

The Medical Service Value Model for Patients without Surgery of Informal Workers in Thailand*

Wiyada Kumam¹, Adisak Pongpullponsak²

¹Department of Mathematics, King Mongkut's University of Technology Thonburi, Bangkok 10400, Thailand;

Centre of Excellence in Mathematics, CHE, Si Ayuthaya Road, Bangkok 10400, Thailand.
wiyada.kum@mail.rmutt.ac.th

²Department of Mathematics, King Mongkut's University of Technology Thonburi, Bangkok 10400, Thailand.

adisak.pon@kmutt.ac.th

Abstract

This study was aimed to develop the medical services value model for estimation of hospital medical expenses of informal workers in Thailand for the case that they are admitted to a hospital for treatment without surgery. The fuzzy regression model has been established using the data surveyed from informal workers by Social Security Office in year 2010. Subsequently, the results obtained from this model, which were compensations for their medical expenses were used to estimate the monetary value of medical services for the patients who received the treatment without surgery.

Keywords: medical services value, informal workers, fuzzy regression.

1 Introduction

From the state of Social Security Office of Thailand ensuring that the system workers shall be entitled to receive medical treatment when they have accident or illness, the Thai government realizes the importance of such that the coverage of benefits should be expanded to informal workers in Social Security office. In 2010, Pongpullponsak et al. [1], determined the prospects for expanding social security coverage to informal workers in Thailand. The author reported four most important benefits for insured persons, including (1) cost of medical treatment, (2) compensation for unemployment, (3) funeral expenses and (4) financial aid. For this study, it was aimed to develop the medical services value model for estimation of hospital medical expenses of informal workers in Thailand in the case of patients admitted to the hospital for treatment without surgery.

There are several researches documented prediction methods of the medical services expenses. For instance, Baker and Krueger [7] studied medical costs for workers' compensation insurance. Jihong and Minglai [4] reported a theoretical investigation of the reformed public health insurance in urban China. In Thailand, the Social Security Office has attempted to provide a benefit on medical services to informal workers. Based on treatment of patients, the expenses of medical services can be divided into 3 groups composing of group I where patients are admitted to a hospital for treatment without surgery, group II where patients are admitted to a hospital for surgical treatment and group III where patients receive treatment but are not admitted to a hospital. Nawata [5, 6], introduced that the hospital length of stay can be analyzed using the discrete-type proportional hazard model and the effectiveness of treatment can be determined by the ordered probit models.

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In many cases, the values of medical services appear as fuzzy data. Consequently, several models have been proposed to support such a problem. Recently, Ho [3], established an optimal evaluation approach for infectious medical waste disposal using the fuzzy analytic hierarchy process. Bolotin [2], introduced linear regression models for fuzzification of indicator variables in medical decision making. Stefan [9] studied predictions of the observed variable with fuzzy numbers in regression models. The aim of this research was to further adapt the model from the work of Pongpullponsak et al. [1] for estimation of medical expenses of informal workers in Thailand for the case that they receive treatment without surgery by using fuzzy regression analysis.

2 Regression model and fuzzy regression model

The classical regression model is presented by

$$y = a_0 + a_1x_1 + a_2x_2 + \dots + a_mx_m, \quad (1)$$

where a_i for all $i = 1, 2, 3, \dots, m$ are the regression coefficients, x_i for all $i = 1, 2, 3, \dots, m$ are input independent variables and y is an output dependent variable.

The fuzzy regression model is presented by

$$\tilde{y} = a_0 + a_1\tilde{x}_1 + a_2\tilde{x}_2 + \dots + a_m\tilde{x}_m, \quad (2)$$

where a_i for all $i = 1, 2, 3, \dots, m$ are the regression coefficients, $\tilde{x}_i$ for all $i = 1, 2, 3, \dots, m$ are fuzzy input independent variables and $\tilde{y}$ is a fuzzy output dependent variable.

3 The medical service value model

In 2009, Nawata et al. [6], proposed a probability function of a patient leaving a hospital as below;

$$p_i(t) = \begin{cases} h_i(t), & t = 1 \\ \left[\prod_{s=1}^{t-1} \{1 - h_i(s)\} \right] h_i(t), & t \geq 2, i = 1, 2, \dots, n \end{cases} \quad (3)$$

where $h_i(t)$ is a conditional probability that the $i - th$ patient stayed in the hospital on the $t - th$ day will leave the hospital on that day.

Therefore, we have

$$h_i(t) = d_t \exp(v_i \beta); t = 1, 2, 3, \dots, T. \quad (4)$$

Let d_t represents the "leaving rate" of the $t - th$ day, β is regression coefficients of symptoms patient and v_i is random variable medical services value of the $i - th$ patient with symptoms. Dennis (2000) studied the health insurance costs of insured persons using the regression equation and Pongpullponsak (2010) established the medical services value model for estimation of hospital medical expenses of informal workers in Thailand when they are admitted to a hospital for treatment without surgery.

From the study of Stefan [9] in year 2010, the fuzzy regression models was developed from observations and unknown regression parameters were fuzzy numbers. Hence, the predictions of the observed variables would be in fuzzy numbers too. In this paper, the medical services value model was constructed using fuzzy regression and given

$$\tilde{y} = 0.23 - 0.001(age) - 0.00000002263(income). \quad (5)$$

Then fuzzy system of independent variable was determined by triangular membership function and Trapezoidal membership function could be defined as:

$$\text{trimf}(x : a, b, c) = \begin{cases} 0 & ; x < a \\ (x - a)/(b - a) & ; a \leq x < b \\ (c - x)/(c - b) & ; b \leq x < c \\ 0 & ; x > c \end{cases} \quad (6)$$

and

$$\text{trapmf}(x : a, b, c, d) = \begin{cases} 0 & ; x < a \\ (x - a)/(b - a) & ; a \leq x < b \\ 1 & ; b \leq x < c \\ (c - x)/(c - b) & ; c \leq x < d \\ 0 & ; x > d. \end{cases} \quad (7)$$

4 The results

Using MatLab, the medical services value model can be created based on fuzzy rule, "if age and income and cost", as shown in Figure 1.

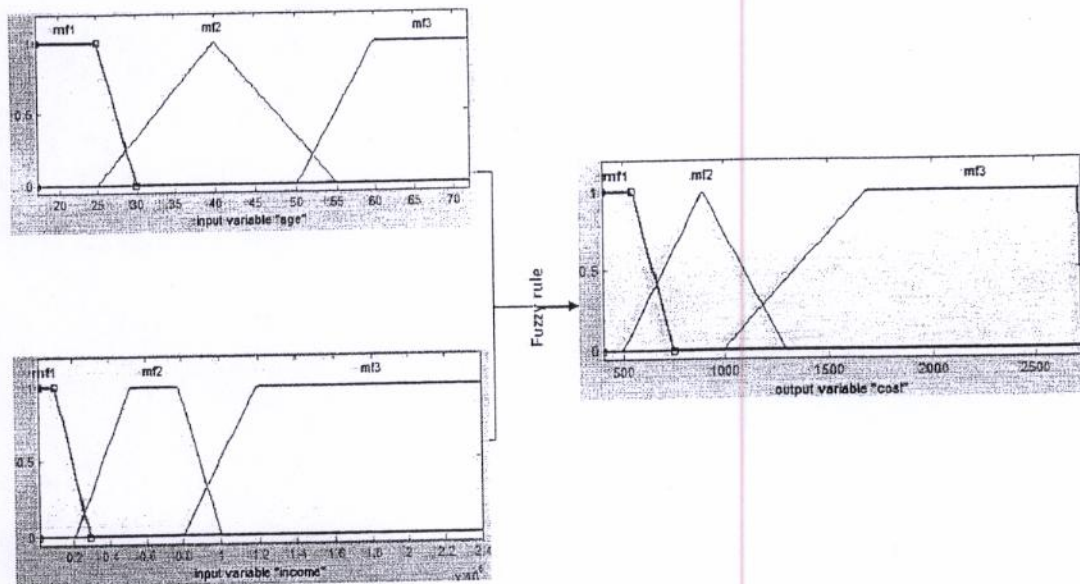


Figure 1: The Fuzzy rule of this study

From the results, the medical services value model for estimation of hospital medical expenses of informal workers in Thailand for the case that they are admitted to a hospital for treatment without surgery can be established. The model was then used to predict for the medical expenses as following. For informal workers who are 44 years at age and have income about 469,000 bath, the estimated medical services value will be 1,340 bath, as shown in Figure 2.

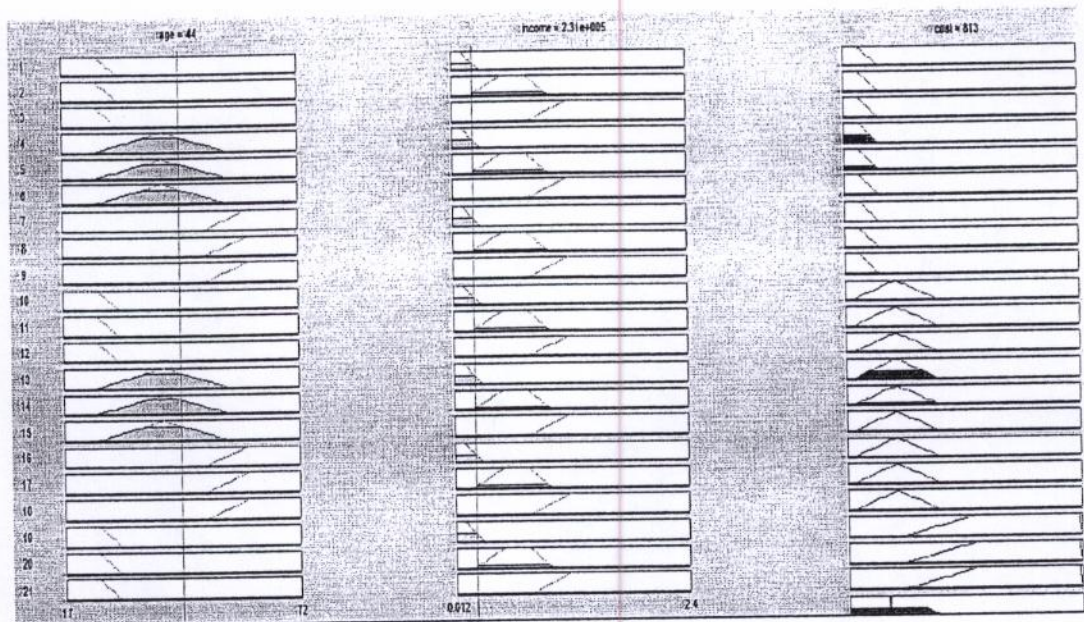


Figure 2: Calculation of medical services value by Centroid method

5 Conclusions

In this study, the model of medical expenses of informal workers in Thailand for the case that patients are admitted to a hospital for treatment without surgery with fuzzy theory was proposed. Using the established model, it was found that the predicted medical services value is related to some variables including age and income of the patients. For the future work, the overview of the medical services value will be considered.

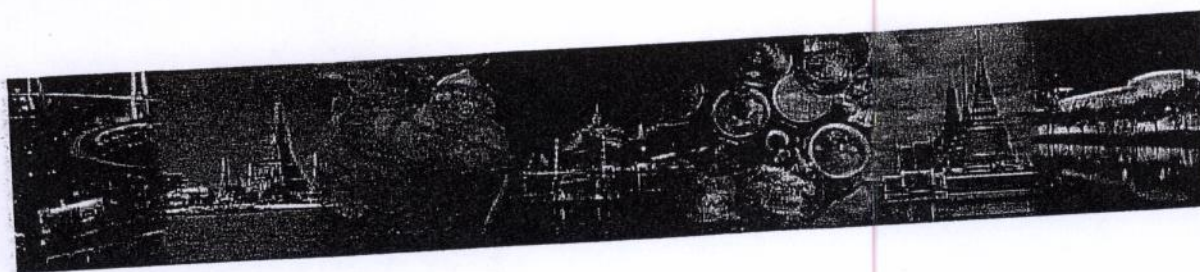
6 Acknowledgment

The first author was supported by the Centre of Excellence in Mathematics, the Commission on High Education, Thailand for Ph.D. program at King Mongkuts University of Technology Thonburi (KMUTT).

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Twin Towers Hotel , 88 Rong Muang, Patunwan, Bangkok 10330. Thailand.
December 17-19, 2011.

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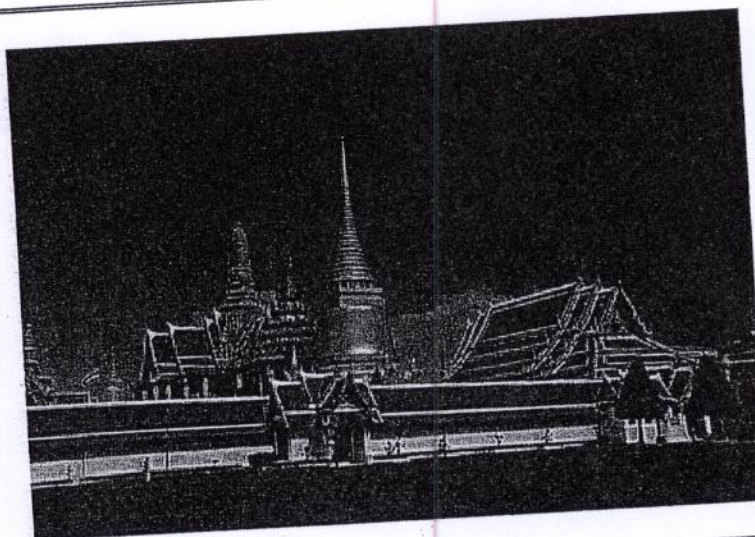
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Past Conferences
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*** The conference ICMA_MU 2011 is still on. ***

The Center of Bangkok is still dry, and whatever little water were able to creep in will be drained out easily and quickly so that we will get back to normal by December.



This conference is the fifth in a series of international meetings organized biannually by the Department of Mathematics, Faculty of Science, Mahidol University, attended by hundreds of participants of several nationalities. The Centre of Excellence in Mathematics will be co-hosting this coming event. Due to the success of the previous four conferences, the organizers are encouraged to hold this next one in order to keep the channels of communications and cooperations open and ever expanding. This conference is intended to provide another important forum for mathematicians and scientists worldwide, working in mathematics and related fields. In a relaxing environment, participants from all over the world will report on research findings, exchange ideas, and discuss the trends and prospects of future research. You are cordially invited to attend this grand event. So, please mark your calendar and plan ahead.

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Title: Record Values

Plenary Lecture 4 :



Prof. Dr. Nguyen Tu Cuong
Hanoi Institute of Mathematics
Hanoi, Vietnam

Title: On the Limit Closure of a Sequence of
Elements in Local Rings

Plenary Lecture 5 :



Prof. Dr. Yong Hong Wu
Curtin University
Australia

Title: On Recent Development of
Mathematical Models for Simulation of
Traffic Flows

Plenary Lecture 6 :



Prof. Charles Micchelli
Department of Mathematics,
City University of Hong Kong
Hong Kong

Title: Convex Regularization for Machine
Learning and Image Analysis

CONFERENCE PROGRAM

Keynote Session: 50 minutes, Plenary Session: 40 minutes, Invited Session: 30 Minutes, Contributed Paper: 20 minutes

Dec 17, 2011	Registration		
8:00-9:00	Opening Ceremony		
9:00-9:40	Welcome Speech: Dean of Science, Prof. Skorn Mongkolsuk		
9:40-10:30	Keynote Session Prof. Efim Zelmanov <i>Abstract Infinite Groups</i>		
10:30-10:50	Coffee Break		
	Room A	Room B	Room C
	Chair: Yongwimon Lenbury	Chair: Nawarat Ananchuen	Chair: Montip Tiensuwan
10:50-11:30	Plenary Speaker: Charles Micchelli <i>Convex Regularization for Machine Learning and Image Analysis</i>	Plenary Speaker: Kazimierz Goebel <i>Shapes and Sizes of Fixed Point Sets</i>	Plenary Speaker: Mohammad Ahsanullah <i>Record Values</i>
11:30-12:00	Invited Speaker: Dinh Que Tran <i>A Mathematical Model for Semantic Similarity Measures</i>	Invited Speaker: Kar Ping Shum <i>On Constructions of Semigroups</i>	Invited Speaker: Bikas K. Sinha <i>Understanding Species' Abundance</i>
12:00-12:20	Contributed Paper: Thi Thuy Van Duong <i>Modeling Mobility in Wireless Network with Spatiotemporal State</i>	Contributed Paper: Van Cuong Dang <i>Binomial Fields of Spacelike Surfaces in Lorentz-Minkowski Space R_1^4</i>	Contributed Speaker: Rungsarit Intaramo <i>Coverage Probability for Fuzzy Extreme Value Theory Control Charts Using α - cuts</i>
12:20-13:30	Lunch		
	Chair: Benchawan Wiwattanapaphee	Chair: Wayne Lawton	Chair: Bikas K. Sinha
13:30-14:00	Invited Speaker: Hideaki Kaneko <i>A Wavelet Collocation Method for the Nonlinear Hammerstein Equations</i>	Invited Speaker: Tu Quoc Thang Le <i>Homology Growth of Finite Covering</i>	Invited Speaker: Timothy E. O'Brien <i>Estimation and Experimental Design Strategies for Multicategory Regression Settings</i>

14:00-14:20	Contributed Paper: Ujjwal Kumar Deb <i>Mathematical Model of Microalgae Flow in the HLTP</i>	Contributed Paper: Le Nam Tran <i>Linear Densities e^x</i> Constant Curvature Curves in a Plane with	Invited Speaker: Tapio Nuutila <i>Testing Linearity in Semiparametric Regression Models</i>
14:20-14:40	Contributed Paper: Nathnarong Khajohnsakumeth <i>Flow of a Modified Second-grade Fluid with Boundary Slip Condition</i>	Invited Speaker: Jean-Marc Bardet <i>Multiple Breaks Detection in General Causal Time Series Using Penalized Quasi-likelihood</i>	Invited Speaker: Dankmar Boehning <i>Modeling a Count Distribution by Means of Regression</i>
14:40-15:00	Contributed Paper: Elvin Moore <i>Maximum Traffic Flow with Flow-Dependent Road Capacities</i>	Invited Paper: Arihant Jain <i>Semi-deterministic Virtual Finite Automaton (SDVFA) of order (s,t)</i>	Contributed Paper: Kuntoro Kuntoro <i>Poisson Regression for Predicting The Number of Visits to Health Services Places Given Predictors Concerning Health Services System: An Evaluation Study of Social Security Net-Health Sector in East Java Province, Indonesia</i>
15:00-15:20	Contributed Paper: Tran Phuong Ha <i>On Truncated Second Main Theorem with Moving Targets</i>		
15:20-15:40	Chair: Christian Licht	Coffee Break	Chair: Timothy E. O'Brien
15:40-16:20	Invited Speaker: Dongwoo Sheen <i>Recent Developments in the Theory and Applications of Nonconforming Finite Element Methods *</i>	Invited Speaker: Bui Xuan Hai <i>On Maximal Subgroups of a Subnormal Subgroup in Division Rings</i>	Invited Speaker: Sujit Ghosh <i>Smooth Density Estimation under Moment Constraint</i>
16:20-16:40	Contributed Paper: Mardiningsih <i>Reduced Gradient Approach for Solving System of Nonlinear Equations</i>	Invited Paper: Mridul Kanti Sen <i>Some Aspects of Semirings</i>	Contributed Speaker: Wimommas Bamrungsetthapong <i>Fuzzy Reliability Estimation Using Bayesian Approach for Non-Repairable Multi-State System</i>
16:40-17:00	Contributed Paper: Nikolay Moshkin <i>Application of High-order Finite-difference Upwind Schemes to Numerical Modeling of Mixed Region Collapse in a Stratified Fluid</i>	Invited Speaker: Tapan Kumar Dutta <i>Singular Ideal and Singular Radical of Semirings</i>	Contributed Paper: Pawan Kumar <i>Estimation Of Ratio-Type Estimator With Sub-Sampling The Non-Respondents</i>
17:00-17:20	Contributed Paper: Deva Kanta Phukan <i>Perturbation and Numerical Solution of Axi-symmetric Flow over a Heated Stretching Sheet of a Newtonian Conducting Fluid in the Presence of Magnetic Field</i>	Contributed Paper: Bibhas Chandra Saha <i>Radicals in Matrix Semiring $\begin{pmatrix} R & I \\ s & L \end{pmatrix}$</i>	Contributed Paper: Sumit Koul <i>Estimation of the Mean Survival Time of the Two-parameter Exponential Distribution: A Sequential Approach</i>
17:20-17:40	Contributed Paper: Ngoc Hai Vu <i>The Finite-Difference Time-Domain Method Using for Material Computation</i>		Contributed Paper: Waliporn Tapang <i>Construction of Quality Control Chart Based on U-Statistics in Ranked Set Sampling</i>
17:40-18:00	Contributed Paper: Sunisa Saiuparad <i>Accuracy and Efficiency of Measurements in a Northeast Monsoon Prediction by a Shallow Water</i>	Contributed Paper: Sukhendu Kar <i>Power Ternary Semirings</i>	Contributed Paper: Wiyada Kumam <i>The Medical Service Value Model for Patients without Surgery of Informal Workers in Thailand</i>

CONFERENCE PROGRAM

Keynote Session: 50 minutes, Plenary Session: 40 minutes, Invited Session: 30 Minutes, Contributed Paper: 20 minutes

Dec 18, 2011

	Room A	Room B	Room C
	Chair: Hideaki Kaneko	Chair: Nguyen Van Sanh	Chair: Dankmar Boehning
9:00-9:40	Plenary Speaker: Yong Hong Wu <i>On Recent Development of Mathematical Models for Simulation of Traffic Flows</i>	Plenary Speaker: Tu Cuong Nguyen <i>On the Limit Closure of a Sequence of Elements in Local Rings</i>	Contributed Paper: Rawee Suwandachochai <i>Integrated Inventory-transportation Problems with Common Carrier Freight Charges</i> Contributed Paper: Porawee Chotpitayasuon <i>The Economic Order Quantity for Imperfect Items under One-time-only and Backordered Shortages</i>
9:40-10:10	Invited Speaker: Karabi Nandy <i>Optimal Designs for Non-Monotone Dose-Response Models</i>	Invited Paper: Sujit Kumar Sardar <i>Role of Operator Semigroups in the Study of Fuzzy Congruences in Γ-semirings</i>	Invited Speaker: Martine Van Wouwe <i>Detection and Correction of Outliers in the Bivariate Chain-Ladder Method</i>
10:10-10:30	Contributed Paper: Pairote Satiracoo <i>Molecular Hydrogen Encapsulation in Goldberg Type I Fullerenes</i>	Contributed Paper: Sarbani Goswami <i>Fuzzy Prime Radicals and Fuzzy Primary Ideals of Γ-semirings</i>	Contributed Paper: Nattakorn Phewchean <i>A Study of Black-Scholes-Merton Framework taking into account Stochastic Earning Yield</i>
10:30-10:50	Coffee Break		
	Chair: Benchawan Wiwattanapaphee	Chair: Anh Vu Le	Chair: Tapio Nummi
10:50-11:20	Invited Speaker: Christian Licht <i>Dynamics of Assemblies of Linearly Elastic Bodies</i>	Invited Speaker: Nanqing Ding <i>On Gorenstein Modules</i>	Invited Speaker: Dilip Nath <i>Models of Loss Reserving Based on Run-off Triangle and Its Applications in Automobile Insurance</i>
11:20-11:40	Contributed Paper: Nuttawat Sontichai <i>A Simplified 2-Dimensional Model for Some Elastic Masonries</i>	Contributed Paper: Yahya Talebi <i>On SSP-Lifting Modules</i>	Contributed Paper: Kawee Nuiwacharoen <i>A New Algorithm for Computing Implied Volatility</i>
11:40-12:00	Contributed Paper: Leeferg Koo <i>Numerical Solution for Elliptical Crack Subject to Shear Loading</i>	Contributed Paper: Hossein Mousa Jafarabadi <i>Completely Simple Semi Hypergroups</i>	Contributed Paper: Nhat Tinh Phan <i>On Second Order Optimality Conditions for Nonsmooth Problems with Constraints</i>
12:00-12:20	Contributed Paper: A. Benerji Babu <i>Nonlinear Rotating Convection in a Sparsely Packed Porous Medium</i>	Contributed Paper: Jayasri Sircar <i>On Right Strongly Prime Ternary Semirings</i>	Contributed Paper: Hafida Guerbyenne <i>Locally Asymptotically Most Powerful Parametric Test for Detecting the Presence of Randomness in the Coefficient of an p-AR(1) Model</i>

Update: December 8, 2011

12:20-13:30	Lunch			
	Chair: Chontita Rattanakul	Chair: Nanqing Ding	Chair: Dilip Nath	
13:30-14:00	Invited Speaker: Hien Tran <i>On Sensitivity and Identifiability of Nonlinear ODE Models and Applications in HIV Dynamics</i>	Invited Speaker: Anh Vu Le <i>The Structure of the Connes' C*-Algebra Associated to a Subclass of MD5-Foliations</i>	Invited Speaker: Rajesh Ranjan Nandy <i>Estimating the Intrinsic Dimensionality of Multivariate Data in the Presence of Strong Correlated Noise</i>	
14:00-14:20	Contributed Paper: Rinrada Thamchai <i>Stability Analysis and Optimal Treatment for the SPAR Drinking Epidemic Model</i>	Invited Speaker: A. R. Rajan <i>On Semigroups and Normal Categories</i>	Contributed Paper: Shabnam M Sarjami <i>An Integrated Mathematical Optimisation Framework for Suppliers Ranking and Demand Allocation</i>	
14:20-14:40	Contributed Paper: Sarawut Suwannaut <i>Analysis of Effective Neurospora Process Model</i>	Invited Speaker: Nikolai Vavilov <i>Yoga of Commutators</i>	Contributed Paper: Vivi Asba <i>Local Seafood Production Planning Under Uncertainty</i>	
14:40-15:00	Contributed Paper: Schehrazad Selmane <i>The Impact of Isolation of Active Tuberculosis Individuals on the Number of Latently Infected Individuals</i>		Contributed Paper: Desi Vinsensia <i>Feasible Neighbourhood Search Approach for Solving Mixed-integer Non Linear Programming Problems</i>	
15:00-15:20	Coffee Break			
	Chair: Elvin Moore	Chair: Nikolai Vavilov	Chair: Rajesh Ranjan Nandy	
15:20-15:40	Contributed Paper: Sineenart Srimongkol <i>A Mathematical Model of a Planar Solid Oxide Fuel Cell</i>	Invited Speaker: Wayne Lawton <i>Bose and Einstein Meet Newton</i>	Contributed Paper: Fajrul H. Poetra <i>Integer Programming Model for Operational Aircraft Maintenance Routing Problem with Side Constraints</i>	
15:40-16:00	Contributed Paper: Phien Phan <i>Some Quantitative Results on Lipschitz Inverse and Implicit Function Theorems</i>	Contributed Paper: Duc Tai Trinh <i>$\mathcal{PT}$ – symmetry and the Spectrum of a Class of $\mathcal{PT}$ -symmetric Hamiltonians</i>	Contributed Paper: Ronal G. Purba <i>Integer Programming Model in Supply Chain Management with Sourcing Decisions</i>	
16:00-16:20	Contributed Paper: Van Minh Man Nguyen <i>Algebraic Methods for Construction of Mixed Orthogonal Arrays</i>		Contributed Paper: Nur Aida Hanum Aizam <i>Mixed Integer Linear Programming Models for University Timetabling</i>	
16:20-16:40	Contributed Paper: Amir Sadeghi <i>A Stable Coupled Newton's Iteration to Approximating Matrix Inverse p^{th} Root</i>	MATLAB and Its High Performance Computing Solutions for Mathematics by TechSource (Teo Chun Chen)		Contributed Paper: Elly Rosmaini <i>A Mixed-Integer Nonlinear Optimization Model for a Water Network Problem</i>
18:30 onward				Welcome Dinner

CONFERENCE PROGRAM

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Dec 19, 2011	Room A	Room B	Room C
	Chair: Maitree Intprasitha	Chair: Wayne Lawton	Chair: Mohammad Ahsanullah
9:00-9:40	Plenary Speaker: Masami Isoda <i>Do You Teach Meaningful Mathematics for Teacher Preparation? Thai Translation of Japanese Textbooks as for the Bases for Pedagogical Content Knowledge</i>	Invited Speaker: Sambasiva Rao Mukkamala <i>α - ideals in Almost Distributive Lattices</i>	Invited Speaker: Nabendu Pal <i>Inferences on a Skew-Normal Distribution</i>
9:40-10:00	Contributed Paper: Suwannee Plianram <i>Japanese Mathematics Textbook: Relation between Structure of Mathematics Textbook and Pedagogical Styles in Classroom</i>	Invited Speaker: Hourong Qin <i>An Expression for Primes and Its Application to $K_2\mathbb{Q}$</i>	<i>Maple in Mathematics Teaching and Learning, as well as Interactive Online Learning by SimNet</i>
10:00-10:20	Coffee Break		
	Chair: Elvin Moore	Chair: Chaiwat Maneesawang	Chair: Montip Tienstuwani
10:20-10:40	Contributed Paper: Anake Sudejannong <i>Teacher's Mathematical Knowledge for Teaching in Elementary School</i>	Invited Speaker: Le Tuan Hoa <i>Non-linear Behaviour of Castelnuovo-Mumford Regularity</i>	Contributed Paper: Choon Peng Tan <i>Universal Portfolios Generated by the Mahalanobis Squared Divergence</i>
10:40-11:00	Contributed Paper: Kasem Premprayoon <i>Development of Student's Mathematical Language by Open Approach</i>	Invited Speaker: Horst Martini <i>Recent Results on the Geometric Dilation Problem in Normed Planes</i>	Contributed Paper: Choon Peng Tan <i>On the Asymptotic Behaviour of the Ratio of Capitals of the Dirichlet Universal Portfolios</i>
11:00-11:20	Contributed Paper: Sampan Thinwathong <i>Small-group Mathematical Communication in Mathematics Classroom Innovated by Lesson Study and Open Approach</i>		Contributed Paper: Ratchaneekorn Thoppradit <i>On Comparison of Vegetables Nutrition by Multiple Criteria Decision Making</i>
11:20-11:40	Contributed Paper: Yanin Kongthip <i>Analyzing Mathematical Communication of Students' Gestures in Lesson Study and Open Approach</i>	Contributed Paper: : Gia Loc Tran <i>The Generalized Gamma Functions</i>	Contributed Paper: Hindra <i>A Combined Approach for Solving Quadratic Assignment Problems</i>
11:40-12:00	Contributed Paper: Auijit Pattanajak <i>Students' Mathematical Communication in the Process of Teacher Professional Development through Lesson Study</i>	Contributed Paper: Chan Pruksapha <i>D' Alembert's Functional Equation on Compact Homogeneous Spaces</i>	Contributed Paper: Wattanavadee Sriwattanapongse <i>Building a Data Warehouse for Research</i>
12:00-12:20	Contributed Paper: Nisara Suthising <i>Students' Abstraction Process for Concept Formation in the Context Using Open Approach and Lesson Study</i>	Contributed Paper: Shayathorn Wanasawat <i>On Binary Quadratic Diophantine Equations with Certain Class of Coefficients</i>	Contributed Paper: Chiranya Surawut <i>Kriging Interpolation of Climate Data</i>
12:20-13:30	Lunch		

	Chair: Boriboon Navaprareetep	Chair: Wayne Lawton	Chair: Suwon Tangmanee
13:30-13:50	Contributed Paper: Ariya Suriyon <i>The Development of Students' Metacognitive Strategies during Problem Solving in Mathematics Classroom using Open Approach</i>	Contributed Paper: Purshottam Agrawal <i>On the Rate of Convergence by Iterates of Beta Operators</i>	Invited Speaker: Bernd Wegner <i>Authors Profiles and Ranking Services at Mathematical Reference Databases</i>
14:10-14:30	Contributed Paper: Katanyuta Bangtho <i>The Teacher's Roles in Planning the Lessons: Focusing on Promoting Analytical Thinking</i>	Contributed Paper: Zayid Abdulhadi <i>Integral Means and Arc Length Inequalities for Typically Real Logharmonic Mappings</i>	Invited Speaker: Fidel Nemenzo <i>Mass Formula for Codes over Finite Rings</i>
14:30-14:50	Contributed Paper: Kawissara Sansanoh <i>Gifted Students' Mathematical Creativity</i>	Contributed Paper: Aram Tangboonduangjit <i>Divisibility Properties of Some Subsequences of Fibonacci Numbers</i>	
14:50-15:10	Coffee Break		
	Chair: Suwon Tangmanee	Chair: Wayne Lawton	Chair: Elvin Moore
15:10-15:30	Contributed Paper: Kittisak Jai-on <i>Developing Lesson Plans Emphasizing the Use of Technology and Open-ended Problems</i>	Contributed Paper: Athassawat Kammanee <i>Broyden Method for Inverse Partially Known Sturm-Liouville Potentials</i>	Invited Speaker: Edy Tri Baskoro <i>The Locating-chromatic Number for a Corona Product of Graphs</i>
15:30-15:50	Contributed Paper: Benjawan Chaipalad <i>Mathematical Representations of Fractions in Open Approach Classroom</i>	Contributed Paper: Chatchawan Panraksa <i>Arithmetic Dynamics and Dynamical Units</i>	Contributed Paper: Astri Syafranty <i>Vertex Exponents of a Class of Two-colored Digraphs with Even Number of Vertices</i>
15:50-16:10	Contributed Paper: Wipaporn Suttiamporn <i>Developing Students' Creativity through Connecting Previously Learned Knowledge and Ideas</i>	Contributed Paper: Mongkolsery Lin <i>On the Composition of the Distributions $\delta^{(s)}$ and $(e^x - 1)^+$</i>	Contributed Paper: Rolando Paluga <i>On the k-Covering Number of the Join and Corona of Graphs</i>
16:10-16:30	Contributed Paper: Michael Little Crow <i>An Experiential Math Curriculum: Basic Robotics for Middle and High School</i>	Contributed Paper: Shea-Ming Oon <i>Matrices with Determinants Equal to Some Arithmetical Functions</i>	Contributed Paper: Tinnaluk Rutjanisarakul <i>Endomorphism Monoids and Groups of Wheel Graphs</i>
16:30-16:50	Contributed Paper: Sirilak Suwanwongsri <i>Impact of Royal Golden Jubilee Ph.D. Program on Graduate Students</i>	Contributed Paper: Karunesh Singh <i>An Inverse Theorem for the Iterates of Modified Bernstein Type Polynomials in L_p Spaces</i>	Contributed Paper: Wajananu Kulclung <i>A Characterization of $3-(\gamma, 2)$-Critical Graphs Which are not $3-\gamma$-Critical of Small Order</i>
16:50-17:10	Contributed Paper: Sudatip Hanchernghai <i>Mathematics Teacher Education Program in Thailand</i>		Contributed Paper: Esamel Paluga <i>On Non-split and Inverse Non-split Domination Numbers of Graphs Resulting from Some Binary Operations</i>
17:10-17:30	Invited Speaker: Pauline Mangulabnan <i>Assessing Alternative Conceptions in Translating Word Problems to Algebraic Equations</i>		