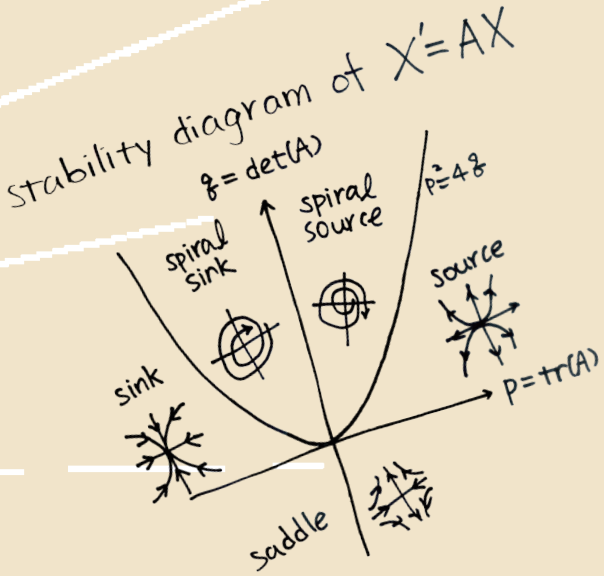
2014 AMMS Dec6-7

The International Mathematical Meeting and the Annual Meeting of the Taiwanese Mathematical Society

國際數學學術研討會暨中華民國數學年會

大會手册



主辦單位：中華民國數學會
承辦單位：國立成功大學數學系
會議時間：2014年12月6日(六)-12月7日(日)
大會網址：http://www.math.ncku.edu.tw/~amms2014/

成大數學系
Department of Mathematics
National Cheng-Kung University

國立成功大學數學系 Department of Mathematics National Cheng-Kung University
70101 臺南市東區大學路1號 Tel: +886-6-2757575 Ext.65100 Fax: +886-6-2743191

2014 中華民國數學會年會暨數學學術研討會

日期：2014 年 12 月 6 日(星期六)至 12 月 7 日(星期日)

地點：國立成功大學成功校區數學系系館

主辦單位：中華民國數學會

承辦單位：國立成功大學數學系

贊助單位：科技部數學研究推動中心、國立成功大學「邁向頂尖大學計畫」推動總中心、國立成功大學理學院、中華民國數學會、國立成功大學數學系研發基金委員會

贊助廠商：Cambridge University Press、EBSCO、昊青股份有限公司、思渤科技股份有限公司、科學文創有限公司、滄海書局(鼎隆圖書)、高立出版集團、群翰資訊有限公司、東華書局(新月圖書)、綠保股份有限公司、知訊圖書、歐亞書局

學術委員會 Scientific Committee

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柯文峰	Wen-Fong Ke	國立成功大學	
李瑩英	Yng-Ing Lee	國立台灣大學	
陳建隆	Jann-Long Chern	國立中央大學	
蔡東和	Dong-Ho Tsai	國立清華大學	
許元春	Yuang-Chung Shen	國立交通大學	
陳若淳	Roger Chen	國立成功大學	

組織委員會 Organizing Committee

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林景隆	章源慶	黃世昌
黃柏嶧	方永富	王辰樹
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楊世偉	劉之中	劉育佑
劉珈銘	蕭仁傑	鄺國權

目錄

2014 年國際數學學術研討會暨中華民國數學會年會

2014.12.06 (六)

8:30-9:30	Registration 報到註冊								數學系館 1F
9:30-10:00	Opening Ceremony Chair: Professor Jung-Kai Chen 年會開幕式 主持人: 陳榮凱教授								經緯廳
10:00-10:50	Plenary Lecture by Professor Shigefumi Mori Chair: Professor Jung-Kai Chen 大會演講 森 重文教授 主持人: 陳榮凱教授								經緯廳
10:50-11:10	Group Photo 團體照								成功大學圖書館 廣場
11:10-11:30	Coffee Break 茶會、討論								數學系館 1F
Sections	數論與代數 Number Theory and Algebra	分析與最佳化 Analysis and Optimization	幾何 Geometry	動態系統生物數學 Dynamical Systems and Biomathematics	偏微分方程 Partial Differential Equations	離散數學 Discrete Mathematics	機率 統計 Probability & Statistics		計算數學 Computational Mathematics
page	pp.13~16	pp.23~26	pp.33~35	pp.41~44	pp.49~52	pp.59~62	pp.69~72 (機)	pp.77~79 (統)	pp.85~88
Room	數學系館 3174	數學系館 3172	測量教室 55180	測量教室 55150	數學系館 3173	測量教室 55170	數學系館 3176	數學系館 3177	測量教室 55160

11:30-12:20	謝銘倫 Ming-Lun Hsieh	Wataru Takahashi	姚美琳 Mei-Lin Yau	蔡志強 Je-Chiang Tsai	陳子軒 Chi-Hin Chan	游森棚 Sen-Peng Eu	陳冠宇 Guan-Yu Chen	黃名鉞 Ming-Yueh Huang	薛克民 Keh-Ming Shyue
12:20-13:40	Lunch　午　餐								
13:40-14:05	彭勇寧 Yung-Ning Peng	陳界山 Jein-Shan Chen	吳進通 Chin-Tung Wu	梁育豪 Yu-Hao Liang	夏俊雄 Chun-Hsiung Hsia	林延輯 Yen-Chi Lin	陳隆奇 Lung-Chi Chen	何弘棋 Hung-Chi Ho	黃聰明 Tsung-Ming Huang
14:05-14:30	劉承楷 Cheng-Kai Liu	吳金典 Chin-Tien Wu		鄭文巧 Wen-Chiao Cheng	林英杰 Ying-Chieh Lin	張惠蘭 Hui-Lan Chang	Akira Sakai	王紹宣 Shao-Hsuan Wang	林得勝 Te-Sheng Lin
14:30-15:00	Coffee Break　茶會、討論　數學系館　1F								
15:00-15:25	涂芳婷 Fang-Ting Tu	黃楓南 Feng-Nan Hwang	趙玹珠 Hyunjoo Cho	黃少遠 Shao-Yuan Huang	江金城 Jin-Cheng Jiang	徐育鋒 Yu-Fong Hsu	張明淇 Ming-Chi Chang		施因澤 Yin-Tzer Shih
15:25-15:50	楊策仲 Tse-Chung Yang	李育杰 Yuh-Jye Lee	李國瑋 Kuo-Wei Lee	林建仲 Jian-Jhong Lin	司靈得 Daniel Spector	黃喻培 Yu-Pei Huang	謝希微 Hsi-Wei Hsieh		胡偉帆 Wei-Fan Hu
16:00-16:50	Plenary Lecture by President Tony F. Chan Chair: Professor I-Liang Chern　大會演講 陳繁昌校長 主持人: 陳宜良教授　經緯廳								
16:50-18:10	中華民國數學學會年度會議暨頒獎典禮　經緯廳								
18:30-21:00	2014 年國際數學學術研討會暨中華民國數學會年會晚宴　資訊大樓　廣場								

2014 年國際數學學術研討會暨中華民國數學會年會

2014.12.07 (日)

8:30-9:00	Registration 報到註冊 數學系館 1F								
Sections	數論與代數 Number Theory and Algebra	分析與最佳化 Analysis and Optimization	幾何 Geometry	動態系統 生物數學 Dynamical Systems and Biomathematics	偏微分方程 Partial Differential Equations	離散數學 Discrete Mathematics	機率 統計 Probability & Statistics	計算數學 Computational Mathematics	數學教育 Mathematics Education
page	pp.17~21	pp.27~31	pp.37~40	pp.45~48	pp.53~57	pp.63~67	pp.73~75 (機) pp.81~83 (統)	pp.89~93	pp.95~99
Room	數學系館 3174	數學系館 3172	測量教室 55180	測量教室 55150	數學系館 3173	測量教室 55170	數學系館 3176	測量教室 55160	數學系館 3177
9:00-9:50	楊一帆 Yi-Fan Yang	徐洪坤 Hong-Kun Xu	蕭欽玉 Chin-Yu Hsiao	陳兆年 Chao-Nien Chen	吳恭儉 Kung-Chien Wu	傅恆霖 Hung-Lin Fu	須上苑 Shang-Yuan Shiu	洪子倫 Tzyy-Leng Horng	李國偉 Ko-Wei Lih
9:50-10:10	Coffee Break 茶會、討論 數學系館 1F								
10:10-11:00	Special Invited Lecture Professor Jongil Park Chair: Roger Chen 經緯廳 特別邀請演講 Professor Jongil Park 主持人: 陳若淳				Interdisciplinary Lecture Professor Norden E.Huang Chair: Professor Ming Chih Lai 格致廳 跨領域演講 黃鍔 院士 主持人: 賴明治				

11:10-11:35	康明軒 Ming-Hsuan Kang	黃延安 Yan-An Hwang	張懷良 Huai-Liang Chang	張志鴻 Chih-Hung Chang	Takayoshi Ogawa	孫新民 Hsin-Min Sun	陳美如 May-Ru Chen	卓建宏 Chien-Hong Cho	陳宜良 I-Liang Chern
11:35-12:00	魏福村 Fu-Tsun Wei	高華隆 Hwa-Long Gau		胡文貴 Wen-Guei Hu	Masaki Kurokiba	史青林 Chin-Lin Shiue	孫立憲 Li-Hsien Sun	林敏雄 Min-Hsiung Lin	舒宇宸 Yu-Chen Shu
12:00-13:30	Lunch (Research Fields Development Forum) 午 餐 (領域發展論壇)								
13:30-13:55	陳憲揚 Hsian-Yang Chen	陸行 Hsing Luh	劉筱凡 Hsiao-Fan Liu	鄭凱仁 Kai-Ren Zheng	Masashi Misawa	梁育菖 Yu-Chang Liang	黃建豪 Chien-Hao Huang	薛名成 Ming-Cheng Shiue	曾正男 Jeng-Nan Tzeng
14:00-14:50	Plenary Lecture by Professor Ching Hung Lam 大會演講 林正洪教授 Chair: Professor Shun-Jen Cheng 主持人: 程舜仁教授								經緯廳
14:50-15:20	Coffee Break 茶會、討論								數學系館 1F
15:20-15:45	林興君 Xing-Jun Lin	林來居 Lai-Jiu Lin	張清皓 Ching-Hao Chang	黃志強 Chih-Chiang Huang	林立人 Li-Ren Lin	羅元勳 Yuan-Hsun Lo	吳筱婷 Haiao-Ting Wu	陳麗貞 Li-Chen Chen	張鎮華 Gerard J. Chang
15:45-16:10	郭容妙 Jung-Miao Kuo	杜威仕 Wei-Shih Du	黃彥彰 Yen-Chang Huang	魏秀娟 Hsiu-Chuan Wei	關汝琳 Ru-Lin Kuan	林凡軒 Fan-Hsuan Lin	李佳蓉 Jia-Rong Li	劉青松 Ching-Sung Liu	李源順 Yuan-Shun Lee
16:10-16:35	Can Hatipoglu	Yasunori Kimura			周世偉 Shih-Wei Chou	學生發表 Student publication	楊智雄 Zhi-Xiong Yang	王辰樹 Chern-Shuh Wang	吳昭容 Chao-Jung Wu
16:35-17:00		莊智升 Chih-Sheng Chuang			黃博峙 Bo-Chih Huang				
	賦歸								

大會演講　Professor Shigefumi Mori

Extremal Rays and the Explicit Minimal Model Program in Dimension Three

Abstract

We will review the theory of extremal rays and the minimal model theory especially in dimension three with emphasis on explicit description of extremal contractions.

Professor Shigefumi Mori

- **現職**

  Professor, Research Institute of Mathematical Sciences (RIMS), Kyoto University, Japan

- **學歷**

  1973 B.A., Kyoto University, Japan
  1975 M.A., Kyoto University, Japan
  1978 Dr. Sci., Kyoto University, Japan

- **研究領域**

  Algebraic Geometry, especially birational classification and the birational geometry of algebraic varieties

- **學術榮譽**

  1990 Japanese Government Prize (Person of Cultural Merits)
  1990 Fields Medal
  1990 Japan Academy Prize (with S. Iitaka and Y. Kawamata)
  1990 American Mathematical Society Cole Prize
  1989 Inoue Science Prize
  1988 Japan Mathematical Society Autumn Prize (with Y. Kawamata)
  1984 Chunichi Culture Prize
  1983 Japan Mathematical Society Iyanaga Prize

大會演講　President Tony F. Chan

Four Color Theorem for Image Segmentation

Abstract

Image segmentation is an essential problem in imaging science. One of the most successful segmentation models is the piecewise constant Mumford-Shah minimization model. This minimization problem is however difficult to carry out, mainly due to the non-convexity of the energy. Recent advances based on convex relaxation methods are capable of estimating almost perfectly the geometry of the regions to be segmented when the mean intensity and the number of segmented regions are known a priori. The next important challenge is to provide a tight approximation of the optimal geometry, mean intensity and the number of regions simultaneously while keeping the computational time and memory usage reasonable.

In this work, we propose a new algorithm that combines convex relaxation methods with the four color theorem to deal with the unsupervised segmentation problem. The proposed algorithm can segment any a priori unknown number of regions with only four intensity functions and four indicator (labeling) functions. The number of regions in our segmentation model is decided by one parameter that controls the regularization strength of the geometry, i.e., the total length of the boundary of all the regions. The segmented image function can take as many constant values as needed. We will present the detail about the new model as well the numerical techniques used to solve it.

陳繁昌 校 長

- **現職**

  香港科技大學校長

- **學歷**

  史丹福大學博士 (1978)

  美國加州理工大學碩士 (1973)

- **研究領域**

  數學造影處理及計算機視像、大規模整合物理設計、運算大腦製圖

跨領域演講　Professor Norden E. Huang

On the Degree of Nonlinearity

Abstract

The term ‘nonlinearity’ has been loosely used, in most cases, not to clarify the situation at hand, but rather as a fig leaf to hide our ignorance. As a result, any anomaly without obvious and ready explanations is labeled as being due to a ‘nonlinear effect.’ Such an approach is a hindrance to progress of our knowledge. Unfortunately, under the present state of our understanding of nonlinearity, no better prescription is available. The central problem is that the present definition of ‘nonlinearity’ is only a qualitative one.

A Degree of Nonlinearity (DN) based primarily on intra-wave frequency modulation is proposed here with the value always between 0 and 1. With this definition, the degree of nonlinearity measures the state rather than a system. The data needed for the definition is the state of the motion, or in effect, the complete suite of observational data. For a complicated state with more than one Intrinsic Mode Function (IMF) containing prominent energy density, the DN must also consider amplitude variations. The combination of both the intra-wave frequency modulation and the amplitude variation then yields the Combined Degree of Nonlinearity (CDN). Extensive tests via the employment of well - known nonlinear systems indicate that the new definition is logical and the values of the CDN given are quite reasonable. With these definitions of the DN and the CDN, we can presumably mover forward and quantify the nonlinearity of any continuous system and the discussion of nonlinear effects can be conducted precisely. Applications of the DN and CDN for structural safety monitoring, bio-medical applications and financial data, by way of example, will be presented and discussed.

黃 鍔 院 士

- **現職**

  中央大學數據分析方法研究中心

- **學歷**

  美國約翰霍普金斯大學博士 (1967)

  國立台灣大學學士 (1960)

- **研究領域**

  流體力學、希爾伯特-黃變換法

邀請演講　Professor Jongil Park

On Knot Surgery 4-Manifolds

Abstract

Since the inception of gauge theory, in particular Seiberg-Witten theory, topologists and geometers working on 4-manifolds have developed various techniques and they have obtained many fruitful and remarkable results on 4-manifolds in last 30 years. Among them, a knot-surgery technique introduced by R. Fintushel and R. Stern turned out to be one of most effective techniques to modify smooth structures without changing the topological type of a given 4-manifold. Nevertheless, there are still fundamental problems on knot surgery 4-manifolds to be settled down. For example, it is an intriguing question to know whether a knot surgery 4-manifold determines a prime knot up to mirror, called Fintushel-Stern conjecture on knot surgery 4-manifold.

In this talk first I'd like to review a knot-surgery technique in some details. And then I'll investigate some open problems such as Fintushel-Stern conjecture.

Professor Jongil Park

- **現職**

  Professor, Seoul National University, South Korea

- **學歷**

  1996 Ph.D., Michigan State University East Lansing, Michigan, USA
  1988 M.S., Seoul National University, Seoul, Korea
  1986 B.S., Seoul National University, Seoul, Korea

- **研究領域**

  Gauge theory - Donaldson theory and Seiberg-Witten theory
  Low-dimensional topology - 3- and 4-manifolds
  The geography of smooth (symplectic, complex) 4-manifolds

大會演講　Professor Ching Hung Lam

Moonshine Vertex Operator Algebra and Its Cousins

Abstract

The Moonshine vertex operator algebra $V^\natural$, whose full automorphism group is isomorphic to the Monster simple group, was first constructed by Frenkel-Lepowsky-Meurman in 1983. Not only does it solve a conjecture of McKay-Thompson that related the Monster simple group to certain modular functions but it also plays a fundamental role in shaping the theory of vertex operator algebra.

In this talk, I will first give few historical remarks about the Moonshine phenomenon and the development of the theory of vertex operator algebra (VOA). I will try to explain how the theory of vertex operator algebra could help us to understand some mysterious properties of the Monster simple group and the Moonshine phenomenon.

If time is permitted, I will also discuss some VOAs related to other sporadic simple groups and some relatively new moonshine phenomena.

林正洪 教 授

- **現職**
  中央研究院數學所研究員
- **學歷**
  俄亥俄州立大學博士 (1996)
  香港大學學士 (1989)
- **研究領域**
  頂點算子代數、李代數、有限群論
- **學術榮譽**
  國立成功大學 特聘教授 2008
  中華民國科技部 傑出研究獎 2009~2011

Plenary Speakers

Professor Shigefumi Mori	Kyoto University
陳繁昌　校長	香港科技大學
林正洪　教授	中央研究院

Special Invited Speakers

跨領域專題	黃　鍔　院士	國立中央大學
韓國數學會	Professor Jongil Park	Seoul National University

領域發展論壇　12 月 7 日　12:00~13:30，地點：各領域議場

數論與代數	楊一帆	教授	國立交通大學
分析與最佳化	許瑞麟	教授	國立成功大學
幾何	蔡東和	教授	國立清華大學
動態系統與生物數學	陳兆年	教授	國立清華大學
偏微分方程	陳建隆	教授	國立中央大學
離散數學	翁志文	教授	國立交通大學
機率	黃啟瑞	教授	中央研究院
統計	陳玉英	教授	國立中央大學
計算數學	賴明治	教授	國立交通大學

雙邊會談　12 月 6 日　11:20~13:40，地點：數學系館三樓 會議室

Korean Mathematical Society

Professor Jongil Park	Seoul National University
Professor Myung Hwan Kim	Seoul National University
Professor Yong Hoon Lee	Pusan National University
Professor Dongsu Kim	National Institute for Mathematical Sciences
Professor Hyungju Park	Postech for Mathematics
Professor Hyang Sook Lee	Ewha Womans University

Taiwan Mathematical Society

陳榮凱 教授	台灣大學數學系
柯文峰 教授	成功大學數學系
王偉仲 教授	台灣大學數學系
于　靖 教授	台灣大學數學系
李瑩英 教授	台灣大學數學系
王振男 教授	台灣大學數學系
賴明治 教授	交通大學應用數學系
蔡東和 教授	清華大學數學系
程舜仁 教授	中央研究院數學研究所
陳宜良 教授	中央大學數學系
林文偉 教授	交通大學應用數學系
許世壁 教授	清華大學數學系

數論與代數

Organizers:Shih-Chang Huang 黃世昌
Ching-Hung Lam 林正洪
地點:數學系館 3174
時間:2014 年 12 月 06 日 (六)

11：30~12：20

On the Derivatives of Anticyclotomic *P*-adic *L*-functions
Ming-Lun Hsieh 謝銘倫 (主持人 : 陳憲揚)

13：40~14：05

Rectangular Finite W-superalgebras and the Super Yangian $Y_{M|N}$
Yung-Ning Peng 彭勇寧 (主持人 : 楊一帆)

14：05~14：30

Engel Type Functional Identity in Semiprime Rings
Cheng-Kai Liu 劉承楷 (主持人：楊一帆)

15：00~15：25

Generalized Legendre Curves and Qutternion Multiplication
Fang-Ting Tu 涂芳婷 (主持人：楊一帆)

15：25~15：50

Monomial, Gorenstein and Bass Orders
Tse-Chung Yang 楊策仲 (主持人 : 楊一帆)

On the Derivatives of Anticyclotomic p-adic L-functions

Ming-Lun Hsieh (謝銘倫)
National Taiwan University
mlhsieh@math.ntu.edu.tw

Abstract

I will report a recent work of Pin-Chi Hung on the construction of anticyclotomic *p*-adic *L*-functions for Hilbert modular forms of finite slopes and a formula relating the first derivative of this *p*-adic *L*-functions at the central point and Teieltbaum's *L*-invariant defined by Chida, Mok and Park.

His results extend previous works of Bertolini, Darmon, Iovita and Speiss to Hilbert modular forms.

Rectangular Finite W-superalgebras and the Super Yangian $Y_{M|N}$

Yung-Ning Peng (彭勇寧)
National Central University
ynp@math.ncu.edu.tw

Abstract

Finite W-algebra $W_{e,h}$ are certain associative algebras determined by a nilpotent element e and a semisimple element h satisfying certain relations in a finite dimensional semisimple or reductive Lie algebra g. In general, they are very complicated and difficult to study. In 2006, Brundan and Kleshchev found a concrete description of $W_{e,h}$ when $\mathrm{g} = \mathrm{gl}_n$ in terms of Yangian algebra and obtained a powerful tool for the study of finite W-algebras.

In this talk, we will generalize the technique of Brundan and Kleshchev to the case of general linear Lie superalgebra $\mathrm{gl}_{M|N}$, where the given e and h are "$rectangular$", and hence a concrete description of the corresponding finite W-superalgebra in terms of super Yangian $Y_{M|N}$ is obtained. It gives a new proof of the earlier result observed by Briot and Ragoucy in 2003.

Engel Type Functional Identity in Semiprime Rings

Cheng-Kai Liu (劉承楷)
National Chang Hua University of Education
ckliu@cc.ncue.edu.tw

Abstract

Let R be a semiprime ring with center $Z(R)$, extended centroid C and Q the maximal right ring of quotients of R. A map $f: R \to Q$ is called k-commuting on R if $[f(x), x]_k = 0$ for all $x \in R$, where $[y, x]_1 = [y, x] = yx - xy$ and $[y, x]_n = [[y, x]_{n-1}, x]\,[y, x]_n = [[y, x]_{n-1}, x]$ for $n > 1$. It is proved that if f is a k-commuting additive map on R, then there exists an idempotent $e \in C$ such that $ef(x) = \lambda x + \mu(x)$ for all $x \in R$, where $\lambda \in C$ and $\mu: R \to C$ is an additive map. Moreover, $(1-e)Q$ is a $n!$-torsion noncommutative reduced ring satisfying the standard identity of degree $2n$. As a consequence of the theorem, it is proved that every k-commuting $Z(R)$-module homomorphism on R is 1-commuting. In the case of prime rings, our theorem gives a partial answer to the unsolved problem of such functional identities initiated in 1995 by Brešar.

Generalized Legendre Curves and Quternion Multiplication

Fang-Ting Tu (涂芳婷)
National Center for Theoretical Sciences (North)
ft12@math.cts.nthu.edu.tw

Abstract

In this talk, we will discuss some results on the Jacobian varieties of the generalized Legendre curves $y^N = x^i(1-x)^j(1-\lambda x)^k, \lambda \in \mathbb{C}; N, i, j, k \in \mathbb{N}$ and their primitive subvarieties with Quternion Multiplication, which are based on explicit computations on the corresponding Galois representations and periods.

Monomial, Gorenstein and Bass Orders

Tse-Chung Yang (楊策仲)
Academia Sinica
jmkuo@amath.nchu.edu.tw

Abstract

In the integral theory for central simple algebras over non-Archimedean local fields, we have the following important classes of orders: maximal orders, hereditary orders, Bass orders and Gorenstein orders. Many theories and relations are investigated by many authors for understanding these classes of orders, as well as their module structures. It is well-known that they form the following proper inclusions :

$$(\text{maximal orders}) \subset (\text{hereditary orders}) \subset (\text{Bass orders}) \subset (\text{Gorenstein orders})$$

In this talk, we study a class of orders called monomial orders in a central simple algebra over a non-Archimedean local field. Monomial orders are easily represented and they may be also viewed as a direct generalization of Eichler orders in quaternion algebras. A criterion for monomial orders to be Gorenstein or to be Bass is given. It is shown that a monomial order is Bass if and only if it is either a hereditary or an Eichler order of period two.

數論與代數

Organizers:Shih-Chang Huang 黃世昌
Ching-Hung Lam 林正洪
地點:數學系館 3174
時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Quaternionic Loci in Siegel's Modular Threefold** Yi-Fan Yang 楊一帆	(主持人：郭容妙)
11：10~11：35	**Bass-Ihara Zeta Functions for Non-uniform Tree Lattices** Ming-Hsuan Kang 康明軒	(主持人：郭容妙)
11：35~12：00	**Kronecker Limit Formula over Function Fields Revisited** Fu-Tsun Wei 魏福村	(主持人:郭容妙)
13：30~13：55	**Fusion Rules of the VOA $V_{C\times D}$** Hsian-Yang Chen 陳憲揚	(主持人:彭勇寧)
15：20~15：45	**Unitary Vertex Operator Algebras** Xing-Jun Lin 林興君	(主持人:彭勇寧)
15：45~16：10	**On Three Dimensional Representations of the Clifford Algebra of a Ternary Cubic Form** Jung-Miao Kuo 郭容妙	(主持人:彭勇寧)
16：10~16：35	**Injective Hulls of Simple Modules over Some Noetherian Rings** Can Hatipoglu	(主持人:彭勇寧)

Quaternionic Loci in Siegel's Modular Threefold

Yi-Fan Yang (楊一帆)
National Chiao Tung University
yfyang@math.nctu.edu.tw

Abstract

An abelian surface over $\mathbb{C}$ is said to have quaternionic multiplication if its endomorphism algebra contains a quaternion algebra over $\mathbb{Q}$. Let A_2 be the moduli space of isomorphism classes of principally polarized abelian surfaces over $\mathbb{C}$. In this talk, we will discuss the loci of principally polarized abelian surfaces with QM is A_2.

Bass-Ihara Zeta Functions for Non-uniform Tree Lattices

Ming-Hsuan Kang (康明軒)
National Chiao Tung University
mhkang@math.nctu.edu.tw

Abstract

We will discuss zeta functions on non-compact arithmetic quotient graph. Despite the in finite-dimensional setting, it turns out to be a rational function, generally with zeros and poles, in contrast to the compact case. The determinant formulas of Bass and Ihara hold true if one denes the determinant as limit of all finite principal minors.

Kronecker Limit Formula over Function Fields Revisited

Fu-Tsun Wei (魏福村)
Academia Sinica
ftwei@math.sinica.edu.tw

Abstract

In this talk, I will discuss an analogue of Kronecker limit formula in the function field context. This formula is applied to the study of “non-central” values of the Rankin product *L*-functions associated with two Drinfeld type new forms. Moreover, we relate the “Taguchi height” of rank 2 Drinfeld modules with "complex multiplication" to logarithmic derivatives of zeta functions.

Fusion Rules of the VOA $V_{C\times D}$

Hsian-Yang Chen (陳憲揚)
Academia Sinica
hychen@math.sinica.edu.tw

Abstract

In this talk, we determine quantum dimensions and fusion rules for the orbifold code VOA $V_{C\times D}^{\tau}$. As an application, we construct certain 3-local subgroups inside the automorphism group of the VOA $V^{\#}$, where $V^{\#}$ is a holomorphic VOA obtained by the $\mathbb{Z}_3$-orbifold construction on the Leech lattice VOA.

Unitary Vertex Operator Algebras

Xing-Jun Lin (林興君)
Academia Sinica
linxingjun@math.sinica.edu.tw

Abstract

Unitary vertex operator algebras are introduced. Most well-known rational vertex operator algebras are shown to be unitary. The classification of unitary vertex operator algebras with central charge $c \leq 1$ is also discussed.

On Three Dimensional Representations of the Clifford Algebra of a Ternary Cubic Form

Jung-Miao Kuo (郭容妙)
National Chung Hsing University
jmkuo@amath.nchu.edu.tw

Abstract

Let f be a ternary cubic form over an algebraically closed field and let C_f denote its Clifford algebra. It was shown recently that C_f has exactly 72 inequivalent three dimensional representations. In this talk, we will give an explicit classification of these representations.

Injective Hulls of Simple Modules over Some Noetherian Rings

Can Hatipoglu
National Center for Theoretical Sciences (South)
hatipoglucan@gmail.com

Abstract

I will talk about Noetherian rings over which injective hulls of simple right modules are locally Artinian. Specifically, I will talk about enveloping algebras of finite dimensional solvable Lie superalgebras with this property, as well as the Ore extensions of the polynomial rings k[x].

分析與最佳化

Organizer:Soon-Yi Wu 吳順益

地點:數學系館 3172

時間:2014 年 12 月 06 日 (六)

11：30~12：20	**Iterative Methods for Split Common Fixed Point Problems** Wataru Takahashi	(主持人:吳順益)
13：40~14：05	**What is the Generalization of Natural Residual Function for NCP** Jein-Shan Chen 陳界山	(主持人:徐洪坤)
14：05~14：30	**Optimization in Path Planning, Image Registration and Optical Design Using Particle Swarm Method** Chin-Tien Wu 吳金典	(主持人:徐洪坤)
15：00~15：25	**Nonlinear Preconditioner for Full-space Lagrange-Newton-Krylov Algorithms with Applications in Large-scale PDE-constrained Optimization Problems** Feng-Nan Hwang 黃楓南	(主持人:陳界山)
15：25~15：50	**Online Nonlinear Support Vector Machine for Large-Scale Classification** Yuh-Jye Lee 李育杰	(主持人:陳界山)

Iterative Methods for Split Common Fixed Point Problems

Wataru Takahashi
Keio University, Japan
wtaka@osaka-ue.ac.jp

Abstract

In this talk, motivated by the iterative methods for the split feasibility problem and the split common null point problem in Hilbert spaces, we consider split common fixed point problems. Then, using nonlinear analysis, we establish weak and strong convergence theorems for split common fixed point problems.

As applications, we get well-known and new weak and strong convergence theorems which are connected with fixed point problems, split feasibility problems, split common null point problems and equilibrium problems.

What is the Generalization of Natural Residual Function for NCP

Jein-Shan Chen (陳界山)
National Taiwan Normal University
jschen@math.ntnu.edu.tw

Abstract

It is well known that the generalized Fischer-Burmeister is a natural extension of the popular Fischer-Burmeister function NCP-function, in which the 2 -norm is replaced by general p -norm. As for another popular natural residual NCP-function, its generalization was unknown during the past three decades. In this short communication, we answer this long-standing open question. In particular, we propose the generalization of natural residual function for NCP, which possesses twice differentiability. This feature enables.

Optimization in Path Planning, Image Registration and Optical Design Using Particle Swarm Method

Chin-Tien Wu (吳金典)
National Chiao Tung University
ctw@math.nctu.edu.tw

Abstract

Particle swarm optimization (PSO) is a population-based stochastic approach for solving continuous and discrete optimization problems. Just like the other heuristic approaches such as differential evolution and genetic algorithm, various PSO methods are employed to solve complex optimization problems in which proper search direction and contraction trust region are difficult to find. The basic ingredients in various PSO methods include randomly generated swarm particle and velocity filed that is employed to update the particle positions. One of the recent developed PSO method is the QPSO (quantum particle swarm optimization) where quantum laws of mechanics is used to govern the movement of swarm particles. Successes of the QPSO have been found in many areas including neural networks, machine learning, antenna design and data mining. In this talk, we will present some of our recent works in path planning of unmanned aerial vehicle (UVA), non-rigid registrations of magnetic resonance (MR) images and optical free form design where PSO and QPSO play crucial roles.

Nonlinear Preconditioner for Full-space Lagrange-Newton-Krylov Algorithms with Applications in Large-scale PDE-constrained Optimization Problems

Feng-Nan Hwang (黃楓南)
National Central University
hwangf@math.ncu.edu.tw

Abstract

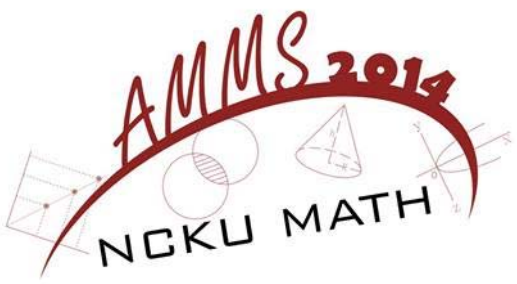
PDE-constrained optimization problems are a class of important and computationally challenging problems. The full-space Lagrange-Newton algorithms is one of the most popular numerical algorithms for solving the problems, since Newton-type method enjoys fast convergence when the nonlinearities in the system are well balanced. However, in many practical problems such as flow control, if some of the equations are much more nonlinear than the others in the system, the method become slow convergent or at worse case it diverges. The radius of convergence is often constrained by a small number of the variables of equations in the system with the strong nonlinearities. In the talk, we introduce and study a parallel nonlinear elimination preconditioned inexact Newton algorithm for the boundary control of thermally convective flows. In this approach, in the standard manner, once the objective function and the PDE constrained problem discretized by some numerical schemes, we convert the constrained optimization problem into unconstrained optimization problem by introducing the augmented Lagrange function, then find the candidate optimal solution by solving the first order necessary condition using an inexact Newton method with backtracking techniques. The key point of new proposed algorithm is that before performing the global Newton update, we first identify the to-be-eliminated components that cause Newton method's into a slow convergence, and then remove the high nonlinearity by using a subspace correction, which can be interpretated the application of nonlinear elimination based preconditioner to the nonlinear system. As a result, the new approach shows a significantly improved performance when compared to a standard Lagrange-Newton type method or its grid-sequencing version. Some numerical results are presented to demonstrate the robustness and efficiency of the proposed algorithm.

Online Nonlinear Support Vector Machine for Large-Scale Classification

Yuh-Jye Lee (李育杰)
National Taiwan University of Science and Technology
yuh-jye@mail.ntust.edu.tw

Abstract

Online learning is an important technique for handling large-scale problems. In general, most of real-world classification problems are not linearly separable but most online learning algorithms give a linear model. Support vector machine (SVM) is one of the most popular nonlinear learning methods by taking the advantage of the kernel trick. Unfortunately, the computational overhead prohibits it for dealing with large scale problems. We propose an online nonlinear SVM algorithm with the reduced kernel trick. Similar to other online learning algorithms such as the passive and aggressive algorithm, we also have a closed form updating rule. Thus, it will be extremely fast for each updating. Moreover, we introduce a proximal model that "memorizes" the statistical information of the instances shown in the learning process. Combining the nonlinear SVM model and the proximal model, our proposed method is insensitive to the input order and is able to quickly achieve a reasonable good solution in a single pass.



分析與最佳化

Organizer:Soon-Yi Wu 吳順益

地點:數學系館 3172

時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Optimization Techniques for Nonlinear Compressed Sensing** Hong-Kun Xu 徐洪坤	(主持人:Wataru Takahashi)
11：10~11：35	**Complement-Associated Games** Yan-An Hwang 黃延安	(主持人:許瑞麟)
11：35~12：00	**Numerical Radii for Tensor Products of Matrices** Hwa-Long Gau 高華隆	(主持人:許瑞麟)
13：30~13：55	**A Queueing Model for the Congestion Problem in Taipei Maokong Gondola System** Hsing Luh 陸行	(主持人:許瑞麟)
15：20~15：45	**Split Mathematical Programs with Semi-infinite Equilibrium Constraints** Lai-Jiu Lin 林來居	(主持人：林來居)
15：45~16：10	**On New Generalizations of Smarzewski's Fixed Point Theorem** Wei-Shih Du 杜威仕	(主持人:林來居)
16：10~16：35	**Common Fixed Points of a Family of Mappings Defined on a Complete Geodesic Space** Yasunori Kimura	(主持人：林來居)
16：35~17：00	**Hybrid Moreau's Proximal Algorithms and Convergence Theorems for Minimization Problem in Hilbert Spaces with Related Problem** Chih-Sheng Chuang 莊智升	(主持人:林來居)

Optimization Techniques for Nonlinear Compressed Sensing

Hong-Kun Xu (徐洪坤)
National Sun Yat-sen University
xuhk@math.nsysu.edu.tw

Abstract

The compressed sensing (CS) addresses the problem of recovering a (nearly) sparse signal through much fewer measurements than the traditional Nyquist rate. One of the restrictions of CS is that the measurements are taken in the linear way. This however would not fit certain practical cases (such as phase retrievals where only the magnitudes of the measurements are given). A consequence of nonlinear measurements lies in nonlinear constraints attached to the CS optimization.

Complement-Associated Games

Yan-An Hwang (黃延安)
National Dong Hwa University
yahwang@mail.ndhu.edu.tw

Abstract

In this work, an alternative definition of the associated game is constructed, we name the E-complement-associated game. We define a sequence of games; the term of order m, in this sequence, is the E-complement-associated game of the term of order $(m-1)$. We show that the sequence converges and that the limit game is the sum of an inessential game and a constant game. Based on the E-complement-associated game, the equal allocation of nonseparable costs (EANSC) is characterized by associated consistency (AC) and other four axioms, Pareto optimality (PO), translation covariance (TC), symmetry (SYM), continuity(CONT). Additionally, we also introduce a corresponding complement-associated game of the Shapley value, we name the Sh-complement-associated game. Based on the Sh-complement-associated game, the corresponding sequence also converges but its limit game is a constant-sum game.

Numerical Radii for Tensor Products of Matrices

Hwa-Long Gau (高華隆)
National Central University
hlgau@math.ncu.edu.tw

Abstract

For n-by-n and m-by-m complex matrices A and B, it is known that the inequality $w(A\otimes B) \le \|A\| w(B)$ holds, where $w(\bullet)$ and $\|\bullet\|$ denote, respectively, the numerical radius and the operator norm of a matrix. In this talk, we consider when this becomes an equality. We give necessary and su_cient conditions for $w(A\otimes B) = \|A\| w(B)$ to hold. In this case, we show that the numerical range.$w(A\otimes B)$ must be a circular disc centered at the origin. Among other things, for some classes of matrices A, we also show that $w(A\otimes A)$ is a circular disc centered at the origin if and only if $w(A)$ is a circular disc centered at the origin.

A Queueing Model for the Congestion Problem in Taipei Maokong Gondola System

Hsing Luh (陸行)
National Chengchi University
slu@nccu.edu.tw

Abstract

The Taipei Maokong Gondola system was opened on July 4, 2007 and has been in operation with two types of cabins since April 2010. There are about 140 cabins with 30 crystal cabins (about 110 regular cabins). The service interval is about 3 min. Two separate queues form to the two types of cabins. There are six stations around the transportation area with the Maokong Gondola system.

The maximum capacity for regular cabin is 8 people while the maximum capacity for the crystal cabin is 5. The service interval for regular cabin is about 15 seconds (based on the ratio of the numbers of cabins of two types). Customers arrive in batches to take the Maokong gondola. During the rush hours like holidays or weekends, the long lineups occur and congestion or overcrowding becomes a problem from the customer service's point of view. In this presentation, we introduce a queueing model that describes a system of dependent queues and solve for the optimal services time for both regular and crystal cabins.

Split Mathematical Programs with Semi-infinite Equilibrium Constraints

Lai-Jiu Lin (林來居)
National Changhua University of Education
maljlin@cc.ncue.edu.tw

Abstract

In this paper we study split mathematical programs with semi-infinite equilibrium constraints, mathematical programs with semi-infinite constraints. We give algorithms and prove strong convergence theorems of these problems. As simple consequence, we obtain some results on common solutions for a countable family of split feasibility problems. Our results contain many original results on optimization theory. Our results also improve and generalized results on fixed point theory and optimization theory.

On New Generalizations of Smarzewski's Fixed Point Theorem

Wei-Shih Du (杜威仕)
National Kaohsiung Normal University
wsdu@nkucc.nknu.edu.tw

Abstract

In this work, we prove some slightly more general versions of the Smarzewski's fixed point theorem and some new fixed point theorems which are original and quite different from the well known results in the literature.

Common Fixed Points of a Family of Mappings Defined on a Complete Geodesic Space

Yasunori Kimura
Toho University, Japan
yasunori@is.sci.toho-u.ac.jp

Abstract

The problem of approximation of a common fixed point for a family of mappings is one of the most crucial problems in nonlinear analysis. It has been applied to a various types of problems such as convex minimization problems, variational inequality problems, equilibrium problems, minimax problems, and others. In this talk, we propose several types of iterative methods to approximate a common fixed point of mappings defined on a complete geodesic space. We also show some recent development related to this topic.

Hybrid Moreau's Proximal Algorithms and Convergence Theorems for Minimization Problem in Hilbert Spaces with Related Problem

Chih-Sheng Chuang (莊智升)
National Sun Yat-sen University
cschuang@math.nsysu.edu.tw

Abstract

In this paper, motivated by Moreau's proximal algorithm, we give several algorithms and related weak and strong convergence theorems for minimization problems under suitable conditions. These algorithms and convergence theorems are different from the results in the literatures. In the final, we also study algorithms and convergence theorems for the split feasibility problem in real Hilbert spaces.

幾何

Organizer:Wan-Keng Cheong 章源慶

地點:測量系教室 55180

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Isotopy and Invariants of Legendrian Surfaces

Mei-Lin Yau 姚美琳 (主持人 : 章源慶)

13：40~14：30

The CR Almost Schur Lemma

Chin-Tung Wu 吳進通 (主持人：蕭仁傑)

15：00~15：25

Manifolds with G_2 Holonomy and Contact Structures

Hyunjoo Cho 趙玹珠 (主持人：劉珈銘)

15：25~15：50

Constant Mean Curvature Foliations and CMC Time Functions in Spacetimes

Kuo-Wei Lee 李國瑋 (主持人:劉珈銘)

Isotopy and Invariants of Legendrian Surfaces

Mei-Lin Yau (姚美琳)
National Central University
yau@math.ncu.edu.tw

Abstract

In this talk we will review the Lagrangian Gauss map associated to a Lagrangian surface, and explore a rigidity property of this map under Hamiltonian deformations. We then apply this rigidity to study the isotopy problem of Legendrian surfaces. This is a work in progress.

The CR almost Schur Lemma

Chin-Tung Wu (吳進通)
National Pingtung University
ctwu@mail.nptu.edu.tw

Abstract

I will talk about a general almost Schur Lemma on pseudo-Hermitian $(2n+1)$-manifolds. When the equality of almost Schur inequality holds, we derive the contact form is pseudo-Einstein and the pseudo-Hermitian scalar curvature is constant.

Manifolds with G_2 Holonomy and Contact Structures

Hyunjoo Cho (趙玹珠)
National Center for Theoretical Sciences (Taipei Office)
hyunjoocho19@gmail.com

Abstract

A 7-dimensional Riemannian manifold M is called a G_2 manifold if its holonomy group of its metric g is contained in the group G_2. In this talk, I first give brief introduction of G_2 manifolds, and then discuss the G_2 and contact structures. This is a joint work with Firat Arikan and Sema Salur.

Constant Mean Curvature Foliations and CMC Time Functions in Spacetimes

Kuo-Wei Lee (李國瑋)
National Taiwan University
d93221007@gmail.com

Abstract

In this talk, we first give a brief introduction to the time functions in spacetimes and the relation between CMC foliations and time functions. Then we summarize some CMC foliations results in cosmological spacetimes, and discuss CMC foliations in the Schwarzschild spacetime, which is conjectured by Malec and O Murchadha in [1,2]. We will give more explanation in latter case and show some partial results in this conjecture. This is the joint work with Yng-Ing Lee.

References：

[1] Malec, E.; O Murchadha, N.: Constant mean curvature slices in the extended Schwarz schild solution and the collapse of the lapse, Phys. Rev. D (3) 68 (2003), no. 12, 124019, 16 pp.

[2] Malec, E.; O Murchadha, N.: General spherically symmetric constant mean curvature foliations of the Schwarzschild solution, Phys. Rev. D 80, (2009), 024017, 8 pp.

幾何

Organizer:Wan-Keng Cheong 章源慶

地點:測量系教室 55180

時間:2014 年 12 月 07 日 (日)

09：00~09：50

Bergman Kernel Asymptotics for Big and Semi-positive Line Bundles

Chin-Yu Hsiao 蕭欽玉 (主持人：鄺國權)

11：10~12：00

Landau Ginzburg Type Theories from Algebraic Geometry

Huai-Liang Chang 張懷良 (主持人：章源慶)

13：30~13：55

Geometric Airy Curve Flows

Hsiao-Fan Liu 劉筱凡 (主持人:章源慶)

15：20~15：45

The Isotopy Problems of Symplectic Submanifolds and *J*-holomorphic Curves

Ching-Hao Chang 張清皓 (主持人:章源慶)

15：45~16：10

The Crofton Formula in the Three-Dimensional Heisenberg Group

Yen-Chang Huang 黃彥彰 (主持人：章源慶)

Bergman Kernel Asymptotics for Big and Semi-positive Line Bundles

Chin-Yu Hsiao (蕭欽玉)
Academia Sinica
chsiao@math.sinica.edu.tw

Abstract

Let L be a holomorphic line bundle over a complex manifold M and let L^k be the k-th power of L. If L is semi-positive and positive at some point, we show that the Bergman kernel of L^k admits a full asymptotic expansion on the set where L is positive, with the possible exception of a proper analytic variety $\Sigma \subset M$. We also prove the asymptotics for big line bundles endowed with singular Hermitian metrics with strictly positive curvature current. In this case the full asymptotics holds outside the singular locus of the metric. As a corollary, we could reprove the Shiffman conjecture, asserting that Moishezon manifolds can be characterized in terms of integral Kähler currents.

Landau Ginzburg Type Theories from Algebraic Geometry

Huai-Liang Chang (張懷良)
Hong Kong University of Science and Technology
mahlchang@ust.hk

Abstract

The Landau Ginzburg model unifies different moduli spaces and their counting in A side of mirror symmetry. Algebra-geometric approach to define it via p-fields and cosection localization unifies these different theories, as like Gromov-Witten theory, FJRW theory, and also others. We will brief on their constructions, comparisons, and also relations which is work under progress.

Geometric Airy Curve Flows

Hsiao-Fan Liu (劉筱凡)
Academia Sinica
hfliu@math.sinica.edu.tw

Abstract

In this talk, I will explain geometric curves flows whose invariants flow according to some soliton equations. One of the most famous curve flows is the vortex filament equation in R^3 which corresponds to the nonlinear Schrödinger(NLS) equation. I will discuss the geometric airy curve flows on space forms whose invariants satisfy the vector modified KdV(vmKdV) type equations. The existence of solutions of such curve flows follows from the correspondence.

The Isotopy Problems of Symplectic Submanifolds and J -holomorphic Curves

Ching-Hao Chang (張清皓)
Academia Sinica
chinghao@math.sinica.edu.tw

Abstract

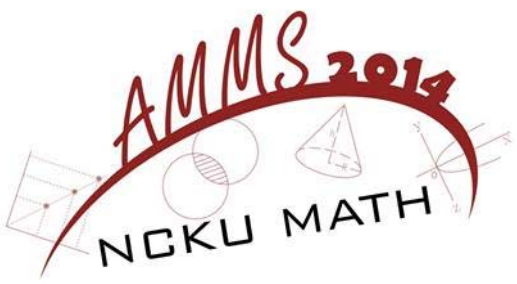
The isotopy problem for symplectic submanifolds in a symplectic manifold is always a very interesting topic in symplectic topology. There are many researches about the isotopy problems for different categories of symplectic submanifolds in different symplectic manifolds using various techniques. For the compact symplectic 4-manifold case, one of the approaches to attack the isotopy problem for the symplectic surfaces in a compact symplectic 4 -manifold (M, w) is to study the isotopies for J -holomorphic curves in (M, w) where J is an w -tame almost complex structure on M . In this talk, we will briefly introduce the idea and take a walk in the moduli space of J -holomorphic curves.

The Crofton Formula in the Three-Dimensional Heisenberg Group

Yen-Chang Huang (黃彥彰)
National Central University
yenchang.huang1@gmail.com

Abstract

In Euclidean space, the Crofton formula is a classic result of integral geometry. It states that the length of a given curve is equal to an integral over all straight lines. The formula has had many applications, for example Buffon's needle and noodle problem, minimum-total-curvature results, and a special case of Hilbert's Fourth Problem; it has also been generated to the higher dimension. We derive the Crofton-like formula in the three-dimensional Heisenberg group which can be realized as an example of the sub-Riemannian manifold. By using the method of the moving frames, we show that the p-area of the regular surface is equal to the integral over all geodesics in the Heisenberg group.



動態系統與生物數學

Organizer:Jung-Chao Ban 班榮超

地點:測量系教室 55150

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Mathematical Modeling of Bimodal Epigenetic Control in Ovarian Cancer Stem Cells

Je-Chiang Tsai 蔡志強 (主持人：許正雄)

13：40~14：05

Cluster Synchronization in Neural Networks

Yu-Hao Liang 梁育豪 (主持人：蔡志強)

14：05~14：30

Zero Entropy Systems

Wen-Chiao Cheng 鄭文巧 (主持人:蔡志強)

15：00~15：25

Proof of a Conjecture for the One-dimensional Perturbed Gelfand Problem from Combustion Theory

Shao-Yuan Huang 黃少遠 (主持人:鄭文巧)

15：25~15：50

Traveling Wave Solutions for Kolmogorov-Type Delayed Lattice Reaction-Diffusion Systems

Jian-Jhong Lin 林建仲 (主持人：鄭文巧)

Mathematical Modeling of Bimodal Epigenetic Control in Ovarian Cancer Stem Cells

Je-Chiang Tsai (蔡志強)
National Chung Cheng University
tsaijc@math.ccu.edu.tw

Abstract

In ovarian and other cancers, emerging data indicate that cancer stem cells contribute to chemoresistance and that their persistence alters clinical outcome.

Previous study has shown that ovarian cancer may be initiated by ovarian cancer initiating cells characterized by surface antigen CD44 and c-KIT.

Based on experimental evidence observation, we develop a mathematical mode to explore how the interaction between c-KIT, tumor suppressor microRNA, and estrogen-mediated RNA leads to overexpression of c-KIT, and thus promotes ovarian carcinogenesis. This is a joint work with the human epigenomics group in CCU.

Cluster Synchronization in Neural Networks

Yu-Hao Liang (梁育豪)
National Chiao Tung University
yhliang@mx.nthu.edu.tw

Abstract

In many chemical, biochemical, biological and neural systems, oscillatory cluster patterns have been observed frequently. Such cluster patterns facilitate some important chemical reactions easily to occur. In this talk, we consider the cluster synchronization in neural network consisting of coupled excitatory or inhibitory neurons. Moreover, in addition to the standard coupling between neurons, we also address a type of coupling for which one fast variable (activator) receives feedback from the slow variable (inhibitor). Examples of networks of identical/nonindentical FitzHugh-Nagumo and Hindmarsh-Rose neurons are also taken into consideration.This is joint work with Jonq Juang.

Zero Entropy Systems

Wen-Chiao Cheng (鄭文巧)
Chinese Culture University
zwq2@faculty.pccu.edu.tw

Abstract

During this talk, for the zero entropy systems, entropy dimension, pressure dimension and local entropy dimension will be defined and some properties will be derived. In particular, analogue of variational principle and mass distribution principle will be shown.

Proof of a Conjecture for the One-dimensional Perturbed Gelfand Problem from Combustion Theory

Shao-Yuan Huang (黃少遠)
National Tsing Hua University
syhuang@math.nthu.edu.tw

Abstract

We study the global bifurcation curves and exact multiplicity of postive solutions for the one-dimensional perturbed Gelfand problem

$$\begin{cases} u''(x) + \lambda \exp\left(\dfrac{au}{a+u}\right) = 0, \ -1 < x < 1, \\ u(-1) = u(1) = 0, \end{cases}$$

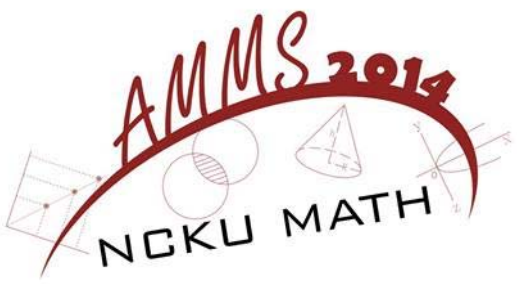
where $\lambda > 0$ is the Frank-Kamenetskii parameter and $a > 0$ is the activation energy parameter. We prove that there exists a critical bifurcation value $a_0 (\approx 4.069) > 4$ such that, on the $(\lambda, \| u \|_\infty)$-plane, the bifurcation curve is S-shaped for $a > a_0$ and is monotone increasing for $0 < a \le a_0$.

Traveling Wave Solutions for Kolmogorov-Type Delayed Lattice Reaction-Diffusion Systems

Jian-Jhong Lin (林建仲)
Feng Chia University
jjlin@mx.math.ncu.edu.tw

Abstract

In this talk, we will focus on the existence of traveling wave solutions for Kolmogorov-type delayed lattice reaction-diffusion systems. Employing the cross iterative technique coupled with the explicit construction of upper and lower solutions in the theory of quasi-monotone dynamical systems, we can prove the existence of such solutions connecting two different equilibria. Moreover, our results can be applied to several ecological examples including one-species, two-species and three-species models with various functional responses and time delays.



動態系統與生物數學

Organizer:Jung-Chao Ban 班榮超

地點:測量系教室 55150

時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Localized Waves in FitzHugh-Nagumo Equations** Chao-Nien Chen 陳兆年	(主持人 : 班榮超)
11：10~11：35	**Conjugacy on the Symbolic Spaces of SFTs under *(j,m)*-decimation** Chih-Hung Chang 張志鴻	(主持人 : 陳兆年)
11：35~12：00	**Pattern Generation Problems Arising in Multiplicative Integer Systems** Wen-Guei Hu 胡文貴	(主持人 : 陳兆年)
13：30~13：55	**Chaos in a Model for Masting** Kai-Ren Zheng 鄭凱仁	(主持人 : 胡文貴)
15：20~15：45	**Traveling Wave Solutions for Two Species Lotka-Volterra System with Spatial Segregations** Chih-Chiang Huang 黃志強	(主持人 : 張志鴻)
15：45~16：10	**A Numerical Method for Bifurcations of Fixed Points of ODE Systems with Periodically Pulsed Inputs** Hsiu-Chuan Wei 魏秀娟	(主持人 : 張志鴻)

Localized Waves in FitzHugh-Nagumo Equations

Chao-Nien Chen (陳兆年)
National Tsing Hua University
chen@math.nthu.edu.tw

Abstract

Patterns and waves are commonly observed in physical, chemical and biological systems. Depending on the system parameters and initial conditions, dissipative structures may stay at rest or propagate with a dynamically stabi-lized velocity. This talk is aimed at variational approach for studying localized waves in FitzHugh-Nagumo equations.

Conjugacy on the Symbolic Spaces of SFTs under -(j,m) decimation

Chih-Hung Chang (張志鴻)
National University of Kaohsiung
chihhung@mail.fcu.edu.tw

Abstract

This talk considers classification of symbolic spaces under (j,m)-decimation, where m is an integer and $1 \le j \le m$. The problem is raised by Abram and Lagarias [W. Abram and J. C. Lagarias, p-adic path set fractals and arithmetic, arXiv:1210.2478, 2013.] on the study of the p-adic path set fractals and arithmetic in number theory. Four sym- bolic spaces, namely, subshift of finite type, sofic shift, path set and p-path set fractal are considered herein. To compute their dimensions under (j,m)-decimation, we first establish their associated (j,m)-adjacency matrices. Such matrix is a rearrangement of the original one according to the pair (j,m). Then we form a new labeled graph by assigning suitable symbols on the edges of the graph induced from (j,m)-adjacency matrices. Finally, we proved that the classification problem can be derived by the labeled (j,m)-adjacency matrices. On one hand, the result extends the classical results on the symbolic spaces; On the other hand, it be can applied to the p-adic path set fractals on number theory.

Pattern Generation Problems Arising in Multiplicative Integer Systems

Wen-Guei Hu (胡文貴)
National Chiao Tung University
wghu@mail.nctu.edu.tw

Abstract

In this talk, I would like to discuss the pattern generation problems which arise from multiplicative integer systems. We investigate the systems by using a method that was developed for studying pattern generation problems in symbolic dynamical systems. The entropy of general multiplicative systems can thus be computed. A multi-dimensional decoupled system is investigated in three main steps. (I) Identify the admissible lattices of the system; (II) compute the density of copies of admissible lattices of the same length, and (III) compute the number of admissible patterns on the admissible lattices.

A one-dimensional coupled system can be decoupled by removing the multiplicative relation set and then performing procedures similar to those applied to a decoupled system. The admissible lattices are chosen to be the maximum graphs of different degrees which are mutually independent. The entropy can be obtained after the remaining error term is shown to approach zero as the degree of the admissible lattice tends to infinity. The intrinsic difficulty in the study of the two-dimensional coupled system will be demonstrated.

Chaos in a Model for Masting

Kai-Ren Zheng (鄭凱仁)
Chung Yuan Christian University
ckj25_1999@yahoo.com.tw

Abstract

Isagi et al introduced a model for masting, that is, the intermittent production of flowers and fruit by trees. A tree produces flowers and fruit only when the stored energy exceeds a certain threshold value. If flowers and fruit are not produced, the stored energy increases by a certain fixed amount; if flowers and fruit are produced, the energy is depleted by an amount proportional to the excess stored energy. Thus a one-dimensional model is derived for the amount of stored energy. When the ratio of the amount of energy used for flowering and fruit production in a reproductive year to the excess amount of stored energy before that year is small, the stored energy approaches a constant value as time passes. However when this ratio is large, the amount of stored energy varies unpredictably and as the ratio increases the range of possible values for the stored energy increases also.

In this talk we describe this chaotic behavior precisely with complete proofs.

Traveling Wave Solutions for Two Species Lotka-Volterra System with Spatial Segregations

Chih-Chiang Huang (黃志強)
National Taiwan University
loveworldsteven@hotmail.com

Abstract

Two species Lotka-Volterra system is a classical model, describing species competition. As the interspecific competition rates tend to infinite, this two species will be spatially segregated. For such a limit model, based on the variational method we construct traveling waves in the real line. Moreover, the existences of traveling waves are established in a cylindrical domain. This is a joint work with Chiun-Chuan Chen.

A Numerical Method for Bifurcations of Fixed Points of ODE Systems with Periodically Pulsed Inputs

Hsiu-Chuan Wei (魏秀娟)
Feng Chia University
hsiucwei@fcu.edu.tw

Abstract

Biological systems are often modeled by ordinary differential equations (ODEs). Bifurcation analysis of these mathematical models is important for the study of biological properties. An adaptive grid method in our previous work has been successfully applied to continuous dynamical systems for bifurcations of equilibria.

In this work, the numerical method is modified for the bifurcations of fixed points of ODE systems with periodically pulsed inputs. Two-parameter and three-parameter bifurcation diagrams are computed using a fairly general predator-prey system with pulsed inputs. The parallel computation of the numerical method is also discussed.

偏微分方程

Organizers:Ching-Lung Lin 林景隆
Ching-Hsiao Cheng 鄭經斅
地點:數學系館 3173
時間:2014 年 12 月 06 日 (六)

11：30~12：20	**The De-Giorgi's Method as Applied to Hamilton-Jacobi Type Equations and Parabolic Equations with Nonlocal Integral Operators** Chi-Hin Chan 陳子軒 (主持人 : 鄭經斅)
13：40~14：05	**On the Asymptotic Analysis of GFDs and the Related Equations** Chun-Hsiung Hsia 夏俊雄 (主持人 : 陳子軒)
14：05~14：30	**The Well-Posedness for the Compressible Navier-Stokes Equations with Density Dependent Viscosity and Free Boudaries in Physical Vacuum** Ying-Chieh Lin 林英杰 (主持人 : 陳子軒)
15：00~15：25	**On a Generalized Radon Transfrom and Boltzmann Equation.** Jin-Cheng Jiang 江金城 (主持人：夏俊雄)
15：25~15：50	**Fractional PDE and L^1 Sobolev Inequalities** Daniel Spector 司靈得 (主持人：夏俊雄)

The De-Giorgi's Method as Applied to Hamilton-Jacobi Type Equations and Parabolic Equations with Nonlocal Integral Operators

Chi-Hin Chan (陳子軒)
National Chiao Tung University
cchan@math.nctu.edu.tw

Abstract

In recent years, the study of regularity properties of solutions to time-dependent Hamilton-Jacobi type equations has attracted considerable attention in the community of P.D.E. specialists. In particular, the Holder regularity of viscosity solutions to Hamilton-Jacboi type equations with Hamiltonian satisfying general coercivity properties was first established by P. Cardaliaguet around 2009 through the use of stochastic method. In 2012, the above mentioned result of P. Cardaliaguet was reproved by P. Cardaliaguet and L. Silvestre through the use of simple comparison principle which is based on the constructions of sub-solutions and super-solutions. In this talk, we will introduce a recent piece of work due to C.H.Chan and A. Vasseur, in which we give an alternative proof of the above mentioned Holder regularity result for solutions to Hamilton-Jacobi type equations. In contrast with the above mentioned work due to P. Cardaliaguet and L. Silvestre, our new proof is based on the De-Girogi's technique, and uses the coercivity property of the Hamiltonian to induce a parabolic-like regularization effect. In this talk, we will also try to compare the technique used in this alternative proof with another previous work entitled "Regularity theory for parabolic nonlinear integral operators." due to L. Caffarelli, C.H.Chan, and A. Vasseur.

On the Asymptotic Analysis of GFDs and the Related Equations

Chun-Hsiung Hsia (夏俊雄)
National Taiwan University
willhsia@math.ntu.edu.tw

Abstract

In this lecture, we shall introduce time periodic solutions of differential equations arised from different occasions. We then turn our attention to the GFDs and study the asymptic stabilities of the solutions.

In particular, two different approaches will be introduced to prove the existence of time periodic solutions of GFDs with time periodic forcings. A few physical implications will be explained. We will also demonstrate some numerical experiments to show some phenomena which violate our intuition.

The Well-Posedness for the Compressible Navier-Stokes Equations with Density Dependent Viscosity and Free Boudaries in Physical Vacuum

Ying-Chieh Lin (林英杰)
National University of Kaohsiung
linyj@nuk.edu.tw

Abstract

In this talk we concern with the isentropic compressible Navier-Stokes equations with density dependent viscosity on the n-dimensional torus $\mathbb{T}^n$ and with initial density vanishing somewhere inside $\mathbb{T}^n$. Let $\Omega(t)$ denote the domain where the fluid density is positive at time t. We assume that the boundary of Ω moves along with the fluid velocity. We will present our strategy to get the local well-posedness of the problem.

On a Generalized Radon Transfrom and Boltzmann Equation

Jin-Cheng Jiang (江金城)
National Tsing Hua University
jcjiang@math.nthu.edu.tw

Abstract

In this talk, we will discuss a generalized Radon transform which is related to the Boltzmann collision operator. This transform has complex structure due to that it contains singularities from space variables and angular variable.

Use the tool from microlocal analysis, we can get a better understanding of this transform and apply this to do some estimates on Boltzmann collision operator.

Fractional PDE and L^1 Sobolev Inequalities

Daniel Spector (司靈得)
National Chiao Tung University
dspector@math.nctu.edu.tw

Abstract

The recent introduction of certain fractional partial differential equations has led to the establishment of new and fruitful connections between harmonic analysis and PDEs. In this talk, I will discuss two aspects of this synthesis - the understanding of regularity as a part of a continuous spectrum in the PDE world alongside the discovery of new inequalities from the harmonic analysis standpoint. This talk is based on joint work with Tien-Tsan Shieh, and also Armin Schikorra.

偏微分方程

Organizers:Ching-Lung Lin 林景隆
Ching-Hsiao Cheng 鄭經斅
地點:數學系館 3173
時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Nonlinear Stability of the Boltzmann Equation in a Periodic Box** Kung-Chien Wu 吳恭儉 (主持人:Takayoshi Ogawa)
11：10~11：35	**ILL-Posedness for Quadratic Nonlinear Schrödinger Equations in Lower Dimension and Related Topics** Takayoshi Ogawa (主持人：Masashi Misawa)
11：35~12：00	**Finite Time Blow Up for a Solution to System of the Drift-diffusion Equations in Three Dimensions** Masaki Kurokiba (主持人:Masashi Misawa)
13：30~13：55	**Monotonicity Type Estimate and Regularity for the *P*-harmonic Map Heat Flows** Masashi Misawa (主持人:方永富)
15：20~15：45	**Construction of Mixed Dimensional Soliton Trains for Nonlinear Schrodinger Equations** Li-Ren Lin 林立人 (主持人：Masaki Kurokiba)
15：45~16：10	**CGO Solutions for Anisotropic Maxwell's Equations** Ru-Lin Kuan 關汝琳 (主持人:Masaki Kurokiba)
16：10~16：35	**The Generalized Glimm's Method to Nonlinear Hyperbolic Balance Laws** Shih-Wei Chou 周世偉 (主持人:吳恭儉)
16：35~17：00	**Geometric Singular Perturbation Approach to Stationary Wave Solutions for Viscous Nonlinear Balance Laws** Bo-Chih Huang 黃博峙 (主持人:吳恭儉)

Nonlinear Stability of the Boltzmann Equation in a Periodic Box

Kung-Chien Wu (吳恭儉)
National Kaohsiung Normal University
kcwu@nknucc.nknu.edu.tw

Abstract

We study the nonlinear stability of the Boltzmann equation in the 3 -dimensional periodic box with size depends on the Knudsen number. The initial perturbation is not necessary smooth. The convergence rate is algebraic for small time region and exponential for large time region. Moreover, the exponential rate depends on the size of the domain (Knudsen number).

Ill-Posedness for Quadratic Nonlinear Schrödinger Equations in Lower Dimension and Related Topics

Takayoshi Ogawa
Tohoku University
ogawa@math.tohoku.ac.jp

Abstract

We consider the Cauchy problem of the quadratic nonlinear Schrödinger equation (q-NLS) in lower spacial dimensions.

It is well known that the quadratic NLS is well-posed in L^2 space while there is a crtiical Sobolev scale, where the invariant scaling suggests the limitation of the local well-posedness. However the lower dimensional cases than 3, this critical scale is not directly connected to the actual threshold for the wellposedness of the problem.

We give a critical Sobolev scase for the well poshness and ill-posedness for the quadratic NLS in one and two space dimensions and gives a discontinuity between the data and solutions under the critical Besov exponent. We also mention a related problem in two space dimension that has the analogous ill-posedness depending on the coefficient (so called the mass resonance) problem.

Finite Time Blow Up for a Solution to System of the Drift-Diffusion Equations in Three Dimensions

Masaki Kurokiba
Muroran Institute of Technology
kurokiba@mmm.muroran-it.ac.jp

Abstract

We discuss the existence of the blow-up solution for multi-component parabolic-elliptic drift-diffusion model in three space dimensions.We show that the local existence, uniqueness and wellposedness of a solution in the weighted L^2 spaces. Moreover we prove that if the initial data satisfies a certain condition, then the corresponding solution blows up in a finite time by using the entropy energy functional. This is a system case for the blow up result of the chemotactic and drift-diffusion equation .

(joint work with Takayoshi Oagawa).

Monotonicity Type Estimate and Regularity for the *P*-Harmonic Map Heat Flows

Masashi Misawa
Kumamoto University
misawa@aster.sci.kumamoto-u.ac.jp

Abstract

We study regularity for the evolution of *P*-harmonic maps between two smooth compact Riemannian manifolds, called p-harmonic map heat flow. The p-harmonic map and its evolution are a natural generalization of the well-known harmonic map and its evolution. We devise a new monotonicity type formula of a scaled energy and establish a criterion for a uniform regularity estimate for regular *P*-harmonic map heat flows. The small energy regularity will be also discussed.

Construction of Mixed Dimensional Soliton Trains for Nonlinear Schrödinger Equations

Li-Ren Lin (林立人)
Academia Sinica
lrlin@math.sinica.edu.tw

Abstract

For nonlinear Schrödinger equations under a mild assumption on the nonlinearity, we introduce our current works on the construction of mixed dimensional soliton trains, that is solutions whose time asymptotic profiles consist of infinite many solitons from multiple dimensions. For example line-point soliton trains (in 2D space) and plane-line-point soliton trains (in 3D space). We will first review the works of Le Coz, Li, and Tsai on the single dimensional cases. The general strategy for the construction and main difficulties (in particular for the mixed cases) will be illustrated.

CGO Solutions for Anisotropic Maxwell's Equations

Ru-Lin Kuan (關汝琳)
National Center for Theoretical Sciences (North)
d97221002@ntu.edu.tw

Abstract

Complex geometrical optics (CGO) solutions are important tools in inverse problems. A lot of applications of them for isotropic problems are studied. However, it is hard to obtain this kind of solutions for anisotropic materials (such as elastic systems and Maxwell systems) generally. In this talk, we will introduce our recent work on constructing CGO solutions of the time-harmonic anisotropic Maxwell's equations.

The Generalized Glimm's Method to Nonlinear Hyperbolic Balance Laws

Shih-Wei Chou (周世偉)
National Central University
swchou@math.ncu.edu.tw

Abstract

We study the Cauchy problem and initial boundary value problem to nonlinear hyperbolic balance laws. Such nonlinear balance laws arise in, for instance, the nozzle flows of gas dynamics with time periodic ducts, traffic models incorporating lane changing effects model, shallow water equations with time-dependent river's bottom and hydrodynamic escape problem. The global existence of weak solutions is established by a new version of the generalized Glimm method which incorporates asymptotic expansions of the fluxes and sources.

Geometric Singular Perturbation Approach to Stationary Wave Solutions for Viscous Nonlinear Balance Laws

Bo-Chih Huang (黃博峙)
National Central University
huangbz@math.ncu.edu.tw

Abstract

In this talk we consider the asymptotic behavior of solutions for regularized equations to some nonlinear hyperbolic balance laws arising from the following topics: the viscous gas flow through discontinuous nozzle, viscous traffic flow model, and the hydrodynamic escape model on planetary atmosphere.

Through the dynamical system theory approach, we can transfer our steady state problem into a singularly perturbed problem. By analyzing the system in different scales, and using the technique of geometric singular perturbations, we are able to construct the singular stationary wave solutions and show there exist true stationary solutions for our problems shadowing the singular stationary wave solutions. For some special degenerate singular solutions, we apply more advanced theory from geometric singular perturbation to prove the persistence of these solutions under the perturbation. Moreover, in the first topic, we introduce a new entropy condition to ensure the uniqueness of the stationary solutions, in the second topic, we also analyze the stability of stationary wave solutions, and in the third topic, we give a sufficient condition on the inner boundary for the existence of the transonic stationary solution.

離散數學

Organizer:Po-Yi Huang 黃柏嶧

地點:測量系教室 55170

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Some Enumerative Results on Lattice Paths

Sen-Peng Eu 游森棚 (主持人 : 黃柏嶧)

13：40~14：05

On Bounded Deviated Permutations

Yen-Chi Lin 林延輯 (主持人：游森棚)

14：05~14：30

Interval Group Testing for Consecutive Positives

Hui-Lan Chang 張惠蘭 (主持人 : 游森棚)

15：00~15：25

Four-Cycle Systems with Four-Regular Leaves

Yu-Fong Hsu 徐育鋒 (主持人 : 張惠蘭)

15：25~15：50

A Construction of Group Divisible Designs

Yu-Pei Huang 黃喻培 (主持人 : 張惠蘭)

Some Enumerative Results on Lattice Paths

Sen-Peng Eu (游森棚)
National Taiwan Normal University
speu@ math.ntnu.edu.tw

Abstract

We introduce some unrelated results arising from the study of lattice paths, which include the type counting of classical lattice paths and h-vector of certain lattice path polytope.

On Bounded Deviated Permutations

Yen-chi Lin (林延輯)
National Taiwan Normal University
yclin@math.ntnu.edu.tw

Abstract

A standard enumeration problem at the collegiate level asks the number of per- mutations in which every number is adjacent to someone appearing before it. In this talk we generalize this terminology by defining bounded deviated permutations to be those in which every number is within a prescribed range to some number ap- pearing before it. The first half of the talk will be about the enumeration problem of these permutations. After identifying their generating functions, we construct a few bijections from these permutations to some known combinatorial structures.

In the second half of the talk we study the distribution of the leading numbers of bounded deviated permutations. We show that these distributions will converge to Gaussian distributions. This phenomenon can be examined by plotting the actual numbers and their asymptotic formulas.

This is a joint work with Wei-Liang Chien, and Sen-Peng Eu.

Interval Group Testing for Consecutive Positives

Hui-Lan Chang (張惠蘭)
National University of Kaohsiung
hchang@nuk.edu.tw

Abstract

Interval group testing has many applications such as identifying splice sites in a genome (Cicalese et al, 2005). In this talk, we will present our studies on fault-tolerant interval group testing. Furthermore, motivated by applications to DNA sequencing, group testing for consecutive positives has been studied (Balding and Torney, 1997; Colbourn, 1999). We recently study this model by interval group testing and provide tight bounds for nonadaptive and two-stage algorithms. (This is a joint work with Wei-Cheng Lan).

Four-Cycle Systems with Four-Regular Leaves

Yu-Fong Hsu (徐育鋒)
Tamkang University
joliwugy@yahoo.com.tw

Abstract

A decomposition of a graph G is a collection $\mathfrak{H} = \{H_1, H_2, \ldots, H_s\}$ of subgraphs of G such that $E(H_1) \cup E(H_2) \cup \ldots \cup E(H_s)$ and $E(H_i) \cap E(H_j) = \varnothing$, for $i \neq j$. If H_i is isomorphic to a graph H for each $i = 1, 2, \ldots, s$, then we say that G has an H-decomposition or G can be decomposed into H. If H is isomorphic to a copy of k-cycle, then we say G has a k-cycle decomposition or G can be decomposed into k-cycles and $\mathfrak{H}$ is a k-cycle system of G.

A quartic graph is a graph which is 4-regular. Let K_n be a complete graph with n vertices and Q_t be a quartic graph with t vertices. In this paper, we solve the existence problem of 4-cycle systems of $K_n - E(Q_t)$, except $t \leq n < (4t-5)/3$. and $t \geq 13$.

A Construction of Group Divisible Designs

Yu-Pei Huang (黃喻培)
I-Shou University
yphuang@isu.edu.tw

Abstract

A group divisible design (v,k,λ)-GDD is a triple $(\mathcal{V},\mathcal{G},\mathcal{B})$ where $\mathcal{V}$ is a finite set of cardinality v, $\mathcal{G}$ is a partition of $\mathcal{V}$ into parts of equal sizes, and $\mathcal{B}$ is a family of k-subsets (blocks) of $\mathcal{V}$ such that every pair of distinct elements of $\mathcal{V}$ occurs in exactly λ blocks or one group, but not both. In this talk, we introduce a construction of group divisible designs.

This is a joint work with Yaotsu Chang and Chong-Dao Lee.

離散數學

Organizer:Po-Yi Huang 黃柏嶧

地點:測量系教室 55170

時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Learning Hidden Graphs** Hung-Lin Fu 傅恆霖	(主持人 : 林延輯)
11：10~11：35	**On the Existence of Simple BIBDs** Hsin-Min Sun 孫新民	(主持人 : 傅恆霖)
11：35~12：00	**Optimally *t*-Pebbling Cycles** Chin-Lin Shiue 史青林	(主持人 : 傅恆霖)
13：30~13：55	**Anti-magic Labeling of Even Regular Graphs** Yu-Chang Liang 梁育菖	(主持人 : 孫新民)
15：20~15：45	**The Sorting Index on Colored Permutations and Even-signed Permutations** Yuan-Hsun Lo 羅元勳	(主持人:史青林)
15：45~16：10	**A Sharp Upper Bound of Laplacian Spread** Fan-Hsuan Lin 林凡軒	(主持人：史青林)
16：10~16：25	**Binary Subwords in Binary Words** 江彥儒、吳孟岍、余忠穎、童偉哲、簡伯丞	(主持人：史青林)
16：25~16：40	**Hamiltonian Paths of Flip Graphs of Dominotilings** Jinn-Lu 呂晉	(主持人 : 史青林)

Learning Hidden Graphs

Hung-Lin Fu (傅恆霖)
National Chiao Tung University
hlfu@math.nctu.edu.tw

Abstract

This talk is devoted to introducing a topic of group testing and its applications on computational molecular biology. The topic we study is complex group testing. Complex group testing has an equivalent formulation in graph theory: Given a graph (or a hypergraph) $G = (V, E)$ where the vertices would represent the items and edges would represent the complexes, the main task is to identify all edges by edge detecting queries of the form "$Q(S)$: does S induce at least one edge of G?" Here, S is a subset of V . For convenience, we let V = [n] = {1, 2, 3,…, n}. A query on a subset S of [n] can be represented by $Q(S)$, and $Q(S)$ = 1 means the outcome is yes and $Q(S)$ = 0 otherwise.

It has been studied by several authors where the size of each complex is restricted to be 2. It is less known where the size of complexes are of size larger than 2. In this talk, we shall first review several known results of learning a hidden graph and then report our results on the case where the complexes are larger than 2. Mainly, adaptive algorithms of group testing are utilized in our works.

On the Existence of Simple BIBDs

Hsin-Min Sun (孫新民)
National University of Tainan
sunhm@mail.nutn.edu.tw

Abstract

We show that, when the number of elements is a prime power, in many situations the necessary conditions are also sufficient for the existence of a simple BIBD.

Optimally *t*-Pebbling Cycles

Chin-Lin Shiue (史青林)
Chung Yuan Christian University
clshiue@cycu.edu.tw

Abstract

Let G be a graph. Suppose p pebbles are distributed onto the vertices of G; then we have a distribution δ where we let $\delta(v)$ be the number of pebbles distributed to the vertex v for each $v \in V(G)$. A pebbling move consists of removing two pebbles from one vertex and then placing one pebble on one of its adjacent vertices. A distribution of G is t-fold solvable if whenever we choose any target vertex v of G we can move t pebbles on v by using pebbling moves. For any positive integer t, the optimal t-pebbling number of G is the inimum number of pebbles necessary so that there is a t-fold solvable distribution of G. Let C_n be a cycle with n vertices where $n \geq 3$. In this paper, we first determine the optimal t-pebbling number of C_n for $t = 1, 2, 3$. Second, we find an upper bound and an lower bound for the optimal t-pebbling number of C_n for $t \geq 4$.These two bounds is very close when n is larger.

Anti-magic Labeling of Even Regular Graphs

Yu-Chang Liang (梁育菖)
National Sun Yat-sen University
chase2369219@hotmail.com

Abstract

An anti-magic labeling of a graph G is a one-to-one correspondence between $E(G)$ and $\{1, 2, \ldots, |E|\}$ such that the sum of the labels assigned to edges incident to distinct vertices are different. If G has an anti-magic labeling, then we say G is anti-magic. This talk show that for any regular graphs with even degree are anti-magic.

The Sorting Index on Colored Permutations and Even-signed Permutations

Yuan-Hsun Lo (羅元勳)
National Taiwan Normal University
yhlo0830@gmail.com

Abstract

We define a new statistic sor on the set of colored permutations $G_{r,n}$ and prove that it has the same distribution as the length function. For the set of restricted colored permutations corresponding to the arrangements of n non-attacking rooks on a fixed Ferrers shape we show that the following two sequences of set-valued statistics are joint equidistributed : $(\ell, \mathrm{Rmil}^0, \mathrm{Rmil}^1, \ldots, \mathrm{Rmil}^{r-1}, \mathrm{Lmil}^0, \mathrm{Lmil}^1, \ldots, \mathrm{Lmil}^{r-1}, \mathrm{Lmal}^0, \mathrm{Lmal}^1, \ldots, \mathrm{Lmal}^{r-1}, \mathrm{Lmap}^0, \mathrm{Lmap}^1, \ldots, \mathrm{Lmap}^{r-1})$ and $(\mathrm{sor}, \mathrm{Cyc}^0, \mathrm{Cyc}^{r-1}, \ldots, \mathrm{Cyc}^1, \mathrm{Lmic}^0, \mathrm{Lmic}^{r-1}, \ldots, \mathrm{Lmic}^1, \mathrm{Lmal}^0, \mathrm{Lmal}^1, \ldots, \mathrm{Lmal}^{r-1}, \mathrm{Lmap}^0, \mathrm{Lmap}^1, \ldots, \mathrm{Lmap}^{r-1})$ Analogous results are also obtained for Coxeter group of type D (i.e., the even-signed permutation group). Our work generalizes recent results of Petersen (2011), Chen-Gong-Guo (2013) and Poznanović (2014).

A Sharp Upper Bound of Laplacian Spread

Fan-Hsuan Lin (林凡軒)
National Chiao Tung University
fanhsuan.am03g@nctu.edu.tw

Abstract

The Laplacian spread of a graph is the difference between the largest and the second least Laplacian eigenvalues of a graph.

We find that the class of strongly regular graphs attains the maximum Laplacian eigenvalue, the minimum second least eigenvalue and hence the maximum Laplacian spread among simple connected graphs with given order, minimum degree, maximum degree, minimum numbers of common neighbors of two adjacent vertices and two nonadjacent vertices respectively. Other extremal graphs are also provided.

Keywords: Laplacian matrix, Laplacian spread, strongly regular graph.

Binary Subwords in Binary Words

江彥儒、吳孟岍、余忠穎、童偉哲、簡伯丞
Air Force Academy

Abstract

We investigate binary subwords in binary words and make some observations.

Hamiltonian Paths of Flip Graphs of Dominotilings

Jinn Lu (呂晉)
National Taiwan Normal University
victor_jinnlu@yahoo.com.tw

Abstract

We investigate the Hamiltonacity of the flip graphs of the domino tilings on a 2*n grid or cyclic band.

機率

Organizer:Hsin-Hung Shih 施信宏

地點:數學系館 3176

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Spectral Analysis of the One-dimensional MCMC Sampling

Guan-Yu Chen 陳冠宇 (主持人 : 陳隆奇)

13：40~14：05

Mean Field Behavior for Percolation on Body-centered Cubic Lattices in High Dimensions

Lung-Chi Chen 陳隆奇 (主持人 : 陳冠宇)

14：05~14：30

General Idea and Recent Results on the Lace Expansion

Akira Sakai (主持人 : 陳冠宇)

15：00~15：25

Two-Sided Free Boundary Problems and Perpetual American Exotic Options

Ming-Chi Chang 張明淇 (主持人 : 須上苑)

15：25~15：50

Disorder Chaos in the Spherical SK Model

Hsi-Wei Hsieh 謝希微 (主持人 : 須上苑)

Spectral Analysis of the One-dimensional MCMC Sampling

Guan-Yu Chen (陳冠宇)
National Chiao Tung University
gychen@math.nctu.edu.tw

Abstract

The Markov chain Monte Carlo (MCMC for short) method is a frequently used technique in sampling probability distributions on graphs. When a MCMC algorithm is implemented, knowing the time to stop and sample is an important issue and the threshold time (or the mixing time) provides an answer to this question. A precise estimate of the mixing time is mostly unavailable due to the complicated structures of graphs.

In this talk, we will focus on the one-dimensional graph and introduce a characterization of its spectrum. Along with Diaconis and Saloff-Coste's formula on the mixing time, one may easily cook up a numerical method to approximate the exact threshold time.

Mean Field Behavior for Percolation on Body-centered Cubic Lattices in High Dimensions

Lung-Chi Chen (陳隆奇)
National Chengchi University
lcchen@nccu.edu.tw

Abstract

The two-point function for nearest-neighbor bond percolation on the d-dimensional hypercubic lattice (if d $\geqq$ 19) obeys an infrared bound which implies that various critical exponents take on their respective mean-field values has been shown by Hara and Slade in 1991. The upper critical dimension for nearest-neighbor bond perco-lation is believed 6. In this talk, we consider a nearest-neighbor percolation on the d-dimensional body-centered cubic lattice and try to get the mean field behavior for d > dc. This is a joint work with Akira Sakai and Markus Heydenreich.

General Idea and Recent Results on the Lace Expansion

Akira Sakai
Hokkaido University, Japan
sakai@math.sci.hokudai.ac.jp

Abstract

The lace expansion has been a powerful tool to rigorously prove mean-field results in high dimensions. However, since its computation is (considered to be) complicated and difficult, the methodology is not currently enjoying great popularity. In this talk, I will explain general idea behind the lace expansion and show a collection of various results, especially recent ones, obtained by the lace expansion.

Two-Sided Free Boundary Problems and Perpetual American Exotic Options

Ming-Chi Chang (張明淇)
National Chiao Tung University
zuroc.am91g@nctu.edu.tw

Abstract

In this paper, we concern on the free boundary problems with the two-sided reward function. Under the jump-diffusion model with the unimodal jump density function, we prove the existence of the solution to such free boundary problems with embedding the smooth pasting conditions. Further, we show that the solution is the rational price of the corresponding perpetual American option. Examples include the perpetual American strangle options, the perpetual American chooser options and the perpetual American vertical spread options.

Disorder Chaos in the Spherical SK Model

Hsi-Wei Hsieh (謝希微)
Academia Sinica
b95105015@ntu.edu.tw

Abstract

We consider a spin system obtained by coupling two distinct Sherrington-Kirkpatrick(SK) models with the same temperature and external field whose Hamiltonians are correlated. The disorder chaos conjecture states that the overlap between two independent samples from, respectively, the Gibbs measures of the two models is essentially concentrated at a single value under the corresponding coupled Gibbs measure. In this paper, using the extended Guerra replica symmetry breaking bound, we prove the spherical SK model is chaotic and the position of the overlap is determined by an equation related to Guerra's bound and the minimizer of the Parisi functional.

機率

Organizer:Hsin-Hung Shih 施信宏

地點:數學系館 3176

時間:2014 年 12 月 07 日 (日)

09：00~09：50

On Stochastic (Fractional) Heat Equations

Shang-Yuan Shiu 須上苑 (主持人：陳美如)

11：10~11：35

The Cover Times of Brownian Motion with Drift

May-Ru Chen 陳美如 (主持人 : 許順吉)

11：35~12：00

Mean Field Games and Systemic Risk

Li-Hsien Sun 孫立憲 (主持人 : 許順吉)

13：30~13：55

A Version of the Weakly Self-avoiding Walk

Chien-Hao Huang 黃建豪 (主持人 : 孫立憲)

On Stochastic (Fractional) Heat Equations

Shang-Yuan Shiu (須上苑)
National Central Univeresity
shiu@math.ncu.edu.tw

Abstract

This is a survey talk. We consider stochastic (fractional) heat equations [S(F)HE], we make sense solutions in mild form in the sense of Walsh. Those equations can be understood as a model of interacting particle system. It becomes more attractive since the solution to KPZ can be realized by the Hopf-Cole transformation of the solution to SHE. I will present the most recent results and directions in this area.

The Cover Times of Brownian Motion with Drift

May-Ru Chen (陳美如)
National Sun Yat-sen University
chenmr@mail.math.nsysu.edu.tw

Abstract

Consider a Brownian motion starting at the origin moving on a restricted interval with positive drift. For a given positive number ℓ, define the cover time of the Brownian motion to be the first time when the range of the Brownian motion is ℓ. In this talk, we study the cover times of some Brownian motions.

Mean Field Games and Systemic Risk

Li-Hsien Sun (孫立憲)
National Central Univeresity
lihsiensun@ncu.edu.tw

Abstract

Due to the recent financial crisis, systemic risk is becoming a central research topic. We propose a simple model of inter-bank borrowing and lending where the evolution of the log-monetary reserves of N banks is described by a system of diffusion processes coupled through their drifts in such a way that stability of the system depends on the rate of inter-bank borrowing and lending. Systemic risk is characterized by the non-negligible probability of a large number of defaults. In addition, we introduce a game feature in the lending and borrowing system where each bank controls its own rate of borrowing from or lending to the central bank under a quadratic cost. The equilibria with finitely many players are solved explicitly and the financial implication is that the central bank acts as a clearing house, adding liquidity to the system without affecting its systemic risk. Finally, we consider two inhomogeneous unsymmetrical grouping problems where banks have strategies using heterogeneous parameters and obtain that the central bank must provide extra cash into the system or keep deposits for banks in order to stabilize this bank system using the heterogeneity framework.

A Version of the Weakly Self-avoiding Walk

Chien-Hao Huang (黃建豪)
Academia Sinica
chhuang@math.sinica.edu.tw

Abstract

We consider a weaker Hamiltonian for the self-repellent walk. The partition function is easily defined for both discrete and continuous model without the truncation, since the range/sausage is well-defined in any dimension. In dimension one, we give a formula for the speed of the endpoint of the polymer path so that the monotonicity of the speed with respect to the parameter is obvious under the polymer measure.

統計

Organizer:Chin-Tsang Chiang 江金倉

地點:數學系館 3177

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Semiparametric Estimation for the Sufficient Dimension Reduction

Ming-Yueh Huang 黃名鉞 (主持人：江金倉)

13：40~14：05

General Semiparametric Regression Models for Recurrent Events

Hung-Chi Ho 何弘棋 (主持人：江金倉)

14：05~14：30

Generalized Concordance Measure

Shao-Hsuan Wang 王紹宣 (主持人：江金倉)

Semiparametric Estimation for the Sufficient Dimension Reduction

Ming-Yueh Huang (黃名鈺)
National Defense University
brightmoonchiefyue@gmail.com

Abstract

With the associated counting process of a response, a simple and easily implemented semiparametric approach is developed to estimate the central subspace and underlying regression function. Different from the existing sufficient dimension reduction approaches, two essential elements, basis and structural dimension, of the central subspace and the optimal bandwidth of a kernel distribution estimator can be simultaneously estimated through a cross-validation version of the pseudo sum of integrated squares. One attractive merit of this estimation technique is that it allows a response to be discrete and some of covariates to be discrete or categorical. Further, the uniform consistency of the cross-validation optimization function and the consistency of the resulting estimators are derived under very mild conditions. Meanwhile, we establish the asymptomatic normality of the central subspace estimator with an estimated rather than exact structural dimension. It is also demonstrated by our extensive numerical experiments that the developed approach dramatically outperforms the semiparametric competitors. In addition, the applicability and practicality of the proposal are highlighted through data from previous studies.

General Semiparametric Regression Models for Recurrent Events

Hung-Chi Ho (何弘棋)
China Medical University Hospital
hermitianho@gmail.com

Abstract

This research aims to investigate the recurrent event process with informative censoring through general semiparametric latent models. Without specifying the distributions of a subject-specific latent variable and censoring times, several approaches are developed for more elaborate formulations of the underlying recurrent events. In light of variant qualitative structures, the conditional distribution features of recurrent event times are fully taken into account in the proposed estimation. These findings support the development of rules for choosing among competing intensity regressions. Under some suitable conditions, we further establish the large sample properties of estimators and the consistency of model checking criteria. Through extensive simulation studies, the presented estimators and numerical measures are also shown to have reasonable good finite-sample performance. In addition, an application to data from the AIDS Link to Intravenous Experiences cohort study demonstrates the applicability of our proposal.

Generalized Concordance Measure

Shao-Hsuan Wang (王紹宣)
National Taiwan University
warmsay@yahoo.com.tw

Abstract

A Concordance measure for a response and multiple covariates of interest has been widely studied in the scientific research literature. Instead of using a linear score in computing this rank association index, a flexible semi-parametric regression model is further introduced to stress the reasonability of a more general multi-polynomial score. Intrinsically, the research issue covers the determination of the unknown order of multi-polynomial function and the central subspace. For such a dimension reduction problem, a BIC-type criterion and a random shift approach are developed to determine the order and the structural dimension, and estimate the central subspace directions.

統計

Organizer:Chin-Tsang Chiang 江金倉

地點:數學系館 3176

時間:2014 年 12 月 07 日 (日)

15：20~15：45 **多組成本效果均值比之統計分析**

Haiao-Ting Wu 吳筱婷 (主持人 : 江金倉)

15：45~16：10 **成本效果比較機率之檢定**

Jia-Rong Li 李佳蓉 (主持人 : 江金倉)

16：10~16：35 **基於截斷型壽命試驗之廣義柏拉圖分配的群允收抽樣計畫**

Zhi-Xiong Yang 楊智雄 (主持人 : 江金倉)

多組成本效果均值比之統計分析

Haiao-Ting Wu (吳筱婷)
逢甲大學
s2036108037@gmail.com

Tsai-Yu Lin (林彩玉)
逢甲大學

Chi-Rong Li (李其融)
中山醫學大學

摘要

成本效果分析(cost-effectiveness analysis)常被應用在生物醫學、經濟學、社會科學及公共衛生等不同領域上，目的為比較兩處理間成本效果是否有顯著差異。過去研究中，大多以成本效果增量比(incremental cost-effectiveness ratio, ICER)為主要衡量指標。然而，在實務應用上，決策者常面臨多組比較的問題，過去有文獻透過 ICER 兩兩互相比較來解決，至於其他相關多組成本效果分析卻鮮少提到。因此，本論文採用成本效果均值比(average cost-effectiveness ratio, ACER)的概念來進行多組處理之成本效果分析，且由於過去文獻指出成本和效果的分配多為偏態，故本研究成本和效果的分配假設為二元對數常態，提出廣義 P 值法(generalized p-value)及 Bootstrap 法兩種統計方法的檢定程序。再藉由模擬分析計算其型 I 誤差及檢定力，以評估兩種方法的表現。根據模擬結果可得，在大部分的參數組合下 Bootstrap 法的表現優於廣義 P 值法。最後，我們將檢定程序應用到治療憂鬱症及背部疼痛等實際資料進行分析。

成本效果比較機率之檢定

Jia-Rong Li (李佳蓉)
逢甲大學
leehldd@gmail.com

Tsai-Yu Lin (林彩玉)
逢甲大學

Chi-Rong Li (李其融)
中山醫學大學

摘要

成本效果分析(cost-effectiveness analyses)常被應用在生物醫學上，主要是比較新處理與標準處理的成本效果。過去研究以成本效果增量比(incremental cost- effectiveness ratio, ICER)做為評估指標居多，而成本效果均值比(average cost- effectiveness ratio, ACER)則是另一種成本效果的評估指標，其可避免 ICER 使用上的限制。本論文則提出以機率觀點仿照 ACER 的新評估指標，可在決策者選擇新處理時，提供獲得成效的可能性。在實務上，成本資料與效果資料經常是來自於偏斜分配，因此本研究將假設成本與效果服從二元對數常態分配下，利用最大概似估計法(maximum likelihood estimate, MLE)與無母數估計法，對我們提出的機率評估指標提供估計量，並且分別建立檢定流程。接著，我們以蒙地卡羅模擬(monte carlo simulation)分析，探討我們提出的檢定流程在有限樣本的型 I 誤差機率與檢定力的表現。我們發現最大概似估計檢定流程的表現優於無母數估計檢定流程。最後，我們利用提出的機率評估指標應用至治療腰部疼痛以及新舊藥物測試等實際資料進行分析。

基於截斷型壽命試驗之廣義柏拉圖分配的群允收抽樣計畫

Zhi-Xiong Yang (楊智雄)
National Chiayi University
s1010239@mail.ncyu.edu.tw

摘要

現今，由於生產技術之進步與科技的發達，諸多商品皆可憑藉機器大量生產，企業界中為確保自家商品之品質，群允收抽樣計畫(group acceptance sampling plans)經常被用來評估進貨以及出貨之商品的品質是否達到所要求的標準。本文中，我們建構其群允收抽樣計畫基於商品壽命來自於雙參數的廣義柏拉圖分配(generalized Pareto distribution)之截斷型壽命試驗(truncated life tests)。在給定不同的允收個數、消費者風險、每一群裡的樣本數以及結束試驗時間下，讓我們感興趣的是找出壽命試驗中群的最小數量 以確保商品真實壽命的中位數 能超過預定的中位數之目標值，並且建構其相關表格，以及對群允收抽樣計畫中的操作特性函數(operating characteristic function)來進行探討與分析以及繪製操作特性曲線(operating characteristic curve)。最後，我們提出一個數值例子來說明在廣義柏拉圖分配下，可利用上述建構出的表格來進行群允收抽樣計畫的程序，以幫助企業解決實務上的問題。

計算數學

Organizer:Chieh-Sen Huang 黃杰森

地點:測量系教室 55160

時間:2014 年 12 月 06 日 (六)

11：30~12：20

Numerical Methods for Weakly Compressible Two-phase Flow

Keh-Ming Shyue 薛克民 (主持人：黃杰森)

13：40~14：05

FAME-matlab Package: Fast Algorithm for Maxwell Equations

Tsung-Ming Huang 黃聰明 (主持人:薛克民)

14：05~14：30

Pulse Interaction and Bound State Formation in Falling Liquid Films

Te-Sheng Lin 林得勝 (主持人：薛克民)

15：00~15：25

A Tailored Finite Point Method for PDE Based Model with Adaptive Grid for Image Denoising and Compression

Yin-Tzer Shih 施因澤 (主持人:黃聰明)

15：25~15：50

Numerical Simulations of Self-propulsion Swimmer by the Immersed Boundary Method

Wei-Fan Hu 胡偉帆 (主持人:黃聰明)

Numerical Methods for Weakly Compressible Two-phase Flow

Keh-Ming Shyue (薛克民)
National Taiwan University
shyue@math.ntu.edu.tw

Abstract

We are interested in solving unsteady weakly compressible two-phase ow problems where the flow speed is assumed to be much less than the sound speed of the uid component and the wavelengths of the acoustic waves are assumed to be large. Representative applications of this kind of problems are such as the rising of gas bubbles in liquids, the falling of liquid drops in the air under gravitational force field, bubbly flow in liquids, and breaking of waves. It is without question that one possible approach to simulate the aforementioned low speed (single- or two-phase) ow problem is to consider it as a fully compressible ow and use a standard upwind _nite volume method for numerical approximation. When this is done with the use of an explicit method, it is known in the literature that we would have a severe time step restriction due to the CFL (Courant-Friedrichs-Lewy) condition for stability, yielding difficulties as the lack of robustness of the method and also the loss of accuracy of the computed solutions. The aim of this talk is to describe recent progress of numerical approaches toward overcome these difficulties.

FAME-matlab Package: Fast Algorithm for Maxwell Equations

Tsung-Ming Huang (黃聰明)
National Taiwan Normal University
min@ntnu.edu.tw

Abstract

To numerically determine the band structure of three-dimensional photonic crystals, we study how the associated large-scale generalized eigenvalue problem (GEP) can be solved efficiently. The main computational challenge is due to the complexity of the coefficient matrix and the fact that the desired eigenvalues are interior. Recently, we reformat the GEP to the null space free eigenvalue problem (NFEP). For solving the NFEP, we have analyzed potential advantages and disadvantages of the null space free inverse Lanczos method, the shift-invert residual Arnoldi method, and the Jacobi-Davidson method from theoretical viewpoints. Based on these theoretical and numerical results, we develop a MATLAB package: FAME to efficiently simulate three-dimensional photonic crystals. In this talk, I will introduce how to use FAME to efficiently compute the band structure of three-dimensional photonic crystals.

Pulse Interaction and Bound State Formation in Falling Liquid Films

Te-Sheng Lin (林得勝)
National Chiao Tung University
tslin@math.nctu.edu.tw

Abstract

We analyze pulse interaction in active-dissipative systems that arise in the study of falling liquid films in the presence of various external effects. Such effects result in additional non-local terms in the form of pseudo-differential operators. We analyze both weakly nonlinear and fully nonlinear reduced model equations. We compare the theoretical predictions with numerical results for reduced model equations and Stokes flow. It is found that non-locality strongly influences pulse interactions and results in several features that are not present in local equations.

A Tailored Finite Point Method for PDE Based Model with Adaptive Grid for Image Denoising and Compression

Yin-Tzer Shih (施因澤)
National Chung Hsing University
yintzer_shih@email.nchu.edu.tw

Abstract

In this talk, we present a novel algorithm by using adaptive grids as well as well as a tailored finite point method for a time dependent convection diffusion model to implement the image denoising and compression. The numerical experiments show that our proposed method not only removes the noise effectively, but also preserves the edge information well during the image compression process.

Numerical Simulations of Self-propulsion Swimmer by the Immersed Boundary Method

Wei-Fan Hu (胡偉帆)
National Chiao Tung University
wfhu@math.nctu.edu.tw

Abstract

In nature, cell motility in fluid is ubiquitous. It is interesting to investigate the biophysical and mechanical principles of locomotion at the small scales relevant to cell swimming. A swimmer is defined to be a creature that moves by changing its body shape periodically. Many microscopic swimmers are equipped with one or more appendages for propulsion, and the appendages could be stiff helix. To rule out models of swimmer, we need to measure swimming force quantitatively together with observation of cell motion hydrodynamically. In this talk, we treat a vesicle as a swimmer; under this assumption, a vesicle can deform its surface such that it is able to sustain movement through fluid in the absence of external total forces.

計算數學

Organizer:Chieh-Sen Huang 黃杰森

地點:測量系教室 55160

時間:2014 年 12 月 07 日 (日)

09：00~09：50	**Multi-block Pseudospectral Method on Studying Nanofiltration** Tzyy-Leng Horng 洪子倫	(主持人:舒宇宸)
11：10~11：35	**On the Numerical Solutions for Blow-up Problems** Chien-Hong Cho 卓建宏	(主持人:洪子倫)
11：35~12：00	**Alternating Projection Methods for Solving Nonnegative Inverse Singular Value Problems** Min-Hsiung Lin 林敏雄	(主持人：洪子倫)
13：30~13：55	**Space-time Conserved Element and Solution Element Method for Scalar Conservation Laws with Discontinuous Flux in the Space Variable** Ming-Cheng Shiue 薛名成	(主持人：卓建宏)
15：20~15：45	**Study on Orthogonal Polynomials over Several Intervals** Li-Chen Chen 陳麗貞	(主持人：王辰樹)
15：45~16：10	**A Positivity Preserving Inexact Noda Iteration for Computing the Smallest Eigenpair of a Large Irreducible M-matrix** Ching-Sung Liu 劉青松	(主持人：王辰樹)
16：10~16：35	**On Implementation of Nonlinear Kalman Filtering Based on Using Synchronization** Chern-Shuh Wang 王辰樹	(主持人:劉育佑)

Multi-block Pseudospectral Method on Studying Nanofiltration

Tzyy-Leng Horng (洪子倫)
Feng Chia University
tlhorng@math.fcu.edu.tw

Abstract

Water resources have become less due to climate changing caused by global warming nowadays. Desalination of sea water to obtain fresh water has become more and more important. Among all methods of desalination, nanofiltration has advantage of less energy consumption over reverse osmosis, and still gets qualitatively good rejection of salt. The governing equations for nanofiltration are basically Navier-Stokes equations and Poisson- Nernst-Planck (PNP) equations, since the process is basically driving electrolyte (sea water) through charged nanopores, which physically involves convection, diffusion and electro-migration. If steric effect is to be concerned, that might be necessary for pores in the size of nanometers, PNP equations then need to be further modified by adding extra terms accounted for finite-size effect. Here we applied high-order multi-block pseudospectral method to study this phenomenon numerically. The 3D geometric configuration is an axisymmetric pore connected to reservoirs at both ends, which can be decomposed into joint rectangular blocks in cylindrical coordinates. Under the framework of method of lines (MOL), the governing equations are first semi-discretized in space by Chebyshev pseudospectral method with boundary and interface conditions being strongly enforced. Then the resultant coupled ordinary-differential-algebraic equations (DAE) can be solved by several well developed DAE solvers. From the computations, we found large pore surface charge density and large Debye length (compared with diameter of pore) are effective for salt rejection.

On the Numerical Solutions for Blow-up Problems

Chien-Hong Cho (卓建宏)
National Chung Cheng University
chcho@math.ccu.edu.tw

Abstract

In many evolution equations, the solutions may become unbounded in finite time, a phenomenon which is known as blow-up. Numerical methods give good approximation when solutions are smooth. However, singularities occur in finite time for the problems we are dealing with. How to compute the blow-up solutions and the blow-up time are of particular interests. In this talk, we report our recent results on the numerical approximation for such kind of problems.

Alternating Projection Methods for Solving Nonnegative Inverse Singular Value Problems

Min-Hsiung Lin (林敏雄)
National Chung Cheng University
mhlin@ccu.edu.tw

Abstract

Inverse singular value problems have been a research focus for decades. Clearly, an inverse singular problem is trivial if the desired matrix is not restricted to a certain structure. This talk will present a numerical procedure, based on the successive projection process, to solve inverse singular value problems for nonnegative matrices subject to given diagonal entries. Although we focus on a specific type of inverse singular value problems with prescribed diagonal entries, this entire procedure can be straightforwardly applied to other types of structure. Numerical examples are used to demonstrate the capacity and efficiency of our method.

Space-time Conserved Element and Solution Element Method for Scalar Conservation Laws with Discontinuous Flux in the Space Variable

Ming-Cheng Shiue (薛名成)
National Chiao Tung University
mingcheng.shiue@gmail.com

Abstract

In this talk, we will study numerical approximation of some scalar conservation laws with discontinuous flux function in the space variable. Indeed, a new modified space time conserved element and solution element method (CESE) is introduced to solve this problem with the given geometric structure of the flux at the interface. The main motivation is to solve this problem by using this modified CESE method which inherits the features of the original CESE method for scalar conservation laws with continuous flux.

Study on Orthogonal Polynomials over Several Intervals

Li-Chen Chen (陳麗貞)
Soochow University
lichen@scu.edu.tw

Abstract

Orthogonal polynomials on several intervals are closely related to the study of the interior problem of tomography. It is of interest in numerical analysis when one tries to solve large indefinite linear systems using Richardson iteration. Applications of these types of polynomials have also appeared in quantum physics.

A Positivity Preserving Inexact Noda Iteration for Computing the Smallest Eigenpair of a Large Irreducible M -matrix

Ching-Sung Liu (劉青松)
National Chiao Tung University
chingsungliu@gmail.com

Abstract

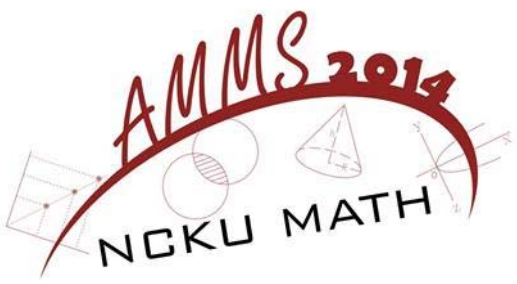
In this paper, based on the Noda iteration, we present inexact Noda iterations (|N|), to find the smallest eigenvalue and the associated positive eigenvector of a large irreducible nonsingular M -matrix. The positivity of approximations is critical in applications, and if the approximations lose the positivity then they may be meaningless and could not be interpreted. We propose two different inner tolerance strategies for solving the inner linear systems involved, and prove that the convergence of resulting |N| algorithms is globally linear and superlinear with the convergence order $(1+\sqrt{5})/2$, respectively. The proposed |N| algorithms are structure preserving and maintains the positivity of approximate eigenvectors.

On Implementation of Nonlinear Kalman Filtering Based on Using Synchronization

Chern-Shuh Wang (王辰樹)
National Cheng Kung University
cswang@math.ncku.edu.tw

Abstract

To develop the Kalman filtering for nonlinear problems, a two-stage method is investigated. We first study on a driving-response system to create a nonlinear system which is synchronized with the original nonlinear system in some sense. We then apply the Kalman filtering to the corresponding synchronized system. According to the target system is synchronized to the original nonlinear system, we thus filtering the original system simultaneously.



數學教育

Organizer:Po-Hung Liu 劉柏宏

地點:數學系館 3177

時間:2014 年 12 月 07 日 (日)

09：00~09：50	**數學教育社會化中的人文因素** Ko-Wei Lih 李國偉	(主持人:劉柏宏)
11：10~11：35	**大學數學教育的幾個議題** I-Liang Chern 陳宜良	(主持人:劉柏宏)
11：35~12：00	**Google Hangouts and Immediate Response Systems 在數學課程上的應用** Yu-Chen Shu 舒宇宸	(主持人：劉柏宏)
13：30~13：55	**如何製作高學習成效的數學類 SPOC's 影音教材** Jeng-Nan Tzeng 曾正男	(主持人:陳東賢)
15：20~15：45	**十二年國民基本教育數學領域課程綱要之我見** Gerard Jennhwa Chang 張鎮華	(主持人:李國偉)
15：45~16：10	**對十二年國教數學領域課程綱要的建言** Yuan-Shun Lee 李源順	(主持人:李國偉)
16：10~16：35	**數學素養調查的實施方式與國際借鏡** Chao-Jung Wu 吳昭容	(主持人:李國偉)

數學教育社會化中的人文因素

Ko-Wei Lih (李國偉)
中央研究院數學研究所
makwlih@sinica.edu.tw

摘要

數學教育的社會化至少包含兩個面向：

1、社會對於學習數學的用處，將逐漸產生懷疑，但是也不能認同把數學只當做升學篩選的工具，因此減少非理工取向學生學習數學的要求會日漸升壓。對於數學課程的內容與教法，也將要求走出培育數學家的菁英思維，而更能把數學知識與生計連結起來。

2、大量的網路教學與免費課程，使得需要使用數學的人不必走入學校，就可獲得相當的教育。

另外，網路上出現超強的解決數學問題軟體或 App，相當程度地削弱甚至顛覆傳統課堂裡的數學教學。數學教育社會化的景觀正在迅速演化，未來也許很難準確逆料，但是因循一定無法有效應變。

本次報告中，將以個人對於人文因素在數學社會化中可能產生的作用，提出一些觀察與感想，與關心數學教育現況與發展的同仁分享。

大學數學教育的幾個議題

I-Liang Chern (陳宜良)
國立中央大學
ilchern@math.ncu.edu.tw

摘要

我將談四個議題

1. 提昇微積分教學的經驗分享
2. 高微課程的定位
3. 加州理工學院數學系與應數系課程結構的分析
4. 數學建模課程的設計

Google Hangouts and Immediate Response Systems 在數學課程上的應用

Yu-Chen Shu (舒宇宸)
國立成功大學
ycshu@mail.ncku.edu.tw

摘要

在本演講中，我將展示如何透過 google hangouts 來進行遠端教學、課程錄影。此外，我將展示由敝系學生所開發之線上即時反饋系統，並說明如何使用它來進行數學課程的教學。

如何製作高學習成效的數學類 SPOC's 影音教材

Jeng-Nan Tzeng (曾正男)
國立政治大學
jengnan@gmail.com

摘要

因為教育部的鼓勵政策，各大學積極參與 MOOC's 教材製作，然而學者觀察全球磨課師發展並檢討磨課師課程的實際成效，發現開放式課程雖然修課人數眾多，但全程觀看的人數比例甚低，且只有 2%的人能通過授課評量。 SPOC's 與 MOOC's 立意相近，但在封閉性的條件下讓教師的進入門檻大幅降低，錄製的內容也更能貼近學生學習。最主要的差異為 SPOC's 教材的閱聽觀眾是封閉的，因此在智財權的處理上會較 MOOC's 寬鬆。無論是 MOOC's 或是 SPOC's 都讓人質疑學生的學習成效是否能達到直接面授的水準。 我將介紹如何用最簡易的方式製作 SPOC's 教材，並且分享如何在平常上課的備課與授課時間內，用最簡便地程序完成 SPOC's 教材內容，以及如何增加一些創意元素在課程影片中，確實增加同學閱讀與學習的時間，達到有效率的翻轉學習。

十二年國民基本教育數學領域課程綱要之我見

Gerard Jennhwa Chang (張鎮華)
國立台灣大學
gjchang@math.ntu.edu.tw

摘要

中小學數學學習相關事宜，由訂課綱、寫書、審書、選書、教書、讀書，一直到考試，歷年來前半段的問題少，後半段的問題多。在此十二年國民基本教育啟動之初，外界將過去所有缺失全部投射在第一階段的總綱草案的討論，引起許多紛爭。本演講的重點有二：整理總綱草案爭論處以及最近的發展，數學課程綱要研修小組目前的想法。講題定為「我見」，是因為演講時常以個人經歷論述，容有若干純屬個人意見。

對 12 年國教數學領域課程綱要的建言

Yuan-Shun Lee (李源順)
臺北市立大學
leeys@go.utaipei.edu.tw

摘要

本報告首先分享林福來教授主持的「十二年國民基本教育數學領域綱要內容之前導研究」之研究結果。再來提出台灣數學教育學會對 12 年國教數學領域課程綱要的建言。本會建言將於 2014.11.08 與會員進行討論，於 2014.11.22 的理、監事會議確認與修正討論內容。

本會建議之大致內容為：

1. 在全民教育的年代，課程綱要應強調學生數學學習的認知過程。

2. 基於數學的本質，以及數學要培養學生理性溝通、邏輯推理的外延能力，課綱應明定奠基活動、課程脈絡、數學探究、數學素養的細目，並且強調於教科書、教學、評量，應納入此四項重要內容。

3. 從特定年級(例如，小五)開始，每周一節課進行數學課程脈絡、數學探究、數學素養議題的教學。同時奠基活動，應從小一開始，每月一節。

4. 基於科技知能進展神速，教學時數又有限制，且需給學生探究時間的前提，建議數學內容採取具涵蓋不同概念的廣度而非深度的課程安排，亦即，將數學重要內容，都讓學生有機會學習，而非聚焦少數內容且深入探討內涵的策略。

5. 參考國外學制和數學本質的深度，以及國小教學與培育分流問題，建議國小高年級應採專業教學，同時應明訂教師每年定期進修的機制。

數學素養調查的實施方式與國際借鏡

Chao-Jung Wu (吳昭容)
國立臺灣師範大學
cjwu@ntnu.edu.tw

摘要

數學素養意指能在各種情境脈絡中形成數學問題、解決問題、以及詮釋現象等能力與態度，此一觀點強調知識的功能性與正向態度。我國實施 12 年國教後，擬針對 12 年級學生實施國民素養調查，以瞭解教育改革後的教育品質，103 年已進行了預試，內容包括語文、數學、科學、數位、美感與教養。本文將報告數學素養調查兩階段的實施方式，以與國際上大型的數學素養或數學能力調查進行比較，並從國際經驗中瞭解相關的爭議與衝擊。

國立成功大學數學系簡介

成大數學系從 45 學年開創時的 6 位專任教師，發展到目前有 33 位專任教師：其中教授 12 位，副教授 10 位，助理教授 11 位；專職行政人員 6 位；博士班學生 12 位，碩士班學生 59 位，大學部學生 237 位；數學系老師人數與全系所學生人數的比例約為 1：9.3，老師人數與研究生人數的比例約為 1:2.15。

系所特色

成大數學系館位於成大成功校區的正中央，也就是成大新總圖書館的正對面。數學系的教師認真負責地致力於教學及輔導工作。除了致力於課程教學，數學系老師也關心學生學習與生活的狀況，盡力協助每一位學生做好個人的生涯規劃。其中有多位優秀教師表現出色，並獲得榮譽與肯定。

本系有專屬的圖書館，目前藏書約 24330 冊，期刊總類約 226 種，圖書室採開架式供師生借閱、資料查詢、影印等使用；亦擁有大約 80 台的個人電腦可透過成大計算機中心連接台灣學術網路與全世界溝通。

進修與就業

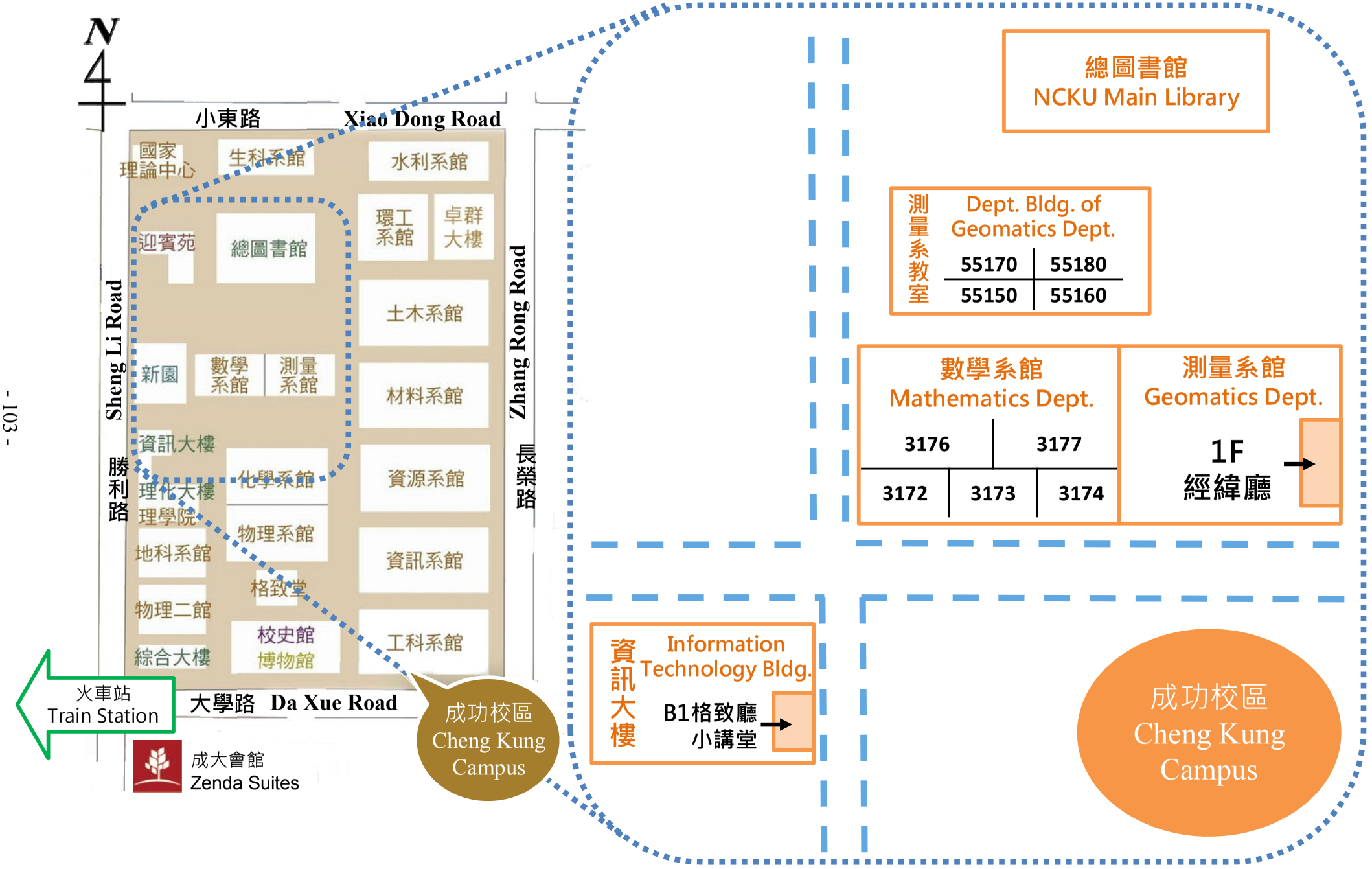
進修：數學研究所或應用數學研究所之外，還包括電機工程、資訊工程、航太工程、工程科學、工業管理、財務金融、統計學等研究所。

就業：以數學教師外為主，另外也可以選擇精算師、管理科學、資訊工程等各行業。

人物

數學系的教師除了負責教學工作培育數學人才，也同時積極地在純數學及應用數學從事學術研究，廣泛的研究領域包括：代數、分析、幾何、數值分析、科學計算、作業研究、機率論及統計等。其中有多位優秀學者在各研究領域表現出色，備受數學界矚目並獲得肯定。澳洲國科會針對 1186 份數學相關的期刊進行評比：過去 5 年，數學系在最優質的 A*等級(前 7.7%)期刊中發表超過 33 篇的論文。成大數學系在 2012 及 2013 年的 QS 世界大學數學學科排名都排進第 51 名到 100 名之間。

姓名	學歷	專長
陳若淳	猶他大學博士	微分幾何、幾何分析
吳順益	劍橋大學博士	泛函分析、數學規劃
李春得	印地安納大學博士	無母數統計、統計近似理論
李國明	哥廷根大學博士	積分方程、反問題
沈士育	布朗大學博士	邊界元方法、應力波、逆熱傳導、選擇權定價
林　牛	布蘭迪斯大學博士	無窮維李超代數的表示理論及其對量子群和幾何的關係
林景隆	成功大學博士	偏微分方程、反問題
洪英志	牛津大學博士	微分幾何、偏微分方程、數學物理
柯文峰	亞歷桑納大學博士	代數、環論、近環、量子資訊
夏　杼	馬里蘭大學博士	代數幾何：黑格叢、表示簇；動態系統：映射類群作用
許瑞麟	北卡羅來納州立大學博士	運籌學、演算法、二次規劃、分數型規畫、非線性分析
黃炎坤	西北大學博士	機率論
王辰樹	清華大學博士	數值分析、矩陣計算、最佳控制系統
方永富	馬里蘭大學博士	偏微分方程、調和分析、富氏分析
江孟蓉	伊利諾大學香檳分校博士	辛幾何
侯世章	明尼蘇達大學博士	數值偏微分方程
連文璟	史丹佛大學博士	偏微分方程
陳重弘	紐約州立大學 Albany 分校博士	生物統計、數理統計
粘珠鳳	明尼蘇達大學博士	表現論、數論、組合
章源慶	加州理工學院博士	代數幾何
黃世昌	奧克蘭大學博士	有限群表現理論
黃柏嶧	台灣大學博士	代數數論、組合學
史習偉	明尼蘇達大學博士	偏微分方程、調和分析
林育竹	清華大學博士	幾何分析、偏微分方程
陳旻宏	明尼蘇達大學博士	科學計算、不連續有限元素法、高階計算方法
郭鴻文	台灣大學博士	Kinetic 理論、偏微分方程
舒宇宸	台灣大學博士	數值偏微分方程、界面問題、多重網格法
楊世偉	東北大學博士	cluster代數及代數和幾何中的組合問題
劉之中	伊利諾大學厄巴納香檳分校博士	數學物理、微分幾何
劉育佑	加州大學爾灣分校博士	應用數學、偏微分方程與數值計算
劉珈銘	加州大學戴維斯分校博士	數學物理、複幾何、微分幾何、拓樸、分析
鄺國權	香港中文大學博士	微分幾何、黎曼幾何、洛倫茲幾何
蕭仁傑	普度大學博士	代數幾何、交換代數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Xiao Dong Road
國家理論中心
生科系館
水利系館
環工系館
卓群大樓
迎賓苑
總圖書館
土木系館
新園
數學系館
測量系館
材料系館
資訊大樓
化學系館
資源系館
理化大樓
理學院
物理系館
地科系館
資訊系館
格致堂
物理二館
校史館
博物館
工科系館
綜合大樓
Sheng Li Road
勝利路
Zhang Rong Road
長榮路
大學路 Da Xue Road
火車站
Train Station
成大會館
Zenda Suites
成功校區
Cheng Kung Campus
總圖書館
NCKU Main Library
測量系教室
Dept. Bldg. of Geomatics Dept.
55170
55180
55150
55160
數學系館
Mathematics Dept.
3176
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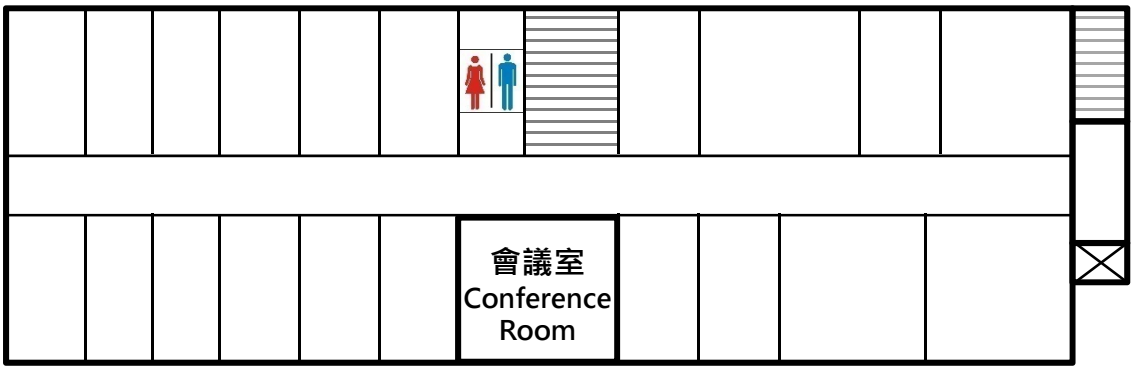
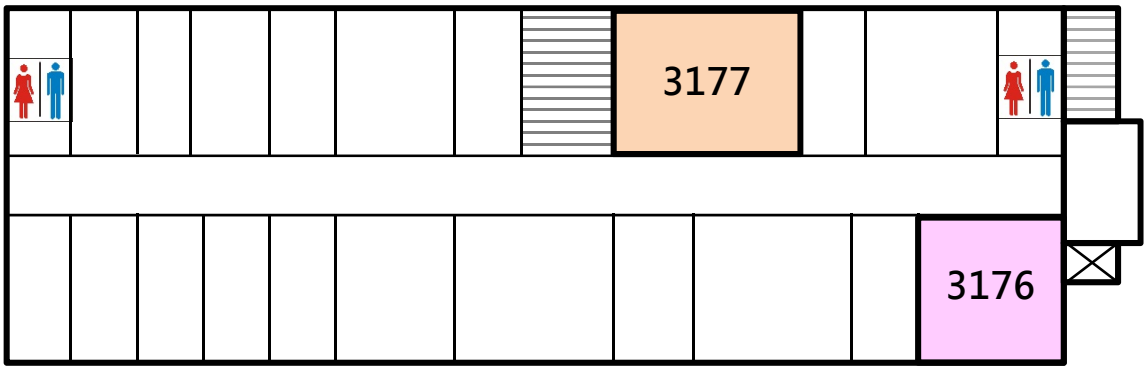
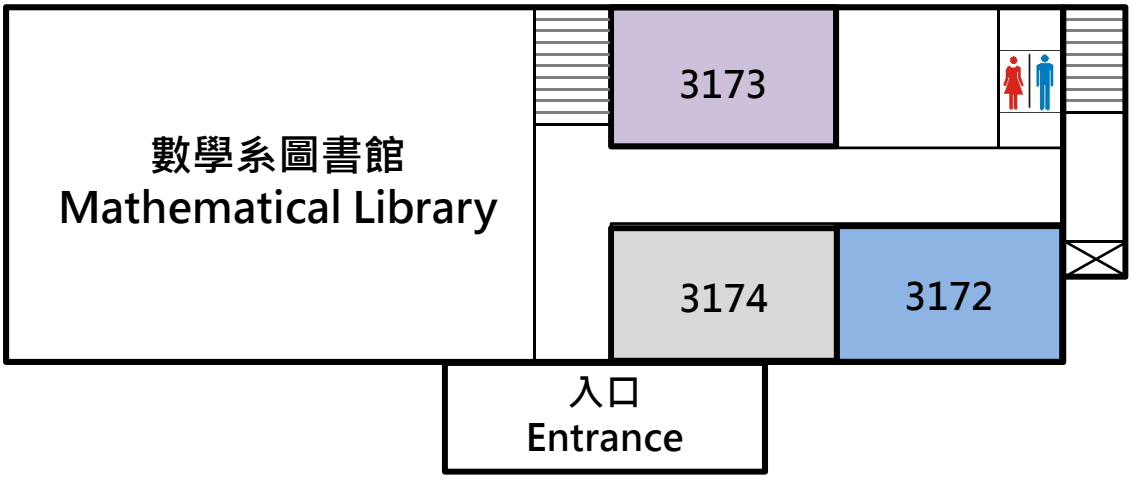
測量系館
Geomatics Dept.
1F
經緯廳
資訊大樓
Information Technology Bldg.
B1格致廳
小講堂
成功校區
Cheng Kung Campus



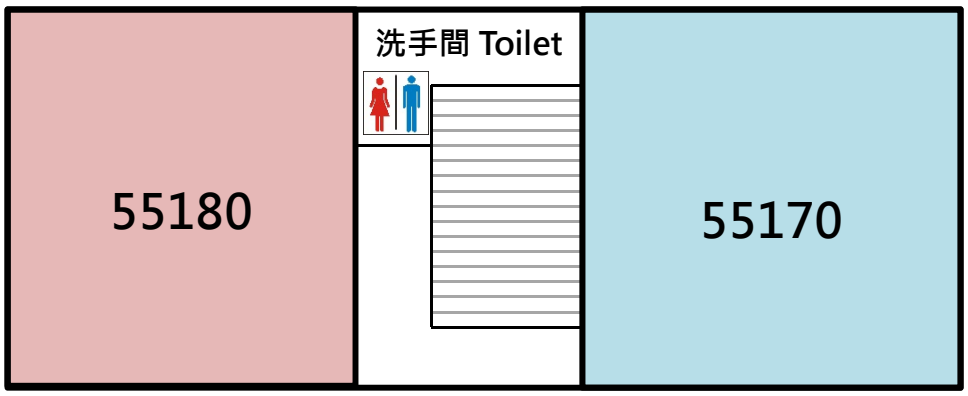
數學系館三樓平面圖　Department of Mathematics
3rd Floor Plan



數學系館二樓平面圖　Department of Mathematics
2nd Floor Plan

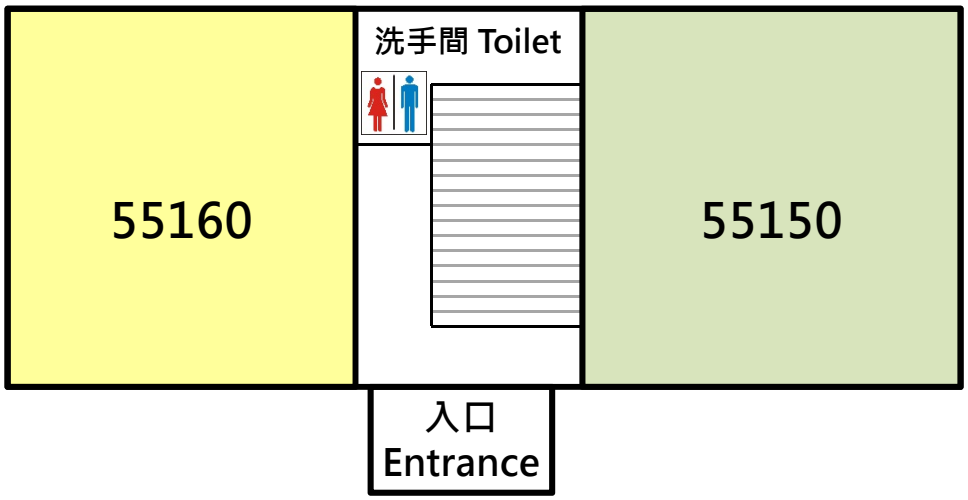


數學系館一樓平面圖　Department of Mathematics
1st Floor Plan



測量系教室二樓平面圖

Dept. Bldg. of Geomatics Dept.
2nd Floor Plan



測量系教室一樓平面圖

Dept. Bldg. of Geomatics Dept.
1st Floor Plan

2014 AMMS

The International Mathematical Meeting and the Annual Meeting of the Taiwanese Mathematical Society