainfall rate, ku and ka band.

Volume 25, No. 2 **(November, 2013), pp 115 – 120**

The Empirical Pattern of Arrival Rate in Mobile Communication Networks (GSM)

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Abstract

The paper presents the Empirical pattern of arrival rate in mobile communication networks (GSM). It is aimed at evaluating the best probability distribution of arrival calls distribution pattern in GSM networks. Description and properties of arrival rate were also highlighted. Data obtained from the MTN network were used. Arrival rate were obtained from the counter-probe link at OMC node of the network. Data were collected for a period of one year. The empirical model obtained based on the data collected was observed to follow an exponential distribution pattern with mean square error (MSE) of 0.675. The model was validated using chi-squared test statistical tool to determine the test of the hypothesis distribution of arrival rate based on the observed and expected data. The analysis showed that the Chi–square value obtained exceeded the critical value therefore the null hypothesis was rejected. Thus using the referenced network as a case study, exponential distribution was taken as the best probability distribution pattern of arrival calls in GSM mobile communication networks.

Keywords: Arrival rate, GSM, Poisson, Chi-square, hypothesis and distribution.

Volume 25, No. 2 **(November, 2013), pp 121 – 126**

Semi-relativistic treatment of Hellmann potential using Supersymmetric Quantum Mechanics

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Abstract

We present an analytical solution of the spinless Salpeter equation for a Hellman potential using the supersymmetric quantum mechanics formalism. We obtain the energy eigenvalues and the corresponding eigenfunctions expressed in terms of hypergeometric functions.

Keywords: Hellmann potential, supersymmetric quantum mechanics, Bethe-Salpeter equation.

Volume 25, No. 2 **(November, 2013), pp 127 – 130**

Calculation of the Radial Oscillator Function of The Angular Momentum Quantum Number

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Abstract

The main characteristic of harmonic oscillation is the fact that the oscillation frequency does not depend on the amplitude of the displacement. Thus all the circular and elliptical orbits have the same frequency. In considering harmonic oscillations, therefore, the three-dimensional quantum mechanical oscillator is usually employed. In this paper, we calculate the radial oscillation function for the angular momentum and radial momentum quantum number for a specified interval using a FORTRAN program (kap14) to compute the oscillation functions.The motivation of this study is to illustrate the power of code Kap 14 for the teaching of quantum mechanics.

Volume 25, No. 2 **(November, 2013), pp 131 – 134**

On Application of Matlab to the Solution of One Dimensional Finitely Damped String

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Abstract

The problem of vibration of plucked strings was investigated. The objective is to determine the vibrational behaviour and the decay rate of a guitar using nylon and steel strings. The derived Newton's second law of motion with damping coefficient was considered. The method of separation of variables was applied to solve the resultant equation. Using Matlab, the graphical result shows that nylon strings decay mainly as a result of internal damping in the strings while steel strings decay due to air viscosity. Therefore we conclude that nylon strings are under less tension than steel strings.

2010 mathematical subject classification:70E15,70E18,70F2

Keywords: motion, mechanical system, vibrations, damped strings, plucking technique, nylon and steel strings.

Volume 25, No. 2 **(November, 2013), pp 135 – 142**

Ground –State Total Energy of Small Atomic Systems Using the Hartree-Fock Method

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Abstract

We present the ground-state total energies of the first ten elements of the periodic table using the Fortran code developed by Koonin and Meredith in 1989 based on the Hartree-Fock method. Our results are in good agreement with previous results obtained using other theoretical and experimental methods.

Keywords: Hartree-Fock, atomic systems, many-body problem, many-electron problem.

Volume 25, No. 2 **(November, 2013), pp 143 – 156**

Investigating the Effect of Loss-of-Coolant on the Stability of Water-Cooled Reactor Design Models

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Abstract

Loss-of-coolant in the operating reactor usually causes instability in the reactor. To investigate the cooling problem of the reactor, two tests were conducted on safety margin. The first was applied to design temperature and design coolant flow rates while, the second was applied to design temperature and design volume of the fuel in the reactor core. The tests were carried out on some typical Water-Cooled Reactor Design (WCRD) models using Linear Regression Analysis Techniques. The results of the statistical analyses on these types of nuclear reactor models reveal that the WCRD models promises stability under application of small size of uranium (fuel) at 9g and below than large size of uranium (fuel) at 12g and above. Meanwhile, at 9g of fuel element the reactor seems to be most stable and safer as the regression plot was optimized. The safety margin prediction of up to 1.25% was validated for a typical WCRD model as an advantage over the current 5.1% challenging problem for plant engineers to predict the safety margin limit. The implication of this research effort to Nigeria's nuclear power project development.

Keywords: Keywords: Linear Regression Analysis, Water-Cooled Reactor Design Model with Normal Pressure, Water-Cooled Reactor Design Model with Abnormal Pressure, Safety Factor, Ỳ, Optimization, Stability Margin in Nuclear Power Reactor Designs

Volume 25, No. 2 **(November, 2013), pp 157 – 164**

Investigation of Hemispherical Thermal Emittance Using the Electrodeposition Technique on Bright Chrome Plated Thin Films at Different Percentage Concentration on Stainless Steel AISI 304 BA 2B For Possible Solar Energy Application.

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Abstract

A flat plate of stainless steel AISI 304 BA 2B was cut into 6 sample plates measuring (7.8cm x 7.7cm x 1.05cm) and polished using emery paper of grit numbers 100, 150 and 320 respectively, and vim polishing powder until their mirror finishing were obtained. The polished sample plates were thoroughly washed rinsed with distilled water, drip dried and were numbered. Each of the plates was chemically deposited in each freshly prepared solutions of 79 to 99% of chromic acid at 45^{0}C for deposition time of 10 minutes. Hemispherical thermal emittance values of the polished plates were measured before and after chemical deposition process. The hemispherical thermal emittance were found to increase slightly depending on the percentage concentration of the chromic acids in the solutions. The average hemispherical thermal emittance of

the polished plates was found to be 0.15 ± 0.01. The hemispherical thermal emittance values of the sample plates deposited in different percentage concentrations of the acids vary from 0.16 to 0.17 ± 0.01. The electrodeposition technique of stainless steel AISI BA 2B produced a spectrally selective surface with optimum values of hemispherical thermal emittance of 0.16 ± 0.01 obtain for 79% concentration of chromic acid with film thickness of 1.308 ± 0.001μm. This surface could be employed in fabrication of spectrally selective surface to enhance the efficiency of flat plate solar collector.

***Volume 25, No. 2* (November, 2013), pp 165 – 170**

Determination of Iodine and Bromine Along With Their Interfering Elements in Zaria Soils by Epithermal Neutron Activation Analysis

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Abstract

The concentrations of iodine and bromine along with the interfering elements were determined in soils samples. The complementary analytical technique of ENAA was used to determine 5 elements in the soil samples. The mean concentrations of I (4.76±2.38 ppm), Br(3.84±2.03 ppm), K(2.78±1.34 %), Mn(336.18±188 ppm) and Na(2266.7±1476 ppm) were determined establishing a base line data of these elements The obtained median values for elements I and Br of 3.91and 3.74 ppm in Zaria soil respectively were below the median values of world soils. The concentration ranges of major elements (major nutrients) such as K, Mn and Na in soil compared well with the reported world soil ranges.

Keywords: Epithermal Neutron Activation, Nigeria Research Reactor-1, Zaria Soils, Iodine and Bromine.

Volume 25, No.2 **(November, 2013), pp 171 – 176**

A Methodology for the Investigation of Cement Retrogression in HP HT Environments

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Abstract

This paper documents a methodology designed and used in the Faculty of Engineering, University of Benin for the determination of the compressive strength of some cement slurries under HP HT (High pressure, high temperature) without the use of a HP HT oven. It illustrates that in the absence of sophisticated laboratories much investigation maybe done by using the basic available equipments.

Keywords:HP HT, cement retrogression, indigenous sands, Ughelli sands

Volume 25, No. 2 **(November, 2013), pp 177 – 182**

Modelling the Bioremediation Rate of Domestic Wastewater Supplemented with Urea and NPK 15:15:15 Fertilizers

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Abstract

The kinetic modelling of the bioremediation of domestic wastewater supplemented with a 1:1 combination of urea and NPK fertilizers was investigated in this study. The batch bioremediation data was obtained by conducting the bioremediation experiments using different concentrations of fertilizers 20, 40, 60 and 80 g/L. A mathematical model was proposed to describe the rate of bioremediation. The bioremediation parameters; biodegradation rate constant k and exponential order α were estimated as part of the model validation exercise. Model validation results show that the formulated model was able to predict the experimental results to a high level of confidence indicating that there was a good fit between experimental and model predicted results. The dynamic behaviour of the bioremediation process was assessed by simulating the validated model to obtain time trajectories of the BOD. The BOD decreased in the course of bioremediation with higher remediation rates recorded with increasing concentration of fertilizer.

Keywords: Bioremediation, domestic wastewater, urea, NPK, biochemical oxygen demand, Modelling

Nomenclature

BOD Biochemical oxygen demand
α Exponential order
k Biodegradation rate constant
r Biodegradation rate

***Volume 25, No. 2* (November, 2013), pp 183 – 188**

Effect of X-Ray Exposure (mAS) on Sugar Concentration and Acid Values f Honey

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Abstract

Samples of honey obtained from GM pure honey a product of healing well enterprise Tungo Minna Niger State (labeled as sample A) and locally produced honey obtained from Obarike Ito Benue State (labeled sample B) both in Nigeria were irradiated at an X-ray tube potentials between 45 kVp and 65 kVp which are within the diagnostic potentials and analyzed using AR200 Digital Refractometer and pH meter. The Refractive index (nD), Sugar Concentration (SC), Acid values (pH) and Moisture concentration were evaluated. It was observed that X-ray irradiation of honey actually causes changes in its measured values with the sugar concentration (% Brix) ranging from 74.4±_. _ to 73.2±_. _ at tube potentials of 45 to 65 kVp for sample A. The acid value also varies from 4.74±__. _ to 4.58±_. __ with moisture content ranging from 24.2% to 20.6%. Similarly for sample B, the sugar concentration (SC) varies from 78.3±_. _ % Brix to 83.2±_. _% Brix, it measured pH lies between 4.97±_. __ to 5.10±_. __, with moisture content of 19.4% to 21.0% at an irradiated tube potential of 45 to 65 kVp. Those measured values do not have a steady defined pattern, but had values that were significant in some cases when compared with those of the control. Hence there is need for caution in referring patients who are undergoing honey therapy for X-ray diagnosis.

Keywords: Sugar Concentration, Moisture Content, X-ray Irradiation, Honey.

Volume 25, No. 2 **(November, 2013), pp 189 – 198**

Population exposure to ionizing radiation from radiological examinations in a large Nigerian hospital (UCH) between 1998 and 2007: Necessity of dose data on the extremity examinations.

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Abstract

Data on medical radiation exposure to population due to diagnostic x-ray procedures at University College Hospital (UCH), Ibadan Southwestern Nigeria between 1998 and 2007 are presented. Information on annual frequencies of conventional X-ray procedures is obtained from the three X-ray rooms of the institution. Estimate of collective effective doses were calculated from the dose associated with each procedure and frequency data. Chest x-ray constituted the highest proportion (22.56%) of the total examination carried out at the hospital during the period of study, while the mean frequency of examinations during the same period was 13083. The estimated effective dose per annum was found to vary between 1523.80 and 1992.60 mSv. The total collective effective dose resulting from conventional x-ray examination at the hospital was 17954.87 mSv and the mean dose per examination was 0.15 mSv. The highest contributor to the effective dose was thoracic spine examination. The trend here is lower than those found in literature. Record of doses associated with skull, cervical spine, thoracic spine, foot, hand, leg, thigh, fore arm, humerus and knee for UCH were not found in any literature, indicating that doses associated with them probably have never been measured. The working age group (21-60 year) is the most examined age group (66%), while pediatric and teenagers constitute about 19% of the population exposed to the ionizing radiation. This study is seen to be helpful in financial and technical planning of the average procedures carried out at the hospital per year for various projections included in this work. Results of the calculated dose could be used to estimate the lifetime attributable risks (LAR) of cancer incidence and mortality per 10,000 population.

Volume 25, No. **2 (November, 2013), pp 199 – 202**

Physical Model of the Lumbar Spine

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Abstract

With the increasing incidences of the lower back pain and the attendant surgical consequences, various attempts have been made by researchers around the world to model the lumbar spine to enable detail studies of the surgical effects on the anatomy of the spine. Most of these models, developed from one or a combination of the four major approaches existing, suffer some common challenges which include variation in sizes of subjects, weight of subjects , posture of the lumbar spine, cost of obtaining modelling data and complexity of the muscles of the lumbar spine. This research is an attempt to present a different approach and model that hopes to eliminate most of the challenges hitherto.

Keywords: Lumbar spine, Flexion, Dorso, Action function and Parameter

Volume25, No.2 **(November, 2013), pp 203 – 208**

The Properties of Real Numbers and the Determination of Origin of Axis in Graphical and Computational Analysis

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Abstract

Graphical and computational analysis is one of the widely used tools by researchers, science and engineering students. Hence, the need for precise and simplified techniques in this area of learning cannot be overemphasized. In this work we showed that every number _, an element of real set $\mathbb{R}$ ($\_ \in \mathbb{R}$) has one and only one greatest multiple NEXT to it of a real number _. And as an application, we showed how this can help in determination of origin of an axis in graphical work analysis.

Volume 25, No. 2 **(November, 2013), pp 209 – 214**

Application of Simulated Annealing to Solve Travelling Salesman Problem

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Abstract

The travelling salesman problem (TSP) is a classical problem in discrete or combinatorial optimization and belongs to the NP-complete classes, which means that it may require an infeasible processing time to be solved by an exhaustive search method, and therefore less expensive heuristics in respect to the processing time are commonly used in order to obtain satisfactory solutions in short running time. In this study an effective local search algorithm based on simulated annealing is proposed to solve the TSP. In order to obtain more accurate solutions, the proposed algorithm based on the standard simulated annealing algorithm adopts a more robust and adaptive combination of parameters such as cooling coefficient of the temperature, the times of random search, the times of compulsive acceptance and the probability of acceptance of a new solution.

To test the performance of the proposed method, a Six-City symmetric TSP Problem is solved using the data collected for the city-city distances. The implementation of the proposed algorithm was done using the Visual Basic.Net programming language and the experimental results show that the proposed algorithm provides better compromise between CPU time and effectiveness among some recent algorithms for the TSP.

Keywords: Simulated annealing, travelling salesman problem (TSP), algorithm, optimal tour, cooling rate.

Nomenclature

$C_{i,j}$ - Solution component of each edge on the TSP graph
G - Best Route Encounter
K- Any nonempty proper subset of the cities, 1… m.
N - Number of steps in Simulated Annealing procedure
NP hard - Non deterministic polynomial time
P - Probability
R - Reject which collect the number of sequence rejected
S - Initially randomly generated route
SA- Simulated Annealing
S'- Randomly generated route in next step
T - Initial temperature
TSP- Travelling salesman problem
U - Randomly generated number
W_T - Sum of Distance in a Route
aTSP- Asymmetric Travelling salesman problem
d_{ij} Distance value between cities
mTSP- multi- Travelling salesman problem
n - Number of nodes (cities)
sTSP- Symmetric Travelling salesman problem
x_{ij} - Decision variable that indicates whether the path from city i to city j is
Δ S - Difference between two routes included in the tour

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Volume 25, No. 2 **(November, 2013), pp 215 – 222**

On some inequalities for Godunova-Levin and MT-Convex functions

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Abstract

In this paper, we obtained some new Hadamard type inequalities for Godunova-Levin and MT-convex functions, using a simple analytical technique. An example to show the applicability of our results to means of real numbers is included

Volume 25, No. 2 **(November, 2013), pp 231 – 234**

Estimation of traffic Delay Using Queuing model

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Abstract

The introduction of tricycles and the removal of power bikes in many cities of Nigeria have made the transport system more complex and increasingly congested. Traffic delay due to incidents is estimated using a deterministic queuing model that assumes that traffic arrival rate, capacity reduction and incident duration can be identified exactly. Major road junctions and link roads in the city of Warri and environs experience traffic jam or road block daily. This work determines maximum delay time on a link road to a major road junction. A queuing model of the traffic situation has been formulated and illustrated numerically.

Keywords: Traffic congestion, incident duration, queuing model, dissipation rate, flow rate.

Volume25, No.2 **(November, 2013), pp 235 – 242**

Comparative Study on the Potency of Four Multivariate Analysis of Variance (Manova) Test Statistics

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Abstract

Multivariate Analysis of Variance (MANOVA) is a very vital aspect of multivariate statistical Analysis. In order to estimate the mean vectors of k independent random samples of size n from p-variate standard population, it is essential to guarantee that the best test statistic(s) are engaged so as to achieve a positive result. The four MANOVA test statistics: Roy's largest root test statistic (θ), Pillai Bartlett trace test statistic (V), WilKs' lambda (Λ) and Lawley-Hotelling (U) test statistics are compared in terms of their powers. It was establish that the powers of these test statistics are function of the various configurations of the mean vectors. Roy's largest root test is the most potent when the mean vectors arrangement is one- dimensional, while pillai test takes the lead in terms of power when there are several dimensional configurations.

Volume 25, No. 2 **(November, 2013), pp 243 – 248**

Measurement of Gross Alpha and Beta Radioactivity in Selected Local Water Boreholes in Northern Nigeria, Gombe State

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Abstract

Random stratified sampling procedure was employed to collect a total of eight samples: one from each sample point, measuring an approximate dimension of 5km^2 of the actual sample site. 20ml of diluted nitric acid (in the ratio 1:1) were added for preservation and later evaporated in a beaker and transferred into clean stainless steel planchets. An eight channel gas-flow proportional counter connected to a

microprocessor loaded with spread sheet program (Quattro-pro) and graphic program (Multiplan). Calibrated for efficiency was employed to count the background, the plateau test and the prepared samples. The gross alpha and beta activity concentrations in the water were found to range from (0.94-62.89)Bqm^{-3} with a geometric mean of 9.54Bqm^{-3} and (131.79-3827)Bqm^{-3} with a geometric mean of 525.82Bqm^{-3} respectively. The overall results showed that both the alpha and beta activities are below the practical screening level of radioactivity in drinking water as set by World Health Organization (WHO) of 100Bqm^{-3} for alpha and 1000Bqm^{-3} for beta recommended by Commission of European Communities (CEC), while that of US Environmental Protection Agency (USEPA) of 550Bqm^{-3} for alpha and 1850Bqm^{-3} for beta.

Keywords: Boreholes, Drinking water, Alpha, Beta, Radioactivity, Gombe, Northern Nigeria

Volume 25, No. 2 **(November, 2013), pp 249 – 256**

Microsoft Excel Visual Basic for Applications Approach to Academic Results Compilations and Computations

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Abstract

In this paper, we present the Microsoft Excel Visual Basic for Applications approach to academic results compilations and computations as an alternative to existing process of entering student's score directly into Microsoft Excel formatted Worksheet. Looking for the cell that corresponds to the student's name and the course been considered on a formatted worksheet is relatively slow, inefficient and prone to errors. Our approach uses a user form to compile and compute all the details of students' academic results from the first semester to the last semester using Microsoft Excel Visual Basic for Applications. The paper encourages the automation of the process using Microsoft Excel Visual Basic for Applications becauseof the availability of Microsoft Office Excel and automation of the process overwhelmingly surpass the existing method by guiding against errors due to wrong cell value entry, increase efficiency by speeding up the entire process and secure the document against unauthorised users.

Keywords: Academic results compilation and computation, Microsoft Excel Visual Basic for Applications, Formatted
Worksheet, User Form, Visual Basic Macros, Grade Point Average, Cumulative Grade Point Average.

Abbreviations: Microsoft Excel Visual Basic for Applications (**MEVBA**), Total Unit (**TU**), Total Point (**TP**), Grade Point
Average (**GPA**),Cumulative Total Unit (**CTU**),Cumulative Total Point (**CTP**), Cumulative Grade Point Average (**CGPA**).

Volume 25, No. 2 **(November, 2013), pp 257 – 264**

Theoretical Investigation of Breakdown Voltage of Air at Low Pressure.

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Abstract

This paper deals with the Paschen's law in electrical breakdown of air at low pressures. Using the Paschen's law, numerical values of the breakdown voltages were deduced at different inter-electrode spacing of 2.5cm and 5.0cm. The values generated were compared to the measured values from the literature and are observed to agree well. With these spacing, it confirms that the theoretical form of the Paschen's law is a function of the product of pressure and electrode spacing and spacing i.e __ = ____, _ . The plots of the breakdown voltages versus electrode-spacing and product of pressure and electrode spacing are presented. Their minimums also agreed well with the experimental results.

Keywords: Dielectric Barrier Discharge (DBD), Townsend's ionization coefficients, breakdown voltage, Paschen's law

Volume 25, No. 2 **(November, 2013), pp 265 - 266**

Riemanns Geodesic Equations Of Motion For Particles Of Non Zero Rest Mass In Gravitational Fields In Rotational Spherical Polar Coordinates

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Abstract

In this paper we formulate the Riemann's Geodesic equations of motion for particle of non zero rest mass in Rotational Spherical Polar Coordinates.
Key Words: Riemann's Geodesic Equations of motion, Particles of non zero rest mass, Gravitational fields, Rotational Spherical Polar Coordinates

Keywords: Riemann's Geodesic Equations of motion, Particles of non zero rest mass, Gravitational fields, Rotational Spherical Polar Coordinates

Volume 25, No. 2 **(November, 2013), pp 267 – 274**

Adjacent Rhotrix of a Complete, Simple and Undirected Graph

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Abstract

The adjacent matrix of a graph is a well-known concept in the combinatorial matrix theory. On the other hand nothing seems to be known on the adjacent rhotrix of a graph. In this paper we introduce the concept of an adjacent rhotrix of a graph and discuss its properties. An n-dimensional rhotrix is known to be an object that lies in some way between $n \times n$ ***dimensional matrix and*** $(2n-1)\times(2n-1)$ ***dimensional matrix and representation of vectors in rhotrix is different from the representation of vectors in matrix.***

Keywords: adjacency, graph, complete, simple, undirected, rhotrix, eigenvalue
AMS Subject Classifications [2010]: 05C50.

Volume25, No.2 **(November, 2013), pp 275 – 284**

Analyzing Cement Retrogression with Autodesk Simulation

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Abstract

The high pressure high temperature environments for oil and natural gas exploitation are characterized by extreme temperatures and pressures. Wells with depth exceeding 15,000 ft (4,570 m) are becoming common all over the world. The bottomhole temperatures in most cases exceed 230 degree F (110 degree C).To produce the oil and gas from any well economically and effectively, complete zonal isolation is indispensable. Zonal isolation implies that a particular zone may be produced or drained with the exclusion of any other zone irrespective of their proximity. Zonal isolation also aids well control and is achieved by the sheath of cement placed between the metal linear and / or casing and the wall of the wellbore. The concept of zonal isolation has become over the year a "creed" in the petroleum industry. In the process of the completion of wells, cement is usually used, the need for zonal isolation can never be more critical than in the deep HP HT wells where pressure temperature and stress conditions are extreme and intense. The cement responsible for this zonal isolation can however be compromised by several factors that come into play during the life of the well. Stresses are imposed over time, on the wellbore downhole by pressure and well bore temperature. In high pressure high temperature wells, the stress associated with the extreme temperature pressure conditions is a common cause for loss of compressive strength with accompanied increase in permeability. This is known as' Cement retrogression'. This paper model experimental data received via an investigation into the use of local Nigerian siliceous material as substitute for imported Silica flour. Modeling was done using Autodesk simulation

Keywords:cement retrogression, Ughelli sands, silica flour, Autodesk simulation

Volume 25, No. 2 **(November, 2013), pp 285 – 290**

Short Cut to the Multiple Binomial Price Model for Option Valuation

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Abstract

This paper developes a method by which a fair price value of options could be obtained without going through the cumbersome nature of multiple binomial price model especially when asset transaction period are extended up to three ,four, five etc, periods. As we continue to equal partition the time interval, it become very necessary for us to use a more convenient method in order to avoid errors of computations. The method in this paper is referred to as a short cut to the multiple binomial price model. This is achieved by applying coefficient of expansion obtained from the Pascal triangle and fixing coefficients into the binomial tree.

Volume25, No.2 **(November, 2013), pp 291 – 294**

Correcting Factor for more Accurate Strongly Correlated Electron Systems in the Half Filled Band of the Hubbard Model

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Abstract

We exactly calculate the ground state energy of the Hubbard model for four electrons on four sites and compare our results with that obtained in a recent study where a modification of the Lanczos technique was used. We found that the results of that study under estimated the exact diagonalization result by as much as 100.0% at $U/t=0$ ***and up to ~ 120.6% at*** $U/t=5.0$.

Keywords: Hubbard model, Lanczos technique, Exactdiagonalization.

Volume 25, No. 2 **(November, 2013), pp 295 – 308**

An EOQ model for delayed deteriorating items with inventory level dependent demand rate and partial backlogging

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Abstract

This paper presents an Economic Order Quantity (EOQ) model for delayed deteriorating items having inventory level dependent demand rate and shortages. Demand at any instant depends linearly on the on-hand inventory level at that instant. In the initial phase, inventory depletes down to a certain level of the inventory due to market demand only. In the second phase, the inventory level gets depleted due to the effect of both market demand and deterioration but still dependent on stock until the inventory level falls to zero. In the final phase of the cycle, shortages are allowed and the unsatisfied demand is partially backlogged at a rate which is a fixed fraction of demand rate during the shortage period. We establish the theoretical results for the optimal replenishment policy of the inventory system in order to minimize the total

average system cost per unit time. Furthermore, we present some numerical examples to illustrate the application of the model developed and use the examples to study the effect of various changes in some possible combinations of model parameters on the decision variables of the system.

Keywords: Stock-dependent demand, delayed deterioration, partial backlogging rate.

Volume 25, No. 2 **(November, 2013), pp 309 – 312**

Effect of the inter-species competition parameters on the onset of stability and degeneracy of co-existence steady-state solutions between competing populations

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Abstract

The differing effects of the intra-species and inter-species competition parameters on the onset of stability and degeneracy of co-existence steady-state solutions between competing yeast species can be clearly differentiated. In this context, we have systematically investigated the effect of the inter-species competition parameters on the onset of stability and degeneracy of co-existence steady-state solutions between competing yeast species which is quite distinct from the analysis of the intra-species competition parameters. A mathematical approach has been proposed to tackle this challenging problem. The implications of this contribution for the dominant survival of the interacting yeast species are discussed quantitatively. The results which we have obtained have not been seen elsewhere, they are presented here and discussed.

Keywords: inter-species competition parameters, stability, degeneracy, competing populations

Volume 25, No. 2 **(November, 2013), pp 313 – 316**

Effect of the intra-species competition parameters on the onset of stability, instability and degeneracy of co-existence steady-state solutions between competing populations

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Abstract

Experts in mathematical ecology have observed the role of a lower carrying capacity and a higher carrying capacity in the onset of stability, instability and degeneracy of co-existence steady-state solutions between competing yeast species populations. To solve this complex problem, a mathematical approach has been proposed in this study with the expectation of providing further insight into ecosystem functioning and stability. Our novel results are clearly presented and discussed quantitatively.

Keywords: intra-species competition parameters, stability, instability, degeneracy, competing populations

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Stability analysis for a system of interacting populations with a dis-similar carrying capacity

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Abstract

The aim of this present contribution is to illustrate the use of a computational method to determine the type of stability for a system of two interacting populations when the carrying capacities values are 3.26 and 3.76 respectively provided the intraspecies and inter-species inhibiting factors on the growth of cowpea and groundnut within the Niger Delta agricultural setting are fixed. For the purpose of this pioneering study, the intrinsic growth rate parameter value for cowpea is 0.0225 grams while the intrinsic growth rate parameter value for groundnut is 0.05 grams. Within the range of variations for the intrinsic growth of cowpea, fewer optimal instances of degeneracy for a fewer co-existence steady-state solutions were obtained. The possibility when the degeneracy characteristic of the co-existence steady-state solution will be lost remains to be empirically verified.The novel results which we have obtained and have not seen elsewhere are presented here and discussed.

Keywords: co-existence steady-state solution, stability, degeneracy, interacting legumes

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Stability analysis for a system of interacting populations with a similar carrying capacity

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Abstract

The purpose of this present contribution is to illustrate the use of a computational method to determine the stability for a system of two interacting legumes such as cowpea and groundnut for a limited resource in a Niger Delta Region agricultural setting. The optimal regions of stability and degeneracy for several co-existence steadystate solutions were obtained. The results which we have obtained and have not seen elsewhere are presented here and discussed.

Keywords: co-existence steady-state solution, stability, degeneracy, interacting legumes

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Evaluation and Validation of a Mathematical Model for Predicting the Eutectic Composition of Simple Binary Alloy System

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Abstract

A mathematical model for determining the composition of simple binary alloy system at the eutectic point has been formulated evaluated and validated in this research. The equation is derived by solving set of straight line equations obtained from the phase diagram of simple binary alloy system (Bi-Cd). The composition arrived at 58% Bi and 42% Cd is very close to that obtained experimentally, 60% Bi and 40% Cd. This model was used to evaluate the eutectic composition of other nine

alloy systems. The results showed very close values to those obtained experimentally, variation lies between ±0.3 to ± 5.5 on the low side and ±7.3 to ±15.9 on the high side. The former is mainly for alloy systems that show complete solubility at the liquid phase and incomplete solubility at the solid phase, while the later is mainly for alloy systems that show complete solubility in the liquid phase and partial solubility in the solid phase. Hence, the model is recommended for application to determine the eutectic composition of simple binary alloy systems, especially those that show complete solubility in the liquid phase and incomplete solubility in the solid state.

Keywords: Mathematical model, eutectic, bi-nary alloy, composition, phase diagram.

Volume 25, No. 2 **(November, 2013), pp 331 – 336**

Verifying the efficacy of F-region drift perturbation near the magnetic equator at sunrise

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Abstract

The efficacy of electron drift perturbation varying with height according to exponential variation of the form:

$$W=W_0 \exp(-bz)$$

has been verified for conditions at sunrise, applying data derived from ionosonde records at Ibadan, an African equatorial station. Results indicate that equatorial F-region drift stabilization is significantly enhanced if the value of the exponential constant is set at 0.21

Volume 25, No. 2 **(November, 2013), pp 337 – 344**

The relationship between electron density and electron temperature near the magnetic equator

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Abstract

The distribution profiles of electron velocity, electron density and electron temperature have been used to study the thermal structure of the ionospheric F-region over Ibadan (7.4$_0$N, 3.9$_0$E; magnetic dip 6.0$_0$S), Nigeria at an altitude of 300 km using a modified composition of the electron density continuity equation. Observations suggest that the magnitudes of daytime electron temperature at Ibadan are solar activity independent. The overall seasonal electron temperature in the neighbourhood of 3000K is in excess of the mean results reported by some workers but also in good agreement with other observations near the magnetic equator. The interplay between photoionisation and thermal conduction in the determination of the heat budget of the electron gas temperature has been discussed to a reasonable extent.

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Maximization of Traffic Flow in a Tunnel

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Abstract

A good understanding of vehicular traffic flow is an important challenge for modern societies. It has direct impact on the quality of lives of citizens.Since, most people experience the daily inconvenience of traffic congestion and pollution. In this research in particular, the ultimate aim is to understand the traffic phenomena at Ebeano-Tunnel in order to actually make decisions which will go a long way to alleviate congestions, maximize flow of traffic, eliminate accidents and minimize exhaust pollutions and other desirable ends. The research methodology was based on the collection of primary data by observers from 7:30am to 12:00 noon from Sunday to Saturday and analyzed which can serve as a tropical average for the year. In the analysis the behavior of cars entering or leaving the Ebeano-Tunnel were evaluated on the basis of their performances (that is the average speed of vehicle entering into the Tunnel and leaving the Tunnel, expected number of vehicles at a given time interval and waiting time when there is congestion). The result obtained showed that the Ebeano-Tunnel is highly congested during the day. The largest flow occurred between 10:30am to 11:00am in the morning. It is advised that an alternative route should be used during this period to avoid congestion. Moreover, with the help of the given data we were able to examine whether the traffic flow (flux) is equal to density _ multiplied by velocity _ and we found out that it is true as it is the well established traffic model.

Keywords: Traffic Flow, Traffic Density, Velocity, Conservation Law, Time Formulation

Volume 25, No. 2 **(November, 2013), pp 351 – 354**

Analysis of Cholera Outbreak between 2000 and 2010 in Wudil Region Using a Mathematical Model

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Abstract

Prevalence of Cholera outbreak is a recursive event in our society. Analysis of cholera outbreak in Wudil region utilizing a mathematical model derived in [1]was presented. Thestudy and analysis of the occurrence of cholera outbreak in Wudil region was based on the data (2000 to 2010) obtained from Wudil General Hospital.

Keywords: strongly correlated electrons; superconductivity; specific heat; half-filling; coupling regime; on-site Coulombic repulsion.

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Fractional Derivatives and Decay-Growth Problem

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Abstract

Radioactive substances decay and as a result they create other substances which also have the affinity to decay. An example is Radium which decays to Radon and thus further decays to Polonium. In real sense, these decays take place in fractions. Suppose that initially a sample of pure radium decays. It is of interest to determine how much radium and radon the sample contain at time t. In this work we make a close comparison of the integer order and fractional order derivatives using the decay-growth model equation of a radioactive substance thus giving the amount of sample it contains after disintegration at time t.

Keywords: Fractional derivatives, Fractional Differential Equation, Matrix exponential function, Mittag-Laffler function.

Volume 25, No. 2 **(November, 2013), pp 363 – 368**

Application of Stationary Markov Chain Model in Predicting Future CD_4 Counts of HIV/AIDS Patients: A Case Study of Anambra State Nigeria

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Abstract

We present a stationary Markov chain model for the prediction of future CD_4 cell counts of HIV/AIDS patients before HAART. Recorded hospital data were obtained for a cohort of 1004 patients with follow-up from the medical Examination department of Nnamdi Azikiwe Uniersity Teaching Hospital, continuous Quality Improvement HIV Care (NAUTH) Nnewi-Anambra Nigeria from January-December 2010. States of the Markov chain model are defined by the seriousness of the sickness based on the epidemiological counts of the CD_4 cell/mm^3. The five states considered are: State one (CD_4 cell counts > 500cells/mm^3), State two (350 < CD_4 < 500cells/mm^3), State three (200 < CD_4 < 350 cells/mm^3) State four (CD_4 < 200 cells/mm^3) and state five (Death). The first four states are named good or alive State. The result obtained from the mean absolute error (MAE) – 15.63 showed the stationary Markov chain model to be conceptually a good model in the prediction of future CD_4 cell counts.

Keywords: Stationary Markov chain, Transition Probability, Transition probability matrix, CD_4 cell counts.

Volume 25, No. 2 **(November, 2013), pp 369 – 376**

Morphological-based Detection and Extraction Algorithm for Nigeria Vehicle License Number Plate

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Abstract

This paper presents an algorithm for the detection and extraction of the Nigerian vehicle licensed number plate. In this work, images of stationed vehicles with negligible inclination captured with digital cameras of high resolution and shutter speed were used. Morphological based edge detection and blob extraction techniques were used to realize the algorithm. The performance of the algorithm was tested with seventy-three (73) images of both the old and the new Nigerian vehicle licensed number plates, taken under varying conditions, and an overall success rate of 84.9% was achieved.

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Attenuation of Migration of Bacteria with Porosity and Depth in Homogeneous Sand Media.

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Abstract

The depth of strata layer and nature of soil strata below the absorption boundary of soakaways/ pit latrines/ septic systems play significant roles in protection of groundwater supply source. An experimental work was carried out to examine the effect of porosity and depth on the attenuation of migration of bacteria in homogeneous sand media using Escherichia coli and Staphylococcus Aureus. Column filtrations were implemented at five depths: 10, 20, 30, 40 and 50cm for each sample of porosities: 0.28, 0.36, 0.37, 0.40 and 0.42. Volumetric approach was used to determine the porosity, plate count method and vertical downward flow were used for bacterial count and column experiment respectively. The coefficient of attenuation as a function of time was calculated. The results showed that attenuation capacity of media increases with increase in depth and decrease in porosity. We are able to observe a variation in attenuation capacity with both bacteria due to difference in their morphological characteristics. This investigation revealed that we can predict threshold depth and porosity for significant and meaningful attenuation of migration with minimum depths of 14cm and 21cm and maximum porosities of 0.34 and 0.36 for E. coli and Staphylococcus respectively. This will be applicable in better design of hydrogeological

barrier against pathogenic contamination of groundwater supply source and their associated diseases.

Keywords: Bacteria, Groundwater, Filtration, Hydrogeological barrier, Attenuation, Migration.

***Volume* 25, No. 2 (November, 2013), pp 387 – 392**

Erratum: Second Derivative Hybrid Block Method with two off-step points for solution of initial Value problems

[J. Nig. Assoc. Math. Phys. *Volume*23 (March, 2013), pp113 – 118]

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The cover title and the inside title header in this paper were wrongly typesetted in the vol. 23 issue of the Journal of NAMP (March issue, 2013).The corrected Title for this manuscript is as indicated above. The entire article is therefore reproduced here as it ought to appear in pages 113 - 118 (Vol. 23).

Abstract

A one step continuous hybrid block method derived from Second Derivative approach is constructed and used to generate Initial Value Methods (IVMs) for initial value problems of stiff ordinary differential equations. The IVMs are applied as simultaneous numerical integrators by assembling them as a single block matrix equation called Second Derivative Block Hybrid Method(SDBHM) which is A(α)-stable. Numerical results produced by the block method show that the method is competitive with existing ones in the literature.

AMS Subject Classification: 65L05, 65L06
Keywords: Initial value problem, off-step point, block hybrid method, second derivative.

Erratum:Investigation of Semidefinite Relaxation in Model Predictive Control Formulation

[J. Nig. Assoc. Math. Phys. *Volume*21 (July, 2012), pp 41 – 46]

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Some equations in this paper were wrongly typesetted in the vol. 21 issue of the

Journal of NAMP. The page of the article is therefore reproduced below as it ought to appear in page 45 (Vol. 21).

Erratum: Geoelectric estimation of aquifer parameters in the Southern part of Edo State, Nigeria

[J. Nig. Assoc. Math. Phys. *Volume*21 (July, 2012), pp 355 – 360]

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Some equations in this paper were wrongly typesetted in the vol. 21 issue of the Journal of NAMP. The page of the article is therefore reproduced below as it ought to appear in page 356 (Vol. 21).