ICMA-2013
The 2013 International Conference on Mathematics and Its Applications
19-20 August 2013
Kuala Lumpur, MALAYSIA

Organized by
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Data Engineering Research Center

AIP
American Institute of Physics

Supported by
AMCS
Applied Mathematics and Computer Science Research Center

www.amcs.co/icma2013
Thermal instabilities in a layer of fluid giving rise to Marangoni convection are crucial phenomena observed in a wide range of fundamental problems of practical importance. Since the important contributions of the pioneering theoretical and experimental works of Bénard (1900), Rayleigh (1916) and Pearson (1958), substantial progress has been made on thermal instability driven by buoyancy (Bénard) and/or thermocapillary (Marangoni) effects. Thermocapillary forces are the dominant driving forces in a reduced gravity environment (Schwabe, 1981). One such example is crystal growth in space. Pearson (1958) showed that variation of surface tension with temperature will drive steady Marangoni convection/instability in a fluid layer provided that the nondimensional Marangoni number is sufficiently large and positive. Marangoni convection is usually undesirable in material processing applications. Thus, it is of interest to have a simple means of controlling the crucial stage in the convection that leads to the onset of instability. One simple mechanism for delaying the onset of convection is by the use of linear and non-linear control strategies. Bau (1999) extended the studies of Pearson (1958) and Takashima (1981a,b) by including a feedback control strategy effecting small perturbations in boundary data to suppress the onset of Marangoni convection. In the proportional feedback control of Bau (1999), the actuators are placed at the bottom heated surface. In addition, sensors are used to detect the departure of the surface temperature from its conductive state. We shall present the effect of feedback control on the onset of Marangoni convection in a rotating fluid layer. Both steady and oscillatory convection will be considered. In addition, the combined effects of feedback control and variable viscosity and internal heating will be given.
Convection in Enclosures with Non-Uniform Heating on Both Sidewalls

S. Sivasankaran
Institute of Mathematical Sciences
University of Malaya

Numerical analysis has been performed on convection flow and heat transfer in a square cavity. The vertical sidewalls of the cavity are maintained with sinusoidal temperature distribution. The governing system of partial differential equations is solved numerically by finite volume method. The results are analyzed for different combinations of pertinent parameters involved in the study. The results are presented in the form of streamlines, isotherms, velocity profiles and Nusselt numbers. It is observed that the non-uniform heating on both walls provides higher heat transfer rate than non-uniform heating of one wall.
CONFERENCES PROGRAM

Venue Address: CITITEL HOTEL MID VALLEY, KUALA LUMPUR.
The exact location is in the Ball Room and Matahari IV Room in Fifth floor.

Notes:
a. The time of each presentation including questions is 20 minutes. Please adhere to it.
b. There is no presentation on August 20.

MONDAY (August 19, 2013) – DAY 1

07:30 - 08:30 Conference Registration
        Welcoming Tea and Networking
08:30 - 08:45 Welcoming Speech by Conference Chair
08:45 - 09:30 Keynote Speaker 1: Prof Dr. Ishak Hashim
        Title: Suppression of Onset of Thermal Convection
09:30 - 09:45 Refreshment
09:45 - 10:30 Keynote Speaker 2: Dr. Sivanandam Sivasankaran
        Title: Convection in Enclosures with non-uniform heating on both sidewalls
10:30 - 11:30 Parallel Session 1
11:30 - 12:00 Break and Lunch
13:00 - 15:00 Parallel Session 2
15:00 - 15:15 Refreshment
15:15 - 16:30 Parallel Session 3
16:30 - 17:00 Closing and best papers announcement
### PARALLEL SESSION I

**Chair**: N. Khan  
**Room**: Ball Room  
**Time**: 10:30 – 13:00

<table>
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<tr>
<th>Time</th>
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| 10:30 – 10:50| Numerical solution for fractional wave equation in a complex domain  
*Hamid Jalab and Rabha Ibrahim* |
| 10:50 – 11:10| Optimal Control of Plasmodium Knowlesi Malaria in Malaysia  
*Mohammed Abdullahi, Yahya Abu Hasan and Farah Aini Abdullahi* |
| 11:10 – 11:30| A Bayesian Network Approach on a Domestic Travel Study  
*Ong Hong Choon, Pey Chin Ho and Sin Yee Chai Yong* |
| 11:30 – 11:50| Pricing Guaranteed Minimum Withdrawal Benefits Under CIR Interest Rate Model  
*Weai Chiet Khow, Yong Kheng Goh and Seong Tah Chin* |
| 11:50 – 12:10| The Scaling Of BFGS-SD In Solving Unconstrained Optimization Problem  
*Mohd Asrul Hery Ibrahim, Mustafa Mamat, Wah June Leong and Azfi Zaidi Mohammad Rafi* |
| 12:10 – 12:30| A New Search Direction for BFGS Method  
*Azfi Zaidi Mohammad Sofi, Mustafa Mamat, Ismail Mohd and Mohd Asrul Hery Ibrahim* |
| 12:30 – 12:50| Vector-Host Epidemic Model of Dengue Fever with Two-Stage Adult Vector  
*Nuraini Yusoff, Harun Budin and Salemah Ismail* |
*Nor Samat and David Percy* |

**Chair**: M.S. Ikhmatiar  
**Room**: Matahari IV  
**Time**: 10:30 – 13:00

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<th>Time</th>
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| 10:30 – 10:50| Improving Three-point Iterative Methods for Solving Nonlinear Equations  
*Fayyaz Ahmad, D. Garca Senz and Malik Zaka Ullah* |
| 10:50 – 11:10| Oscillation Criterion for Second Order Nonlinear Equations With Alternating Coefficients  
*Kumaresan Nallasamy, M. J. Saad and Kuru Ratnavelu* |
| 11:10 – 11:30| IMPLICIT BLOCK METHODS WITH OFF-STEP POINTS FOR NUMERICAL SOLUTION OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS  
*Lee Ken Yap and Fudziah Ismail* |
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<tr>
<td>11:30 – 11:50</td>
<td>ON THE OSCILLATION OF FIRST ORDER NEUTRAL DELAY DIFFERENTIAL EQUATIONS</td>
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<td>Fatima Ahmed, Rokiah Rozita Ahmed, Ummul Khair Salma Din and Mohd Salmi Md Noorani</td>
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<td>11:50 – 12:10</td>
<td>Conductivity Model Construction for a Transversely Isotropic Earth</td>
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<td>Sri Mardiyati</td>
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<td>12:10 – 12:30</td>
<td>EFFECTS OF RADIATION ON MHD CONVEXTIVE HEAT AND MASS TRANSFER FLOW IN A POROUS MEDIUM WITH CHEMICAL REACTION</td>
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<td>S.Karthikeyan, M.Bhuvaneswari, S.Rajan and S.Sivasankaran</td>
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<td>12:30 – 12:50</td>
<td>A Comparative Study Of Two New Classical Conjugate Gradient Methods</td>
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<td>Abdelrhaman Abashar, Mustafa Mamat, Mohd Rivaie and Ismail Mohd</td>
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<td>Optimal Control For Stochastic Bilinear Quadratic Neuro Takagi-Sugeno Fuzzy Singular System Using Simulink</td>
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<td>Mohd Zahurin Mohamed Kamali, Kumaresan Nallasamy and Kurunathan Ratnavelu</td>
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**PARALLEL SESSION II**

Chair : A. Salleh  
Room : Ball Room A  
Time : 14:00 – 15:00

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<th>Time</th>
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<tr>
<td>14:00 – 14:20</td>
<td>SHRINKAGE COVARIANCE MATRIX IN HOTELLING’S T2 FOR DIFFERENTIALLY EXPRESSED GENE SETS</td>
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<td>Suryaefiza Karjanto, Rasimah Aripin, Norazan Mohamed Ramli and Nor Azura Md Ghani</td>
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<td>14:20 – 14:40</td>
<td>OPTIMAL CONTROL STRATEGIES OF LASSA FEVER</td>
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<td>Umar Chado Doko, Abdullahi Mohammed Baba &amp; Mamman Mamuda</td>
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<td>14:40 – 15:00</td>
<td>Casting In Modified Chordal Ring Of Degree Six Network Topology</td>
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<td>Raja Noor Farah Azura Raja Ma’amor Shah</td>
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<td>14:00 – 14:20</td>
<td>An Exact Solution of Heat And Mass Transfer On MHD Free Convection Flow In A Porous Medium Past An Infinite Inclined Plate</td>
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<td><em>Zulkhibri Ismail, Ilyas Khan and Sharidan Shafie</em></td>
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<tr>
<td>14:20 – 14:40</td>
<td>Mathematical Modelling For The Drying Method And Smoothing Drying Rate Using Cubic Spline For Seaweed Kappaphycus Striatum Variety Sacol In a Solar Dryer</td>
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<td><em>Majid Khan and Jumat Sulaiman</em></td>
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<td>14:40 – 15:00</td>
<td>Secret Sharing Scheme Based Graph Domination</td>
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<td><em>N.A. Rajab, N. M.G. Al-Saidi and Mohamed R. Md. Said</em></td>
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<td><em>Muna Alsallal</em></td>
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<td>14:20 – 14:40</td>
<td>Associative Three-Dimensional Genetic Algebras</td>
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<td><em>Nur Zatul Akmar Hamzah</em></td>
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<td>14:40 – 15:00</td>
<td>Interval Type-2 Fuzzy TOPSIS with Borda Count Approach in MCDM Problem</td>
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<td><em>Adawiyah Otheman</em></td>
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## PARALLEL SESSION III

**Chair**: M.S. Ikhmatiar  
**Room**: Ball Room A  
**Time**: 15:15 – 16:35

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<th>Time</th>
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*Kausalyah Venkatason, Shasthri Sivaguru, Kassim A Abdullah, Moumen M Idres, Qasim H Shah, and Wong Shaw Voon* |
| 15:35 – 15:55 | OPTIMAL CONTROL STRATEGIES FOR HIV/AIDS DYNAMICS  
*Amiru Sule*                                                                                                                                          |
| 15:55 – 16:15 | Effects on Mass and Stiffness on Vibrating Amplitudes of a Triple Mass Triple Spring System  
*S. Rajan, S. Sivasankaran*                                                                                                                         |
| 16:15 – 16:35 |                                                                                                                                                                                                             |

**Chair**: E. A. Awan  
**Room**: Ball Room B  
**Time**: 15:15 – 16:35

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<th>Time</th>
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| 15:15 – 15:35 | Phase fitted explicit hybrid method for solving second-order ordinary differential equations  
*Faieza Samat and Mohamed Suleiman*                                                                                                               |
| 15:35 – 15:55 | MONOTONICITY PRESERVING INTERPOLATION USING RATIONAL quartic said-ball function  
*Samsul Ariffin Abdul Karim*                                                                                                                        |
*M. Ghazali Kamardan, A. Mujahid A. Zaidi, M. Zaid M. Othman, and A. Kadir Mahamad*                                                                |
| 16:15 – 16:35 | A Mathematical Model Development for the Lateral Collapse of Various Geometric Tubes - Part 2  
*M. Ghazali Kamardan, A. Mujahid A. Zaidi, M. Zaid M. Othman, and A. Kadir Mahamad*                                                                |
### Schedule

**Chair**: A. Salleh  
**Room**: Matahari IV  
**Time**: 15:15 – 16:35

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<th>Time</th>
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*Lazim Abdullah and Herrini Mohd Pauzi* |
| 15:35 – 15:55 | Chromatic Polynomials of Chordal Ring and Modified Chordal Ring Networks  
*Abdul Jalil M. Khalaf and Mohamed Othman* |
| 15:55 – 16:15 | A Type-2 Fuzzy Sets Multi-Criteria Decision Making Method for Supplier Selection  
*Adawiyah Otheman and Lazim Abdullah* |
| 16:15 – 16:35 | Possibilistic Fuzzy Linear Regression Model and Its Application to Predict CO2 Emissions  
*Lazim Abdullah and Herrini Mohd Pauzi* |

**TUESDAY (August 20, 2013) – DAY 2**

No Scientific activities
Numerical solution for fractional wave equation in a complex domain

Rabha W. Ibrahim, Hamid A. Jalab

Abstract. In this paper, we study numerical solutions of the time-space fractional wave equation in a complex domain. The fractional time is taken in the sense of the Riemann-Liouville differential operator while the fractional space is assumed in the Srivastava-Owa differential operator. Here we employ some properties of the univalent functions in the unit disk to determine the upper bound of this solution. The maximal solution is illustrated in term of the generalized hypergeometric functions. Numerical solutions are determined for systems of fractional differential equation involved wave equation. Moreover, applications are illustrated.

Optimal Control of Plasmodium Knowlesi Malaria in Malaysia

Mohammed Baba Abdullahi, Yahya Abu Hasan, Farah Aini Abdullah

Abstract. We present a SVIR + SI model to describe the interaction between human and Anopheles leucosphyrus group of mosquito population. Control strategies inform of vaccination, in susceptible human, treatment on infected humans and chemical and biological control against the mosquitoes. An optimal control approach is applied in order to find the best way out the disease. Numerical simulations of the problem, suggest that applying the three control measure can effectively reduce if not eliminate the spread of Plasmodium Knowlesi malaria in a Malaysia.
A Bayesian Network Approach on a Domestic Travel Study

Hong Choon Ong, Pey Chin Ho & Sin Yee Chai Yong

Abstract. This study analyzes the causal relationships between the factors while considering domestic travel among students in Universiti Sains Malaysia, Main Campus by using Bayesian Network structure learning algorithms. Bayesian network is a probabilistic graphical model that represents dependency relationships among variables of interest. It converts variables and their dependent relationships into nodes and arcs respectively. We found the score based methods like the hill climbing and tabu search algorithms as giving the best network score. Furthermore, there is a strong link between travelling seasons and the type of accommodation and also companion during travels.

Pricing Guaranteed Minimum Withdrawal Benefits under CIR Interest Rate Model

Weai Chiet Khow, Yong Kheng Goh and Seong Tah Chin

Abstract. In this paper we consider the pricing of a guaranteed minimum withdrawal benefit (GMWB) under Cox-Ingersoll-Ross (CIR) stochastic interest rate model. GMWB is a type of variable annuity that is commonly used in retirement planning. When a GMWB is purchased, the policyholder pays initial capital to the insurer to be invested in a series of investment fund at policyholder’s discretion. The policyholder is then allowed to withdraw periodically a certain amount, and would be guaranteed by the insurer to at least withdraw up to a sum which equals to the initial capital paid, in which the guarantee is financed via paying annual proportional fees. As a result the policyholder would be protected against any downside risk, while being able to enjoy the potential gain offered by the underlying investment fund selected. Assuming a deterministic withdrawal rates, we develop the approximate fair value of the GMWB using Monte-Carlo simulation assuming interest rates follows the CIR stochastic differential equation. CIR model is chosen because of its mean reverting and nonnegative properties. The lower and upper bound of the option price will be derived from Rogers-Shi method and Thompson’s method, which will then be compared to the option price obtained from Monte Carlo simulation. The sensitivity of the pricing method against interest rate volatility, equity price volatility, correlation between equity price and interest rate will also be considered.
The Scaling Of BFGS-SD in Solving Unconstrained Optimization Problem

Mohd Asrul Hery Bin Ibrahim, Mustafa Mamat, Leong Wah June, Azfi Zaidi Mohammad Sofi

Abstract. In this paper, we suggested a simple scaling on BFGS-SD method for solving unconstrained optimization problems. For general convex functions, we prove that the method is globally convergent with inexact line searches. The results will be obtained by implementing algorithms in Matlab for the test problem. The comparison with the original BFGS method is doing in term of the numbers of iteration and the CPU-time (Computer Processor Unit) in second with the original BFGS method.

A New Search Direction for BFGS Method

Sofi, A.Z.M., Mamat, M., Mohd, I. & Ibrahim, M.A.H

Abstract. In this paper, we introduced a new search direction for BFGS method by taking a small portion of previous gradient vector to be used in the current iteration of search direction. We also construct a new formula to be fit within the new search direction and proved this formula is globally converge. The idea here is the usage of a small portion of previous gradient vector within the formula will add the extra amount of sufficient length on the current search direction that being used. We tested the algorithm with some unconstrained optimization test problems and proven that the numerical results had support the theorem.

Vector-Host Epidemic Model of Dengue Fever with Two - Stage Adult Vector

Nuraini Yusoff, Harun Budin and Salemah Ismail

Abstract. In this paper, we will discuss a vector-host epidemic model of dengue fever with two stages of adult vector, before and after the first egg-laying. The reason to have these two stages is due to their different biting rates. In Malaysian climate, before egg-laying, Aedes aegypti bites every four days while it bites every other day after the first egg-laying. Results from previous research regarding the population dynamics of these two stages of Aedes aegypti in Shah Alam, Malaysia were used as the recruitment rate of vector in this system. This model was tested on the dengue fever cases of Shah Alam for the year 2008. The numerical solution of the system was obtained using Maple and compared to the result of the model with only one-stage adult vector. This model was found to give a better approximation of the actual incidences. Computation of the basic reproduction number using this model was also done.
Asymptotic Analysis of Solutions for the SIR-SI Differential Equations of Dengue Disease Transmission

N.A. Samat and D.F. Percy

Abstract. The main aim of this paper is to introduce a simple method of asymptotic analysis in obtaining approximate solutions for the SIR-SI differential equations (susceptible-infective-recovered for human populations; susceptible-infective for vector populations) that represent a dengue disease transmission model. Firstly, we describe the ordinary differential equations for the SIR-SI disease transmission model. Then, we introduce the asymptotic analysis of solutions of this continuous time, discrete space SIR-SI model. This is followed by the application of the results of asymptotic analysis of solutions for the SIR-SI differential equations to dengue data of Kuala Lumpur, Malaysia. Finally, the results of the analysis and application are discusses. In this study, the asymptotic analysis of solutions gives useful information about the steady state populations of humans (SIR) and mosquitoes (SI).

Improving Three-point Iterative Methods for Solving Nonlinear Equations

Fayyaz Ahmad, D. Garca-Senz, Malik Zaka Ullah

Abstract. In this article, we report on sixth-order and seventh-order iterative methods for solving nonlinear equations. In particular sixth-order derivative-based and derivative-free iterative families are constructed in such a way that they comprise a wide class of sixth-order methods which were developed in the past years. Weighting functions are introduced to enhance the algorithmic efficiency whereas an appropriate parametric combination gives weight-age flexibility in between those weighting functions. The usage of weighting factors and weighting functions define a wide class of iterative schemes for solving nonlinear equations. The freedom to construct different parametric combinations as well as different forms of weighting functions makes the iterative schemes more accurate and flexible, it means that one can easily modify the scheme by changing weight functions and parametric combination.

Oscillation Criterion for Second Order Nonlinear Equations with Alternating Coefficients

M. J. Saad, N. Kumaresan and Kuru Ratnavelu

Abstract. In this paper, some the sufficient conditions for the oscillation of the solutions of the second order non-linear ordinary differential equation are obtained using Riccati Technique. The given results are the extension and improvement of the results of
oscillation which were obtained before by many authors as Bihari [2] and Kartsatos [7]. These results are illustrated with examples that are solved using Runge Kutta method of forth order.

Implicit Block Methods with Off-Step Points for Numerical Solution of First Order Ordinary Differential Equations

Yap Lee Ken, Fudziah Ismail

Abstract. The implicit block methods with off-step points are proposed for solving first order ordinary differential equations. The block methods are applied to provide the approximation for both the main and off-step points simultaneously. The stability properties are discussed. Some numerical examples are tested to illustrate the efficiency of the methods.

On The Oscillation of First Order Neutral Delay Differential Equations

Fatima n. Ahmed, Rokiah Rozita Ahmad, Ummul Khair Salma din, & Mohd Salmi Md Noorani

Abstract. In this paper, we studied the oscillation behaviour of first order neutral delay differential equations. Some new sufficient conditions for the oscillation of all solutions are obtained and some examples are included to illustrate the new theorems.

Conducitivity Model Construction for a Transversely Isoropic Earth

SRI MARDIYATI

Abstract. The electrical potential measurement on the ground surface using the Schlumberger configuration can be used to estimate the conductivity model of the earth. The conductivity in transversely isotopic earth is a conductivity type which has the same value in all horizontal directions but have a different value in vertical current flow. This conductivity type is discussed in this research and the linearized inverse theory of Backus and Gilbert is used to create an iterative method for constructing a conductivity model whose calculated potential response are in agreement with the observations.
Effects of Radiation on Mhd Convective Heat And Mass Transfer Flow In A Porous Medium With Chemical Reaction

S.Karthikeyan, M.Bhuvaneswari, S.Rajan and S.Sivasankaran

Abstract. This paper investigates the influence of thermal radiation and chemical reaction on the problem of unsteady hydro-magnetic natural convection heat and mass transfer flow of an electrically conducting fluid in a porous medium bounded by a semi-infinite vertical plate with heat generation and variable suction. The differential approximation is incorporated to represent the radiative heat flux in the energy equation. The governing dimensionless equations of this investigation are solved analytically after using small perturbation approximation. The effects of different combinations of flow parameters on the velocity, temperature and concentration profiles are depicted graphically. Tabulated results for the skin-friction coefficient, Nusselt number and Sherwood number are presented and discussed.

A Comparative Study of Two New Classical Conjugate Gradient Methods

Abdelrhaman Abashar, Mustafa Mamat, Mohd Rivaie, Ismail Mohd

Abstract. The conjugate gradient methods hold an important role in solving unconstrained optimization. In this paper we compared the performance profile of the classical conjugate gradient coefficients $\beta_k$ and the famous formula. These two new $\beta_k$ possess global convergence properties using exact line search. Numerical results show that, the two new $\beta_k$ are efficient when compared to the other CG coefficients.

Optimal Control for Stochastic Bilinear Quadratic Neuro Takagi-Sugeno Fuzzy Singular System Using Simulink

M. Z. M. Kamali, N. Kumaresan and Kuru Ratnavelu

Abstract. In this paper, optimal control for stochastic bilinear neuro Takagi-Sugeno fuzzy singular system with quadratic performance is obtained using simulink. The goal is to provide optimal control with reduced calculus effort by comparing the solutions of the matrix Riccati differential equation (MRDE) obtained from simulink. The advantage of the proposed approach is that, it allows instantaneous evaluation of solution at any desired number of points spending negligible computing time and memory. An illustrative numerical example is presented for the proposed method.
Shrinkage Covariance Matrix in Hotelling’s $T^2$ for Differentially Expressed Gene Sets

_Suryaefiza Karjanto, Rasimah Aripin, Norazan Mohamed Ramli and Nor Azura Md Ghani_

**Abstract.** In microarray studies, it is common that the number of samples ($n$) exceeds the number of genes ($p$) but the Hotelling’s $T^2$ statistic requires that $n>p$. As a result, the combined sample covariance matrix is not invertible and therefore the distribution of the resulting statistic is either unknown or insufficient. In this study, shrinkage covariance matrix was proposed to improve Hotelling’s $T^2$ statistic for identification of differentially expressed gene sets. The use of shrinkage covariance matrix overcomes the non-singularity problem in the estimation of sample covariance matrix when $p > n$. The performance of the proposed method was assessed using simulation study. Shrinkage covariance matrix approach shows a promising result for detection of differentially expressed gene sets as compared to other methods.

Optimal Control Strategies of Lassa Fever

_Umar Chado Doko, Abdullahi Mohammed Baba & Mamman Mamuda_

**Abstract.** An epidemiological model for the spread of Lassa fever, caused by the Lassa virus, was developed. We formulate an optimal control problem, based on biological observations. Three main control strategies are considered in order to limit the virus transmission to humans, these include educating people in high risk areas, decreasing the rodents population as well as treatment of the infected humans, for which optimal control theory is applied. Numerical and analytical analysis suggests that applying the three control strategies will control if not eliminate Lassa fever in a community.

Casting In Modified Chordal Ring of Degree Six Network Topology

_R.N. Farah and N. Irwan_

**Abstract.** Wired networking environment presents some interesting challenges to the study of network casting. Hence, graphs are usually used to represent networks of communication. The topology should be well designed to meet future reliability demands. Therefore, Modified Chordal Ring of Degree Six (CHRm6) topology had been proposed as mathematical model to represent a network. This paper discussed about broadcasting scheme and multicasting scheme focusing on even and odd nodes. An atomic structure of CHRm6 is used to derive results in broadcasting scheme while multicasting scheme used CHRm6 structure. In this type of network, CHRm6 involve
more total number of nodes to be disseminating a message in terms of broadcasting and deliver message to multiple destinations simultaneously in terms of multicasting.

An Approach to Detect Illegal Text Usage in Research Literature Using Latent Semantic Indexing

*Muna Alsallal, Rahat Iqbal, Anne James, Saad Amin*

**Abstract.** Research suggests that there are an increasing number of illegal similarities within research literature. As part of our research we are investigating the application of an information retrieval technique, Latent Semantic Indexing, to derive semantic information from text files. In this paper, we present an integrated framework for enhancing the automatic detection for illegal similarity texts, steering the area of Latent Semantic Index (LSI) and highlighting its ability to unmask the latent relationship between texts in order to detect illegal similarity. We have conducted an experiment to investigate the efficiency of a dimensionality reduction parameter as the core for LSI technique, the experiments designed to establish the highest amount of re-occurrence for given values and also the distribution for given values of the dimensionality reduction parameter k in Latent Semantic Indexing. The results so far are promising.

Study and Approach of Computational Fluid Dynamics of VOF Model in Two Phase flow through Porous Medium under Microgravity Condition

*Raisul Hasan, Pradyumna Ghosh, R. S. Singh*

**Abstract.** In this research paper firstly theoretical analysis and design of the porous matrix for filtration and selection of associated liquid (highly viscous and low viscous liquid) is carried out. Hence, porosity of the bed has been found out followed by a detailed CFD analysis of the flow to identify displacement structure (fingering: due to the nonlinear interactions among viscous, capillary and gravitational forces). Moreover, an experiment will be with synthetic porous medium consists of a single layer of glass beads which are then positioned homogeneously or non-homogeneously between two Perspex sheets and then fluid displacement structure/fingering will be photographed. Then the effort will be made to validate results with the experiment based photograph and then the CFD model will be extended to microgravity condition.
Interval Type-2 Fuzzy TOPSIS with Borda Count Approach in MCDM Problem

Adawiyah Otheman and Lazim Abdullah

Abstract. Multiple criteria decision making (MCDM) has been widely used in ranking alternatives from a set of available alternatives with regard to relevant criteria. Similar with the Fuzzy TOPSIS that is the famous technique in MCDM problem. In this paper, Borda count has been used to calculate the aggregate of decision matrices and in weighting part. Usually, Borda count is used in social choice problem. However, in this paper we merge Borda count and Fuzzy TOPSIS with the consideration of alternatives and criteria. In order to clarify this approach we will describe solution of a numerical example for supplier selection problem at the end of this paper. The result showed the merge was successful by getting the ranking for the alternatives.

Effects on Mass and Stiffness on Vibrating Amplitudes of a Triple Mass Triple Spring System

S. Rajan, S. Sivasankaran

Abstract. Mathematica is applied to study vibrating amplitude of a Triple mass triple spring system gives the three coupled linear second order ODEs. The solutions of the equations are the vibration amplitudes. One needs to adopt a method to solve them. Traditionally, one replaces these equations with six coupled linear first ODEs and forms an Eigen value equation. The vibration amplitudes are linked to the Eigen values. By applying Mathematica, in Direct Mathematica method the consistency of two methods has been confirmed. Amplitudes are displayed for a wide range of masses and stiffnesses.

A Comparison of the Central Composite Design, Faced and Circumscribed (CCC and CCF) for Vehicle Front End Design Optimization

Kausalyah Venkatason, Shastri Sivaguru, Kassim A Abdullah, Moumen M Idres, Qasim H Shah, Wong Shaw Voon

Abstract. Pedestrian injury poses a significant problem throughout the world. Markedly, pedestrians are the second largest category of motor vehicle deaths accounting for about 13 percent of fatalities, after occupant injuries. Thus it is vital to design pedestrian friendly vehicles to mitigate injuries and fatalities. This work here aims to use a statistical optimization methodology to obtain the optimum design parameters for the vehicle front end geometry, analyzing the differences between the CCC and CCF designs. The central composite design is applied to the crash simulations. On the basis of the design,
a total of 100 simulation runs were generated. Multi linear regression analysis is then performed following which the quadratic programming is used to carry out the optimization task using the response surface models obtained. It is concluded that the CCC offers a better prediction for the optimum values in comparison to the CCF design. The SSR value for the CCC design offers a better fit for the model yielding the value of 2.68 which is lesser than CCF’s value of 2.87. In addition, the error between the predicted CCC designs and observed experimental values are 28% for CCC and 81% for CCF respectively, thus affirming the conclusion made

OPTIMAL CONTROL STRATEGIES FOR HIV/AIDS DYNAMICS

Amiru sule, Farah Aini Abdullah

Abstract. Human immunodeficiency virus/Acquired immune deficiency syndrome (HIV/AIDS), is a disease of the human immune system caused by infection with human immunodeficiency virus (HIV). In this study a system of ordinary differential equations describing the interaction of human population is developed, we proposes an optimal control strategies namely CD4+ count testing, effective public health education, and treatment for the infective incorporated in the model. Optimal control theory was used in order to establish the existence of the optimal control strategies analytically. Numerical simulations suggest that all the three strategies have a positive impact on combating the spread of HIV/AIDS.

Adaptive Neuro-Fuzzy Inference System for Prediction of Carbon Dioxide Emissions in Malaysia

Lazim Abdullah and Herrini Mohd Pauzi

Abstract. There are several ways to predict air quality, varying from simple regression to models that based on artificial intelligence. Most of the conventional methods are not sufficiently able to provide good forecasting performances due to the problems with non-linearity and complexity of the data. Artificial intelligent techniques are successfully used in modelling in order to cope with the problems. This paper describes the development of adaptive neuro-fuzzy inference system (ANFIS) to forecast the carbon dioxide (CO₂) emissions in Malaysia by using five variables: energy use, gross domestic product per capita, population density, combustible renewable and waste and CO₂ intensity which contribute the most to the CO₂ emissions. Prediction performances of the neuro-fuzzy CO₂ model have been found to be satisfactorily with small values of RMSE, MAE and MAPE.
An Exact Solution of Heat and Mass Transfer on MHD Free Convection Flow in a Porous Medium Past an Infinite Inclined Plate

Zulkhibri Ismail, Ilyas Khan and Sharidan Shafie

Abstract. The study of unsteady magnetohydrodynamic (MHD) free convection flow in a porous medium past an infinite inclined plate has been investigated. The closed form analytical solutions have been obtained by using Laplace transform method under the boundary condition of ramped wall temperature. The analytical expressions for nondimensional skin-friction, Nusselt number and Sherwood number have been computed. It is found that decreasing the inclination angle, the fluid velocity along an inclined plate will be increased.

Possibilistic Fuzzy Linear Regression Model and Its Application to Predict CO₂ Emissions

Lazim Abdullah and Herrini Mohd Pauzi

Abstract. A fuzzy linear regression has been used in predicting analysis as to handle uncertainty problems in real life applications. Most of the research used least-squares approach of fuzzy linear regression in their applications. However, fuzzy linear regression based on possibilistic approach has given little attentions. This paper aims to perform possibilistic fuzzy linear regression in CO₂ emissions prediction by employing data from Malaysia. The prediction efficiency of CO₂ emissions Malaysia was measured. The predictive model identified Gross Domestic Products as the most effective predictors for Malaysia. Root Mean Square Errors and Mean Absolute Percentage Errors of Malaysian model were reasonably acceptable. The possibilistic fuzzy linear regression successfully identified the highest fuzzy numbers coefficient of the CO₂ emissions data.

A Type-2 Fuzzy Sets Multi-Criteria Decision Making Method for Supplier Selection

Adawiyah Otheman and Lazim Abdullah

Abstract. In recent years, supply chain management of has been attracted the attention of most companies due to its importance in interconnected businesses. The strong business network is critical in ensuring companies survival in the midst of competitive market condition and also in fulfilling customer needs. Supplier selection is one of the most important activities in supply chain management. The appropriate choice of supplier would help the company in terms of reducing purchase risk, maximizing the overall profit and increasing customer satisfaction. However, the method of selecting appropriate supplier is not straightforward as it involves number of potential companies with diverse criteria. This paper aims to propose a new type-2 multi-criteria decision
making method by incorporating the concepts of entropy weight, linguistic weighted average and ranking values. The proposed method is tested with a case of supplier selection problem. The comparison results show that the selections from the proposed method are consistent with the original methods. It indicates that the proposed method offers a feasible solution to supplier selection problem.

Mathematical Modelling For the Drying Method and Smoothing Drying Rate Using Cubic Spline for Seaweed *Kappaphycus Striatum* Variety *Sacol* In a Solar Dryer


**Abstract.** The solar drying experiment of seaweed using Green V-Roof Hybrid Solar Drier (GVRHSD) was conducted in Semporna, Sabah under the metrological condition in Malaysia. Drying of sample seaweed in GVRHSD reduced the moisture content from about 93.4% to 8.2% in 4 days at average solar radiation of about 600W/m² and mass flow rate about 0.5 kg/s. Generally the plots of drying rate need more smoothing compared moisture content data. Special cares is needed at low drying rates and moisture contents. It is shown the cubic spline (CS) have been found to be effective for moisture-time curves. The idea of this method consists of an approximation of data by a cubic spline regression having first and second derivatives. The analytical differentiation of the spline regression permits the determination of instantaneous rate. The method of minimization of the functional of average risk was used successfully to solve the problem. This method permits to obtain the instantaneous rate directly from the experimental data. The drying kinetics were fitted with six published the exponential model thin layer drying models. The models were fitted using the coefficient of determination ($R^2$), and root mean square error (RMSE).The modeling of models using raw data tested with the possible of exponential drying method. The result showed that the model from modified Page was found to the best model for describe the drying behavior. Besides that, the drying rate smoothed using CS shows to be effective method for moisture-time curves good estimators as well as for the missing moisture content data of seaweed *Kappaphycus Striatum* Variety *Sacol* in Solar Dryer under the condition tested.

Chromatic Polynomials of Chordal Ring and Modified Chordal Ring Networks

*Abdul Jalil M. Khalaf and Mohamed Othman*

**Abstract.** A processor or computer interconnection network can be modelled as a graph. The vertices of the graph correspond to the processors or the nodes of the network, and the edges represent connections between nodes. The chordal ring networks have been the objects of a great deal of attention in recent years, and several parallel computers
have configurations based on the chordal ring topology. In this paper, we find the chromatic number and the chromatic polynomial of some chordal ring and modified chordal ring networks.

**Secret Sharing Scheme Based Graph Domination**

*N.A. Rajab, N. M. G. Al-Saidi, Mohamed R. Md. Said, and K. A. Kadhim*

**Abstract.** Over the past decades, computer networks and data communication system have been developing fast, so, the necessity to protect a transmitted data is a challenging issue, and data security has become a serious problem nowadays. A secret sharing scheme is a method which allows a master key to be distributed among a finite set of participants, in such a way that only certain authorized subsets of participants can reconstruct the master key. To create secret sharing scheme, many mathematical structures are used, the most widely used structure is the one that based on graph theory (graph access structure). Subsequently, many researchers tried to find efficient schemes based on graph access structures. In this paper, we propose a novel efficient construction of perfect secret sharing scheme for uniform access structure. The dominating set of vertices in a regular graph is used for this construction; such that; each vertex represents a participant and each minimum independent dominating subset represent a minimal qualified subset. Some relations between dominating set, graph order and regularity are achieved, to demonstrate the possibility of using dominating set to construct secret sharing scheme. The information rate that is used as a measure for the efficiency of such systems is calculated to show that the proposed method has some improved values.

**A Mathematical Model Development for the Lateral Collapse of Various Geometric Tubes – Part 1**

*M. Ghazali Kamardan, A. Mujahid A. Zaidi, M. Zaid M. Othman and A. Kadir Mahamad*

**Abstract.** A large majority of previous work on lateral collapse had been focusing on cylindrical tubes; thus, there is still a gap of knowledge regarding the mathematical model for the lateral collapse of the various geometric tubes. The purpose of this research is to study the lateral collapse behavior of symmetric hexagon tubes and symmetric decagon tubes and hence to develop a mathematical model of the collapse behavior of these symmetric tubes. For that, a predictive mathematical model was developed and then a finite element analysis procedure was conducted for the lateral collapse behavior of symmetric hexagon tubes and symmetric decagon tubes to validate the proposed mathematical model. It was discovered that these tubes performed different deformation behavior than the cylindrical tube. Hexagon tubes basically
performed the perfectly plastic collapse behavior and the decagon tubes performed phase by phase elastic - plastic collapse behavior pattern. The mathematical prediction had managed to show the fundamental of the deformation behavior of symmetric hexagon tubes and symmetric decagon tubes. However, further study needs to be conducted in order to improve the mathematical model.

A Mathematical Model Development for the Lateral Collapse of Various Geometric Tubes - Part 2

M. Ghazali Kamardan, A. Mujahid A. Zaidi, M. Zaid M. Othman and A. Kadir Mahamad

Abstract. The purpose of this research is to study the lateral collapse behaviour of square tube and symmetric decagon tubes and hence to develop a mathematical model of the collapse behaviour of these tubes. For that, a predictive mathematical model was developed and a finite element analysis procedure was conducted for the lateral collapse behaviour of square tube and symmetric decagon tubes. Lastly, the mathematical model was verified by using the finite element analysis simulation results. It was discovered that these tubes performed different deformation behaviour than the cylindrical tube. The square tube performs TypeII deformation [8] with an initial peak and then followed with an immediately reduced force. Meanwhile, symmetric octagon tubes performs phase by phase elastic - plastic deformation behaviour patterns. The mathematical model had managed to show the fundamental of the deformation behaviour of square tube and decagon tubes. However, further studies need to be conducted in order to further improve on the proposed mathematical model.