

Workshop on Jordan structures in analysis and geometry

分析和幾何學中的約當結構研討會 2006

SECOND ANNOUNCEMENT

National Sun Yat-sen University

台灣·高雄·中山大學

Kaohsiung, Taiwan.

April 3-7, 2006

Organizing Committee

Cho-Ho Chu 朱礎豪, Liming Ge 葛力明,

Ngai-Ching Wong 黃毅青, Pei-Yuan Wu 吳培元, Jen-Chih Yao 姚任之.

Recent years have seen many important developments and applications of Jordan structures in geometry, analysis and operator algebras. The aim of the workshop is to bring together experts in relevant areas to exchange ideas and inform recent progress, with a view to stimulate new research as well as generating new directions and opportunities for young researchers including research students.

Speakers include (as of March 20, 2006):

L. J. Bunce (Reading), Jor-Ting Chan 陳作庭 (Hong Kong), Chang-Pao Chen 陳璋泡 (Taiwan), C-H. Chu (London), Hong-ke Du 杜鴻科 (China), C. M. Edwards (Oxford), Y. Friedman (Jerusalem), Hwa-Long Gau 高華隆 (Taiwan), T. Honda (Japan), R. V. Hugli (Ireland), R. Iordanescu (Bucharest), H. Ishi (Japan), J-S. Jeang 蔣志祥 (Taiwan), Guoxing Ji 吉國興 (China), Chunglan Jiang 蔣春瀾 (China), Chifune Kai (Japan), I. Kantor (Sweden), W. Kaup (Tübingen), Hang-Chin Lai 賴漢卿 (Taiwan), Ka-Sing Lau 劉家成 (Hong Kong), C. W. Leung 梁子威 (Hong Kong), Lai-Jiu Lin 林來居 (Taiwan), Ying-Hsiung Lin 林英雄 (Taiwan), M. Mackey (Dublin), M. Mathieu (Belfast), K. McCrimmon (Virginia), M. Neal (Denison), C. K. Ng 吳志強 (Nankai), T. Nomura (Kyushu), Chun-Gil Park 朴春吉 (Korea), A. M. Peralta (Granada), S-Y. Shaw 蕭勝彥 (Taiwan), L. Stacho (Szeged), Bit-Shun Tam 譚必信 (Taiwan), H. Upmeyer (Marburg), W. Werner (Münster), P-Y. Wu 吳培元 (Taiwan), B. Zalar (Maribor).

Venue: Applied Math. Dept., National Sun Yat-sen University, Kaohsiung, for April 3-6.

NCTS/South Office, National Cheng Kung University, Tainan, for April 7.

Registration Fee: Free for students, NT\$600 for participants with NSC supports, and US\$100 for others.

Sponsors: Ministry of Education, NCTS, NSC, NCKU and NSYSU

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<http://www.math.nsysu.edu.tw/~wong/wjs2006>

Workshop on Jordan Structures in Analysis and Geometry

分析和幾何學中的約當結構研討會 2006

	Monday April 3	Tuesday April 4	Wednesday April 5	Thursday April 6	Friday April 7 (Tainan)	
9:00-9:50 am	Wu	Upmeier	A one day trip to Kenting National Park	McCrimmon	Iordanescu Jiang	
10:00-10:50	Kaup	Kaup		Kantor	Werner Du	
		Tea/coffee/snacks			Tea/coffee/snacks	
11:10-12:00	Upmeier	Lau		Nomura	Peralta Ji	
12:10-12:40	Stacho	Kusuda		Mathieu	Mackey	
		Lunch			Lunch	
2:00-2:50 pm	Edwards	Neal		Bunce		A half day tour to look around the historical city Tainan
3:00-3:30	Honda	Tam, BT Lai, HC Lin, LJ		Jeang, JS Shaw, SY		
		Tea/coffee/snacks			Tea/coffee/snacks	
3:50-4:20	Zalar	Hugli Ng Lin, YH		Ishi	Chan, JT	
4:30-5:00	Chen, CP Gau, HL	Leung Park		Kai		
5:10-6:00	Friedman	Chu*(ends at 5:50)		Concert		
5:50		Photo				
6:30		Banquet				

1. Registration takes place during 8:10-8:40, at NSYSU, Monday, April 3.
2. Opening is at 8:45-9:00, Monday, April 3. Closing is at 12:40-12:50, Friday, April 7.
3. Programs on Monday, Tuesday and Thursday are held at NSYSU, Kaohsiung; but program on Friday at NCKU, Tainan.

WORKSHOP ON JORDAN STRUCTURES
IN ANALYSIS AND GEOMETRY 2006

NATIONAL SUN YAT-SEN UNIVERSITY
KAOHSIUNG, TAIWAN, R. O. C.
APRIL 3–7, 2006.

March 24, 2006

Monday, April 3, 2006
College of Science Building, NSYSU, Kaohsiung

08:10 – 08:40 Registration

Lecture Hall 2001 (Chair: JC Yao)

08:10 – 08:40 Registration

08:45 – 9:00 Opening

Wei-Hsien Wang 王維賢 副校長 (Vice President, National Sun Yat-sen University)

09:00 – 9:50 Pei-Yuan Wu 吳培元 (National Chiao Tung University, Taiwan)

Numerical ranges of matrices and operators. (page 20)

10:00 – 10:50 Wilhelm Kaup (University of Tuebingen, Germany)

Jordan algebras, holomorphy and CR-geometry, I. (page 13)

TEA/COFFEE/SNACKS

Lecture Hall 2001 (Chair: CH Chu)

11:10 – 12:00 Harald Upmeyer (University of Marburg, Germany)

Jordan Algebras, Harmonic Analysis and Quantization Theory. (page 18)

12:10 – 12:40 Laszlo L. Stacho (SZTE Bolyai Institute, Hungary)

Continuous Reinhardt domains. (page 18)

Lunch

Lecture Hall 2001 (Chair: W Kaup)

14:00 – 14:50 C. Martin Edwards (The Queen's College, Oxford, UK)

The inner ideal structure of JBW^ -triples.* (page 9)

Parallel Session I, Lecture Hall 2001 (Chair: R Iordanescu)

15:00 – 15:30 Tatsuhiro Honda (Hiroshima Institute of Technology, Japan)
Starlike and convex mappings on a complex Banach space. (page 10)

TEA/COFFEE/SNACKS

15:50 – 16:20 Borut Zalar (University of Maribor, Slovenia)
Algebraic Jordan-von Neumann theorem and its connection with some Jordan type mappings. (page 20)

16:30 – 17:00 Chang-Pao Chen 陳璋泡 (National Tsing Hua University, Taiwan)
Lower bounds of copson type for hausdorff matrices. (page 7)

Parallel Session II, Lecture Hall 3001 (Chair: M Mathieu)

15:00 – 15:30 Bit-Shun Tam 譚必信 (Tamkang University, Taiwan)
The Omega Limit Set Associated with a Cone-Preserving Linear Map. (page 18)

TEA/COFFEE/SNACKS

15:50 – 16:20 Remo V. Hugli (University College Dublin, Ireland)
Algebraic properties of normal contractive projections on JBW^ -triples.* (page 10)

16:30 – 17:00 Hwa-Long Gau 高華隆 (National Central University, Taiwan)
 C^ -Isomorphisms, Jordan Isomorphisms and Numerical Range Preserving Maps.*
(page 9)

Lecture Hall 2001 (Chair: W Kaup)

17:10 – 18:00 Yaakov Friedman (Jerusalem College of Technology, Israel)
Bounded symmetric domains as a model for physics. (page 9)

Tuesday, April 4, 2006

College of Science Building, NSYSU, Kaohsiung

Lecture Hall 2001 (Chair: K McCrimmon)

09:00 – 9:50 Harald Upmeyer (University of Marburg, Germany)
Homogeneous Vector Bundles on Jordan Algebras and Multiplier Representations. (page 19)

10:00 – 10:50 Wilhelm Kaup (University of Tuebingen, Germany)
Jordan algebras, holomorphy and CR-geometry, II. (page 13)

TEA/COFFEE/SNACKS

Lecture Hall 2001 (Chair: PY Wu)

11:10 – 12:00 Ka-Sing Lau 劉家成 (The Chinese University of Hong Kong)
Cauchy transform of fractal sets. (page 14)

12:10 – 12:40 Masaharu Kusuda (Kansai University, Japan)
Crossed products of Hilbert C^ -modules by coactions and duality theorems.* (page 13)

Lunch

Lecture Hall 2001 (Chair: H Upmeyer)

14:00 – 14:50 Matthew P. Neal (Denison University, USA)
Jordan and Ternary structures in Operator Space Theory. (page 16)

Parallel Session I, Lecture Hall 2001 (Chair: KS Lau)

15:00 – 15:30 Hang-Chin Lai 賴漢卿 (Chung Yuan Christian University, Taiwan)
Complex Fractional Programming and the Charnes-Cooper Transformation. (page 13)

TEA/COFFEE/SNACKS

15:50 – 16:20 Chi-Keung Ng 吳志強 (Nankai University, China)
Geometric unitaries of unital JB -algebras. (page 16)

16:30 – 17:00 Chi-Wai Leung 梁子威 (The Chinese University of Hong Kong)
Fourier analysis on domains in compact groups. (page 14)

Parallel Session II, Lecture Hall 3001 (Chair: SY Shaw)

15:00 – 15:30 Lai-Jiu Lin 林來居 (National Changhua University of Education, Taiwan)
Systems of Variational Inclusion with applications to Ekeland's Variational Principle, Equilibrium Problems, Fixed Point Theorems and Optimization Problems. (page 14)

TEA/COFFEE/SNACKS

15:50 – 16:20 Ying-Hsiung Lin 林英雄 (National Changhua University of Education, Taiwan)
Any P -complemented block basis of a symmetric basis for a real Banach space can be extended to an unconditional basis of the whole space. (page 15)

16:30 – 17:00 Chun-Gil Park 朴春吉 (Chungnam National University, Korea)
Homomorphisms between JC^ -Algebras.* (page 17)

Lecture Hall 2001 (Chair: H Upmeyer)

17:10 – 17:50 Cho-Ho Chu 朱礎豪 (University of London, UK)
Jordan structures in C^ -algebras.* (page 8)

17:50 – 18:10 Group Photo in front of the Sun Yat-sen Hall

18:30 Banquet

Wednesday, April 5, 2006
A one day trip to Kenting National Park

Thursday, April 6, 2006
College of Science Building, NSYSU, Kaohsiung

International Conference Hall (Chair: M Edwards)

09:00 – 9:50 Kevin M. McCrimmon (University of Virginia, USA)
A Survey of J-Operators in Jordan Theory. (page 16)

10:00 – 10:50 Issai Kantor (Lunds University, Sweden)
On generalized representations of Jordan algebras. (page 12)

TEA/COFFEE/SNACKS

11:10 – 12:00 Takaaki Nomura (Kyushu University, Japan)
Cayley transforms of a homogeneous Siegel domain. (page 16)

12:10 – 12:40 Martin Mathieu (Queen's University Belfast, UK)
When are two C^ -algebras Jordan isomorphic?* (page 15)

Lunch

International Conference Hall (Chair: M Edwards)

14:00 – 14:50 Leslie J. Bunce (University Of Reading, UK)
Dunford-Pettis properties in JB^ -triples and Hilbert space surjections.* (page 7)

Parallel Session I, Room 4009-1 (Chair: T Nomura)

15:00 – 15:30 Jyh-Shyang Jeang 蔣志祥 (Military Academy, Taiwan)
Disjointness preserving shifts on $C_0(X)$. (page 11)

TEA/COFFEE/SNACKS

15:50 – 16:20 Hideyuki Ishi (Yokohama City University, Japan)
T-algebras and Jordan algebras. (page 11)

16:30 – 17:00 Chifune Kai (Kyoto University, Japan)
A characterization of symmetric Siegel domains by convexity of Cayley transform images. (page 12)

Parallel Session II, Room 4011 (Chair: W Werner)

15:00 – 15:30 Sen-Yen Shaw 蕭勝彥 (Lunghwa University of Science and Technology, Taiwan)

The Daugavet Equation and Numerical Ranges of Operators. (page 17)

TEA/COFFEE/SNACKS

15:50 – 16:20 Jor-Ting Chan 陳作庭 (The University of Hong Kong)

Mappings preserving spectra of products of matrices. (page 7)

Drama Hall

17:10 – 18:00 Concert, performed by the faculty and students of Music Department, NSYSU.

Friday, April 7, 2006

National Center for Theoretical Sciences, South Office, NCKU, Tainan

Parallel Session I (Chair: I Kantor)

09:00 – 9:50 Radu Iordanescu (Romanian Academy, Romania)

Some differential geometrical applications of Jordan algebras. (page 10)

10:00 – 10:50 Wend Werner (Westfälische Wilhelms-Universität, Germany)

Ternary rings of operators, affine manifolds and causal structure. (page 20)

TEA/COFFEE/SNACKS

11:10 – 12:00 Antonio M. Peralta (Universidad de Granada, Spain)

A substitute for topology in JB^ -triples.* (page 17)

Parallel Session II (Chair: NC Wong)

09:00 – 9:50 Jiang Chun Lan 蔣春瀾 (Hebei Normal University, China)

Structure of Operators on Hilbert Spaces. (page 12)

10:00 – 10:50 Hong-Ke Du 杜鴻科 (Shaanxi Normal University, China)

Two Subspaces of a Hilbert Space. (page 8)

TEA/COFFEE/SNACKS

11:10 – 12:00 Guoxing Ji 吉國興 (Shaanxi Normal University, China)

Analyticity of certain operator algebras. (page 11)

12:10 – 12:40 Michael Mackey (University College Dublin, Ireland)

Confined Banach Spaces. (page 15)

12:40 – 12:50 Closing

Soon-Yi Wu 吳順益主任 (Chairman, South Office of National Center for Theoretical Sciences)

Lunch

A half day tour to look around the historical city Tainan

Abstract List

Dunford-Pettis properties in JB^* -triples and Hilbert space surjections

Leslie John Bunce

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Abstract

We discuss recent joint work with Antonio Peralta (Granada) proving that a JB^* -triple, E , possesses the Alternative Dunford-Pettis property of Freedman if and only if E possesses the usual Dunford-Pettis property or is a Hilbert space or is a spin factor. Moreover, the possession of the Dunford-Pettis property by E or E^* is equivalent to every surjective operator from E or E^* to Hilbert space being a Dunford-Pettis operator, and thus equivalent to the possession, by E or E^* , of the Surjective Dunford-Pettis property of Leung. Via essential earlier work of Becerra and Peratita, and of Peralta and Villanueva, one consequence is a characterisation of pairs of JB^* -triple whose projective tensor product possesses the Alternative Dunford-Pettis property.

Mappings preserving spectra of products of matrices

Jor-Ting Chan 陳作庭

The University of Hong Kong

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Abstract

In this talk, we shall discuss mappings on matrix spaces that preserve the spectra of various products of matrices.

Lower bounds of copson type for hausdorff matrices

Chang-Pao Chen 陳璋泡

National Tsing Hua University, Taiwan

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Abstract

Let $1 \leq p \leq \infty$, $0 < q \leq p$, and $A = (a_{n,k})_{n,k \geq 0} \geq 0$. Denote by $L_{p,q}(A)$ the supremum of those L satisfying the following inequality:

$$\left(\sum_{n=0}^{\infty} \left(\sum_{k=0}^{\infty} a_{n,k} x_k \right)^q \right)^{1/q} \geq L \left(\sum_{k=0}^{\infty} x_k^p \right)^{1/p},$$

whenever $X = \{x_n\}_{n=0}^\infty \in \ell_p$ and $X \geq 0$. The purpose of this paper is to find the exact value of $L_{p,q}(A)$ for A to be a Hausdorff matrix or its transpose. In particular, we apply it to Cesàro matrices, Hölder matrices, Gamma matrices, and generalized Euler matrices. Our results generalize the work of Bennett.

Jordan structures in C^* -algebras

Cho-Ho Chu

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Abstract

In the study of C^* -algebras, it is often useful to make use of their Jordan structures. We illustrate this viewpoint by some examples.

Two Subspaces of a Hilbert Space

Hong-Ke Du 杜鴻科

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Abstract

Let \mathcal{H} be a separable, infinite dimensional, complex Hilbert space and \mathcal{M} and \mathcal{N} two closed subspaces of \mathcal{H} . Denote $\mathcal{H}_1 = \mathcal{M} \cap \mathcal{N}$, $\mathcal{H}_2 = \mathcal{M} \cap \mathcal{N}^\perp$, $\mathcal{H}_3 = \mathcal{M}^\perp \cap \mathcal{N}$, $\mathcal{H}_4 = \mathcal{M}^\perp \cap \mathcal{N}^\perp$. Let $\mathcal{H}_5 = \mathcal{M} \cap (\mathcal{H} \ominus (\oplus_{i=1}^4 \mathcal{H}_i))$ and $\mathcal{H}_6 = (\mathcal{H} \ominus (\oplus_{i=1}^4 \mathcal{H}_i)) \ominus \mathcal{H}_5$. If $P_{\mathcal{M}}$ and $P_{\mathcal{N}}$ denote the orthogonal projections on \mathcal{M} and \mathcal{N} , respectively. It is clear that $\mathcal{H}_i \perp \mathcal{H}_j$, $j \neq i$ and $1 \leq i, j \leq 6$, $P_{\mathcal{M}}\mathcal{H}_i \subseteq \mathcal{H}_i$ and $P_{\mathcal{N}}\mathcal{H}_i \subseteq \mathcal{H}_i$, $1 \leq i \leq 4$, thus $P_{\mathcal{M}}$ and $P_{\mathcal{N}}$ have the following operator matrices

$$P_{\mathcal{M}} = \begin{pmatrix} I & & & & & \\ & I & & & & \\ & & 0 & & & \\ & & & 0 & & \\ & & & & I & \\ & & & & & 0 \end{pmatrix}, P_{\mathcal{N}} = \begin{pmatrix} I & & & & & \\ & 0 & & & & \\ & & I & & & \\ & & & 0 & & \\ & & & & Q & Q^{\frac{1}{2}}(I-Q)^{\frac{1}{2}}D \\ & & & & D^*Q^{\frac{1}{2}}(I-Q)^{\frac{1}{2}} & D^*(I-Q)D \end{pmatrix}$$

according to the space decomposition $\mathcal{H} = \oplus_{i=1}^6 \mathcal{H}_i$, respectively.

In this taking, base on the formula above we shall discuss the following subjects .

1. The *Friedrichs angle* and *Dixmier angle* between two subspaces \mathcal{M} and \mathcal{N} .
2. A new characterization of gaps between two subspaces.
3. Linear combinations of two idempotents.
4. Path connectivity of idempotents and generalized projections.
5. Common complements of two subspaces.

The inner ideal structure of JBW^* -triples

C. Martin Edwards

The Queen's College, Oxford, UK

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Abstract

The geometric structure of the predual A_* of a JBW^* -triple A is closely related to the algebraic structure of A . In this talk, this relationship will be described and some recent results will be presented.

Bounded symmetric domains as a model for physics

Yaakov Friedman

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Abstract

The Principles of Special and General relativity lead to symmetry on the relativistic state space. This symmetry implies that the domains of relativistically admissible velocities and accelerations are bounded symmetric domains. The Lie algebra of these domains defines the possible relativistic evolutions. Replacing the group of projective maps with the group of conformal one allows obtaining explicit solutions of relativistic dynamics. For the General relativity model we need to generalize the bounded symmetric domains to Bisymmetric spaces, introduced by I. Kantor, and to develop this mathematical model.

The spin domain may serve as a state space for both spin 1 and spin 1/2 particles. The connection of the JB^* -triple product if this domain with Clifford algebras and Pseudo-Complex Modules may help to import the techniques and application to different areas of physics developed in these areas to JB^* -triples.

C^* -Isomorphisms, Jordan Isomorphisms and Numerical Range Preserving Maps

Hwa-Long Gau 高華隆

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Abstract

Let $V = B(H)$ or $S(H)$, where $B(H)$ is the algebra of bounded linear operators acting on the Hilbert space H , and $S(H)$ is the set of self-adjoint operators in $B(H)$. Denote the numerical range of A in $B(H)$ by $W(A) = \{(Ax, x) : x \text{ in } H, (x, x) = 1\}$. It is shown that a surjective map

$f : V \rightarrow V$ satisfies $W(AB + BA) = W(f(A)f(B) + f(B)f(A))$ for all A, B in V if and only if there is a unitary operator U in $B(H)$ such that f has the form

$$X \mapsto \pm U^* X U \text{ or } \pm U^* X^t U$$

where X^t is the transpose of X with respect to a fixed orthonormal basis. In other words, the map f or $-f$ is a C^* -isomorphism on $B(H)$ and a Jordan isomorphism on $S(H)$. Moreover, if H has finite dimension, then the surjective assumption on f can be removed.

Starlike and convex mappings on a complex Banach space

Tatsuhiro Honda

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Abstract

We give starlike criteria for a class of rational mappings on the unit ball in a complex Banach space. We also give a sufficient condition for these functions to be convex when they are defined in complex Hilbert spaces. These criteria facilitate the construction of concrete examples of starlike and convex mappings on some domain in a complex Banach space.

Algebraic properties of normal contractive projections on JBW^* -triples

Remo Viktor Hugli

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Abstract

It is well known that contractive projections are in close connection with the triple structure of a JB^* -triple or JBW^* -triple A . Detailed studies of these relations provide explicit algebraic conditions which are necessary and sufficient for the existence of contractive projections onto certain subspaces of A or its predual A_* . The conditions involve commutation of the projections with the operators $D(a, a)$ and $Q(a)$, as well as transitivity properties of certain triple automorphisms.

Some differential geometrical applications of Jordan algebras

Radu Iordanescu

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Abstract

I intend to present in my lecture some Romanian contributions concerning the applications of Jordan algebras to differential geometry. On that occasion, I shall point out some open problems.

T -algebras and Jordan algebras

Hideyuki Ishi

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Abstract

In 1963, Vinberg introduced a formal matrix algebra called T -algebra, and showed that every homogeneous cone is constructed from a T -algebra. Moreover, an Euclidean Jordan algebra corresponding to a symmetric cone is obtained from the T -algebra corresponding to the same symmetric cone via the Jordan product. In this talk, we realize T -algebras as vector subspaces of the algebra of real matrices, where the product is defined by the composition of projection with matrix multiplication.

Disjointness preserving shifts on $C_0(X)$

Jyh-Shyang Jeang 蔣志祥

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Abstract

In this talk, we shall talk about disjointness preserving (quasi-) n -shift operators on $C_0(X)$, where X is locally compact and Hausdorff. When $C_0(X)$ admits a quasi- n -shift T , there is a countable subset of $X_\infty = X \cup \{\infty\}$ equipped with a tree-like structure, called φ -tree, with exactly n joints such that the action of T on $C_0(X)$ can be implemented as a shift on the φ -tree. If T is an n -shift, then the φ -tree is dense in X and thus X is separable. By analyzing the structure of the φ -tree, we show that every (quasi-) n -shift on c_0 can always be written as a product of n (quasi-)1-shifts. Although it is not the case for general $C_0(X)$ as shown by our counter examples, we can do so after dilation.

Analyticity of certain operator algebras

Guoxing Ji

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Abstract

Let \mathcal{M} be a σ -finite von Neumann algebra on a complex Hilbert space \mathcal{H} . We consider some analytic properties of operator subalgebras of \mathcal{M} , maximal subdiagonal algebras and analytic operator algebra determined by a flow on \mathcal{M} by use of Tomita-Takesaki theory in operator algebras. We will concern on the invariance under modular automorphism groups for subdiagonal algebras, non-commutative H^p spaces, operator factorization, relative invariant subspace lattices and algebraic commutants of analytic operator algebras.

Structure of Operators on Hilbert Spaces

Jiang Chun Lan 蔣春瀾
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Abstract

In the talk, we discuss similarity classification problem of Cowen-Douglas operator by using strongly irreducible operator theory, complex geometry, and K -theory.

A characterization of symmetric Siegel domains by convexity of Cayley transform images

Chifune Kai
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Abstract

A homogeneous Siegel domain is a canonical unbounded realization of a homogeneous bounded domain. For a symmetric Siegel domain, which is a Hermitian symmetric space of the non-compact type, Korányi and Wolf defined (the inverse of) a Cayley transform which maps the domain to its Harish-Chandra realization which is bounded and convex. In this talk we deal with the parametrized family of Cayley transforms for a homogeneous Siegel domain defined by Nomura. For a symmetric Siegel domain, this family includes the Cayley transform defined by Korányi and Wolf. We show that the Cayley transform image of a homogeneous Siegel domain is convex if and only if the domain is symmetric. Moreover this convexity restricts the parameter of the Cayley transform to specific ones, so that the Cayley transform coincides with the one defined by Korányi and Wolf.

On generalized representations of Jordan algebras

Issai Kantor
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Abstract

Let V be a linear space. For $a \in \text{End}(V)$ we denote by $*_a$ a multiplication in $\text{End}(V)$, given by the formula: $x *_a y = [[a, x], y] = xay + yax - axy - yxa$. Let π be a linear map of a Jordan algebra A in $\text{End}(V)$. The element $a \in \text{End}(V)$ is called *consistent* with π , if 1) $\pi(x) *_a \pi(y) = \pi(A(x, y)) \forall x, y \in A$, 2) if $b \in [a, [a, \pi(A)]]$ satisfies the condition 1), then $b = a$. The map $\pi : A \rightarrow \text{End}(V)$ is called a *generalized representation* of the algebra A in a linear space V if there is $a \in \text{End}(V)$, which consistent with π . We will say that π has an *order* l , if $(\pi(A))^{l+1} = 0$ and l is minimal with this property. It can be shown, that a generalized representation is a specialization iff it has the order 2, and it is an ordinary representation (Jacobson representation) iff it has the order 3. It

will be shown that the finite-dimensional generalized representations of finite order of a Jordan algebra A are in one-to-one correspondence with finite-dimensional representations of the 3 graded Lie algebra $L(A)$, corresponding to A . Moreover, it will be given a classification of irreducible generalized representations of finite order of semisimple Jordan algebras.

Jordan algebras, holomorphy and CR-geometry

Wilhelm Kaup

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Abstract

In the first part we give a survey on the interplay between Jordan theory (algebras and triple systems) and symmetric Banach manifolds (bounded symmetric domains), their biholomorphic automorphism groups, the biholomorphic equivalence problem.

In the second part we give an introduction to CR-geometry (CR = Cauchy-Riemann) and show how by Jordan methods interesting classes of homogeneous CR-manifolds can be obtained.

Crossed products of Hilbert C^* -modules by coactions and duality theorems

Masaharu Kusuda

Kansai University, Japan

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Abstract

In the researches of C^* -crossed products, duality for C^* -crossed products is a basic tool, which is called Takai's duality, Imai-Takai's duality, Katayama's duality, according to C^* -crossed products by actions or by coactions of locally compact groups on a C^* -algebra. In the study of Morita equivalence of C^* -crossed products, crossed products of Hilbert C^* -modules first appeared. More generally, when a locally compact group acts on a Hilbert C^* -module, crossed products of Hilbert C^* -modules are constructed. Then duality for them would play a basic role.

The aim of this talk is to present three kinds of duality theorems for crossed products of Hilbert C^* -modules, and I will focus my talk to how three kinds of duality theorems are formulated.

Complex Fractional Programming and the Charnes-Cooper Transformation

Hang-Chin Lai 賴漢卿

Chung Yuan Christian University, Taiwan

Email: hclai@cycu.edu.tw

Abstract

We extend the Charnes-Cooper transformation to complex fractional programs involving continuous complex functions and analytic functions. Such programs are shown to be equivalent to nonfractional complex programming problems. This technique is employed also to reduce complex linear fractional programs to complex linear programs. More generally, it can be shown that complex convex concave fractional programming problems are equivalent to complex convex nonfractional programs using the generalized Charnes-Cooper transformation.

Cauchy transform of fractal sets

Ka-Sing Lau 劉家成

The Chinese University of Hong Kong

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Abstract

In complex analysis the Cauchy Integral is defined on a piecewise smooth closed curve. In this talk we consider the Cauchy integral for certain measure on a fractal set, we call this the Cauchy transform of the measure. We present some analytic and geometric properties of this transform, in particular, for the Cauchy transform of the Hausdorff measure on the Sierpinski gasket.

Fourier analysis on domains in compact groups

Chi-Wai Leung 梁子威

The Chinese University of Hong Kong

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Abstract

Let Ω be a measurable subset of a compact group G of positive Haar measure. Let $\mu : \pi \mapsto \mu_\pi$ be a non-negative function defined on the dual space \widehat{G} and let $L^2(\mu)$ be the corresponding Hilbert space which consists of elements $(\xi_\pi)_{\pi \in \text{supp } \mu}$ satisfying $\sum \mu_\pi \text{Tr}(\xi_\pi \xi_\pi^*) < \infty$, where ξ_π is a linear operator on the representation space of π , and is equipped with the inner product $((\xi_\pi), (\eta_\pi)) = \sum \mu_\pi \text{Tr}(\xi_\pi \eta_\pi^*)$. We show that the Fourier transform gives an isometric isomorphism from $L^2(\Omega)$ onto $L^2(\mu)$ if and only if the restrictions to Ω of all matrix coordinate functions $\sqrt{\mu_\pi} \pi_{ij}$, $\pi \in \text{supp } \mu$, constitute an orthonormal basis for $L^2(\Omega)$. Finally compact connected Lie groups case is studied.

Systems of Variational Inclusion with Applications to Ekeland's Variational Principle, Equilibrium Problems, Fixed Point Theorems and Optimization Problems

Lai-Jiu Lin 林來居

National Changhua University of Education, Taiwan

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Abstract

In this paper, we study the existence theorems of systems of variational inclusions problems. From these results, we study Ekeland variational principle in topological vector space, common fixed point for two family of multivalued maps, existence theorems of systems of equilibrium problems, mathematical program with equilibrium constraints, bilevel problems and semi-infinite problems.

Any P -complemented block basis of a symmetric basis for a real Banach space can be extended to an unconditional basis of the whole space

Ying-Hsiung Lin 林英雄

National Changhua University of Education, Taiwan

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Abstract

Let $y_n = \sum_{i \in A_n} a_i x_i$, $n \in \mathbb{N}$, be a P -complemented block basis of an unconditional basis $\{x_n\}$ of a real Banach space X . Then there exists a projection Q from X onto $[y_n]$ such that $Q(x_i) = a_{in} y_n$ for $i \in A_n$, $n \in \mathbb{N}$, where $\{a_{in}\}$ are some suitable scalars. Furthermore, the result announced in this title is proved. This gives an affirmative answer to some open problem raised by P . Casazza in the symmetric basis case.

Confined Banach Spaces

Michael Mackey

University College Dublin, Ireland

Email: Michael.Mackey@ucd.ie

Abstract

We discuss smoothness of the Weyl functional calculus and use it to prove that every C^* -algebra is a confined Banach space.

When are two C^* -algebras Jordan isomorphic?

Martin Mathieu

Queen's University Belfast, UK

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Abstract

We shall discuss the question whether the ‘spectral data’ of a C^* -algebra are a complete Jordan isomorphism invariant.

A Survey of J -Operators in Jordan Theory

Kevin M. McCrimmon
University of Virginia, USA
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Abstract

I will give a historical discussion of the origins of Jordan systems and their axioms, then argue for the primacy of the quadratic Jordan J -operator (known variously as U , P , or Q) in the study of Jordan systems.

Jordan and Ternary structures in Operator Space Theory

Matthe Paul Neal
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Abstract

Many Jordan and ternary structures appear naturally in operator space theory. Most of the universal objects (injective envelopes, Silov boundaries etc...) in the category are ternary algebras in the sense of Harris. In addition, one can study contractive projections and Jordan triple systems “out of category” and investigate their operator space structure. In this talk I will discuss my recent results with Bernard Russo and David Blecher on contractively complemented Hilbert spaces, order structure in operator space theory, ideals and faces in operator algebras, quantized holomorphy, and other research questions in the area. I will also communicate important unsolved problems that may require the attention of Jordan algebraists.

Geometric unitaries of unital JB -algebras

Chi-Keung Ng 吳志強
Nankai University, China
Email: ckng@nankai.edu.cn

Abstract

A norm-one vector u of a real Banach space X is called a geometric unitaries if the set $\{f \in X^* : \|f\| = 1 = f(u)\}$ span X^* . We will give a totally algebraical characterization of the geometric unitaries of unital JB -algebras. In particular, we show that geometric unitaries of $\mathcal{L}(H)_{sa}$ are just 1 and -1.

Cayley transforms of a homogeneous Siegel domain

Takaaki Nomura
Kyushu University, Japan
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Abstract

I will present a family of Cayley transforms of a Siegel domain. The family contains previously known Cayley transforms. Examples and applications are presented.

Homomorphisms between JC^* -Algebras

Chun-Gil Park 朴春吉

Chungnam National University, Korea

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Abstract

It is shown that every almost linear mapping $h : \mathcal{A} \rightarrow \mathcal{B}$ of a JC^* -algebra \mathcal{A} into a JC^* -algebra \mathcal{B} is a homomorphism when $h(2^n u \circ y) = h(2^n u) \circ h(y)$ for all unitaries $u \in \mathcal{A}$, all $y \in \mathcal{A}$ and all nonnegative integers n , and that every almost linear continuous mapping $h : \mathcal{A} \rightarrow \mathcal{B}$ of a JC^* -algebra \mathcal{A} of real rank zero to a JC^* -algebra \mathcal{B} is a homomorphism when $h(2^n u \circ y) = h(2^n u) \circ h(y)$ for all $u \in \{v \in \mathcal{A} \mid v = v^*, \|v\| = 1, v \text{ is invertible}\}$, all $y \in \mathcal{A}$ and all nonnegative integers n . We moreover prove the Hyers–Ulam stability of homomorphisms in JC^* -algebras. This concept of stability of mappings was introduced for the first time by Th.M. Rassias in his paper [On the stability of the linear mapping in Banach spaces, Proc. Amer. Math. Soc. **72** (1978), 297–300].

A substitute for topology in JB^* -triples

Antonio M. Peralta

Universidad de Granada, Spain

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Abstract

We shall revise the concept of compact tripotent in the bidual space of a JB^* -triple. Looking for a substitute of the topology in the setting of JB^* -triples we introduce and develop “closed tripotents” in the bidual of a JB^* -triple. The concept of compact tripotent was introduced by Edwards and Rüttimann, generalizing the ideas developed by Akemann for compact projections in the bidual of a C^* -algebra. We also obtain some characterisations of weak compactness in the dual space of a JC^* -triple, showing that, a bounded subset in the dual space of a JC^* -triple is relatively weakly compact if and only if its restriction to any abelian maximal subtriple C is relatively weakly compact in the dual of C . This generalizes a very useful result by Pfitzner in the setting of C^* -algebras. Among the consequences we shall see how to obtain a Dieudonné’s Theorem for JC^* -triples, generalizing the ideas by Brooks, Saitô and Wright for C^* -algebras.

The Daugavet Equation and Numerical Ranges of Operators

Sen-Yen Shaw 蕭勝彥

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Abstract

A space X is said to have the Daugavet property if all rank-one operators on X satisfy the Daugavet equation $\|I + T\| = 1 + \|T\|$. We discuss characterizations of operators which satisfy the Daugavet equation and characterizations of spaces which possess the Daugavet property. One characterization of the Daugavet equation is that $\|T\|$ lies in the closure of the spatial numerical range of T . We also extend this result and the Abramovich-Aliprantis-Burkinshaw theorem about the Daugavet equation on a uniformly convex Banach space from a single operator to a family of operators.

Continuous Reinhardt domains

Laszlo Lajos Stacho

SZTE Bolyai Institute, Hungary

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Abstract

We extend the concept of Reinhardt domains to complex function spaces complex continuous functions. We establish a Sunada type theorem on their linear equivalence along with a parametric description of their infinitesimal automorphisms.

The Omega Limit Set Associated with a Cone-Preserving Linear Map

Bit-Shun Tam 譚必信

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Abstract

If D is a subset of a Banach space, $T : D \rightarrow D$ is a map and $x \in D$, then the omega limit set of x under T , denoted by $\omega(x; T)$, is defined to be the set of limits of convergent subsequences of the sequence $(T^k x)_{k \in \mathbb{N}}$. Recently, motivated by the classical Denjoy-Wolff theorem for fixed point free analytic maps of the open unit disk into itself, Lins and Nussbaum proved the following result: Let K be a closed, pointed, full convex cone in \mathbb{R}^n and let A be an $n \times n$ matrix that satisfies $A(\text{int } K) \subseteq \text{int } K$. Let $T : C_z \rightarrow C_z$ be the map defined by $Tx = Ax/(z^T x)$, where $z \in \text{int } K^*$, K^* being the dual cone of K , and $C_z = \{x \in K : z^T x = 1\}$. Suppose that T has no fixed point in the relative interior of C_z . Then for any x that belongs to the relative interior of C_z , $\text{conv}(\omega(x; T))$ is included in the relative boundary of C_z . If, in addition, K is polyhedral, then $\omega(x; T)$ is a finite set included in the relative interior of a nontrivial face of K , which is independent of the choice of x . In this talk, modifying an argument due to Birkhoff (that makes use of the Jordan canonical form of a matrix and the concept of annihilating polynomial) we supply an elementary proof for the above result. We also extend their result to a more general situation.

Jordan Algebras, Harmonic Analysis and Quantization Theory

Harald Upmeyer

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Abstract

Using the Jordan theoretic description of bounded hermitian symmetric domains of finite dimension, we introduce the weighted Bergman spaces of holomorphic functions whose reproducing kernel is given by the Jordan theoretic determinant. Viewing these Hilbert spaces as quantum mechanical state spaces, we study various operator calculi on the weighted Bergman spaces which are covariant with respect to the holomorphic automorphism group of the underlying domain. The primary examples are the well-known Berezin-Toeplitz calculus and the Weyl calculus. Our main results, obtained in collaboration with J. Arazy (Haifa) are

1. Unified construction of covariant calculi using the geodesic symmetries, incorporating as special cases the Toeplitz calculus, the Weyl calculus and in the limiting case also the rather mysterious Wick calculus (normal ordering).
2. Spectral resolution (computation of eigenvalues) for the Berezin transform in this setting, using multivariable special functions of hypergeometric type.
3. Generalization of these concepts to the real case, involving real symmetric domains and non-euclidean Jordan algebras and triples.

Homogeneous Vector Bundles on Jordan Algebras and Multiplier Representations

Harald Upmeier

University of Marburg, Germany

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Abstract

It is well known that the weighted Bergman spaces of holomorphic functions on finite-dimensional symmetric domains $D = G/K$ can be realized via holomorphic line bundles carrying a unitary representation of the holomorphic automorphism group G of the underlying domain D . This construction of the so-called scalar holomorphic discrete series can be generalized in two ways:

1. Homogeneous vector bundles induced from representations of the Jordan triple automorphism group K . This gives rise to vector valued Bergman spaces on which the group G acts irreducibly (vector valued holomorphic discrete series).
2. More challenging is the construction of reducible holomorphic vector bundles induced from a representation of the automorphism group U of the compact dual space (generalized Grassmann manifold). We find an explicit decomposition of these bundles into irreducible subspaces via intertwining operators closely related to the quasi-inverse operation, using invariant differential operators of higher order. This generalizes work by Koranyi and Misra for the unit disk.

Ternary rings of operators, affine manifolds and causal structure

Wend Werner

Westfälische Wilhelms-Universität, Germany

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Abstract

On the open unit ball D of a ternary ring of operators X we define an affine connection ∇ which for a number of reasons seems to be a ‘natural’ one. Its construction is based on a noncommutative hyperbolic structure

We furthermore consider the problem of finding those cones in the tangent space of D that come from embedding X into a space of bounded Hilbert space operators. We also discuss invariance under parallel transport on (D, ∇) .

Numerical ranges of matrices and operators

Pei Yuan Wu 吳培元

National Chiao Tung University, Taiwan

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Abstract

In this talk, we review some of the results we obtained in the past few years with Hwa-Long Gau on the numerical ranges of finite matrices and bounded linear operators on a Hilbert space. We will mainly discuss properties of the numerical ranges of two classes of matrices: the companion matrices and S_n -matrices. They are both the building blocks in different canonical forms for matrices under similarity. The interplay between the structure of such matrices and the geometry of their numerical ranges will be highlighted.

Algebraic Jordan - von Neumann theorem and its connection with some Jordan type mappings

Borut Zalar

University of Maribor, Slovenia

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Abstract

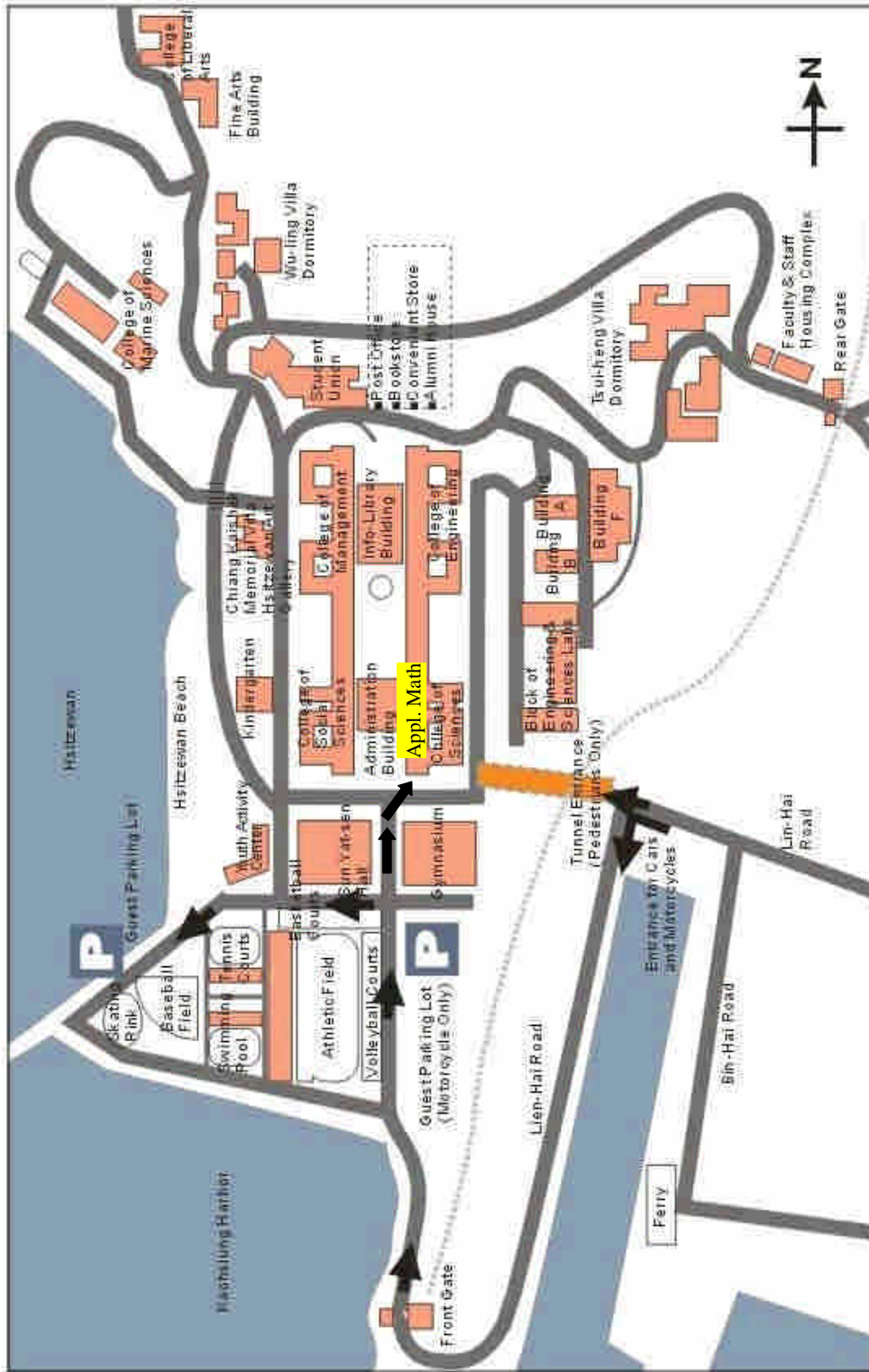
Classical Jordan-von Neumann theorem characterizes Hilbert spaces among Banach spaces via the parallelogram equality. If we view the square of the norm as the main ingredient of this equality, we may transform the above problem into rather wide algebraic setting of modules over $*$ -rings and algebras and consider possible generalizations. It turns out that algebraic version of Jordan-von Neumann theorem exists and in its proof type of mappings naturally arises, which have similar properties to Jordan derivations. It turns out that Jordan-von Neumann type of theorem is true for all modules over such $*$ -ring in which all such mappings have a special algebraic form.

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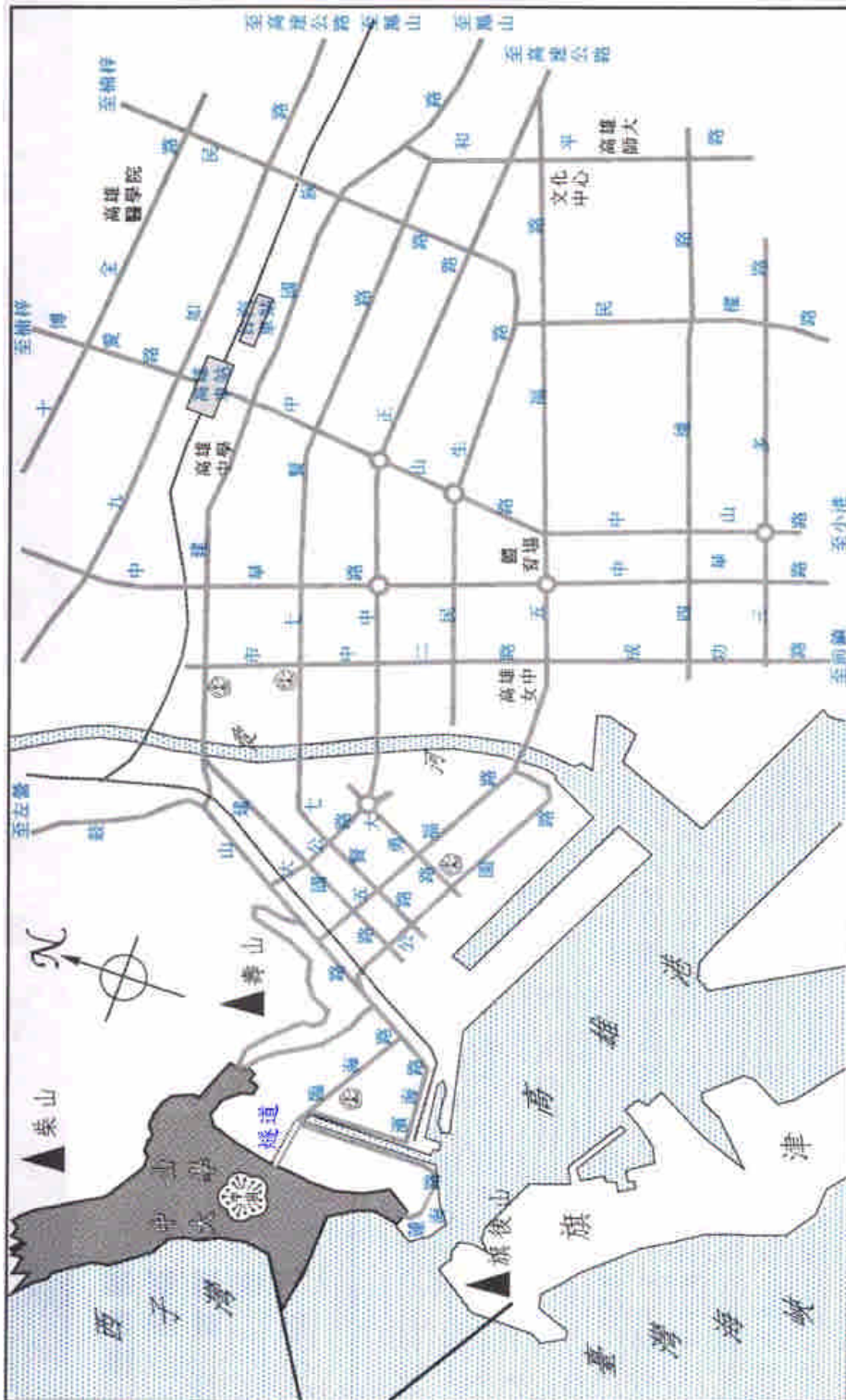
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National Sun Yat-sen University Campus Locations

National Sun Yat-sen University Campus Locations



國立中山大學高雄市位置圖

Concert

Workshop on Jordan structures in analysis and geometry
分析和幾何學中的約當結構研討會 2006

Drama Hall, Science College Building
National Sun Yat-sen University, Kaohsiung, Taiwan.

April 6, 2006, 17:10-18:10pm



時間：2006年4月6日，17:10~18:10pm

地點：中山大學理學院小劇場

演出者：許滌芳、林昌龍、江采諭

許宜庭、林亭君、孫慎穗

蔡婉瑜、施虹名

Everyone is invited!

⊕ 活動名稱：

分析和幾何學中的約當結構研討會

⊕ 活動時間：

2006年4月6日 pm 17:10~18:10

⊕ 活動地點：

中山大學理學院小劇場

⊕ 演出人員：

- ◆ 鋼琴三重奏：許滌芳、林昌龍、江采諭
- ◆ 弦樂四重奏：許宜庭、林亭君、孫慎穗、蔡婉瑜
- ◆ 聲樂獨唱：施虹名、許滌芳

⊕ 演出曲目：

- 鋼琴三重奏
 1. Brahms: Hungarian Dance
 2. Raff: Cavatina
 3. Arnold: Heart Throbs
 4. Mendelssohn: Piano Trio in D Minor, Op.49, mov. 1
- 弦樂四重奏
- 聲樂獨唱

⊕ 演出者簡介：

➤ 許滙芳

高雄市人，五歲開始習琴，曾師事洪肅容老師、陳藝苑老師、許明馨老師、李美文老師。畢業於國立中山大學音樂系、國立中山大學音樂研究所。

在校期間，術科方面表現優異，於比賽中皆獲不錯的成績，也多次於音樂會中擔任鋼琴獨奏，如 2000 年與中山大學音樂系管弦樂團演出蕭邦第一號鋼琴協奏曲；2002 年受邀與高雄市交響樂團演出貝多芬第四號鋼琴協奏曲；2004 年 10 月受邀於高雄市文化局主辦的“愛河音樂季之”狂戀鋼琴”音樂會中與高雄市交響樂團合作；11 月於高雄市愛樂協會年度音樂會中擔任鋼琴獨奏；2005 年 1 月於高雄市文化中心至善廳舉辦個人鋼琴獨奏會，演出深獲好評，亦擁有豐富的演奏經驗。現任教於高雄市瑞豐國中、前金國小音樂班；擔任高雄室內合唱團及高雄市愛樂協會合唱團鋼琴伴奏。

➤ 林昌龍

現國立中山大學音樂學系大三學生，指導老師為楊仁傑教授，已獲多次中山大學音樂系術科優秀獎學金，於 2003-2004 年分別考入奇美管弦樂團&國立台灣交響樂團&亞洲青少年交響樂團，曾與中山大學絃樂團，台南市立青少年管絃樂團，奇美管絃樂團，奇美絃樂團協奏小提琴，二胡及絃樂四重奏，2005 7 月考上 Eastern Music Festival 全額獎學金並赴美參加音樂營，同時贏得 Rimsky-Korsakov: Capriccio Espagnol 之 violin solo 徵選並演出該曲，在校曾代表接受小提琴家 Guillaume plays，胡乃元，林允白，大提琴家涂強，Robert jeeselon 大師指導，樂團方面曾擔任台南女中管絃樂團，音樂班聯合樂團，Eastern Festival Orchestra 的首席 以及奇美管絃樂團，台南市立交響樂團，Asian Youth Orchestra 副首席，現在為奇美管絃樂團團員，巴洛克獨奏家室內樂團團員及中山大學交響樂團首席。

➤ 江采諭

高雄市人。畢業於國立屏東教育大學(原國立屏東師範學院)音樂教育系，就讀期間，曾與國立屏東教育大學音樂系管絃樂團共同演出艾爾加大提琴協奏曲，深獲好評。現就

讀於國立中山大學音樂研究所二年級，主修大提琴。曾師事李佩薰老師、鄭伊晴老師、曾史妃老師、陳如萍老師，現師事林敏媛老師。

➤ 許宜庭

➤ 林亭君

➤ 孫慎穗

➤ 蔡婉瑜

➤ 施虹名

WORKSHOP ON JORDAN STRUCTURES
IN ANALYSIS AND GEOMETRY 2006

March 18, 2006

Stuttle Buses Pick-up time table (preliminary version and subject to change)

Monday (April 3)

- Morning: Kingship Hotel → Campus:
 - 7:50AM Bus #1
 - 8:00AM Bus #2, *not confirmed*
- Evening: Campus → Kingship Hotel
All Buses start at 18:15PM at pick-up point in front of College of Science Building.

Tuesday (April 4)

- Morning: Kingship Hotel → Campus:
 - 8:20AM Bus #1
 - 8:30AM Bus #2, *not confirmed*
- Evening: Campus → Banquet: on foot (15 minutes).
- Night: Banquet → Kingship Hotel
All Buses start at 21:00PM at the United Health World Restaurant (統一健康世界賞海樓，西子灣哨船街 14 號).

Wednesday (April 5) A one day tour to Kenting National Park

- Bus leaving Campus (at pick-up point in front of College of Science Building) at 7:15am (**No delay**)
- Bus leaving Kingship Hotel at 7:30 am
- Bus expected to arrive back Kaohsiung by 7:00pm

Thursday (April 6)

- Morning: Kingship Hotel → Campus:
 - 8:20AM Bus #1
 - 8:30AM Bus #2, *not confirmed*
- Evening: Campus → Kingship Hotel
All Buses start at 18:30PM at pick-up point in front of College of Science Building.

Friday (April 7) A half day program at NCKU, and a half day sightseeing the historical city Tainan

- Bus leaving Campus (at pick-up point in front of College of Science Building) at 7:00am (**No delay**)
- Bus leaving Kingship Hotel at 7:15 am
- Bus expected to arrive back Kaohsiung by 7:00pm