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日本数学会

2015年度秋季総合分科会

英　文　サ　マ　リ　集

2015年9月

於　京都産業大学

最終版: 2015/08/25

2015　日本数学会
秋季総合分科会プログラム

期　日　2015年9月13日(日)～9月16日(水)

会　場　京都産業大学
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9月14日(月)　神山ホール

日本数学会賞秋季賞受賞者 …… (15:30〜16:30)

MSJ Autumn Prize Winner

岡　本　　久 (京 大 数 理 研)　数理流体力学に現れる困難について …… (16:45〜17:45)

Hisashi Okamoto (Kyoto Univ.)　Difficulties arising in mathematical fluid mechanics

概要 The Euler and the Navier-Stokes equations for incompressible fluid motion have attracted a large number of mathematicians. If we look back the challenges of mathematicians in the last fifty years, it seems to me that the equations look dangerous rather than beautiful in the sense that very many talented mathematicians were beaten or betrayed. Beautiful theories which work very well in other branches of mathematics are often helpless in the Navier-Stokes equations or at least their values are marginal. I, too, observed such scenes, and this talk is my personal recollections of the difficulties of the equations.

企 画 特 別 講 演

9月13日(日)

第III会場

萩田真理子 (お茶の水女大理)　誤り訂正符号系列の存在性について ····· (13:00〜14:00)

Mariko Hagita (Ochanomizu Univ.)　Existence properties on error-correcting sequences

概要 We define an (N, k, d) error-correcting sequence over X as a periodic sequence $\{a_i\}_{i=0,1,\ldots}$ $(a_i \in X)$ with period N, such that its sub k-tuples $\{(a_i, a_{i+1}, \ldots, a_{i+k-1}) | i = 0, 1, \ldots, N-1\}$ (multiset) are all distinct for $0 \leq i \leq N-1$, and that they form an error-correcting code with minimum distance $d := \min_{0 \leq s < t \leq N-1} \{\sum_{i=0}^{k-1} \delta(a_{i+s}, a_{i+t})\}$, where $\delta(x, y) = 1$ for $x \neq y$ and $= 0$ for $x = y$. If $d \geq 2e+1$, then one can correct up to e errors in a k-tuple, so the sequence is said to be e-error correcting.
An m-sequence over $GF(q)$ of period $q^n - 1$ is a $(q^n - 1, n, 1)$ error-correcting sequence. We shall consider when an m-sequence will be an error-correcting sequence with minimum distance $d = 3$ or $d = 5$ and we gave some new constructions of error-correcting sequences.

第IV会場

前野俊昭 (名城大理工)*　シューベルト多項式とシューア多項式 ····· (13:00〜14:00)

Toshiaki Maeno (Meijo Univ.)　Schubert polynomials and Schur polynomials

概要 In my talk, I will survey some basic properties of the Schubert polynomials in comparison with the Schur polynomials. The Schubert polynomials were introduced by A. Lascoux and M.-P. Schutzenberger around 1980 in the context of the Schubert calculus on the flag varieties. They form a natural linear basis of the polynomial ring in the infinite variables, which includes the Schur polynomials as its subfamily. Hence, the Schubert polynomials can be considered as a nonsymmetric generalization of the Schur polynomials. They indeed retain combinatorial or algebraic properties of the Schur polynomials in the viewpoint of the Schubert calculus. One of the interesting features of the Schubert polynomials is their combinatorial structure controlled by some noncommutative algebras related to integrable systems. Nowadays the Schubert calculus is widely developed, and a lot of corresponding variants of the Schubert polynomials have been constructed.

第VI会場

特別招待講演 (大韓数学会)

Dongho Chae (Chung-Ang Univ.)　The incompressible Euler equations and the Liouville/unique continuation theorems ····· (13:00〜14:00)

Dongho Chae (Chung-Ang Univ.)　The incompressible Euler equations and the Liouville/unique continuation theorems

9月15日(火)

第I会場

菊 池　誠 (神戸大システム情報)　不完全性定理: 形式化された数学の限界と可能性 ····· (13:00〜14:00)

Makoto Kikuchi (Kobe Univ.)　The Incompleteness Theorems: The Bounds and Possibilities of Formalized Mathematics

概要 The incompleteness theorems proved by Gödel in 1931 are monumental achievements in mathematical logic in which the existence of an undecidable statement in arithmetic and the unprovability of the consistency of a formal system of mathematics are shown. These theorems are among the most famous and important theorems in mathematics of the last century and, by bringing us novel insights on the concepts of truth and proof in mathematics, they have had a great influence on philosophy, computer science, cognitive science, and many other areas which are related to human reasoning and computation over many decades. However, the proofs of the theorems require some subtle conditions concerning the validity of formalizations of mathematics, and we need to be careful in the mathematical treatment of the conditions and in the understanding of the meanings of the theorems. In this talk, we introduce basic notions and facts in mathematical logic such as the completeness theorem for predicate logic and the axioms of arithmetic and set theory, and we show the outline of the proofs of the incompleteness theorems and some related theorems in mathematical logic. Then, we discuss the mathematical significance and philosophical consequences of the incompleteness theorems, and we argue the bounds and possibilities of formalizations of mathematics within the framework of predicate logic.

第V会場

中 居　功 (お茶の水女大理)　Some topics in Web geometry ····· (13:00〜14:00)

Isao Nakai (Ochanomizu Univ.)　Some topics in Web geometry

概要 A d-web of codimension one is a configuration $W = (F_1, F_2, ..., F_d)$ of foliations of codimension one. Web structure is ubiquitous in the mathematical nature. For instance, the theta divisor Θ of the Jacobian $J(C)$ of a non-hyperelliptic compact Riemann surface C of genus g possesses naturally a $2g-2$-web structure of codimension one. The dual (Legendre transform) of a codimension one foliation of degree d of the projective space is a d-web of codimension (and of degree one). An implicit ordinary differential equation $f(x, y, p) = 0$, $p = dy/dx$, of degree d in p defines a d-web on the xy-plane by the solutions. Two vector fields generate 2-webs of dimension one. All these webs are "non commuting" on generic condition, and determined by their topological (even set theoretical) structure. On one hand, "commuting" webs with polyhedral symmetry etc appear as in the special cases corresponding to the elliptic curve, Klein-Halphen singularities. In this talk I will introduce the various webs and explain their structure.

9月16日(水)

第II会場

安 田 正 大 (阪　大　理)　モチヴィック多重ゼータ値と有限多重ゼータ値 ····· (13:00〜14:00)

Seidai Yasuda (Osaka Univ.)　Motivic multiple zeta values and finite multiple zeta values

概要 I would like to talk about motivic and finite multiple zeta values and related topics. A main topic of my talk is a relation between motivic and finite multiple zeta values. It is applied to give an upper bound of the dimension of the space of finite multiple zeta values of a fixed weight. Besides, I would also like to explain some other aspects in my interest of the theory of multiple zeta values and some open questions.

第IV会場

愛 木 豊 彦 (日 本 女 大 理)　コンクリート中性化に関連する数理モデルについて ····· (13:00〜14:00)

Toyohiko Aiki (Japan Women's Univ.)　On mathematical models for concrete carbonation

概要 The concrete is important material constituting infrastructure supporting society. Recently, several interesting mathematical models have been proposed for investigation of damage, carbonation, composition and chemical reaction for concrete. In this talk we focus on two models describing a carbonation process. The first model is given as a free boundary problem on an interval in the real line and proposed by Böhm and Muntean in 2007. In this model the free boundary corresponds to the carbonation front so that the value of the free boundary indicates the depth of concrete carbonation. On the simplified model of their one we could get the large time behavior result which guarantees the real experimental law for the depth of the carbonation. The aim of second one is to describe the carbonation process in a domain of $\mathbb{R}^3$ and the model is a system two nonlinear partial differential equations describing mass conservation laws for moisture and carbon dioxide. The main difficulty is how to deal the hysteresis on the relationship between humidity and saturation of degree. Here, we show the existence and uniqueness results for this system. Moreover, we have supposed the other free boundary problem in order to overcome the difficulty. At the end of this talk we introduce the two scale model consists of two partial differential equations and the free boundary problem for macro and micro parameters, respectively.

数 学 基 礎 論 お よ び 歴 史

9月15日(火)　　第I会場

9:55〜11:25

概要 We discuss Poisson's voluminous book on the heat problems, which is one of his last works in life, and after five years of Fourier's death, in the rivalry to Fourier, Poisson works his heat theory including essential mathematical topics against Fourier in heat theory and Navier in fluid dynamics, namely, in this book, Poisson mentiones the mathematical conclusions as the finishing strokes of his academic activities in the fluid dynamics and heat theory.

概要 We discuss the trigonometric series and eigen values are derived from the particular value in the process of the study of heat and wave. Euler and Lagrange studied wave equation of the cords or strings. Lagrange derives from this study the trigonometric series in the linear equation using the particular value. Fourier and Poisson develope the series. Sturum and Liouvill specially derived the particular value from the solving heat problem, which is also the same problem by Poisson. Hilbert solves the integral equation using the eigenvalue and the eigenfunction, of which the former is hinted from the studies of linear heat problem by Sturm and Liouville. These points here are our propositions.

概要 Wada, old Japanese mathematician made six kinds of power series, i.e., Rokuyaku; He solved thirty eight problems. But he did not solve the values of approximate expressions and cosets. We would like to show the method finding them.
Point of the method: Example: $S_k - xS_k = d_2(1) + \Sigma(n = 2 \to k)x^{n-1} - d_2(k)x^k$.
If $S_k = \Sigma(n = 1 \to k)d_2(n)x^{n-1} = 1 + 3x + 6x^2 + 10x^3 + 21x^4 + \cdots + d_2(k)$, $d_2(n) = (1/2!)n(n+1)$.
1. $S_k = 1/(1-x)^3 - x^k\{d_0(k)/(1-x)^3 + d_1(k)/(1-x)^2 + d_2(k)/(1-x)\}$.
2. $\bar{S_k} = x^k\{d_0(k)/(1-x)^{p+1} + d_1(k)/(1-x)^p + \cdots + d_p(k)/(1-x)\}$.

概要 Netherlands surveying surgery is transmitted to the Edo period of Japan. Sadanori Shimizu (1645–1717) established in the Netherlands survey surgery. Edo shogunate was using this survey surgery. Kikugenpou betsuden ichimaki-hihachiji is a secret picture scroll of the Netherlands surveying which Sadanori Shimizu established. Koutaku Hosoi (1658–1735) and Sadanori Shimizu are both served in Inaba Tansyu from 1702. At this time, we think that they had intimate exchanges. Therefore, it is supposed that Kotaku Hosoi wrote the picture scroll. Therefore we asked for the handwriting analysis such as the title. We got the result that there is a high possibility that Koutaku Hosoi wrote the picture scroll.

概要 Netherlands surveying surgery is transmitted to the Edo period of Japan. Sadanori Shimizu (1645–1717) established the Netherlands survey surgery. Kikugenpou betsuden ichimaki-hihachiji is a secret picture scroll of the Netherlands surveying which Sadanori Shimizu established. But we don't know the date of manufacture with an author of this picture scroll. On the other hand, Yoshisato Yanada wrote the catalog of kikugenpou betsuden-catalog illustration of hihachi in 1759. The contents of both are different from the first four pages and genealogy. Surveying contents are the same. Therefore we compare both in the details. We offer a document to consider which was written earlier by this.

11:30〜12:00　歴史部門懇談会

14:15〜16:00

概要 Tow ideals I and J on κ, regular uncountable, are isocoherent if there is a bijection $f : \kappa \to \kappa$ such that $f_*(I) = \{X \subset \kappa : f^{-1}(X) \in I\}$ and J have a comon proper extension. In this case $f_*^{-1}(J)$ and I have a common proper extension.

Direct translation to $\mathcal{P}_\kappa\lambda$ might be unsuccessful. That is, $f_*^{-1}(J)$ may not be an ideal even if $f_*(I)$ is an ideal.

First choice is restricting f so that $f_*^{-1}(J)$ is an ideal. Second, weaker one, is only assuming f to be a bijection so that even $f_*(I)$ might not be an ideal.

概要 For a topological space $X = \langle X, \mathcal{T}\rangle$ and an elementary submodel $M \prec \langle H_\theta, \in\rangle$ with $X \in M$, let X_M be the space with the base set $X \cap M$ and the topology generated by $\{O \cap M : O \in \mathcal{T} \cap M\}$. In this talk, we give a partial answer of Tall's irrational problem: Suppose $2^\omega > \omega_1$ and $2^{<\kappa} = \kappa$ for every regular cardinal κ with $2^\omega \leq \kappa < |X|$. If X_M is completely metrizable, separable, and uncountable, then $X_M = X$.

概要 Most of axiom A posets are not σ-short. We introduce frame systems of axiom A posets and prove non-σ-shortness of axiom A posets which have frame systems.

概要 In model theory, Ramsey-type theorems are often used for constructing (generalized) indiscernible sets. In this talk we give a complete proof of the Ramsey property of free amalgamation classes using finite combinatorial methods, which have been discussed for a long period with many incomplete or wrong proofs.

概要 Evans–Wong proved that if an omega-categorical generic structure is not simple then it has SOP_3. Our talk is about a generalization of their result.

概要 Let f be a log-like function and α a real number such that $0 < \alpha < 1$. Let $K_{f,\alpha}$ be a class of binary graphs defined as an amalgamation class of ab initio type with α a coefficient for the predimension function. Under some mild assumption on f, it has been shown that a generic graph for $(K_{f,\alpha}, <)$ has a model complete theory if α is a rational number. One of the key facts is that there is a certain kind of 0-extensions. We will discuss that how this fact for the rational number cases can be applied to irrational number cases.

16:15〜17:15　特別講演

概要 It is known that determinacies of infinite games characterize not only “Big Five Systems” but also various other subsystems of second order arithmetic. In this talk, I will give an overview of these results and talk about recent work on descriptive complexity of winning strategies.

9月16日(水)　第I会場

9:30〜11:20

概要 (1) World of phenomena: Aut(R): Axiomatic set theory: Aut(R):−Mathematics: Philosophycal arguments: R ==========> SPEC(R): R ==========> M(R): R ==========> Aut(R)
(2) Spectral problem: Spectral geometry: Main theorems;: Isomorphism of the Hilbert spaces
(3) Fluctuation;: δxp: Fluctuation formulas: δxp: Some cases are studied
(4) Algebraic construction: To constract mathematics by the algebraic methods: Algebraic: Abstract: The possibilities:
(5) Dynamical systemn: Finite dimensional:: Infinite dimensional dynamical systems: $\varphi t = \exp(tX|p), \varphi t = \exp(tP)$ general arguments/
(6) Abelian differential: Automorphic functions:: Automorphic forms: Induced representation: Riemannian surfaces;::: Abelian differentials: We seek the possibilities of representations of the Galois group of algebraic functions: On Abelian differentials;;; Automorphic representation:

概要 Introducing a new idea, CA-concept, of improved model theory, we solve Sorites paradox. Millions of our intuitions will be wrong. As an example, we show that there exists no (concept of) excellent ethnic group and hence no cause of ethnic identity.

概要 Let $\{\to\} \subseteq \mathcal{S} \subseteq \{\to, \wedge, \vee, \neg\}$. $\mathbf{H}_{\mathcal{S}}$ denotes the Hilbert-style intuitionistic propositional logic $\mathbf{H}$ restricted axioms and substitution to $\mathcal{S}$-formulas. Horn proved that $\mathbf{H}_{\mathcal{S}}$ is the $\mathcal{S}$-fragment of $\mathbf{H}$. We determine the sets $\mathcal{S}$ with the following property : for any sets Σ of $\mathcal{S}$-formulas, $\mathbf{H} + \Sigma$ is conservative over $\mathbf{H}_{\mathcal{S}} + \Sigma$. We also consider this problem between $\mathbf{H}_{\mathcal{S}}$ and $\mathbf{H}_{\mathcal{S}'}$ $(\mathcal{S} \subseteq \mathcal{S}')$.

概要 We discuss axiom schemata preserving the disjunction and existence properties (DP and EP) of intuitionistic predicate logic $\mathbf{H}_*$. The DP and EP are regarded as "hallmarks" of constructivity of intuitionistic predicate logic. However, there are (uncountably) many intermediate predicate logics having DP and EP. We consider axiom schema A such that $\mathbf{H}_*$ with the axiom schema A (i.e., $\mathbf{H}_* + A$) still enjoys DP and EP. A sufficient condition in terms of Kripke models is given. By making use of this condition, we give some examples of axiom schemata preserving DP and EP, including the Gabbay–de Jongh axiom and the axiom schema of Markov's principle.

概要 Yamakami [2011, Theoret. Comput. Sci.] studies context-free languages with advice functions. We consider the class of non-uniform contextfree languages where the lengths of advices are assumed to be the same as those of inputs. CFL/n denotes the resulting class. We let CFL(2) denote the class of intersections of two contextfree languages. Yamakami raised a problem whether there is a CFL-immune set in CFL(2) - CFL/n. We present an affirmative solution to the problem.

概要 The notion of probability plays a crucial role in quantum mechanics. It appears as the Born rule. In modern mathematics which describes quantum mechanics, however, probability theory means nothing other than measure theory, and therefore any operational characterization of the notion of probability is still missing in quantum mechanics. In our former works, based on the toolkit of algorithmic randomness, we presented an alternative rule to the Born rule for specifying the property of results of measurements in an operational way. This rule is about pure states. In this talk, we present an alternative rule to the Born rule for mixed states, and show that these two rules both for pure and mixed states can be derived from a rule, called the principle of typicality, in a unified manner.

概要 We give a characterization of 3-randomness via complexity, which is induced by a 2-randomness version of Miller–Yu's result.

11:30〜12:00　数学基礎論および歴史分科会総会

代　数　学

9月13日(日)　　第II会場

9:15〜11:50

概要 In this talk, we give efficient algorithm for computing basis for generalized eigenspaces of matrices with rational numbers. In well-known method, the computation uses the arithmetric of polynomials and it is slow. Our algorithm depends on minimal annihilating polynomials and uses the arithmetric of only rational numbers. So it is faster and efficient. Our program is implemented on Risa/Asir a computer algebra system.

概要 Let P and Q be finite partially ordered sets on $[d] = \{1, \ldots, d\}$, and $\mathcal{O}(P) \subset \mathbb{R}^d$ and $\mathcal{O}(Q) \subset \mathbb{R}^d$ their order polytopes. The twinned order polytope of P and Q is the convex polytope $\Delta(P, -Q) \subset \mathbb{R}^d$ which is the convex hull of $\mathcal{O}(P) \cup (-\mathcal{O}(Q))$. It follows that the origin of $\mathbb{R}^d$ belongs to the interior of $\Delta(P, -Q)$ if and only if P and Q possess a common linear extension. It will be proved that, when the origin of $\mathbb{R}^d$ belongs to the interior of $\Delta(P, -Q)$, the toric ideal of $\Delta(P, -Q)$ possesses a quadratic Gröbner basis with respect to a reverse lexicographic order for which the variable corresponding to the origin is smallest. Thus in particular if P and Q possess a common linear extension, then the twinned order polytope $\Delta(P, -Q)$ is a normal Gorenstein Fano polytope.

概要 For an integral convex polytope $\mathcal{P} \subset \mathbb{R}^d$, we recall $i(\mathcal{P}, n) = |n\mathcal{P} \cap \mathbb{Z}^d|$ the Ehrhart polynomial of $\mathcal{P}$. Let $g_r(\mathcal{P})$ be the r-th coefficients of $i(\mathcal{P}, n)$ for $r = 0, \ldots, d$. Martin Henk and Makoto Tagami gave lower bounds on the coefficients $g_r(\mathcal{P})$ in terms of the volume of $\mathcal{P}$. They proved that these bounds are best possible for $r \in \{1, 2, d-2\}$. In this talk, we give a new and best possible lower bounds.

概要 Macdonald (1963) proves a volume formula for lattice polyhedra of arbitrary dimension, which is a generalization of Pick's formula (1899) for two-dimensional lattice polygons. In the proof of Macdonald analysis of the Ehrhart polynomials is essential. In this talk we show a generalization of Nukaga's volume formula (1990) for two-dimensional lattice polygons by using polynomials which are similar to the Ehrhart polynomials.

概要 Let A be a two-dimensional normal local ring with the unique maximal ideal m, and I be an m-primary ideal of A. Then I is a p_g ideal if and only if the Rees algebra $R(I)$ is a Cohen–Macaulay normal domain. If A has a resolution of singularities, there exists a p_g ideal of A. Moreover, if A is a rational singularity, then any integrally closed ideal is a p_g ideal. As a main result, we prove the following theorem: Theorem: Let A be a two-dimensional excellent Gorenstein normal local domain, and I a p_g ideal of A. Then $R(I)$ is a graded almost Gorenstein ring in the sense of Goto–Takahashi–Taniguchi.

概要 The purpose of this talk is to give a characterization for the Rees algebras of socle ideals in a regular local ring to be almost Gorenstein graded rings. This shows that almost Gorenstein Rees algebras rather rarely exist for socle ideals, if the dimension of the base local ring is greater than two.

概要 Let R be a UFD containing a rational number field and let d and D be R-derivations of $R[x, y]$. We have a necessary and sufficient condition for $\mathrm{Ker}d = \mathrm{Ker}D$.

概要 An affine oriented matroid is a generalization of an affine hyperplane arrangement, and its bounded complex corresponds to the CW-complex consisting of bounded regions cut by affine hyperplanes. In 2002, Novik et al. defined the matroid ideal of a bounded complex and showed that the matroid ideal has a (cellular) graded minimal free resolution supported by the bounded complex. In this talk, we will give characterization of Cohen–Macaulay-ness of a bounded complex and that of its matroid ideal, and show that a bounded complex is Cohen–Macaulay if its matroid ideal is also.

概要 In this talk, we studies characterizing local rings in terms of homological dimensions. The key tool is the notion of a prethick subcategory which we introduce in this talk. Our methods recover the theorems of Salarian, Sather–Wagstaff and Yassemi.

概要 The Ish arrangement was introduced by Armstrong recently to give a new interpretation of the q,t-Catalan numbers of Garsia and Haiman. In this talk, I will show that the Ish arrangement is a free arrangement.

14:15〜15:15　特別講演

概要 The theory of Gröbner bases has a lot of application in many research areas, and is implemented in various mathematical software. In this talk, we will focus on recent developments in the theory of Gröbner bases of toric ideals and their application.

15:30〜18:00

概要 For a one-sided noetherian ring, Gabriel constructed two maps between the isomorphism classes of indecomposable injective modules and the two-sided prime ideals. We generalize these maps as maps between two spectra of a Grothendieck category with some property. The two spectra are called the atom spectrum and the molecule spectrum. This generalization provides a simple way to understand the construction of Gabriel's maps, and it is shown that they induce a bijection between the minimal elements of the atom spectrum and those of the molecule spectrum.

概要 We fix a commutative ring $\Bbbk$ and a group G. For small $\Bbbk$-categories R and S with G-actions we define G-invariant S-R-bimodules and their category denoted by $S\text{-Mod}^G\text{-}R$, and denote by R/G the orbit category of R by G. For small G-graded $\Bbbk$-categories A and B we define G-graded B-A-bimodules and their category denoted by $B\text{-Mod}_G\text{-}A$, and denote by $A\#G$ the smash product of A and G. We then define functors $(\text{-})/G\colon S\text{-Mod}^G\text{-}R \to (S/G)\text{-Mod}_G\text{-}(R/G)$ and $(\text{-})\#G\colon A\text{-Mod}_G\text{-}B \to (A\#G)\text{-Mod}^G\text{-}(B\#G)$, and show that they are equivalences and quasi-inverses to each other having good properties with tensor products and preserving projectivity of bimodules. We apply this to equivalences given by bimodules such as Morita equivalences, stable equivalences of Morita type and standard derived equivalences.

概要 Homological shells of a given projective subvariety $X \subseteq \mathbb{P}^N(\mathbb{C})$ whose arithmetic depth is greater than or equal to 2 always move in a finite union of connected algebraic families without fixing their dimensions or their degrees in advance. To study their geometric behavior, we define three kinds of families of homological shells, and construct three kinds of the universal families depending on their kinds of the families of homological shells by stratifying the Hilbert schemes suitably. As byproducts of these constructions, we obtain Koszul domains, and Koszul graph maps, which bring us geometric tools to study the families of homological shells.

概要 We consider a finite-dimensional algebra over an algebraically closed field k. For a relationship between a cogeometric pair (E, σ) and the finite condition (Fg), the following conjecture is proposed by Mori. Let A be a cogeometric self-injective Koszul algebra and the complexity of $A/\operatorname{rad} A$ finite. Then A satisfies the condition (Fg) if and only if the order of σ is finite. In this talk, we show that if A is cogeometric and satisfies the condition (Fg), then the order of σ is finite. Also, if A satisfies $(\operatorname{rad} A)^3 = 0$, then we show that this conjecture holds.

概要 Recently, N. Hamaguchi and A. Nakajima introduced the notions of weakly separable extensions and weakly quasi-separable extensions. In this talk, we show the difference between the separability and the weakly separability in skew polynomial rings. Moreover, we give some results concerning weakly quasi-separable polynomials in skew polynomial rings.

概要 Let R be a ring and $n \geq 2$ an integer. We provide a systematic way to define new multiplications on $\mathrm{M}_n(R)$, the ring of $n \times n$ full matrices with entries in R. The obtained new rings Λ are Auslander–Gorenstein if and only if so is R.

概要 In this talk, we give a combinatorial description of two-term tilting complexes for a Brauer star algebra. Namely, we establish a bijection between two-term tilting complexes and signed triangulations of a polygon with a puncture.

18　水 野 有 哉 (名大多元数理)　Preprojective algebras of Dynkin type, tilting theory and Weyl group ····· 15

Yuya Mizuno　(Nagoya Univ.)　Preprojective algebras of Dynkin type, tilting theory and Weyl group

概要 Preprojective algebras are one of the fundamental object in the representation theory of algebra. In this talk, we explain a close relationship between representation theory of Preprojective algebras and Weyl group. In particular, we discuss a connection between tilting theory and Weyl group, braid group.

19　板 垣 智 洋 (東 京 理 大 理)　The Hochschild (co)homology of a class of algebras given by a cyclic quiver and two paths ····· 10

Tomohiro Itagaki (Tokyo Univ. of Sci.)　The Hochschild (co)homology of a class of algebras given by a cyclic quiver and two paths

概要 For an algebra given by a cyclic quiver and one path relation, its Hochschild (co)homology is computed by Xu and Wang. In this talk, we describe the Hochschild (co)homology of algebras given by a cyclic quiver and two paths.

20　小 原 大 樹 (東 京 理 大 理)　On the Hochschild cohomology ring modulo nilpotence of the finite dimensional quiver algebras with quantum-like relations ····· 15

Daiki Obara (Tokyo Univ. of Sci.)　On the Hochschild cohomology ring modulo nilpotence of the finite dimensional quiver algebras with quantum-like relations

概要 We consider the finite dimensional quiver algebras defined by n cycles and quantum-like relations. We determine the minimal projective resolutions and the Hochschild cohomology rings modulo nilpotence of these algebras. We introduce the simple examples of these algebras.

9月14日(月)　第II会場

9:15〜12:00

21　岩 見 智 宏 (九 州 産 大 工)*　Some remarks on Fano fibrations ····· 10

Tomohiro Iwami　(Kyushu Sangyo Univ.)　Some remarks on Fano fibrations

概要 Based on the author's previous talk about certain $\mathbb{Q}$-conic bundles of semi-stable type in the case of (three-dimensional) polarized log pairs, I discuss on triviality of moduli-part of log adjunction or (local) isotriviality of certain fibrations associated to such $\mathbb{Q}$-conic bundles, with regards to several properties of local triviality or conic bundles appearing in Fano fibrations studied by J. Kollar–Y. Miyaoka–S. Mori, and E. Sato.

22　朝　克 己　Plane curves with small polar degree ····· 10
渡 利 正 弘 (沖 縄 工 高 専)

Katsuki Asa　Plane curves with small polar degree
Masahiro Watari
(Okinawa Nat. Coll. of Tech.)

概要 Let C be a projective plane curve defined by a reduced homogeneus polynomial F in $\mathbb{C}[x,y,z]$. For this C, we consider *the polar map* $\varphi_C : \mathbb{P}^2(\mathbb{C}) \longrightarrow \mathbb{P}^2(\mathbb{C})$ defined by $p \longmapsto \big(F_x(p), F_y(p), F_z(p)\big)$. We call the degree of φ_C the *polar degree* of C. Dolgachev determined all curves whose polar degrees are equal to 1. After his work, we consider the plane curves whose polar degrees are 2, 3 and 4.

概要 Let L be a very ample line bundle with $h^1(L) \geq 2$ on a smooth projective curve of genus g. One says that L is normally generated if X is projectively normal under the associated projective embedding. We show that L is normally generated if $\deg(L) \geq 2g - 1 - 4h^1(L)$ for large enough genus g.

概要 For a compact Riemann surface X, it is well known that the divisor class group of X is isomorphic to the Jacobian of X by the Abel–Jacobi map. Given an element u of Jacobian, one wants to express, in terms of u, the element of the divisor class group corresponding to u. This problem is called Jacobi inversion problem. For hyperelliptic curves, it is well known that one can solve the problem by the hyperelliptic sigma functions. These results were extended to the more general plane algebraic curves defined by $y^r = f(x)$, which are special cases of (n, s) curves, by Matsutani and Previato. In this talk, we extended the results to the telescopic curves proposed by Miura, which contain (n, s) curves as special cases.

概要 We give Dolbeault complex of non commutative projective space of positive characteristics.

概要 In this talk, we introduce K-theoretic Segre classes for a vector bundle and also for a virtual bundle. The main results are the formula for the K-theoretic Segre classes in terms of the generating function and the pushforward formula for the relative Segre classes.

概要 In this talk, we will explain the formula that describes K-theory Schubert classes of Grassmannians. It is written as a determinant with entries given by the Segre classes of tautological vector bundles. The proof is based on Kazarian's method which uses the Kempf–Laksov resolutions of the Schubert varieties.

概要 Noncommutative real algebraic geometry is an emerging subject which deals with equations and inequalities in noncommutative algebra over the reals, with the help of analytic tools such as representation theory and operator algebras. After introducing this concept, I will present a simple characterization of a group to have Kazhdan's property (T) in terms of NCRAG. The result suggests the possibility of finding new examples of property (T) groups by use of computers. In fact, Netzer and Thom recently obtained a computer-based proof of property (T) for SL(3,Z) that yields a much better estimate of the Kazhdan constant than the previously known.

概要 In this talk, we study slopes of cyclic covering fibrations of a fibered surface. Firstly, we give the lower bound of the slope of these fibrations, which is a generalization of the double covering case. Secondly, we define singularity indices for cyclic covering fibrations of a ruled surface and give the slope equality of these fibrations, which is a generalization of the hyperelliptic case. Finally, we give an upper bound of the slope of these fibrations by estimating these singularity indices.

概要 We prove formula between Nekrasov partition functions defined from stable and costable ADHM data for the plane following method by Nakajima–Yoshioka based on the theory of wall-crossing formula developed in Mochizuki. This formula is similar to the conjecture by Itoh–Maruyoshi–Okuda for A_1 singularity.

13:10〜14:10　特別講演

概要 I will report on my study of the birational type of modular varieties associated to orthogonal grops of signature $(2, n)$. For the full orthogonal groups of a certain class of quadratic forms, I prove that there are only finitely many modular varieties that are not of general type. A similar finiteness is proved for the stable orthogonal groups (a canonical congruence subgroup) in much wider generality. The study has an application to a conjecture of Gritsenko and Nikulin on reflective modular forms. In the course I calculate a certain generalization of classical Gauss sum that could be called orbital Gauss sum.

9月15日(火)　第II会場

9:30〜11:25

概要 The nonequivariant coherent-constructible correspondence (NCCC) conjecture is a version of homological mirror symmetry for toric varieties. NCCC is first discovered by Bondal and formulated in terms of microlocal sheaf theory by Fang–Liu–Treumann–Zaslow. In this talk, we give a proof of NCCC conjecture in the case of toric surfaces.

32 白 土 智 彬 (名大多元数理) 野性的ファイバーを持つ楕円曲面の Frobenius 分裂性と応用 · · · · · · · · · · 15
Tomoaki Shirato (Nagoya Univ.) Frobenius splitting for elliptic fibrations with wild fiber and applications

概要 A notion of Frobenius splitting was firstly introduced by Mehta and Ramanathan to investigate the cohomology of Schubert varieties in positive characteristic field. Frobenius splitting is a global condition on projective varieties in positive characteristic field and sometimes behave nicely in positive characteristic filed. I will talk about the Frobenius splitting elliptic fibrations with wild fiber and their applications by using the relative Frobenius morphism and classify the Frobenius splitting elliptic fibrations with wild fibers by anti-Euler characteristic and the multiplicities of multiple fibers.

33 泊 昌 孝 (日 大 文 理)* 正規化ブローイングアップの接錐が被約な 2 次元正規特異点について · · 15
Masataka Tomari (Nihon Univ.) Normal two-dimensional singularities where the normalized tangent cone is reduced

概要 We give a characterization of the normal two-dimensional singularities where the normalized tangent cone is reduced as the Kodaira singularities with maximal degree in terms of Artin's fundamental cycle (Theorem 1). We show that every normal two-dimensional singularity can be embedded in the class of Theorem 1 as the 1st infinety near neighborhood by the normalized blowing-up. Further we also show that sufficiently negative exceptional divisor is blowing down to the singularity of Theorem 1.

34 渡 辺 究 (埼 玉 大 理 工)* Uniform families of minimal rational curves on Fano manifolds · · · · · · · 15
Kiwamu Watanabe (Saitama Univ.) Uniform families of minimal rational curves on Fano manifolds

概要 It is a well known fact that families of minimal rational curves on rational homogeneous manifolds of Picard number one are uniform, in the sense that the tangent bundle to the manifold has the same splitting type on each curve of the family. In this talk we prove that certain –stronger– uniformity conditions on a family of minimal rational curves on a Fano manifold of Picard number one allow to prove that the manifold is homogeneous.

35 中 空 大 幸 (岡 山 大 自 然)* Extremal binary doubly even self-dual code の support t-design について · 10
Hiroyuki Nakasora (Okayama Univ.) On the support t-designs of extremal binary doubly even self-dual codes

概要 Let C be an extremal binary doubly even self-dual code of length n and D_w be the support design of C for a weight w. We introduce the two numbers $\delta(C)$ and $s(C)$: $\delta(C)$ is the largest integer t such that, for all weight, D_w is a t-design; $s(C)$ denotes the largest integer t such that there exists a w such that D_w is a t-design. We consider the possible values of $\delta(C)$ and $s(C)$.

36 木 本 一 史 (琉 球 大 理) 群・部分群対に対する群行列式の類似 · 10
若 山 正 人 (九 大 I M I)
Kazufumi Kimoto (Univ. of Ryukyus) Analog of group determinants for group-subgroup pairs
Masato Wakayama (Kyushu Univ.)

概要 For a given pair (G, H) of finite group G and its subgroup H, we define an analog of the so-called group determinant in terms of the wreath determinant, which is defined for rectangular matrices such that the number of rows divides the number of columns. We show a factorization formula of the wreath determinant for a group-subgroup pair (G, H) when G is a finite abelian group and the variables are suitably specialized.

37　上岡修平 (京大情報)　平面分割と直交多項式 ····· 15

Shuhei Kamioka (Kyoto Univ.)　Plane partitions and orthogonal polynomials

概要 A connection between plane partitions and orthogonal polynomials is revealed. It is shown that the trace generating function for plane partitions, originally found by Stanley and generalized by Gansner, can be naturally derived from determinant calculation based on the little q-Laguerre polynomials and a generalization of them. A generalization of the q-Chu–Vandermonde sum is also given to prove the orthogonality of the generalized little q-Laguerre polynomials.

11:30〜12:00　代数学分科会総会

14:15〜15:15　特別講演

土岡俊介 (東大数理)　KOR 予想の広がり

Shunsuke Tsuchioka (Univ. of Tokyo)　KOR conjecture and beyond

概要 In their paper (Invent. Math. 151 (2003) 513–552), Külshammer–Olsson–Robinson initiated a study of modular character theory of finite groups over a positive integer which is not necessarily a prime. While the "main conjecture" in the paper (KOR conjecture) is settled affirmatively by Anton Evseev recently, I will talk on new directions including: (1) Graded refinement of the KOR conjecture, (2) Lie theoretic analog of the KOR conjecture, (3) Rogers–Ramanujan type identities arising from super analog of KOR theory.

15:30〜17:50

38　小田文仁 (近畿大理工)
竹ヶ原裕元 (室蘭工大)
吉田知行 (北星学園大)　The units of a partial Burnside ring relative to the Young subgroups of a symmetric group ····· 10

Fumihito Oda (Kinki Univ.)
Yugen Takegahara (Muroran Inst. of Tech.)
Tomoyuki Yoshida (Hokusei Gakuen Univ.)
The units of a partial Burnside ring relative to the Young subgroups of a symmetric group

概要 The unit group of a partial Burnside ring relative to the Young subgroups of the symmetric group S_n on n letters is included in the image by the tom Dieck homomorphism. As a consequence of this fact, the alternating character ν_n of S_n is expressed explicitly in a $\mathbb{Z}$-linear combinations of permutation characters associated with finite left S_n-sets S_n/Y for the Young subgroups Y.

39　河田成人 (阪市大理)*　有限群のブロックにおける高さ 0 の表現加群と Auslander–Reiten 連結成分について ····· 10

Shigeto Kawata (Osaka City Univ.)　On height zero lattices and Auslander–Reiten components for blocks of finite groups

概要 Let $\mathcal{O}G$ be the group ring of a finite group G over a complete discrete valuation ring $\mathcal{O}$. Then the tree classes of the Auslander–Reiten components containing certain $\mathcal{O}G$-lattices of height 0 are A_∞.

40　柴田大樹 (筑波大数理物質)　On irreducible representations of quasireductive supergroups ····· 15

Taiki Shibata (Univ. of Tsukuba)　On irreducible representations of quasireductive supergroups

概要 We work over an algebraically closed field k. An algebraic supergroup (scheme) G is the group functor represented by a finitely generated commutative Hopf superalgebra. There is a largest algebraic subgroup G_{ev} of G. An algebraic supergroup G is quasireductive if G_{ev} is split reductive. In 2011, V. Serganova studied representations of quasireductive supergroups when k is characteristic zero. In this talk, we will construct irreducible representations of quasireductive supergroups when the characteristic of k is not equal to 2. This is a generalization of Serganova's results.

概要 For a pivotal finite tensor category $\mathcal{C}$ over an algebraically closed field k, we define the adjoint object $A \in \mathcal{C}$, the algebra $\mathrm{CF}(\mathcal{C}) = \mathrm{Hom}_{\mathcal{C}}(A, 1)$ of class functions, and the internal character $\mathrm{ch}(X) : A \to 1$ in $\mathcal{C}$ for an object $X \in \mathcal{C}$. Let $\mathrm{Gr}_k(\mathcal{C})$ be the Grothendieck algebra of $\mathcal{C}$ defined over k. We show that the map $\mathrm{ch} : \mathrm{Gr}_k(\mathcal{C}) \to \mathrm{CF}(\mathcal{C})$ given by $[X] \mapsto \mathrm{ch}(X)$ is a well-defined injective algebra map. As an application, we show that $\mathrm{Gr}_k(\mathcal{C})$ is a semisimple algebra if $\mathcal{C}$ is a non-degenerate pivotal fusion category over k.

概要 Casselman(1980) defined a basis of the space of Iwahori fixed vectors of principal series representation of a p-adic group. The problem is to express Casselman's basis in terms of another natural basis, and vice versa. In this talk, we show that Casselman's problem results in the transition matrix of standard basis and Yang–Baxter basis through Hecke algebra and prove a duality relation for the coefficients in the expression by generalizing the result of Lascoux–Leclert–Thibon(1997) of type A to general Lie type.

概要 Let F be a non-Archimedean local field, and let G be an inner form of $GL_N(F)$ with $N \geq 1$. Let JL be the local Jacquet–Langlands correspondence between $GL_N(F)$ and G. In this talk, we report that we can compute the invariant s associated with the essentially square-integrable representation $JL^{-1}(\rho)$ for a cuspidal representation ρ of G by using the parametric degree due to Bushnell and Henniart, and we restate the second part of a theorem given by Deligne, Kazhdan, and Vignéras in terms of the invariant s.

概要 The $\mathcal{W}$-algebras are certain vertex operator algebras constructed by the so-called quantized Drinfel'd-Sokolov reduction from the affine vertex operator algebras. The $\mathcal{W}$-algebras has been conjectured to be C_2-cofinite and rational only if the level k is admissible. In this talk, structure of certain simple $\mathcal{W}$-algebras assocated with the Deligne exceptional Lie algebras and non-admissible levels are described as the simple current extensions of certain vertex operator algebras. As an application, the C_2-cofiniteness and $\mathbb{Z}_2$-rationality of the algebras are proved.

概要 In this talk, we introduce the notion of the *generalized principal subspaces* associated with the non-necessarily integral lattices, generalizing the principal subspaces associated with integral lattices. Combinatorial bases and the characters of the generalized principal subspaces are given. As an application, we decompose the *intermediate vertex subalgebra* $V_{E_{7+1/2}}$, which is the "level one affine VOA" of the intermediate Lie algebra $E_{7+1/2}$, by using a generalized principal subspace. Then, we obtain modular invariance of the n-point correlation function of $V_{E_{7+1/2}}$.

概要 We consider a lifting of Joseph ideals for the minimal nilpotent orbit closure to the setting of affine Kac–Moody algebras and find new examples of affine vertex algebras whose associated varieties are minimal nilpotent orbit closures. As an application we obtain a new family of lisse (C2-cofinite) W-algebras that are not coming from admissible representations of affine Kac–Moody algebras.

9月16日(水)　第II会場

9:30〜12:00

概要 Let P be an odd prime.
A prime $Q(\neq P)$ is called Wieferich prime with respect to P, if $P^{Q-1}-1$ has a squre factor Q^2.
If $p=e+1$ is a prime and a general Mersenne number $N_p=\frac{P^p-1}{P}$ has squre factor Q^2(Q : prime), then Q turns out to be a Wieferich prime with respect to P.
In the classical case ($P=2$), no square factor is found in 2^p-1 where the p are primes. But in the general case there are many square factors in $N_p=\frac{P^p-1}{P}$.

概要 Let $\{F_n\}_{n\geq 0}$ be the sequence of Fibonacci numbers. In this talk, we give linear independence results over $\mathbb{Q}$ for the infinite series $\sum_{n=1}^{\infty}\chi_j(n)/F_n$ with certain nonprincipal real Dirichlet characters χ_j. We also deduce the irrationality results for the special principal Dirichlet characters and for another multiplicative functions.

概要 The integral values of Bernoulli polynomials are expressed in terms of r-Stirling numbers of the second kind. The integral values of Cauchy polynomials are expressed in terms of r-Stirling numbers of the first kind. Several relations between the integral values of Bernoulli polynomials and those of Cauchy polynomials are obtained in terms of r-Stirling numbers of both kinds. Also, we find a relation between the Cauchy polynomials and hyperharmonic numbers.

概要 We consider a generalization of the lcm-sum function, and we give two kinds of asymptotic formulas for the sum of that function.

概要 Picking binomial coefficients which cannot be divided by a given prime from Pascal's triangle, we find that they form a set with self-similarity. Stein and Wilson proved that the points in the first rows of Pascal's triangle modulo a prime (the above set with self-similarity) multiply 'randomly'. The speaker talk about that certain ways to count the points in Pascal's triangle modulo a prime provide their 'random multiplying'. The speaker will also mention the connection between such counting and Essouari's zeta functions associated to Pascal's triangle modulo a prime.

概要 Some variants of the Goldbach problem have been studied by many researchers. In this talk, we consider such a variant with primes in arithmetic progressions, and study about the mean value of the representation function of this problem. We show a kind of explicit formula for this mean value under a weakened variant of GRH. This is an improvement of the result of Rüppel (2012) and a generalization of the result of Languasco–Zaccagnini (2012).

概要 We investigate a uniform distribution of $\zeta^{(k)}$ and an application of Birkhoff's ergodic theorem to ζ and $\zeta^{(k)}$ under an affine Boolean transformation.

概要 We obtain new elliptic function identities, which are product-to-sum type formulas for derivative of some elliptic functions. Further, from specializations of our formulas, we derive not only various known an elliptic analogue of reciprocity laws of generalized Dedekind sums by Egami, Fukuhara–Yui, but also new reciprocity laws of an elliptic analogue of generalized Dedekind sums.

55 南出 真 (山口大理)* 微分円問題における有限型 Voronoï 公式 10
古屋 淳 (浜松医科大)
谷川好男 (名大多元数理)

Makoto Minamide (Yamaguchi Univ.) The truncated Voronoï formula in a new circle problem
Jun Furuya
(Hamamatsu Univ. School of Medicine)
Yoshio Tanigawa (Nagoya Univ.)

概要 We shall consider a new problem concerning the circle problem. In the classical problem, many researchers study the error term of the asymptotic formula for $\sum_{n\le x} r(n)$, where $r(n)$ is the number of pairs of integers (k,l) satisfying $k^2+l^2=n$. It is known that $r(n)$ is given by $4\zeta(s)L(s)=\sum_{n=1}^{\infty} r(n)n^{-s}$ ($\mathrm{Re}\, s>1$), where $\zeta(s)$ is the Riemann zeta function and $L(s)$ is the Dirichlet L-function w.r.t. the non-trivial character mod 4. In our problem we define $R_{(1)}(n)$ by $\zeta'(s)L'(s)=\sum_{n=1}^{\infty} R_{(1)}(n)n^{-s}$ ($\mathrm{Re}\, s>1$), and study the error term of the asymptotic formula for $\sum_{n\le x} R_{(1)}(n)$.

56 D. Banerjee (Harish-Chandra Res. Inst.)* On nonsquare-free integers 10
南出 真 (山口大理)

Debika Banerjee (Harish-Chandra Res. Inst.) On nonsquare-free integers
Makoto Minamide (Yamaguchi Univ.)

概要 In the previous talk (at Meiji Univ. March 2015), we showed the asymptotic formula for the number of square-free integers $\le x$ whose prime factors $> y$, where $x^{\varepsilon} < y \le x$. By this result we see that the number of nonsquare-free integers $\le x$ whose prime factors $> y$ is estimated $\ll x/\log^2 y$. In this talk, we will try to improve this result.

57 D. Banerjee (Harish-Chandra Res. Inst.)* On non$k$-free integers 10
南出 真 (山口大理)

Debika Banerjee (Harish-Chandra Res. Inst.) On non$k$-free integers
Makoto Minamide (Yamaguchi Univ.)

概要 Let k be an integer ≥ 2. We will deduce the formula for the number of k-free integer $\le x$ whose prime factors $> y$, where $x^{\varepsilon} < y \le x$. Also we will see that the number of non$k$-free integers $\le x$ whose prime factors $> y$ is estimated $\ll x/\log^2 y$. We will improve this result in this talk.

58 谷川好男 (名大多元数理)* 短区間平均値定理について 10

Yoshio Tanigawa (Nagoya Univ.) Mean square estimate in short intervals

概要 Let $a(n)$ be an arithmetical function whose generating Dirichlet series belongs in a certain Selberg class. Let $E(x)$ be an arithmetical error term obtained by the sum of $a(n)$. I am going to talk my recent results with X. Cao and W. Zhai on the mean square estimate for $E(x)$ in short intervals.

14:15〜15:45

概要 We propose a 3rd order generalization of the Kaneko–Zagier modular differential equation, which has essentially two parameters. We describe modular and quasimodular solutions of integral weight in the case where one of the exponents at infinity is a multiple root of the indicial equation. We also classify solutions of character type, that is, solutions which are expected to relate to characters of simple modules of some vertex operator algebras.

概要 Let $M_k^{\#}(5)$ be the space of weakly holomorphic modular forms of weight k for $\Gamma_0(5)$ that are holomorphic at all cusps except possibly at ∞. We define a canonical basis for $M_k^{\#}(5)$ and prove that for almost all of the basis elements, the majority of their zeros in a fundamental domain for $\Gamma_0(5)$ lie on the lower boundary of the fundamental domain.

概要 A complex singular $K3$ surface has a Jacobian fibration with two II^* fibers. In this talk, we give the explicit Mordell–Weil generators of the fibration on the singular $K3$ surface whose transcendental lattice is isometric to $\langle 6\rangle^2$.

概要 For an elliptic curve, the p-adic L-fucntion interpolates special values of the twists of the Hasse–Weil L-function by the Dirichlet characters with conductor a power of p. As its refinement, for each positive integer S, Mazur and Tate constructed the Mazur–Tate element, which interpolates the twists by the characters with conductor S, and proposed conjectures connecting the element with arithmetic invariants. One of our main results shows that the "order of vanishing" of Mazur–Tate elements is greater than or equal to the algebraic rank in many cases. Our main method is to study some divisibility of Kato's Euler system by extending Darmon's argument on Heegner points.

概要 In this talk, we give a lower bound of the order of the p-Sylow group of the ideal class group of the field K_n of p^n-torsion points of an elliptic curve over $\mathbb{Q}$ with conductor p. Our bound depends on n and the $\mathbb{Z}$-rank of $E(\mathbb{Q})$. We also give an example such that p^{2n} divides the class number of the field K_n in the case of $p = 5077$ for each positive integer n.

概要 We give a family of triples of odd prime numbers such that the maximal totally real 2-extension of $\mathbb{Q}$ unramified outside the three prime numbers has the Galois group of order 512 and derived length 3. The Galois group is presented explicitly by generators and relations.

概要 We classify all finite sets S of primes of $\mathbb{Q}$ except 2 such that the Galois groups of the maximal pro-2-extensions of $\mathbb{Q}_{\mathrm{cyc}}$ unramified outside S are pro-metacyclic, where $\mathbb{Q}_{\mathrm{cyc}}$ denotes the $\mathbb{Z}_2$-extension of $\mathbb{Q}$. We also consider an application to Greenberg's conjecture.

16:00〜17:00　特別講演

概要 Let k be a complete valuation field, and X a topological space. We study the Berkovich spectrum $M(X)$ of the Banach k-algebra of k-valued bounded continuous functions on X. The evaluation gives a continuous map $\iota_X\colon X \to M(X)$, which is a homeomorphism onto the image if and only if X is zero-dimensional and Hausdorff. We verify that ι_X satisfies the universality of a totally disconnected compactification, and hence is independent of k.

幾　何　学

9月13日(日)　　第X会場

9:50〜12:00

概要 Papus theorem is famous in geometry history. But, the application is few. This Time, we found concurent theorem in two papus theorem composition by combining them in 3 paralell lines. We show this figure and offer this theorem as the matter of its proof. Of course, we confirm the reliability by CAD zoom tool.

概要 I creative “the Branch Equations” that describe phase transition and the SYNC. Indeed, my equations describe in-phase synchronization and anti-phase synchronization. Their critical points at phase locking move from original critical points.

概要 Ruled real hypersurfaces are typical examples of non-Hopf hypersurfaces in a nonflat complex space form. These examples are constructed by the same method in a complex projective space and a complex hyperbolic space. In this talk, we make a survey of geometric properties of ruled real hypersurfaces which depend on the sign of the sectional curvature of those ambient spaces.

概要 We discuss a curvature property of Lorentzian stationary surfaces in 4-dimensional space forms of index 2, which is related to a property of null curves via a characteristic initial value problem.

概要 A zero mean curvature surface in the Lorentz–Minkowski 3-space is said to be of Riemann-type if it is foliated by circles in parallel planes. We classify all zero mean curvature surfaces of Riemann-type according to their causal characters, and as a corollary, we prove that if a zero mean curvature surface of Riemann-type has exactly two causal characters, then the lightlike part of the surface is a part of a straight line.

概要 A C^∞-map germ which is right-left equivalent to $(u, v) \mapsto (u, v^2, v^3)$ at the origin is called a cuspidal edge. A cuspidal edge is said to be generic if the limitting normal curvature κ_ν which is defined along the singular curve does not vanish. In this talk, we show that any real-analytic generic cuspidal edge admits an isometric deformation (i.e. a deformation of preserving the first fundamental form).

概要 In the speaker's previous work, the isotopy types of developable closed strips along a given real-analytic knot in 3-dimensional spaceforms were determined. In this talk, we show that it can be generalized to the case of the ambient space being a 3-space of constant curvature which might be non-simply-connected or non-orientable.

概要 In this paper, the existence of C^1-umbilics with arbitrarily high indices is shown. This implies that more than C^1-regularity is required to prove Loewner's conjecture.

概要 The Jorge–Meeks n-noid ($n \geq 2$) is a complete minimal surface of genus zero with n-catenoidal ends in the Euclidean 3-space, which has $(2\pi/n)$-rotation symmetry with respect to its axis. In this talk, we show that the corresponding maximal surface in Lorentz–Minkowski 3-space has an analytic extension as a properly immersed zero mean curvature surface. The extension changes type into a time-like surface.

14:15〜16:45

概要 It is known that any three-dimensional Riemannian manifold can be locally isometrically embedded into the six-dimensional Euclidean space. On the other hand, the least dimensional Euclidean space into which the given Riemannian manifold can be locally isometrically embedded is not so well understood, even for the left-invariant Riemannian metrics on Lie groups. In this talk, we report the classification of left-invariant Riemannian metrics on three-dimensional Lie groups which can be locally isometrically embedded into the four-dimensional Euclidean space.

概要 We investigate semisimple orbits of the isotropy representations for semisimple pseudo-Riemannian symmetric spaces. By using restricted root system we give the Jordan–Chevalley decomposition for the shape operators of the orbits. As applications, we give examples of austere orbits.

概要 In this paper, we study biharmonic hypersurfaces in Einstein manifolds. Then, we determine all the biharmonic hypersurfaces in irreducible symmetric spaces of compact type which are regular orbits of commutative Hermann actions of cohomogeneity one.

概要 In this talk, we give sufficient conditions for orbits of Hermann actions to be weakly reflective in terms of symmetric triads, that is a generalization of irreducible root system.

概要 Compact Lie groups are compact Riemannian symmetric spaces with respect to their bi-invariant Riemannian metrics. So we can consider antipodal sets of them, defined by Chen and Nagano. We classify maximal antipodal subgroups of the quotient groups $U(n)/\mathbb{Z}_\mu$ and $SU(n)/\mathbb{Z}_\mu$.

15　田中真紀子 (東京理大理工)* Isometries of extrinsic symmetric spaces ····· 15
J.-H. Eschenburg (Univ. of Augsburg)
P. Quast (Univ. of Augsburg)
Makiko Tanaka (Tokyo Univ. of Sci.) Isometries of extrinsic symmetric spaces
Jost-Hinrich Eschenburg (Univ. of Augsburg)
Peter Quast (Univ. of Augsburg)

概要 We show that every isometry of an extrinsic symmetric space extends to an isometry of its ambient Euclidean space. As a consequence, any isometry of a real form of a Hermitian symmetric space extends to a holomorphic isometry of the ambient Hermitian symmetric space. Moreover, every fixed point component of an isometry of a symmetric R-space is a symmetric R-space itself.

16　河井公大朗 (東　大　数　理)　余等質性 1 の coassociative 部分多様体 ····· 15
Kotaro Kawai (Univ. of Tokyo)　Cohomogeneity one coassociative submanifolds

概要 Coassociative submanifolds are 4-dimensonal calibrated submanifolds in G_2-manifolds. We construct explicit examples of coassociative submanifolds in $\Lambda^2_- S^4$, which is the complete G_2-manifold constructed by Bryant and Salamon. Classifying the Lie groups which have 3- or 4-dimensional orbits, we show that the only homogeneous coassociative submanifold is the zero section of $\Lambda^2_- S^4$ up to the automorphisms and construct many cohomogeneity one examples explicitly.

17　小池直之 (東京理大理)　対称空間内のチューブを発する体積を保存する平均曲率流 ····· 15
Naoyuki Koike (Tokyo Univ. of Sci.)　Volume-preserving mean curvature flow for tubes in a symmetric space

概要 We investigated the volume-preserving mean curvature flow starting from a tube (of non-constant radius) over a compact closed domain of a certain kind of reflective submanifold in a symmetric space and proved that the tubeness is preserved along the flow under certain conditions.

18　小野　肇 (埼玉大理工)　Almost all Lagrangian torus orbits in $\mathbb{C}P^n$ are not Hamiltonian volume
入江　博 (茨城大理)　minimizing ····· 10
Hajime Ono (Saitama Univ.)　Almost all Lagrangian torus orbits in $\mathbb{C}P^n$ are not Hamiltonian volume
Hiroshi Iriyeh (Ibaraki Univ.)　minimizing

概要 We prove that most of Lagrangian torus orbits in $\mathbb{C}P^n$ are not Hamiltonian volume minimizing when $n \geq 3$.

9月14日(月)　第X会場

10:30〜10:45　2015年度日本数学会幾何学賞授賞式

10:50〜11:50　2015年度日本数学会幾何学賞受賞特別講演

入谷　寛 (京　大　理)　トーリック多様体のミラー対称性
Hiroshi Iritani (Kyoto Univ.)　Mirror symmetry for toric varities

概要 I will explain a mirror construction for the big equivariant quantum cohomology of toric varieties via shift operators of equivariant parameters. Shift operators in equivariant quantum cohomology have been introduced in the work of Braverman, Okounkov, Maulik and Pandharipande and can be regarded as equivariant lifts of the Seidel representation. These operators naturally define a mirror Landau–Ginzburg potential and a primitive form. I will also explain that shift operators are closely related to the Gamma structure in quantum cohomology.

13:15〜14:15　2015年度日本数学会幾何学賞受賞特別講演

佐伯　修 (九大IMI)　安定写像と多様体のトポロジー

Osamu Saeki (Kyushu Univ.)　Stable maps and topology of manifolds

概要 In this talk, we consider generic smooth maps, called stable maps, between manifolds that are singular in general, and see how their topology and their singularities are related to the differential topology of the manifolds over which the maps are defined. When the singularities are relatively mild, we will see that the existence of such maps gives strong restrictions to the topology of the manifolds. We also review the theory of singular fibers of stable maps and present its applications to the cobordism theory of maps and manifolds together with applications to the visualization of scientific data.

9月15日(火)　第X会場

10:00〜12:00

19 小松　尭 (東北大理)　正方格子上の離散時間量子ウォークの極限分布 ····· 15

Takashi Komatsu (Tohoku Univ.)　Limiting distributions of discrete-time quantum walks on the square lattice

概要 The notion of quantum walks was introduced by Aharonov as a quantum counterpart of the classical random walks. It is one of the problem to determine limiting distribution of quantum walks. In this talk, we will propose a model of discrete-time quantum walks on the square lattice without localization and give its limiting distribution. Furthermore, we discuss the relationship between our quantum walk and one-dimensional quantum walk.

20 長谷川大 (Univ. de São Paulo)　Parabolic, ridge and sub-parabolic curves of implicit surfaces with singularities ····· 10

Masaru Hasegawa (Univ. de São Paulo)　Parabolic, ridge and sub-parabolic curves of implicit surfaces with singularities

概要 In this talk, we discuss parabolic, ridge and sub-parabolic curves of implicit surfaces defined by smooth functions having Morse singularities of index 1 or 2.

21 長澤壯之 (埼玉大理工)*　分解されたメビウス・エネルギーのメビウス不変性について ····· 15
石関彩 (埼玉大理工)

Takeyuki Nagasawa (Saitama Univ.)　The Möbius invariance of decomposed Möbius energies
Aya Ishizeki (Saitama Univ.)

概要 It is well known that one of O'Hara's knot energies is called the Möbius energy because of its invariance under Möbius transformations. We gave in a previous talk that the Möbius energy can be decomposed into three parts that retain invariance except for under an inversion with respect to a sphere centered on a knot. Here, we consider the exception by assuming the knots have an extra regularity. The result holds not only for knots but also for closed curves in $\mathbb{R}^n$.

22 本間泰史 (早大理工)　The Rarita–Schwinger operator on Einstein spin manifolds ····· 10

Yasushi Homma (Waseda Univ.)　The Rarita–Schwinger operator on Einstein spin manifolds

概要 The Rarita–Schwinger operator is an elliptic first order differential operator on the spin 3/2 fields. We show that the operator on Einstein spin manifolds satisfies an algebraic relation, which gives an interesting feature of its spectrum. In particular, we have a method of calculating the spectrum on irreducible compact symmetric spaces.

23　池田　薫 (慶大経済)♭　戸田格子のエネルギーでパラメトライズされた $GL_n(\mathbb{R})$ の主系列表現と幾何学的量子化 ····· 15

Kaoru Ikeda (Keio Univ.)　The principal series of $GL_n(\mathbb{R})$ parameterized by the energy of the Toda lattice and geometrical quantizations

概要 In this talk I introduce the geometrical constructions of the unitary representations of $GL_n(\mathbb{R})$ along the recipe of the geometrical quantization given by Kostant. The unitary representations are classified by the connections defied by the iso-energy surfaces of the Toda lattice

24　中村　聡 (東北大理)　因子付き K-安定性と Log-二木不変量 ····· 10

Satoshi Nakamura (Tohoku Univ.)　K-stability with a divisor and Log-Futaki invariant

概要 Szekelyhidi introduced the notion of K-stability with a divisor in his Ph. D. thesis. By studying his K-stability condition, we got an numerical obstruction to existence of constant scalar curvature Kähler metric which has cusp singularity along a divisor.

25　細野元気 (東大数理)*　Approximations and examples of singular Hermitian metrics on vector bundles ····· 15

Genki Hosono (Univ. of Tokyo)　Approximations and examples of singular Hermitian metrics on vector bundles

概要 We study singular Hermitian metrics on vector bundles on complex manifolds. In this talk, we give two results and examples. Our first result shows coherence of the higher rank analogue of multiplier ideals when metrics are defined by global sections. Related to this result, we construct an example of a singular Hermitian metric whose Nakano-curvature is not bounded below. Our second result can be used to determine all negatively curved singular Hermitian metrics on certain rank 2 bundles on elliptic curves.

26　秦泉寺雅夫 (北大理)　Toward direct proof of mirror theorem of projective hypersurfaces ···· 15

Masao Jinzenji (Hokkaido Univ.)　Toward direct proof of mirror theorem of projective hypersurfaces

概要 We discuss direct computational proof of mirror theorem (especially generalized mirror transformation) of genus 0 Gromov–Witten invariants of projective hypersurfaces. The main difficulty lies in taking non-equivariant limit of residue integral representation of Gromov–Witten invariants. We have constructed a way to take this limit up to $d = 8$ rationnal curves. If this construction is completed, the proof is reduced to combinatorial identities of rational functions associated with tree graphs.

14:15〜16:25

27　國川慶太 (東北大理)　一般余次元トランスレーティングソリトンの分裂定理 ····· 15

Keita Kunikawa (Tohoku Univ.)　Splitting theorem for translating solitons in arbitrary codimension

概要 We study the translating solitons of the mean curvature flow. Although many authors study the translating solitons in codimension one, there are few examples for higher codimensional cases except for Lagrangian translating solitons. First we give non-trivial examples of translating solitons in arbitrary codimension. We will see that they have the property called parallel principal normal (PPN). Inspired by this fact and the work of Smoczyk for self-shrinkers in 2005, we then show the splitting theorem for complete translating solitons with PPN.

概要 In this talk, we shall give an upper diameter bound for compact shrinking gradient Ricci solitons in terms of the range of the scalar curvature. As an application, we shall provide a sufficient condition for four-dimensional compact shrinking gradient Ricci solitons to satisfy the Hitchin–Thorpe inequality.

概要 Kähler–Ricci solitons arise from the geometric analysis, such as Kähler–Ricci flow, and have been studied extensively in recent years. As is the case of Kähler–Einstein metrics, it is expected that the existence of Kähler–Ricci solitons is closely related to some GIT stability of manifolds. For instance, Donaldson showed that any cscK manifolds with discrete automorphism group admit the sequence of balanced metrics. In this talk, we explain that an analogue of this result also holds for Kähler–Ricci solitons. We introduce a certain kind of balanced metric, called quantized Kähler–Ricci solitons, and show that the strong analytic K-polystability leads to the existence of quantized Kähler–Ricci solitons, and this sequence converges to the Kähler–Ricci soliton in the L^1-topology.

概要 Presentation of the subject is that deforming a symplectic structure on a manifold by applying the theory of a quasi-Poisson action with a moment mapping to a symplectic manifold with a Hamilton action. In particular, we fully describe the deformation of the symplectic structure of the canonical Kähler form on $\mathbb{C}P^1$.

概要 Calculating the spectral invariants of Floer homology of distance-like functions, we recently found some kind of superheavy subsets in symplectic manifolds. We showed if convex open subsets in Euclidian space with the standard symplectic form are disjointly embedded in a spherically negative monotone closed symplectic manifold, their compliment is superheavy. The key of the proof is the estimate of the Conley–Zhender index of the periodic orbits of the special Hamiltonian. This method can also be applied to spherically monotone symplectic manifolds, by which we can show an analogous property of spherically monotone symplectic manifolds.

概要 We will talk about Hofer's pseudo matric on the space of Lagrangian submanifolds. We will explain an inequality which is the Lagrangian version of the inequality of Gromov width and displacement energy which is called energy-capacity inequality.

33　杉本佳弘 (京大数理研)♭　Symplectic homology を用いた partial symplectic quasi-state の構成とその応用 ····· 15

Yoshihiro Sugimoto (Kyoto Univ.)　A construction of a partial symplectic quasi-state via symplectic homology and its application

概要 We use symplectic homology to construct partial symplectic quasi-states on symplectic manifolds with contact type boundaries. We apply this partial symplectic quasi-states to the study of symplectic homology itself. We prove that our symplectic homology of a symplectic manifold with a contact type boundary vanishes if it is displaceable in its symplectic completion.

16:45〜17:45　特別講演

見村万佐人 (東北大理)*　離散群のバナッハ空間への固定点性質の, 真の代数化

Masato Mimura (Tohoku Univ.)　Strong algebraization of fixed point properties

概要 Purely algebraic criteria of fixed point properties with respect to superreflexive Banach spaces, under relative fixed point property, inspired from Shalom's one in ICM 2006, are established. No bounded generation is imposed. One application is that Steinberg groups $\mathrm{St}(n, A)$ over any finitely generated, unital, commutative, and associative ring A, possibly noncommutative, enjoy the fixed point property with respect to any noncommutative L_p-space, provided that n at least 4, and that p in $(1, \infty)$.

9月16日(水)　第X会場

10:00〜12:00

34　伊藤仁一 (熊本大教育)　円織面, 直角双曲線織面としての二次曲面 ····· 10
山下雄太郎 (三股中)

Jin-ichi Itoh (Kumamoto Univ.)　Quadratic surfaces as the surfaces generated by circles or rectangular hyperbolas
Yutaro Yamashita (Mimata Junior High School)

概要 D. Hilbert and S. Cohn-Vossen wrote in their book "Anschauliche Geometrie" that ellipsoids and other quadratic surfaces are generated by parallel circles. Here we show how ellipsoids, one-sheeted hyperboloids, two-sheeted hyperboloids, and elliptic paraboloids are explicitly represented by two families of parallel circles (as circular surfaces) using coordinates. As circles are important objects in ellipsoids, rectangular hyperbolas (whose two asymptotes are orthogonal) are important objects in general hyperbolas. We found that many one-sheeted hyperbolas and two sheeted hyperbolas are represented by parallel circles (how they are constructed by rectangular hyperbola), and there are infinitely many families of parallel rectangular hyperbola instead of only two as in circular cases. Also all hyperbolic paraboloids are generated by rectangular hyperbolas.

35　伊藤仁一 (熊本大教育)　Moderate smoothness of most Alexandrov surfaces ····· 10
J. Rouyer (IMRA, Bucharest)
C. Vîlcu (IMRA, Bucharest)

Jin-ichi Itoh (Kumamoto Univ.)　Moderate smoothness of most Alexandrov surfaces
Joël Rouyer (IMRA, Bucharest)
Costin Vîlcu (IMRA, Bucharest)

概要 We show that, in the sense of Baire categories, a typical Alexandrov surface with curvature bounded below by κ has no conical points. We use this result to prove that, on such a surface (unless it is flat), at a typical point, the lower and the upper Gaussian curvatures are equal to κ and ∞ respectively.

概要 Let P be a finite set of points in a compact surface M. The Voronoi edges are contained in the cut locus of P. We study a relation of the Voronoi edges and the cut locus of P. In particular, we show the Euler characteristic of M by the numbers of the minimum points, saddle points and maximum points of the distance function to P.

概要 We study Riemannian manifolds with boundary under a lower weighted Ricci curvature bound. We prove several rigidity theorems for such manifolds with boundary. We have a rigidity theorem for the inscribed radii, a volume growth rigidity theorem for the metric neighborhoods of the boundaries, and a splitting theorem. We also obtain rigidity results for the smallest Dirichlet eigenvalues for the weighted p-Laplacians.

概要 We give an equivalent relation between the finiteness of the diameter of a metric measure space with Riemannian curvature-dimension condition and a behavior of the heat distributions on such space. As an application, we also give a dimeter bound, which is asymptotically sharp estimate. The result had not been known even in the case of Riemannian manifolds.

概要 It is shown by Colding and Minicozzi the uniqueness of the tangent cone at infinity of Ricci-flat manifolds with Euclidean volume growth which has at least one tangent cone at infinity with a smooth cross section. In this article we raise an example of the Ricci-flat manifold implying that the assumption for the volume growth in the above result is essential. More precisely, we construct a complete Ricci-flat manifold of dimension 4 with non-Euclidean volume growth who has at least two distinct tangent cones at infinity and one of them has a smooth cross section.

概要 We study and specify the high-dimensional limit of Stiefel manifolds as metric measure spaces in Gromov's topology. The limit is the infinite-dimensional Gaussian space, which is drastically different from the manifolds.

41　高津飛鳥 (首都大東京理工)♭　抽象 Wiener 空間上の Gauss 測度族の Wasserstein 幾何 ····· 15
河備浩司 (岡山大理)

Asuka Takatsu (Tokyo Metro. Univ.)　Riemannian Wasserstein geometry on the space of Gaussian measures
Hiroshi Kawabi (Okayama Univ.)　over the Wiener space

概要 The space of Gaussian measures on an abstract Wiener space being equivalent to the Wiener measure becomes a Hilbert manifold, and the manifold admits a non-positive Riemannian metric derived from the information geometry. We consider another geometric structure on the manifold, so-called the Wasserstein geometry, which is a metric geometry on the space of probability measures. We first show the convexity of the manifold with respect to the Wasserstein geometry, which enables us to restrict the Wasserstein geometry to the manifold naturally. We then construct a Riemannian metric on the manifold, which induces the Wasserstein distance function. The Riemannian manifold has a non-negative sectional curvature, which provdies the difference from the information geometry.

14:15〜16:15

42　大鳥羽暢彦 (慶大理工)*　球面束上のスカラー曲率一定計量 ····· 15
J. Petean (CIMAT)

Nobuhiko Otoba (Keio Univ.)　Metrics of constant scalar curvature on sphere bundles
Jimmy Petean (CIMAT)

概要 We construct Riemannian metrics of constant scalar curvature on twisted sphere bundles and draw a similar picture as in the following situation studied previously by O. Kobayashi (1985, 1987), Schoen (1989), Petean (2010) et al. Let $r > 0$ be a real number and $g(r)$ the Riemannian metric of $S^m(1) \times S^k(r)$, the direct product of two round spheres ($m \geq 1$, $k \geq 1$, $n := m + k \geq 3$). The number of solutions to the corresponding Yamabe equation

$$-4\tfrac{n-1}{n-2}\Delta_{g(r)}u + R_{g(r)}u = R_{g(r)}u^{\frac{n+2}{n-2}} \qquad (u > 0)$$

on $S^m \times S^k$ diverges to infinity as $r \to \infty$ (resp. $r \to 0$) unless $m = 1$ (resp. $k = 1$). On the other hand, if $\frac{k-1}{m} \leq r^2 \leq \frac{k}{m-1}$, there is no nonconstant solution depending only on one of the S^m- and S^k-variables.

43　梅原慶裕 (東北大理)　3 次元閉多様体上の二つの共形不変量の組の分布について ····· 15

Yoshihiro Umehara (Tohoku Univ.)　Distribution of the pair of two conformal invariant on a 3-dimensional closed manifold

概要 For a smooth closed manifold X of dimension three, the author study the distribution of the pair of two conformal invariant, which are the Yamabe constant and the L^1-norm of the Cotton tensor.

44　松本佳彦 (東工大理工)　漸近的双曲多様体の間の調和写像 ····· 15
芥川和雄 (東工大理工)

Yoshihiko Matsumoto (Tokyo Tech)　Harmonic maps between asymptotically hyperbolic manifolds
Kazuo Akutagawa (Tokyo Tech)

概要 We consider the asymptotic Dirichlet problem for harmonic maps between noncompact manifolds. When the domain and the target manifolds are both hyperbolic spaces, existence and uniqueness were studied by Akutagawa and Li–Tam in the 1990s. Here we generalize their results to the case of asymptotically hyperbolic manifolds. Analogously to the classical theorems of Eells–Sampson and Hamilton, the unique existence in each relative homotopy class is shown under some assumption.

概要 We extend the notion of Branson's Q-curvature to Weyl connections on even-dimensional conformal manifolds. This is related to an asymptotic Dirichlet problem for Weyl structures on asymptotically hyperbolic manifolds that are approximately Einstein.

概要 Kellerhals and Perren conjectured that the growth rates of the reflection groups given by hyperbolic Coxeter polyhedra are always Perron numbers. We prove that this conjecture is always true for the case of ideal Coxeter polyhedra in $\mathbb{H}^3$. We also detect the ideal Coxeter polyhedron in $\mathbb{H}^3$ with the minimal growth rate. In addition, we show that there are correlations between the volumes and the growth rates of ideal Coxeter polyhedra in $\mathbb{H}^3$ in many cases.

概要 I will discuss about the entropy, the speed and the volume growth associated with a random walk on a hyperbolic group.

概要 We study correspondence between the following: (1) large scale structure of the metric space consisting of Cayley graphs of finite groups with k generators; (2) structure of groups which appear in the boundary in the space of k-marked groups. We show the correspondence among the metric properties 'geometric property (T)', 'cohomological property (T),' and the group property 'Kazhdan's property (T)'. Geometric property (T) of Willett–Yu is stronger than being expander graphs. Cohomological property (T) is stronger than geometric property (T) for general coarse spaces.

16:45〜17:45　特別講演

深 谷 友 宏 (東 北 大 理)　相対双曲群の境界と粗幾何学

Tomohiro Fukaya (Tohoku Univ.)　Boundary of relatively hyperbolic group and the coarse geometry

概要 Let G be a hyperbolic group. The Gromov boundary of G contains coarse geometric properties of G. For example, it can be used to show the injectivity of the coarse assembly map and thus, the Novikov conjecture of G. It is also used to study the group cohomology of G.

Higson and Roe constructed "coarse algebraic topology". By using this, they verified the coarse Baum–Connes conjecture for CAT(0)-groups and hyperbolic groups. Boundaries play an important rule in their theory. Fukaya–Oguni verified the coarse Baum–Connes conjecture for the product of hyperbolic groups, CAT(0)-groups, polycyclic groups, and, some relatively hyperbolic groups. In our theory it is essential to construct an appropriate boundary of the product of metric spaces.

Relatively hyperbolic group H is characterized by the action on the compact metric space M. This space H can be regarded as a boundary of H, and thus is called the Bowditch boundary. However, M is not enough to study the coarse geometric properties of H. We constructed an appropriate boundary of H by blowing-up all parabolic points of the Bowditch boundary. In the construction, we use the "coarse structure", which is not neccesary induced by a metric. We will explain how we can use this boundary to study the coarse geometric properties of H, for example, to compute the K-theory of the Roe algebra of H, via the coarse assembly map.

函　数　論

9月13日(日)　　第IX会場

9:30〜12:00

1　西　本　勝　之 (デカルト出版)*　The solutions to the Laplace's non-homogeneous ordinary differential equations by means of the N-fractional calculus ····· 15

Katsuyuki Nishimoto (Descartes Press Co.)　The solutions to the Laplace's non-homogeneous ordinary differential equations by means of the N-fractional calculus

概要 In this article, the solutions to the non-homogeneous ordinary differential equations with linear coefficients, $\varphi_2 \cdot (az+b) + \varphi_1 \cdot (gz+h) + \varphi \cdot (pz+q) = f$, $(\varphi_\nu = d^\nu\varphi/dz^\nu$ for $\nu > 0$, $\varphi_0 = \varphi = \varphi(z)$, a, b, g, h, p, q: *constants*, $agp \neq 0$, $f = f(z) \neq 0)$ which are called as "the Laplace's ordinary differential equations", are discussed by means of the N (Nishimoto's)-fractional calculus (NFC-method) (The calculus in the 21st century).

2　尾　和　重　義 (大和大教育)*　Notes on some conditions for univalency ····· 10

Shigeyoshi Owa (Yamato Univ.)　Notes on some conditions for univalency

概要 Let $\mathcal{A}$ be the class of functions $f(z)$ in the open unit disk $\mathbb{U}$ with $f(0) = f'(0) - 1 = 0$. Let $\mathcal{S}$ and $\mathcal{S}^*$ be subclasses of $\mathcal{A}$ consisting of $f(z)$ which are univalent in $\mathbb{U}$ and starlike in $\mathbb{U}$, respectively. The object of the present talk is to discuss some conditions for $f(z)$ to be in the classes $\mathcal{S}$ and $\mathcal{S}^*$.

3　黒　木　和　雄 (大阪体育大)　Some starlikeness conditions concerned with the second coefficient ···· 15

Kazuo Kuroki (Osaka Univ. of Health and Sport Sci.)　Some starlikeness conditions concerned with the second coefficient

概要 Let $\mathcal{A}$ be the class of analytic functions $f(z) = z + \sum_{k=2}^{\infty} a_k z^k$ in the open unit disk $\mathbb{U} = \{z \in \mathbb{C} : |z| < 1\}$. Some starlikeness conditions for $f(z) \in \mathcal{A}$ missing the second coefficient a_2 were discussed. In the present talk, by considering starlikeness of order α for $f(z) \in \mathcal{A}$ with $a_2 \neq 0$, we discuss some starlikeness conditions concerned with the second coefficient a_2.

4　早　味　俊　夫 (摂南大理工)　Notes on the convex combinations of harmonic univalent functions ··· 15

Toshio Hayami (Setsunan Univ.)　Notes on the convex combinations of harmonic univalent functions

概要 Let $\mathcal{H}$ be the class of all functions $f(z) = h(z) + \overline{g(z)}$ which are harmonic and sense-preserving in the open unit disk $\mathbb{U} = \{z : z \in \mathbb{C} \text{ and } |z| < 1\}$ and normalized by $f(0) = h'(0) - 1 = 0$, and let $\mathcal{S}_\mathcal{H}$ be the subclass of $\mathcal{H}$ consisting of all univalent functions in $\mathbb{U}$. This class is preserved under some elementary transformations. But we note that even if $f_1(z)$ and $f_2(z)$ are in $\mathcal{S}_\mathcal{H}$, the convex combination $f_3(z)$ of $f_1(z)$ and $f_2(z)$ defined as $f_3(z) = tf_1(z) + (1-t)f_2(z)$ $(0 < t < 1)$ is not necessarily a member of $\mathcal{S}_\mathcal{H}$. In the present talk, we discuss some conditions for $f_3(z)$ to belong to $\mathcal{S}_\mathcal{H}$.

5　大野林太郎 (東北大情報)　Conditions and properties of concave functions ····· 15

Rintaro Ohno (Tohoku Univ.)　Conditions and properties of concave functions

概要 Similar to starlike or convex functions, concave functions define a special class in the geometric function theory. Meromorphic functions with a simple pole inside the unit disk are said to be concave, if they map the unit disk conformally onto the complement of a convex set. In this presentation we will introduce some analytic characterizations of concave functions as well as extensions to the necessary and sufficient conditions. We will also take a closer look at the coefficients using these properties and discuss their bounds.

概要 Let

$$f(z) = c_0 + \sum_{k=1}^{\infty} c_k z^{n_k}$$

be a power series with Hadamard gaps, i.e. $n_{k+1}/n_k \geq q > 1$ $(k \geq 1)$, convergent in the unit disk $D = \{|z| < 1\}$. It is known that if $\limsup_{k\to\infty} |c_k| > 0$, then $f(z)$ has no finite defective value. We shall discuss the defects of $f(z)$ in the case where $\lim_{k\to\infty} c_k = 0$ and $\sum_{k=0}^{\infty} |c_k|^2 = +\infty$.

概要 In this talk we are concerned with Trudinger's inequality for Riesz potentials of functions in Musielak–Orlicz spaces on metric measure spaces.

概要 We consider parabolic operators of fractional order and their iterates on the upper half space on the euclidean space. We deal with Hilbert spaces of solutions of those parabolic equations. We shall discuss, in this talk, the existence of reproducing kernels and give an explicit form by using their fundamental solutions.

概要 We consider the polyharmonic Bergman space on the unit ball. We give the form of the reproducing kernel of biharmonic Bergman space and the estimates for the reproducing kernel.

14:15〜16:15

概要 We explain a new phenomenon which concern about small copies of the Mandelbrot set.

概要 We will see J-stability theorem of immediately expanding rational maps in non-Archimedean dynamics as an analogue of R. Manñè, P. Sad, and D. Sullivan's J-stability theorem in complex dynamics.

概要 We will talk about an approximation of the activity current T_c in the parameter space Λ (a connected complex manifold) of a holomorphic family $f : \Lambda \times \mathbb{P}^1 \to \mathbb{P}^1$ of rational functions $f_\lambda = f(\lambda, \cdot)$ of degree $d > 1$ having a marked critical point $c : \Lambda \to \mathbb{P}^1$ by parameters λ for which $c(\lambda)$ is periodic under f_λ, i.e., is a superattracting periodic point.
This gives an affirmative answer, in the superattracting case, to a question on the removability of a seemingly technical assumption on the parameter space Λ posed by Dujardin–Favre for rational functions having preperiodic critical points, and refines Bassanelli–Berteloot on a similar approximation of the bifurcation current T_f of the holomorphic family f, simplifying the original proofs of those results.

概要 Regarding the i.i.d. random dynamical system on the extended real line such that at every step we choose $f_1(x) = 2x$ with probability p and we choose $f_2(x) = 2x - 1$ with probability $1 - p$, let $A_p(x)$ be the probability of tending to $+\infty$ regarding the random orbits starting with the initial value x. Then the function $A_p(x)$ on $[0, 1]$ is equal to Lebegue's singular function with respect to parameter p. Also, the partial derivative $\frac{\partial A_p(x)}{\partial p}|_{p=1/2}$ with respect to p at $p = 1/2$ is equal to $2B(x)$, where $B(x)$ is the Takagi function. We consider complex analogues of the above story in random complex dynamical systems.

概要 Recently, H. Sumi introduced complex analogues of the Takagi function, which play a role in the iteration of rational maps on the Riemann sphere $\hat{\mathbb{C}}$ and random complex dynamical systems. We investigate the Hölder regularity of a complex analogue C of the Takagi function. Under certain assumptions, by employing methods from ergodic theory, we obtain new results about the set of points in which C satisfies a local Hölder condition with a prescribed Hölder exponent. In particular, we determine the set of points $z \in \hat{\mathbb{C}}$ for which C is not locally constant in a neighbourhood of z. This is a joint work with H. Sumi.

概要 We will extend the results on the non-landing of stretching rays for real cubic polynomials to non-real cubic polynomials. For a given critical portrait, there exists a surface which consists of cubic polynomials with that critical portrait. In this surface, stretching rays are level curves of the Boettcher vector map. We will show that, if the Boettcher vector is not an integer, the ray does not land, that is, its accumulation set is non-trivial.

16　梶 野 直 孝 (神 戸 大 理)　Apollonian gasket 上の Laplacian とその Weyl 型固有値漸近挙動 · · · · · · 15

Naotaka Kajino (Kobe Univ.)　The Laplacian on the Apollonian gasket and its Weyl type eigenvalue asymptotics

概要 The *Apollonian gasket* is a fractal subset of $\mathbb{R}^2$ obtained by repeating indefinitely the process of removing the interior of the inner tangent circles of the ideal triangles starting from an ideal triangle. (The closed region in $\mathbb{R}^2$ enclosed by three circles each of which is tangent to the other two is called an *ideal triangle*.) It has been observed by Teplyaev that the notion of a canonical energy form can be introduced for functions on the Apollonian gasket but no analysis of this form has been done. The purpose of this talk is to present the author's recent results on a concrete description of this energy form, its closedness in an appropriate L^2-space, and the Weyl type eigenvalue asymptotics of the associated Laplacian saying that the growth order of the large eigenvalues is given by the Hausdorff dimension d of the Apollonian gasket and that the limit in the asymptotics is comparable to the d-dimensional Hausdorff measure of the gasket.

16:30〜17:30　特別講演

鈴 木 紀 明 (名 城 大 理 工)*　多項式近似とポテンシャル論

Noriaki Suzuki (Meijo Univ.)　Polynomial approximation and potential theory

概要 We study polynomial approximation on real line $\mathbf{R}$ with exponential weights of the form $w(x) = \exp(-Q(x))$. We assume that w belong to a relevent class $\mathcal{F}(C^2+)$. Let $\mathcal{P}_n$ be the set of all polynomials of degree not more than $n \in \mathbf{N}$. Put $E_{n,p}(f,w) = \inf_{P\in\mathcal{P}_n} \|(f-P)w\|_{L^p(\mathbf{R})}$ for $fw \in L^p(\mathbf{R})$, $1 \le p < \infty$ and $fw \in C_0(\mathbf{R})$ when $p = \infty$. A question is that when $\lim_{n\to\infty} E_{p,n}(f,w) = 0$ holds, which is known as the Bernstein approximation problem. In the 1970's, G. Freud investigates systematically for a weight $Q(x) = |x|^\alpha$, $\alpha > 1$. In his theory, infinite-finite range inequalities play an important role, which means $\|PW\|_{L^p(\mathbf{R})} \le C\|PW\|_{L^p(I_n)}$ for all $P \in \mathcal{P}_n$, where $I_n = [-cn^{1/\alpha}, cn^{1/\alpha}]$. In 1984, potential theory gave a big breakthrough on approximation theory. Rakhmanov and Mhasker–Saff independently defined a number a_n by a solution of $2\int_0^1 a_n t Q'(a_n t)/\sqrt{1-t^2}dt = n\pi$, which is called the MRS number. By using weighted potential theory, they proved $\|PW\|_{L^p(\mathbf{R})} \le 2\|PW\|_{L^p(J_n)}$ for all $P \in \mathcal{P}_n$, where $J_n = [-a_n, a_n]$. Note that a weight w in $\mathcal{F}(C^2+)$ has a positive answer to the Bernstein problem. For $w \in \mathcal{F}(C^2+)$, we set $T(x) = xQ'(x)/Q(x)$. If T is bounded, then w ia called a Freud-type weight. Otherwise, w is called an Erdös-type weight. There are many study for Freud-type weights, for, example, $E_{p,n}(f,w) \le CE_{p,n-1}(f',w)$ (Favard inequality) and $\|P'w\|_{L^p(\mathbf{R})} \le C(n/a_n)\|Pw\|_{L^p(J_n)}$ holds for every $P \in \mathcal{P}_n$ (Markov–Bernsten inequality). The main purpose of my talk is to give extensions of the above results to Erdöd-type weights. Then powers of T appear in those inequalities.

9月14日(月)　第IX会場

9:30〜12:00

17　小 森 洋 平 (早 大 教 育)　3次元双曲理想コクセター多面体の増大度について · · · · · · · · · · · · · · · · · 15
雪 田 友 成 (早 大 教 育)

Yohei Komori (Waseda Univ.)　On the growth rate of ideal Coxeter groups in hyperbolic 3-space
Tomoshige Yukita (Waseda Univ.)

概要 We study the set $\mathcal{S}$ of growth rates of of ideal Coxeter groups in hyperbolic 3-space which consists of real algebraic integers greater than 1. We show that (1) $\mathcal{S}$ is unbounded while it has the minimum, (2) any element of $\mathcal{S}$ is a Perron number, and (3) growth rates of of ideal Coxeter groups with n generators are located in the closed interval $[n-3, n-1]$.

18 松 崎 克 彦 (早 大 教 育) ヘルダー連続微分をもつ円周の微分同相写像の等角重心拡張の連続性 · · 15
Katsuhiko Matsuzaki (Waseda Univ.) Barycentric extension of circle diffeomorphisms

概要 The barycentric extension due to Douady and Earle gives a conformally natural extension of a quasisymmetric automorphism of the circle to a quasiconformal automorphism of the unit disk. We consider such extensions for circle diffeomorphisms of Hoelder continuous derivatives and show that this operation is continuous with respect to an appropriate topology for the space of corresponding Beltrami coefficients.

19 志 賀 啓 成 (東 工 大 理 工) Teichmüller 曲線の個数について · 15
Hiroshige Shiga (Tokyo Tech) On the number of Teichmüller curves

概要 Let $M(g,n)$ be the moduli space of Riemann surfaces of type (g,n) with $2g-2+n>0$. A Teichmüller curve is a pair (C,f) of a hyperbolic Riemann surface C of finite analytic type and a locally isometric holomorphic map $f : C \to M(g,n)$ with respect to the hyperbolic distance on C and the Teichmüller distance on $M(g,n)$. In this talk, we discuss a bound of the number of Teichmüller curves when the topological type of C is fixed.

20 天 野 政 紀 (東 工 大 理 工) On families of asymptotic Jenkins–Strebel rays · 15
Masanori Amano (Tokyo Tech) On families of asymptotic Jenkins–Strebel rays

概要 In this talk, we give a parametrization of asymptotic Jenkins–Strebel rays. For any admissible curve family of a surface, the subset of the boundary of the Teichmüller space which is constructed by pinching of the given curve family can be determined. There exists a homeomorphism of the product of parameter spaces and the boundary space onto the Teichmüller space such that each family of asymptotic Jenkins–Strebel rays is represented when varies only the parameters.

21 宮 地 秀 樹 (阪 大 理) Extremal length functions are log-plurisubharmonic · · · · · · · · · · · · · · · · 15
Hideki Miyachi (Osaka Univ.) Extremal length functions are log-plurisubharmonic

概要 In this talk, we shall show that the extremal length functions on Teichmüller space are log-plurisubharmonic. As a corollary, we obtain an alternative proof of S. Krushkal's result that a function defined by the Teichmüller distance from a reference point is plurisubharmonic. To show the log-plurisubharmonicity, we obtain explicit formulae of the Levi forms of the extremal length functions.

22 中 西 敏 浩 (島根大総合理工)* タイヒミュラー空間のトレース関数による座標系と写像類群 · · · · · · · · · · 15
中 村 豪 (愛知工大基礎教育センター)
Toshihiro Nakanishi (Shimane Univ.) Parametrization of Teichmüller spaces by trace functions and mapping class group
Gou Nakamura (Aichi Inst. of Tech.)

概要 We give a set of trace functions which give a global parametrization of the Teichmüller space $\mathcal{T}(g,n)$ such that the action of the mapping class group on $\mathcal{T}(g,n)$ can be represented by rational transformations in the parameters.

23 濱田英隆 (九州産大工) The Schwarz lemma and the Schwarz–Pick lemma in several complex variables ····· 10
G. Kohr (Babeş-Bolyai Univ.)
Hidetaka Hamada (Kyushu Sangyo Univ.) The Schwarz lemma and the Schwarz–Pick lemma in several complex variables
Gabriela Kohr (Babeş-Bolyai Univ.)

概要 We generalize the harmonic Schwarz lemma to pluriharmonic mappings of the unit ball B_X of a complex Banach space X into the unit ball B^n of $\mathbb{C}^n$ with respect to an arbitrary norm. Also, we obtain a generalization of the harmonic Schwarz–Pick lemma to the case of pluriharmonic mappings of the homogeneous unit ball B_X of a complex Banach space X into the unit ball B^n. Further, we will generalize the Schwarz–Pick lemma to holomorphic mappings of the homogeneous unit ball B_X of a complex Banach space X into the unit ball B_Y of an arbitrary complex Banach space Y.

24 濱田英隆 (九州産大工) The Landau theorem in several complex variables ····· 10
G. Kohr (Babeş-Bolyai Univ.)
Hidetaka Hamada (Kyushu Sangyo Univ.) The Landau theorem in several complex variables
Gabriela Kohr (Babeş-Bolyai Univ.)

概要 As an application of the Schwarz lemma and Schwarz–Pick lemma, we will generalize the Landau theorem by Chen and Gauthier to mappings of finite dimensional homogeneous unit balls into the Euclidean space. By using similar arguments, we can also generalize the pluriharmonic Landau theorem by Chen and Gauthier to mappings of finite dimensional homogeneous unit balls into the Euclidean space.

25 濱田英隆 (九州産大工) Bonk's distortion theorem and the Bloch constant for Bloch mappings in $\mathbb{C}^n$ ····· 15
Hidetaka Hamada (Kyushu Sangyo Univ.) Bonk's distortion theorem and the Bloch constant for Bloch mappings in $\mathbb{C}^n$

概要 Let B_X be a homogeneous unit ball in $X = \mathbb{C}^n$. In this talk, we generalize Bonk's distortion theorem to Bloch mappings on B_X. As an application, we give a lower bound of the Bloch constant.

13:15〜14:15 特別講演

大沢健夫 (名大多元数理)♭ L^2 extension theorems and Suita conjecture
Takeo Ohsawa (Nagoya Univ.) L^2 extension theorems and Suita conjecture

概要 In the theory of functions of complex variables, Riemann (1857) first tried to introduce a coordinate system in the set of algebraic functions of one variable. Periods of integrals of Riemann surfaces are components of such a coordinate. By generalizing this notion of periods, Griffiths established a theory of period mappings for families of compact Kaehler manifolds. Based on the theory of Griffiths, T. Fujita discovered a convexity property of this generalized period mapping in terms of the curvature of the direct image of relative canonical bundles. This is in the context of Hodge theory where the L^2 harmonic forms are analyzed. On the other hand, after the foundation of several complex variables was established by K. Oka and H. Cartan, the L^2 method was developed to obtain effective results in complex analysis and geometry. An extension theorem with L^2 growth condition was obtained in this context. It was applied to study singularities of plurisubharmonic functions, to prove the invariance of plurigenera for families of projective varieties, and to study the multiplier ideal sheaves. Recently, J. Cao proved in a general context that an L^2 extension theorem implies the semipositivity of the direct image of relative canonical bundles. Vice versa, B. Berndtsson and L. Lempert showed that such a curvature property implies an L^2 extension theorem in an optimal form. Since this progress is closely related to the solution of a long-standing conjecture of N. Suita, it might be a good occasion to give an overview of this development going back to the origin of the ideas of deformation and extension.

9月15日(火)　第IX会場

9:15〜12:00

26 田島慎一 (筑波大数理物質)* 局所コホモロジーを用いた Bruce–Roberts ミルナー数の計算法について
鍋島克輔 (徳島大総合) ····· 15

Shinichi Tajima (Univ. of Tsukuba) A method for computing Bruce–Roberts' Milnor numbers via local cohomology
Katsusuke Nabeshima (Univ. of Tokushima)

概要 A new effective method is proposed for computing Bruce–Roberts' Milnor numbers. A key ingredient of the proposed method is the concept of local cohomology.

27 田島慎一 (筑波大数理物質)* 超曲面に付随したホロノミー D-加群の計算アルゴリズムについて I···· 10
鍋島克輔 (徳島大総合)

Shinichi Tajima (Univ. of Tsukuba) Algorithms for computing holonomic D-modules associated with a hypersurface
Katsusuke Nabeshima (Univ. of Tokushima)

概要 Algorithms are obtaind for computing holonomic D-modules associated with hypersurface singularities.

28 田島慎一 (筑波大数理物質)* 超曲面に付随したホロノミー D-加群の計算アルゴリズムについて II ··· 10
鍋島克輔 (徳島大総合)

Shinichi Tajima (Univ. of Tsukuba) Algorithms for computing holonomic D-modules associated with a hypersurface II
Katsusuke Nabeshima (Univ. of Tokushima)

概要 The structure of holonomic D-modules associated with non-isolated hypersurface singularities is considered. Effectivity of the resulting algorithms is described by using examples.

29 奥山裕介 (京都工繊大工芸) Lehto–Virtanen, Marty, and Zalcman-type theorems and their applications to Kobayashi hyperbolic geometry ····· 15

Yûsuke Okuyama (Kyoto Inst. Tech.) Lehto–Virtanen, Marty, and Zalcman-type theorems and their applications to Kobayashi hyperbolic geometry

概要 We will talk about a Lehto–Virtanen-type theorem and a rescaling principle for an isolated essential singularity of a holomorphic curve in a complex space, as well as a Marty-type theorem and a Zalcman-type one for a family of holomorphic curves in a complex space, which are useful for establishing a big Picard-type theorem and a big Brody-type one for holomorphic curves.

30 本田竜広 (広島工大工) Growth, distortion and coefficient bounds on complex Banach spaces
I. Graham (Univ. of Toronto) ····· 15
濱田英隆 (九州産大工)
G. Kohr (Babeş-Bolyai Univ.)
Kwang Ho Shon (Pusan Nat. Univ.)

Tatsuhiro Honda (Hiroshima Inst. of Tech.) Growth, distortion and coefficient bounds on complex Banach spaces
Ian Graham (Univ. of Toronto)
Hidetaka Hamada (Kyushu Sangyo Univ.)
Gabriela Kohr (Babeş-Bolyai Univ.)
Kwang Ho Shon (Pusan Nat. Univ.)

概要 In this talk, we consider growth, distortion theorems and coefficient bounds for holomorphic mappings on the unit ball of on a complex Banach space, including some sharp improvements of existing results.

概要 Ueda's theory is a theory on a flatness criterion around a smooth hypersurface of a certain type of topologically trivial holomorphic line bundles. We propose a codimension two analogue of Ueda's theory. As an application, we give a sufficient condition for the anti-canonical bundle of the blow-up of the three dimensional projective space at 8 points to be non semi-ample however admit a smooth Hermitian metric with semi-positive curvature.

概要 We establish the variational formula of L_s-canonical semi-exact differential $(-1 < s \leq 1)$ for the deforming open torus $R(t)$ with complex parameter $t \in \Delta = \{|t| < r\}$. This formula implies the intimate relation between the Euclidean radius of the moduli disk for $R(t)$ and the pseudoconvexity.

概要 In the study of the holomorphic equivalence problem for tube domains, it is fundamental to investigate tube domains with polynomial infinitesimal automorphisms. To apply Lie group theory to the holomorphic equivalence problem for such tube domains T_Ω, investigating certain solvable subalgebras of $\mathfrak{g}(T_\Omega)$ plays an important role, where $\mathfrak{g}(T_\Omega)$ is the Lie algebra of all complete polynomial vector fields on T_Ω. Related to this theme, we discuss the structure and equivalence of a class of tube domains with solvable groups of automorphisms. Besides, we give a concrete example of a tube domain whose automorphism group is solvable and contains nonaffine automorphisms.

概要 As an application of a sharp L^2 extension theorem for holomorphic functions due to Guan–Zhou, a stability theorem for the boundary asymptotics of the Bergman kernel is proved. An alternate proof of this extension theorem is given, too. It is a simplified proof in the sense that it is free from ODE.

概要 We introduce a positive scalar function $\rho(a, \Omega)$ for a domain Ω of a complex manifold X with a global holomorphic frame of the cotangent bundle by closed Abelian differentials, which is an analogue of Hartogs' radius. We prove an *estimate of Cartan–Thullen type with* $\rho(a, \Omega)$ for holomorphically convex hulls of compact subsets. In one dimensional case, we apply the obtained estimate of $\rho(a, \Omega)$ to give a new proof of Behnke-Stein's Theorem for the Steiness of open Riemann surfaces. We then extend the idea to deal with the problem to generalize Oka's Theorem (IX) for ramified Riemann domains over $\mathbf{C}^n$. We obtain some geometric conditions in terms of $\rho(a, X)$ which imply the validity of the Levi problem (Hartogs' inverse problem) for a finitely sheeted ramified Riemann domain over $\mathbf{C}^n$.

函 数 方 程 式 論

9月13日(日)　第VI会場

9:00〜12:00

1 齋藤三郎 (群馬大★)*
L. P. Castro (Univ. of Aveiro)
藤原宏志 (京大情報)
M. M. Rodrigues (Univ. of Aveiro)
Vu Kim Tuan (Univ. of West Georgia)

Aveiro discretization method in mathematics: A new discretization principle (I: Principle) ····· 8

Saburou Saitoh (Gunma Univ.★)
L. P. Castro (Univ. of Aveiro)
H. Fujiwara (Kyoto Univ.)
M. M. Rodrigues (Univ. of Aveiro)
Vu Kim Tuan (Univ. of West Georgia)

Aveiro discretization method in mathematics: A new discretization principle (I: Principle)

概要 We found a very general discretization method for solving wide classes of mathematical problems by applying the theory of reproducing kernels. An illustration of the generality of the method is here performed by considering several distinct classes of problems to which the method is applied. In fact, one of the advantages of the present method —in comparison to other well-known and well established methods— is its global nature and no need of special or very particular data conditions. Numerical experiments have been made, and consequent results are here exhibited.

2 齋藤三郎 (群馬大★)*
L. P. Castro (Univ. of Aveiro)
藤原宏志 (京大情報)
M. M. Rodrigues (Univ. of Aveiro)
Vu Kim Tuan (Univ. of West Georgia)

Aveiro discretization method in mathematics: A new discretization principle (II: Applications) ····· 8

Saburou Saitoh (Gunma Univ.★)
L. P. Castro (Univ. of Aveiro)
H. Fujiwara (Kyoto Univ.)
M. M. Rodrigues (Univ. of Aveiro)
Vu Kim Tuan (Univ. of West Georgia)

Aveiro discretization method in mathematics: A new discretization principle (II: Applications)

概要 Due to the powerful results which arise from the application of the present method, we consider that this method has everything to become one of the next generation methods of solving general analytical problems by using computers. In particular, we would like to point out that we will be able to solve very global linear partial differential equations satisfying very general boundary conditions or initial values (and in a somehow independent way of the boundary and domain). Furthermore, we will be able to give an ultimate sampling theory and an ultimate realization of the consequent general reproducing kernel Hilbert spaces. The general theory is here presented in a constructive way, and containing some related historical and concrete examples.

概要 We have a slowly varying solution of the differential equation denoted in the title from a nonlinear differential equation with an irregular singular point. So, we state new theorems on the asymptoticity and the convergence of the formal power series solutions of this differetial equation in the general form, and get an analytical expression of that slowly varying solution from these theorems.

概要 A Functional equation $\sum_{i=1}^{m} a_i(z)u(\varphi_i(z)) = f(z)$ is considered, where $\{a_i(z)\}_{i=1}^{m}$, $\{\varphi_i(z)\}_{i=1}^{m}$ are holomorphic at $z = 0$ and $\varphi_i(0) = 0$, $\varphi_i'(0) = 1$ and $f(z)$ is holomorphic in a sector or a formal power series. We show under certain conditions that the equation has a solution of formal power series and for $f(z) \equiv 0$ it has a formal solution of the form $\tilde{v}(z) = e^{\psi(1/z)}z^{\alpha}\tilde{w}(z)$, where $\psi(t)$ is a polynomial of t and $\tilde{w}(z)$ is a formal power series. These shows that the equation has formal solutions of irregular singular type in the theory of ordinary equations.

概要 We introduce a generalization of the elliptic integral of the first kind by using the (p, q)-sine function. Applying the generalized elliptic integral to a new mean, which was defined by Bhatia and Li in 2012, we give another proof for their theorem on the mean.

概要 We give an method to evaluate A-hypergeometric polynomials numerically. The method utilizes a system of difference equations satisfied by the polynomial. A-hypergeometric polynomials are normalizing constants of A-distributions in statistics.

概要 We study the contiguity relations for hypergeometric functions of type (k, n), in terms of the twisted cohomology groups and the intersection forms. To write the contiguity relations explicitly, we use intersection matrices and their inverse. In this talk, I would like to give expressions of the inverses of some intersection matrices.

This study will be applied to the numerical evaluation of the normalizing constant of the hypergeometric distribution on the $r_1 \times r_2$ contingency tables with fixed marginal sums.

概要 We consider nonautonomous N-dimensional generalized Lotka–Volterra competition systems with delays. Under certain conditions we show that such systems are permanent. Our result gives an extension as well as an improvement of previous results.

概要 We consider a half-linear differential system:

$$x' = a_{11}(t)x + a_{12}(t)\phi_{p^*}(y), \quad y' = a_{21}(t)\phi_p(x) + a_{22}(t)y,$$

where all time-varying coefficients are continuous; p and p^* are positive numbers satisfying $1/p + 1/p^* = 1$; and $\phi_q(z) = |z|^{q-2}z$ for $q = p$ or $q = p^*$. The aim of this talk is to clarify that uniform asymptotic stability, exponential stability, global uniform asymptotic stability, and global exponential stability are equivalent for the half-linear differential system.

概要 We study an inverse problem to determine a nonlinearity of an autonomous equation from a blow-up time of solutions of the equation, focusing on the local uniqueness of the nonlinearity.

概要 In this talk we will classify the limits of the solutions of a linear integral delay system. In particular, if the solution tends to a point or a periodic orbit, we will give the explicit expressions in terms of the coefficient matrix, the delay parameter and the initial conditions.

概要 In this talk, we characterize the range of the wave operators for Schrödinger equations with time dependent short range potentials by way of wave packet transform.

13 古場　一 (早大理工)* 松岡秀樹 (東大数理)
Generalized quasi-reversibility method for a backward heat equation with a fractional Laplacian ····· 7

Hajime Koba (Waseda Univ.) Hideki Matsuoka (Univ. of Tokyo)
Generalized quasi-reversibility method for a backward heat equation with a fractional Laplacian

概要 We considers a backward problem on a heat equation with a fractional Laplacian. It is not easy to solve a backward heat equation directly. To consider a backward heat equation, we apply the N-th power of the Dirichlet–Laplacian and small parameters to regularize the equation. This method is called a quasi-reversibility method. We use the generalized quasi-reversibility method to study the backward heat system.

14:15〜16:15

14 堀内利郎 (茨城大理) 千葉奈緒希
Radial symmetry and its breaking in the Caffarelli–Kohn–Nirenberg type inequalities for $p = 1$ ····· 10

Toshio Horiuchi (Ibaraki Univ.) Naoki Chiba
Radial symmetry and its breaking in the Caffarelli–Kohn–Nirenberg type inequalities for $p = 1$

概要 The main purpose of this talk is to study the Caffarelli–Kohn–Nirenberg type inequalities with $p = 1$. We show that symmetry breaking of the best constants occurs provided that a parameter $|\gamma|$ is large enough. In the argument we effectively employ equivalence between the Caffarelli–Kohn–Nirenberg type inequalities with $p = 1$ and isoperimetric inequalities with weights.

15 側島基宏 (東京理大理)
Remarks on higher-order weighted Rellich inequalities in L^p ····· 12

Motohiro Sobajima (Tokyo Univ. of Sci.)
Remarks on higher-order weighted Rellich inequalities in L^p

概要 The validity of higher-order weighted Rellich inequalities with respect to L^p-norm in $\mathbb{R}^N$ ($\||x|^{\alpha-2m}u\|_{L^p} \le C\||x|^{\alpha}\Delta u\|_{L^p}$) for $N \in \mathbb{N}$, $1 \le p \le \infty$, $m \in \mathbb{N}$ and $\alpha \in \mathbb{R}$ is investigated. The result generalizes the validity of weighted Rellich inequalities obtained in the previous work Metafune–Sobajima–Spina (2014).

16 池畠　優 (広島大工)* 伊藤弘道 (東京理大理) 笹本　明 (産業技術総合研)
The enclosure method for the evaluation of the spot welding area using a solution of the Laplace equation ····· 12

Masaru Ikehata (Hiroshima Univ.) Hiromichi Itou (Tokyo Univ. of Sci.) Akira Sasamoto (Nat. Inst. of Adv. Industrial Sci. and Tech.)
The enclosure method for the evaluation of the spot welding area using a solution of the Laplace equation

概要 We consider an inverse boundary value problem for the Laplace equation in two dimensions which is a mathematical formulation of a nondestructive evaluation to know the location and shape of the welded parts. Using the Enclosure Method, we give an explicit solution to the problem.

17　坂口　茂 (東北大情報)* Neutrally coated inclusions in three dimensions ····· 12
Hyeonbae Kang (Inha Univ.)
Hyundae Lee (Inha Univ.)

Shigeru Sakaguchi (Tohoku Univ.) Neutrally coated inclusions in three dimensions
Hyeonbae Kang (Inha Univ.)
Hyundae Lee (Inha Univ.)

概要 Among coated inclusions each of which consists of a core and a shell with different constant conductivities in three dimensions, we want to determine the neutrally coated inclusions, that is, those which are neutral to all uniform fields in the isotropic medium. We first derive an over-determined boundary value problem in the shell of the inclusion provided that the conductivity of the core is larger than that of the shell. Then we prove that if the over-determined problem admits a solution, then the inclusion must be spherical.

18　梶木屋龍治 (佐賀大理工)　A priori estimate for the first eigenvalue of the p-Laplacian ····· 12

Ryuji Kajikiya (Saga Univ.) A priori estimate for the first eigenvalue of the p-Laplacian

概要 For a convex domain, we give an a priori estimate for the first eigenvalue of the p-Laplacian in terms of the radius d of the maximum ball contained in the domain. As a consequence, we prove that the first eigenvalue diverges to infinity as $p \to \infty$ if the domain is convex and $d \leq 1$. We show that in the annulus $a < |x| < b$, the first eigenvalue diverges to infinity if $b - a \leq 2$ and converges to zero if $b - a > 2$.

19　劉　暁静 (茨城大理工)　p-ラプラシアンを含む強最大値原理についての注意 ····· 10
堀内利郎 (茨城大理)

Xiaojing Liu (Ibaraki Univ.) Remarks on the strong maximum principle involving p-Laplacian
Toshio Horiuchi (Ibaraki Univ.)

概要 The main purpose of this talk is to study the strong maximum principle involving p-Laplacian with $p \neq 2$. Let $N \geq 1$, $1 < p < \infty$ and $p^* = \max(1, p-1)$. Let Ω be a bounded domain of R^N. We shall study the strong maximum principle for the operator; $-\Delta_p + a(x)Q(\cdot)$. Here $a \geq 0$ a.e. in Ω, Δ_p is a p-Laplacian and $Q(\cdot)$ is a nonlinear term. Let $u \in L^1_{\mathrm{loc}}(\Omega)$ if $p = 2$ and let $u \in W^{1,p^*}_{\mathrm{loc}}(\Omega)$ if $p \neq 2$. We assume that $u \geq 0$ a.e. in Ω, $Q(u) \in L^1_{\mathrm{loc}}(\Omega)$ and $\Delta_p u$ is a Radon measure on Ω. When $p \neq 2$, we assume that u is admissible. Moreover, we assume that $-\Delta_p u + a(x)Q(u) \geq 0$ in Ω in the measure sense. Then we prove that if $\tilde{u} = 0$ on a set of positive $p-$capacity in Ω, then $u = 0$ a.e. in Ω. Here $\tilde{u}$ is a quasicontinuous representative of u.

20　薄羽邦弘 (東京理大理工)　Partial regularity of minimizers of $p(x)$-growth functionals with $1 < p(x) < 2$ ····· 10

Kunihiro Usuba (Tokyo Univ. of Sci.) Partial regularity of minimizers of $p(x)$-growth functionals with $1 < p(x) < 2$

概要 In this talk, we deal with the problem of regularity of the map which minimizes the functional of the type called $p(x)$-growth.
We prove partial regularity of minimizers u for $p(x)$-energy functionals of the following type

$$\mathcal{E}(u) = \int_\Omega (A_{ij}^{\alpha\beta}(x,u) D_\alpha u^i D_\beta u^j)^{p(x)/2} dx,$$

assuming that $A_{ij}^{\alpha\beta}(x,u)$ and $p(x)$ are sufficiently smooth and that $p(x)$ is subquadratic.
We prove that $u \in C^{0,\alpha}(\Omega_0)$ for some $\alpha \in (0,1)$ and an open set $\Omega_0 \subset \Omega$ with $\mathcal{H}^{m-\gamma_1}(\Omega - \Omega_0) = 0$, where $\mathcal{H}^s$ denotes the s-dimensional Hausdorff measure and $\gamma_1 = \inf_\Omega p(x)$.

16:30〜17:30　特別講演

眞野智行 (琉球大理)　大久保型微分方程式の多変数化と平坦構造

Toshiyuki Mano (Univ. of Ryukyus)　A generalization of differential equations of Okubo type to several variables case and flat structure

概要 The aim of this talk is to give a generalization of differential equations of Okubo type to several variables case and to show that the spaces of their independent variables admit a geometric structure called "flat structure". This construction gives a generalization of B. Dubrovin's theory on Frobenius manifolds. As a consequence of our construction, it is shown that the isomonodromic deformations of generic Okubo type differential equations are equivalent to solutions to a system of nonlinear differential equations called "generalized WDVV equation". Besides, we show the existence of a special generator system called "flat generator system" for the ring of invariant polynomials of a complex reflection group. This is a generalization of K. Saito's result for finite Coxeter groups.

9月14日(月)　第VI会場

9:00〜12:00

21　田中　敏 (岡山理大理)　Uniqueness of sign-changing radial solutions for the scalar field equation in some ball and annulus ····· 12

Satoshi Tanaka (Okayama Univ. of Sci.)　Uniqueness of sign-changing radial solutions for the scalar field equation in some ball and annulus

概要 The following Dirichlet problem is considered: $\Delta u - u + |u|^{p-1}u = 0$, $x \in \Omega$; $u = 0$, $x \in \partial\Omega$. Here, Ω is either an annulus or a ball in $\mathbf{R}^N$ and $p > 1$. The uniqueness of radial solutions having exactly $k-1$ nodes is shown for the following cases: Ω is a sufficiently thin annulus; Ω is a certain small ball, $N \geq 4$ and $1 < p < N/(N-2)$; Ω is the unit ball, $N = 3$ and $1 < p \leq 3$; Ω is any annulus or any ball, but $p > 1$ is sufficiently close to 1 and $N = 3$, 5 or 7.

22　森　竜樹 (龍谷大理工)
久藤衡介 (電通大情報理工)
辻川　亨 (宮崎大工)
四ツ谷晶二 (龍谷大理工)　Profiles of solutions to a stationary limiting problem for a cell polarization model ····· 12

Tatsuki Mori (Ryukoku Univ.)
Kousuke Kuto (Univ. of Electro-Comm.)
Tohru Tsujikawa (Univ. of Miyazaki)
Shoji Yotsutani (Ryukoku Univ.)　Profiles of solutions to a stationary limiting problem for a cell polarization model

概要 We investigate profiles and limiting profiles of solutions to a stationary limiting problem for a cell polarization model proposed by Y. Mori, A. Jilkine and L. Edelstein-Keshet in SIAM J. Appl Math (2011). Especially, we are interested in limiting profiles with an internal layer which appear due to mass constrain. We study them by using exact representation of solutions which we have obtained. This is a joint work with Professors K. Kuto (Univ. of Electro-Comm.), T. Tsujikawa (Univ. of Miyazaki) and Shoji Yotsutani (Ryukoku Univ.).

23　牧野　哲 (山口大*)*　Einstein–Euler 方程式の球対称解について (承前) ····· 12

Tetu Makino (Yamaguchi Univ.*)　On spherically symmetric solutions to the Einstein–Euler equations (Supplement)

概要 We consider the exterior metric to time dependent spherically symmetric solutions to the Einstein–Euler equations using the Schwartzschild metric under the Birkhoff's theorem.

概要 We establish the Hadamard variatinal formula for the higher variation of the Green function for the Laplace equation with the Dirichlet boundary condition under the smoothly domain perturbation.

概要 In this talk we consider the phase field method for the volume preserving mean curvature flow. In 1997 Golovaty studied the Allen–Cahn equation with non-local term. We show the convergence of the solution to the weak solution for the volume preserving mean curvature flow. The weak solution is called L^2-flow and is similar to the formulation of Brakke's mean curvature flow.

概要 In this talk we consider a mean curvature flow with transport terms and Neumann boundary conditions. We give the boundary gradient estimates for the mean curvature flow with the transport terms via the weighted monotonicity formula. The estimates depend on the $W^{1,p}_x L^q_t$-norm with respect to the transport terms, where $p, q > 1$ satisfy $1 - \frac{n}{p} - \frac{2}{q} > 0$. Our assumption of regularity for the transport terms is reasonable from the point of scaling arguments.

概要 We study a free boundary problem associated with the curvature dependent motion of planar curves in the upper half plane whose two endpoints slide along the horizontal axis with prescribed fixed contact angles. The main result concerns the classification of solutions; every solution falls into one of the three categories, namely, area expanding, area bounded and area shrinking types.

概要 We study in detail the asymptotic behavior of solutions on a free boundary problem associated with the curvature dependent motion of planar curves in the upper half plane whose two endpoints slide along the horizontal axis with prescribed fixed contact angles. We show that solutions are asymptotically self-similar both in the area expanding and the area shrinking cases, while solutions converge to either a stationary solution or a traveling wave in the area bounded case. We also explain results on the concavity properties of solutions.

概要 The asymptotic behavior of solutions to an area-preserving curvature flow of planar curves in the upper half plane is investigated. Two endpoints of the curve slide along the horizontal axis with prescribed fixed contact angles. First, by establishing an isoperimetric inequality, we prove the global existence of the solution. We then study the asymptotic behavior of solutions with concave initial data near a traveling wave.

概要 I am concerned with geometric evolution of interface under the dynamic boundary conditions. Using the level set approach the evolution of interface is described by the degenerate parabolic equations including mean curvature flow equation on dynamic boundary conditions. I introduce the notions of viscosity super-and subsolutions suitable for the singular degenerate parabolic equations on the dynamic boundary conditions. I establish comparison and existence theorems of initial value problem for the singular degenerate parabolic equations including mean curvature flow equation on the dynamic boundary conditions.

概要 For semilinear parabolic equations with a power nonlinearity, we consider the existence and the behavior of solutions with time-dependent singularities. Here, by time-dependent singularity, we mean a singularity with respect to the space variable whose position depends on the time variable. Under some condition for the nonlinearity, we construct solutions with a time-dependent singularity. This is a joint work with Toru Kan (Tokyo Institute of Technology).

概要 The Kuramoto–Sakaguchi equation is a partial integro-differential equation of the physical theory of coupled oscillators. It describes the temporal evolution of the phase distribution of coupled oscillators in the presence of some additive perturbation. In this talk, we summarize the recent arguments concerning the mathematical analysis of the Kuramoto–Sakaguchi equation, including the current status of our investigation.

概要 Let $H := -\Delta + V$ be a nonnegative Schrödinger operator on $L^2(\mathbf{R}^N)$, where $N \geq 2$ and V is a radially symmetric function decaying quadratically at the space infinity. In this talk we consider the Schrödinger heat semigroup e^{-tH} and make a complete table of the decay rates of the operator norms of e^{-tH} in the Lebesgue spaces as $t \to \infty$.

概要 We study the existence and the asymptotic stability of time-periodic solutions to the drift- diffusion model for semiconductors. If alternating-current voltage is applied to PN-junction diodes, a time-periodic current flow is observed. The main purpose of this talk is mathematical analysis on this periodic flow.

13:15〜14:15　特別講演

概要 In this talk we consider linear wave equations with time dependent coefficients and its application to a nonlinear wave equation. Some equations with variable coefficients can be handled by the same way for the constant coefficients if the coefficients are “approximate constants”. However, some properties of variable coefficients, for instance, oscillation, degeneration and less regularity, bring crucial problems if we directly apply some kind of standard method for constant coefficients equations. Actually, the behavior of some solutions of the equations with variable coefficients are quite different from the equations with constant coefficients. The aim of our research is to make clear the influence of some properties of variable coefficients to the solutions by using a precise analysis of the solution in Fourier space. Moreover, we try to apply the result for the global solvability of a non-linear wave equation of Kirchhoff type with non-analytic large data.

9月15日(火)　第VI会場

9:00〜12:00

35 藤江健太郎 (東京理大理)　感応性関数をもつ放物・放物型 Keller–Segel 系の球対称解の時間大域的存在と有界性 ····· 12
仙葉　隆 (九工大工)
Kentarou Fujie (Tokyo Univ. of Sci.)　Global existence and boundedness of radial solutions to a parabolic-parabolic Keller–Segel system with general sensitivity
Takasi Senba (Kyushu Inst. of Tech.)

概要 In this talk, global existence and boundedness of radial solutions to a fully parabolic Keller–Segel system will be established for general sensitivity.

36 溝口紀子 (東京学大教育)　Nonexistence of type I blowup solutions to parabolic-parabolic Keller–Segel system ····· 12
Noriko Mizoguchi (Tokyo Gakugei Univ.)　Nonexistence of type I blowup solutions to parabolic-parabolic Keller–Segel system

概要 This talk is concerned with the parabolic-parabolic Keller–Segel system in two dimensions. When a solution (u, v) blows up at $t = T < +\infty$, the blowup is called type I if $\|u(t)\|_\infty \le C(T-t)^{-1}$ for $t \in [0, T)$ with some constant $C > 0$, and type II otherwise. The speaker showed that each blowup is of type II under assumption of radial symmetry. It is given in this talk that the conclusion holds true in general case with no extra condition. The radial symmetry was essentially used in the proof of the previous result. A method in Navier–Stokes equations is useful in the proof in the general case.

37 内藤雄基 (愛媛大理)　Global attractivity in the weighted norm for a supercritical semilinear heat equation ····· 12
Yūki Naito (Ehime Univ.)　Global attractivity in the weighted norm for a supercritical semilinear heat equation

概要 We consider the behavior of solutions to the Cauchy problem for a semilinear heat equation with supercritical nonlinearity. We study the convergence of solutions to steady states in a weighted norm, and show the global attractivity property of steady states. We also give its convergence rate for a class of initial data.

38 中島主恵 (東京海洋大海洋)　Uniqueness and stability of multi-layered steady-state in a spatially inhomogeneous reaction diffusion equation ····· 12
Wei-Ming Ni (Univ. of Minnesota)
Kimie Nakashima (Tokyo Univ. of Marine Sci. and Tech.)　Uniqueness and stability of multi-layered steady-state in a spatially inhomogeneous reaction diffusion equation
Wei-Ming Ni (Univ. of Minnesota)

概要 In this talk we will consider a miglation selection model for the evolution of gene frequencie which is described as a reaction diffusin equation. We will show the existence of multi layered steady-state. We will also prove that the steady-state is linearly stable and unique.

概要 In this talk, we consider nonlinear diffusion problems of the form $u_t = \Delta u + f(u)$ with Stefan type free boundary conditions, where the nonlinear term $f(u)$ is monostable, bistable or combustion type. Such problems may be used to describe the spreading of a biological or chemical species. In this talk, we will focus on the radially symmetric solutions and their spreading phenomena, that is, the free boundary $|x| = h(t)$ goes to infinity and $u(t,x) \to 1$ as $t \to \infty$. We will give a sharp estimate of $h(t)$ and asymptotic profile of solution u for large t. In particular, we will give a difference between one dimensional case and radially symmetric case in high dimensions.

概要 We consider a point-condensation phenomenon in solutions of a semilinear elliptic equation with variable coefficients. This means that distribution of a solution concentrates in very narrow regions around a finitely many points. In order to know where the concentration points are, we introduce a locator function composed of the coefficients involved in the equation, and prove that any concentration point must be a critical point of the locator function. Moreover, we construct a solution concentrating near a nondegenerate critical point of the locator function.

概要 We consider 2D Smoluchowski–Poisson equation. In this model, blowup in infinite time arises only if the total mass is quantized.

概要 In this talk, a time domain enclosure method for an inverse obstacle scattering problem using a single electromagnetic wave is introduced. The wave is observed at the same place as the support of the source over a finite time interval and the governing equation is given by the Maxwell system outside the obstacle. It is assumed that the obstacle is a perfect conductor placed in the whole space. Two types of analytical formulae which contain information about the geometry of the obstacle are given.

概要 We consider the initial value problem for a fourth-order dispersive flow equation for maps from the one-dimensional flat torus into compact Riemann surfaces with constant sectional curvature, as a generalization of two-sphere-valued physical models. We show the uniqueness of a time-local solution to the initial value problem.

概要 This talk is devoted to find Gevrey class solutions for the Cauchy problem to the Kirchhoff equation. Similar results are obtained for the initial-boundary value problems in bounded domains and exterior domains with compact boundary.

概要 We consider the large time behavior of solutions of the Cauchy problem of the quasilinear wave equation: $\partial_t^2 u = \partial_x((1+u)^{2a}\partial_x u)$, which has richly physical backgrounds. If $1+u(0,x)$ is bounded away from a positive constant, we can construct a local solution for smooth initial data. When $1+u(t,x)$ is going to 0 in finite time, the equation degenerates. We give a sufficient condition that the equation degenerates in finite time. A known result on global existence and our main theorem determine a threshold of $\int_{\mathbb{R}} u_1(x)dx$ separating the global existence of solutions and the occurrence of the degeneracy.

概要 In this talk, we consider the initial value problem for semilinear damped wave equations in one space dimension. Wakasugi (2014) have obtained an upper bound of the lifespan for the problem in the subcritical case. Also, M. D'Abbicco & S. Lucente & M. Reissig (2014) showed the blow-up result in the critical case. The aim of this talk is to give an estimate of the upper bound of the lifespan in the critical case, and show the optimality of the upper bound. Also, we derive an estimate of the lower bound of the lifespan in the subcritical case which shows the optimality of the upper bound in Wakasugi. Moreover, we show that the critical exponent changes when the initial data satisfies some symmetric assumption.

概要 We study the Cauchy problem with small initial data for a system of semilinear wave equations $\Box u = |v|^p$, $\Box v = |\partial_t u|^p$ in n-dimensional space. When $n \geq 2$, we prove that blow-up can occur for arbitrarily small data if (p, q) lies below a curve in p-q plane. On the other hand, we show a global existence result for $n = 3$ which asserts that a portion of the curve is in fact the borderline between global-in-time existence and finite time blow-up. We also estimate the maximal existence time and get an upper bound, which is sharp at least for $(n, p, q) = (2, 2, 2)$ and $(3, 2, 2)$.

概要 The Cauchy problem is studied for systems of quasi-linear wave equations with multiple speeds in two space dimensions. Using the method of Klainerman and Sideris together with the localized energy estimate, we give an alternative proof of a beautiful result of Hoshiga and Kubo (*Global small amplitude solutions of nonlinear hyperbolic systems with a critical exponent under the null condition*, SIAM J. Math. Anal. **31** (2000), 486–513).

12:10〜12:30　2015 年度日本数学会解析学賞授賞式

14:15〜16:15

概要 We consider global behavior of solutions to generalized KdV equation in mass subcritical setting. The data is taken from a scale critical $\hat{L}^p$ space. It turns out that under a physical assumption on relation between nonlinear Schrodinger equation, there exists a threshold solution which has the smallest size in a suitable sense among all non-scattering soluitons.

概要 We study global existence and scattering for generalized Korteweg–de Vries (gKdV) equation in some scale critical space.

概要 We consider Hartree equations with inverse-square potentials $(\mathrm{HE})_a$:

$$i\frac{\partial u}{\partial t} = \Big(-\Delta + \frac{a}{|x|^2}\Big)u + \lambda u\,(|x|^{-\gamma} * |u|^2).$$

If $a > -(N-2)^2/4$, then we see blow-up in finite time ($\lambda < 0$, $\gamma > 2$) and scattering theory ($\lambda > 0$, $1 < \gamma < 2$) by virtue of virial identity. Now we have proved the virial identity for $(\mathrm{HE})_a$ with critical case $a = -(N-2)^2/4$; nevertheless the energy class does not coincide with $H^1(\mathbb{R}^N)$.

概要 Consider the initial value problem for systems of cubic derivative nonlinear Schrödinger equations in one space dimension with the masses satisfying a suitable resonance relation. We give structural conditions on the nonlinearity under which the small data solution gains an additional logarithmic decay as $t \to +\infty$ compared with the corresponding free evolution.

概要 We consider the Cauchy problem for a system of Schrödinger equations. We prove the existence and uniqueness of solutions in analytic function space characterized by the pseudo-conformal generators for data such as sufficiently small and exponential decay at infinity.

概要 Nonexistence of local solutions to the Cauchy problem of semirelativistic equations with power type nonlinearity is shown in scale subcritical and one space dimension case. The nonexistence result is obtained by a transformation of semirelativistic equations and a test function method with test functions which cancel the highest order derivatives.

概要 We consider the Cauchy problem for the fourth order nonlinear Schrödinger equation with derivative nonlinearity $(i\partial_t + \Delta^2)u = \pm|\nabla|(|u|^2u)$ on $\mathbb{R}^d$, $d \geq 3$, with random initial data. We prove that almost sure local in time well-posedness, small data global in time well-posedness and scattering hold in $H^s(\mathbb{R}^d)$ with $\max(\frac{d-5}{2}, \frac{d-5}{6}) < s$, whose lower bound is below the scale critical regularity $s_c = \frac{d-3}{2}$.

56 平山浩之 (名大多元数理)
岡本葵 (信州大工)
スケール臨界指数における 4 階非線型 Schrödinger 方程式の適切性と解の散乱について 10

Hiroyuki Hirayama (Nagoya Univ.)
Mamoru Okamoto (Shinshu Univ.)
Well-posedness and scattering for fourth order nonlinear Schrödinger type equations at the scaling critical regularity

概要 In this talk, we consider the Cauchy problem of the fourth order nonlinear Schrödinger type equation with derivative nonlinearity. In one dimensional case, we prove that the fourth order nonlinear Schrödinger equation with the derivative quartic nonlinearity $\partial_x(\overline{u}^4)$ is the small data global in time well-posed and scattering to a free solution. Furthermore, we show that the same result holds for the dimension $d \geq 2$ and derivative polynomial type nonlinearity, for example $|\nabla|(u^m)$ with $(m-1)d \geq 4$.

57 百名亮介 (早大理工)*
L^p-型の初期値に対する非線形シュレディンガー方程式の適切性について 10

Ryosuke Hyakuna (Waseda Univ.)
On the local well-posedness for the pure power NLS in one space dimension

概要 We consider the Cauchy problem for the 1D pure power NLS with the initial data $u_0 \in \widehat{H^{s,p}}$, where $\widehat{H^{s,p}} = \{\phi \in \mathcal{S}'(\mathbb{R}) : (1+\xi^2)^{\frac{s}{2}}\hat{\phi} \in L^{p'}\}$. It is shown that the initial value problem is locally well-posed if $0 < s < 1/2$ and p is near 2.

16:30〜17:30　特別講演

滝本和広 (広島大理)
Entire solutions to some types of parabolic Hessian equations

Kazuhiro Takimoto (Hiroshima Univ.)
Entire solutions to some types of parabolic Hessian equations

概要 In this talk, we shall obtain our recent results on the characterization of entire solutions to so-called parabolic Hessian equations which are fully nonlinear PDEs in general. This talk is based on joint works with Saori Nakamori.

9月16日(水)　第VI会場

9:00〜12:00

58 林雅行 (早大理工)
小澤徹 (早大理工)
Local well-posedness for the derivative nonlinear Schrödinger equation 10

Masayuki Hayashi (Waseda Univ.)
Tohru Ozawa (Waseda Univ.)
Local well-posedness for the derivative nonlinear Schrödinger equation

概要 We study Cauchy problem for Schrödinger equations in one space dimension with power nonlinearity involving derivative. Ambrose and Simpson established the local existence of solutions on a periodic domain in the energy space. We proved local well-posedness in the energy space by improving their method. Our proof is based on the compactness argument, the gauge transformation and the Strichartz estimates.

59 瓜屋航太 (東北大理)*
小川卓克 (東北大理)
岩渕司 (阪市大理)
2 次の非線形 Schrödinger 方程式系に対する非適切性について 12

Kota Uriya (Tohoku Univ.)
Takayoshi Ogawa (Tohoku Univ.)
Tsukasa Iwabuchi (Osaka City Univ.)
On the ill-posedness for a system of quadratic nonlinear Schrödinger equations

概要 We are concerned with the ill-posedness issue for a system of quadratic nonlinear Schrödinger equations in two dimensions. From previous studies for the large time behavior of the solution to the system, one may expect that the critical regularity to show the well-posedness depends on the dispersion coefficients. To prove the ill-posedness, we show the failure of the uniform continuity of the data-solution map for the mass resonance case and show the norm inflation for other cases.

60　近藤信太郎 (明大 MIMS)　Almost-periodic solution of Hasegawa–Wakatani equations with vanishing resistivity ····· 12

Shintaro Kondo (Meiji Univ.)

Almost-periodic solution of Hasegawa–Wakatani equations with vanishing resistivity

概要 In this talk, we consider the zero-resistivity limit for Hasegawa–Wakatani equations in a cylindrical domain when the initial data are Stepanov-almost-periodic in the axial direction. Hasegawa–Wakatani equations are nonlinear partial differential equations which describe nuclear fusion plasma. When the temperature of the plasma is very high, the resistivity of the plasma approaches zero; therefore, it is important for nuclear fusion plasma research to consider the case of zero resistivity.

61　許　本源 (東工大理工)
野津裕史 (早大高等研)
米田　剛 (東工大理工)　A local analysis of the axi-symmetric Navier–Stokes flow near a saddle point and no-slip flat boundary ····· 10

Penyuan Hsu (Tokyo Tech)
Hirofumi Notsu (Waseda Univ.)
Tsuyoshi Yoneda (Tokyo Tech)

A local analysis of the axi-symmetric Navier–Stokes flow near a saddle point and no-slip flat boundary

概要 We do numerical computations on axi-symmetric Navier–Stokes flows with no-slip flat boundary. We compare a hyperbolic flow with swirl and one without swirl and observe that the following phenomenons occur only in the swirl case: The distance between the maximum point of the velocity and the z-axis is drastically changing around some time (turning point). An "increasing velocity phenomenon" occurs near the boundary and the maximum value of the velocity is obtained near the point of symmetry at the boundary when time is close to the turning point.

62　岡部考宏 (弘前大教育)*
筒井容平 (信州大理)　Navier–Stokes flow in the weighted Hardy space with applications to time decay problem ····· 12

Takahiro Okabe (Hirosaki Univ.)
Yohei Tsutsui (Shinshu Univ.)

Navier–Stokes flow in the weighted Hardy space with applications to time decay problem

概要 The asymptotic expansions of the Navier–Stokes flow in $\mathbb{R}^n$ and the rates of decay are studied with aid of weighted Hardy spaces. Fujigaki and Miyakawa ('01), Miyakawa ('00) proved the nth order asymptotic expansion of the Navier–Stokes flow if initial data decays like $(1+|x|)^{-n-1}$ and if nth moment of initial data is finite. In the presentation, it is clarified that the moment condition for initial data is essential in order to obtain higher order asymptotic expansion of the flow and to consider the rapid time decay problem.

63　小薗英雄 (早大理工)
清水扇丈 (京大人間環境)　Navier–Stokes equations with external forces in Lorentz spaces and its application to self-similar solutions ····· 12

Hideo Kozono (Waseda Univ.)
Senjo Shimizu (Kyoto Univ.)

Navier–Stokes equations with external forces in Lorentz spaces and its application to self-similar solutions

概要 We show existence theorem of global mild solutions with small initial data and external forces in Lorentz spaces with scaling invariant norms. If the initial data have more regularity in another scaling invariant class, then our mild solution is actually the strong solution. The result on local existence of solutions for large data is also discussed. Our method is based on the maximal regularity theorem on the Stokes equations in Lorentz spaces. Then we apply our theorem to prove existence of self-similar solutions provided both initial data and external forces are homogeneous functions.

概要 We consider the primitive equations which describe the large-scale motion of atmosphere and ocean in geophysics. Cao and Titi (Ann. Math., 2007) proved, in the L^2-setting, that they admit a unique global-in-time solution for arbitrarily large initial data. We extend their result to the L^p-setting by adopting an analytic semigroup approach. Namely, we introduce the hydrostatic Stokes operator to rewrite the primitive equations as a semi-linear parabolic equation. The local well-posedness is established by applying Fujita–Kato's method. It is then combined with an H^2-a priori estimate to deduce the global well-posedness as well as an exponential decay estimate as time goes to infinity.

概要 We consider the initial value problem for the one dimensional system of equations of a compressible viscous fluid driven by a bounded periodic self-gravitation of the fluid. We focus on the structure of stationary solutions to the isentropic self-gravitational system and prove that a certain bounded stationary solution is lost when the average of the specific volume reaches a critical value. We then show that there does exist an unbounded solution for the initial value problem when the average exceeds the critical value. We also present a sufficient condition for the unboundedness in terms of the initial values of an energy form.

概要 We investigate the decay rate of the radially symmetric solution for Burgers equation on the exterior of a small ball in multi-dimensional space, where the boundary data and the data at the far field are prescribed. In a previous paper, we showed that, for the case in which the boundary data is equal to 0 or negative, the asymptotic stability is the same as that for the viscous conservation law. This time, it is proved that if both boundary data is positive, the asymptotic state is a superposition of the stationary wave and the rarefaction wave, which is a new wave phenomenon. The proof is given using a standard L^2 and L^1 energy method.

概要 It is known that Poiseuille flow in compressible fluid becomes unstable when Reynolds and Mach numbers are so large that they satisfy some condition. We show that traveling waves bifurcate from Poiseuille flow for some values of Reynolds and Mach numbers in a range where the instability condition is satisfied.

概要 We consider large time behavior of solution to compressible Navier–Stokes equation around the spatially periodic stationary solutions in a periodic layer of R^n $(n = 2, 3)$. There exists a spatially periodic stationary solution if the external force is spatially periodic and is sufficiently small in some Sobolev space. We show that the L^2 norm of perturbation decays in the order $t^{-\frac{n-1}{4}}$ as $t \to \infty$ if the initial perturbation is sufficiently; in fact, the perturbation behaves diffusively in large time.

概要 We consider models for compressible two-phase flows with phase transitions. These are derived by first principles, i.e., balance of mass, momentum, and energy. As a first step, we analyze a simplified model, where the temperature is assumed to be constant. Performing a Hanzawa transform, the problem is transformed to a quasilinear parabolic two-phase problem with complicated transmission conditions on the interface in a fixed domain. Then the density can be considered as a function of the velocity and of the height function, applying the method of characteristics. We prove maximal Lp-regularity of a the corresponding linearized problem, and then by a fixed point argument in a suitable space, we obtain local existence of the isothermal model.

概要 We consider the two phase problem for compressible and comressible case without surface tension. In this talk, we shall describe that local well-posedness of our problem.

概要 We consider the two phase problem for compressible and compressible case. In this talk, we shall describe the global well-posedness for our problem when the initial data is sufficient small.

14:15〜15:15　特別講演

岸 本　展 (京 大 数 理 研)　非線形分散型方程式の解の無条件一意性について

Nobu Kishimoto (Kyoto Univ.)　Unconditional uniqueness of solutions for nonlinear dispersive equations

概要 When the solution to a nonlinear evolution equation is obtained by the iteration argument using an auxiliary function space, uniqueness of solutions in a natural space (e.g. space of continuous functions with values in the Banach space of initial data), which we call unconditional uniqueness, becomes a non-trivial property, and to show that often requires some additional work. Recently, unconditional uniqueness for some nonlinear dispersive equations (such as the Korteweg–de Vries equation and nonlinear Schrödinger equations) in the periodic setting has been shown by a simple integration by parts argument, which can be regarded as a variant of the Poincaré–Dulac normal form reduction. In this talk, we review some results in this direction and introduce an abstract framework, which is applicable to a wide variety of nonlinear dispersive equations. We also give a remark on the applicability of this method in the non-periodic case.

実　函　数　論

9月15日(火)　　第IV会場

9:30〜12:00

1　伊　東　由　文 (徳　　島　　大*)　運動の相対性について ····· 15

Yoshifumi Ito (Univ. of Tokushima*)　On the relativity of motion

概要 In this paper, we study the relativity of motion. Thereby, we remake Einstein's theory of relativity. Here it is important that the practical physical space is the 3-dimensional Euclidean space. Therefore, we have to use the orthogonal coordinate system in order to express Newton's equation of motion. The relativity of motion means that we study the meaning of the difference of observed motions when we observe the motion of one point of mass by using two different orthogonal coordinate systems. This result is very new. (2015.5.11)

2　伊　東　由　文 (徳　　島　　大*)　L^2_{loc} 関数のフーリエ変換再考 ····· 15

Yoshifumi Ito (Univ. of Tokushima*)　Fourier transformation of L^2_{loc}-functions. Revisited

概要 In this paper, we study the Fourier transformation of L^2_{loc}-functions on $\mathbf{R}^d$. We prove Paley–Wiener type theorem for L^2-functions on $\mathbf{R}^d$. By using this result, we prove the structure theorems for the Fourier images of L^2_c and L^2_{loc}. (2015.5.21)

3　徳　永　清　久 (山 口 大 理 工)　等差数列による三角形二重積分 ····· 15

Kiyohisa Tokunaga (Yamaguchi Univ.)　A triangular double integral by the arithmetic sequence

概要 The conventional double integral is usually calculated as a repeated integral, which is inverse differentials for respective variables, but the general procedure to directly calculate by the formula of double limits of independent double sums for a concrete example is not known. Meanwhile, we showed the general procedure of double Riemann integral based on a triangular element method as a single limit at infinity of dependent double sums to directly calculate the correct value for a concrete example. The authenticity of the definition formula of integral calculus is determined by the possibility of the direct calculation without using inverse differential in the single integral for 1-variable functions. We also apply this criterion to the double integral for 2-variable functions.

4　坂　田　繁　洋 (早　　大　GEC)　上半空間における Poisson 積分の凸性 ····· 15

Shigehiro Sakata (Waseda Univ.)　Power concavity of Poisson's integral for the upper half space

概要 We study the shape of Poisson's integral for the upper half space. In particular, we investigate its power concavity. The aim is to give a sufficient condition for the uniqueness of a maximizer of Poisson's integral.

5　笠　原　雪　夫 (北　　大　　理)
井　上　昭　彦 (広　島　大　理)
M. Pourahmadi (Texas A&M Univ.)　Rigidity for matrix-valued Hardy functions ····· 10

Yukio Kasahara (Hokkaido Univ.)
Akihiko Inoue (Hiroshima Univ.)
Mohsen Pourahmadi (Texas A&M Univ.)　Rigidity for matrix-valued Hardy functions

概要 We present a matricial generalization of the concept of rigid functions in the Hardy space H^1, and a spectral characterization of complete nondeterminacy for multivariate stationary processes.

概要 Let H be a real Hilbert space, let $x \in H$ and let $C, D \subset H$ be subsets. We consider the problem of finding the closest point from x to $C \cap D$. This problem is called the best approximation problem and is well known in optimization theory. When C and D are closed and convex sets, many methods for solving this problem have been studied in [1]. In this talk, we study the best approximation problem when the set C is an open and convex cone.

概要 In this talk, we apply a fixed point theorem in partial ordered sets to boundary value problems for fractional order differential equations. We prove the existence and uniqueness of nonnegative solutions of boundary value problems for α order differential equations where $3 < \alpha \leq 4$. To prove our main theorem, we use a fixed point theorem in partially ordered sets.

概要 In 2013, Izumi Komori-Furuya and Sato proves the Adams type inequality on weighted Morrey spaces for the fracional integrals under the condition $A_{p,q}$. We aim to show the similar inequality of higher order commutators generated by BMO-functions and the fractional integral operator.

概要 In this talk, we shall verify the weighted Kakeya (Nikodým) maximal operator $K_{N,w}$ is bounded on the weighted Lebesgue space $L^2(w)$, whenever the radial weight w satisfies the doubling and supremum conditions. To do this, we show that all such weights w belong to A^*_∞ which is slightly modified Muckenhoupt weight class.

14:15〜16:25

概要 The aim of this talk is to consider the difference between two complex interpolation functors. As starting spaces, we consider the closure of essentially bounded and compactly supported functions in Morrey spaces. We shall show that two functors result in different function spaces.

概要 The aim of this talk is to discuss why we need to postulate various conditions on generalized Morrey spaces when we discuss the boundedness of operators.

概要 In this talk, we will discuss what happens when we are given an increasing sequence of reproducing kernel Hilbert spaces. We do not assume that the increasing sequence converges. As application, we consider a realization of the Dirac delta.

概要 In this talk, we consider the boundedness of multilinear Fourier multiplier operators which are called flag paraproducts.

概要 In this talk, we study the concept of acute points of a nonlinear mapping. We also study some properties of acute points, attractive points and fixed points. Then, we prove some weak and strong convergence theorems for nonlinear mappings.

概要 We formulate a general portmanteau theorem for nonadditive measures. As its direct consequence, it turns out that Lévy convergence of nonadditive measures coincides with every one of Choquet, Šipoš, Sugeno, and Shilkret integral functional convergence. This result is applied when discussing the metrizability of the Lévy topology on the space of nonadditive measures and defining the Fortet–Mourier type metrics on a uniformly equi-autocontinuous set of nonadditive measures.

概要 In this talk, we introduce the notion of the frame of the unit ball of a Banach space as a new extremal structure. Some basic properties of frames of unit balls are given. Moreover, we consider application of frames of unit balls to Tingley's problem.

17　水口洋康 (新潟大自然)　Absolute normalized ノルム空間における幾何学的定数の上限値 ····· 15
斎藤吉助 (新潟大理)

Hiroyasu Mizuguchi (Niigata Univ.)　On the upper bound of geometric constants in absolute normalized normed spaces
Kichi-Suke Saito (Niigata Univ.)

概要 We consider the space $\mathbb{R}^2$ with a absolute normalized norm $\|\cdot\|_\psi$. We treat the von Neumann–Jordan constant, the modified von Neumann–Jordan constant and the Zbăganu constant. For each absolute normalized norm, the upper bound of the von Neumann–Jordan constant in the space $(\mathbb{R}^2, \|\cdot\|_\psi)$ had been obtained. We consider the conditions in which these constant coincide with the upper bound.

16:40〜17:40　特別講演

斎藤吉助 (新潟大理)*　バナッハ空間の幾何学的構造についての最近の進展

Kichi-Suke Saito (Niigata Univ.)　Recent development on geometric structure of Banach spaces

概要 Since 2000, we have a series of papers about geometrical structure of Banach spaces using the notion of absolute norms. In particular, we characterized geometric properties of Banach spaces, for example, strict convexity, uniform convexity and so on. Further, we presented new notions of geometric properties of Banach spaces using ψ-direct sums of Banach spaces. On the other hand, we have several geometric constants of Banach spaces which are important to study the theory of Banach spaces. For example, we try to calculate von Neumann–Jordan constant, James constant and so on. Our aim in this talk is to present the recent development of our works.

9月16日(水)　第IV会場

9:15〜12:00

18　吉野徳晃 (東京理大理)　準線形退化放物・楕円型走化性方程式系への吉田近似を用いた作用素論的アプローチ ····· 15

Noriaki Yoshino (Tokyo Univ. of Sci.)　An operator-theoretic approach using the Yosida approximation to a quasilinear degenerate chemotaxis system of parabolic-elliptic type

概要 This talk is concerned with existence of weak solutions to a quasilinear degenerate chemotaxis system of parabolic-elliptic type. In the previous meeting we reported an existence result via a linear approximation in the diffusion term. In this talk we will propose a new approach from the Yosida approximation.

19　藤江健太郎 (東京理大理)　非線形拡散項をもつ癌浸潤走化性モデルの時間大域的可解性と解の漸近挙動 ····· 15
石田祥子 (東京理大理)
伊藤昭夫
横田智巳 (東京理大理)

Kentarou Fujie (Tokyo Univ. of Sci.)　Global solvability and asymptotic behavior of solutions to a chemotaxis model for tumor invasion with nonlinear diffusion
Sachiko Ishida (Tokyo Univ. of Sci.)
Akio Ito
Tomomi Yokota (Tokyo Univ. of Sci.)

概要 This talk deals with a chemotaxis model for tumor invasion with nonlinear diffusion. It is shown that a solution of the system exists globally in time and remains bounded. Moreover it is established that the solution approaches a certain spatially homogeneous equilibrium.

概要 This talk is concerned with solvability of Vlasov–Poisson systems in a half-space. In 2013, an existence result on a time interval $(0, T)$ was obtained by Skubachevskii. However, the time $T > 0$ should be extremely small and, in view of physics, this assumption is quite unnatural. The purpose of this talk is to remove or weaken the unnatural assumption.

概要 We consider the existence of periodic solutions for some system which describes double-diffusive convection phenomena in the whole space. As for the periodic problem in unbounded domains, there exist some results for the solvability of, e.g., Navier–Stokes equations. In their arguments, it seems that the smallness of data is nessesary to construct solutions so that fixed point theorem can be applied. On the other hand, we can find some results for the solvability of periodic problem with large data in bounded domain. However, it is difficult to remove the assumption for boundedness of domain since some properties for compactness are used in their arguments.
In this talk, we consider the solvability of periodic problem in the whole space, especially with large data.

概要 The well-posedness of the Stefan problem with a dynamic boundary condition is treated. To show the existence of the weak solution, the original problem is approximated by a limit of an equation and dynamic boundary condition of Cahn–Hilliard type. By using this Cahn–Hilliard approach, it becomes clear that the state of the mushy region of the Stefan problem is characterized by an asymptotic limit of the fourth-order system, which has a double-well structure. This fact also raises the possibility of the numerical application of the Cahn–Hilliard system to the degenerate parabolic equation, of which the Stefan problem is one.

概要 In this talk the selfadjointness problem for Schrödinger operators $Au = -\mathrm{div}(a\nabla u) + Vu$ in $\mathbb{R}^N$ $(N \in \mathbb{N})$ posed by Kato in 1981 and its L^p-generalization $(1 < p < \infty)$ are dealt with. Under $|a(x)| \le k(1 + |x|)^{\ell+2}$ and $V(x) \ge c|x|^{\ell}$, the precise lower bounds of c for (essential) selfadjointness in L^2 and m-sectoriality in L^p of minimal and maximal realizations of A are given.

概要 In this talk we consider existence and uniqueness of (classical) solutions to abstract nonlocal Cauchy problems for nonlinear evolution equations

$$\begin{cases} (d/dt)u(t) + A(t)u(t) = f(t) + C(t, K(t)u)g(t), \quad t \in I := [0, T]; \\ u(0) = u_0 + Mu. \end{cases}$$

Here $\{A(t); t \in I\}$ is a family of closed linear operators in the complex Hilbert space X, $K(t) : C(I; Y) \to \mathbb{C}$ is linear and bounded for all $t \in I$, $K(\cdot)$ is continuous on I and $M : C(I; Y) \to Y$ is a bounded linear operator, where Y is a subspace of X.

概要 We consider coupled systems of heat equations and PDE models of grain boundary motions. In this light, these systems can be regarded as interactive mathematical models of a grain boundary motions under non-isothermal setting. In this talk, we discuss the asymptotic behavior of solutions to our systems.

概要 In this talk, an original nonlinear system of parabolic PDEs is proposed and studied. The system is a modified version of the Kobayashi–Warren–Carter model of grain boundary motion such that the governing free-energy includes some anisotropic effects of grains. Additionally, we note that our mathematical model enables to reproduce the dynamic changes of structural units (stable structures), caused by the rotations of crystalline orientations. After organizing the mathematical notations and assumptions, the modelling method of our system and the results of mathematical analysis will be presented in the conclusion part of this talk.

27 山崎教昭 (神奈川大工)
鈴木友之 (神奈川大工)
高棹圭介 (東大数理)
Remarks on numerical experiments of Allen–Cahn equations with constraint via Yosida approximation ····· 15

Noriaki Yamazaki (Kanagawa Univ.)
Tomoyuki Suzuki (Kanagawa Univ.)
Keisuke Takasao (Univ. of Tokyo)
Remarks on numerical experiments of Allen–Cahn equations with constraint via Yosida approximation

概要 We consider a one-dimensional Allen–Cahn equation with constraint from the view-point of numerical analysis. Our constraint is the subdifferential of the indicator function on the closed interval, which is the multivalued function. Therefore, it is very difficult to make numerical experiments of our equation. In this talk we approximate our constraint by Yosida approximation. Then, we study the approximating system of our original model numerically. In particular, we give the criteria for the standard forward Euler method to give stable numerical experiments of our approximating equation. Moreover, we give some numerical experiments of approximating equation.

14:15〜15:15

28 加納理成 (高知大教育)
深尾武史 (京都教育大)
完全塑性モデルに関連したある弱変分不等式の解の存在について ····· 15

Risei Kano (Kochi Univ.)
Takesi Fukao (Kyoto Univ. of Edu.)
The existence of solutions for the weak-variational inequalities by the perfect plasticity model

概要 In this talk, we discuss that the existence of solutions for the weak-variational inequalities by the perfect plasticity model. In order to weaken the conditions of the function in constraints, we consider the variational inequalities for weak formulation.

29 伊藤昭夫
剣持信幸
村瀬勇介 (名城大理工)
撹拌を考慮した日本酒醸造過程モデルとその近似問題について ····· 15

Akio Ito
Nobuyuki Kenmochi
Yusuke Murase (Meijo Univ.)
Mathematical model for brewing Japanese Sake with stirring process and its approximated problems

概要 In this talk, we discuss a certain model for brewing process of Japanese Sake with stirring processes. This model is the system of differential equations with stirring terms and a constraint condition. We analyze with putting homogeneous Neumann boundary conditions and Robin boundary condition for heat equation. we will show you some mathematical results for our model and its approximated problems.

30 熊崎耕太 (苫小牧工高専)
水分・二酸化炭素輸送を連立させた中性化過程を表す数理モデルの可解性について ····· 15

Kota Kumazaki (Tomakomai Nat. Coll. of Tech.)
Solvability of a mathematical model for concrete carbonation process consisting of moisture and carbon dioxide transport

概要 In this talk, we consider a mathematical model describing concrete carbonation process. This model consists of moisture transport and carbon dioxide transport. Moisture transport is described as a quasilinear parabolic equation with a hysteresis effect between the relative humidity and the degree of saturation. Carbon dioxide transport is a parabolic equation considered the concentration of carbon in air and in water. In this talk, we discuss the existence and uniqueness of a solution of our model.

31　佐藤直紀（長岡工高専）　多孔質媒体の水分吸着現象を表す 1 次元自由境界問題の周期解の存在について 15
愛木豊彦（日本女大理）

Naoki Sato
(Nagaoka Nat. Coll. of Tech.)
Toyohiko Aiki (Japan Women's Univ.)

Existence theorems of periodic solutions for one dimensional free boundary problems for adsorption phenomena

概要 We study one dimensional free-boundary problem for adsorption phenomenon in wet-dry process on the surface of porous medium like paper. We consider a pore in the porous medium. Water-drop will be generated in the pore if humidity becomes high. The boundary of the domain of water-drop is a free boundary in time. We make mathematical model of this phenomenon as one dimensional free boundary problem.Our main aim is to investigate the relation between a degree of saturation and humidity, numerically. Because there is no quantitive result. In this talk, we introduce some results with respect to the existence of a periodic solution in time for our problem. At first, we show solvability of Cauchy problems. Next, using Schauder's fixed point theorem, we get solvability of our periodic problem.

15:30〜16:30　特別講演

石田祥子（東京理大理）　Chemotaxis-Navier–Stokes 系とその周辺の数学解析

Sachiko Ishida (Tokyo Univ. of Sci.)

Mathematical analysis of chemotaxis-Navier–Stokes systems and related models

概要 We would like to deal with chemotaxis-Navier–Stokes systems and fully parabolic Keller–Segel systems. It is well known that Keller–Segel systems describe a part of the life cycle of cellular slime molds with the chemotaxis. In more detail, slime molds move towards higher concentration of the chemical substance when they plunge into hunger. The magnitude relation between the diffusion term and the aggregation term divides the solutions exist globally or blow up. We will introduce this result on the systems with degenerate diffusion. We recently considered the chemotaxis-Navier–Stokes systems with position dependent sensitivity which see that the bacteria cells swim in an incompressible fluid. We obtain the results about global existence and boundedness on both degenerate and linear diffusion case, and moreover, we try to have the stabilization of a solution.

函　数　解　析　学

9月13日(日)　　第VIII会場

14:30〜16:30

1　香川智修 (東京都市大)　The Hermite function expansions of the Heaviside function ····· 15

Toshinao Kagawa (Tokyo City Univ.)　The Hermite function expansions of the Heaviside function

概要 The aim of this talk is to give the examples of the Hermite function expansions of the tempered disributions. We calculate the coefficients of the Hermite function expansions of the Heaviside function, $\frac{1}{x\pm i0}$, the signum $\mathrm{sgn}(x)$ and the principal value $\mathrm{p.v.}\frac{1}{x}$.

2　香川智修 (東京都市大)
岡　康之 (釧路工高専)　A characterization of the generalized functions via the special Hermite expansions ····· 15

Toshinao Kagawa (Tokyo City Univ.)
Yasuyuki Oka (Kushiro Nat. Coll. of Tech.)　A characterization of the generalized functions via the special Hermite expansions

概要 The aim of this talk is to give the correspondence between the dual space of the Gel'fand–Shilov space ($\mathcal{S}$ type) and the sequence with the exponential decreasing decay, and the dual space of the Gel'fand–Shilov space and the sequence space with the exponential increasing decay by means of the special Hermite functions.

3　片岡清臣 (東大数理)*
山崎海斗 ((株)東京出版)　実解析的パラメーターをもつ佐藤超関数に対するソボレフ型2次形式とその応用 ····· 10

Kiyoomi Kataoka (Univ. of Tokyo)
Kaito Yamasaki (Tokyo Shuppan Co.)　Micro local energy forms of Sobolev type for hyperfunctions with real analytic parameters and some applications

概要 We introduce some bilinear forms for hyperfunctions with real analytic parameters, which permit energy estimates including 0-th order analytic pseudo-differential operators. We give some applications to micro local analytic hypo-ellipticities of pseudo-differential equations.

4　谷口晃一 (中大理工)*
岩渕　司 (阪市大理)
松山登喜夫 (中大理工)　Schrödinger 作用素の関数の L^p-有界性について ····· 15

Koichi Taniguchi (Chuo Univ.)
Tsukasa Iwabuchi (Osaka City Univ.)
Tokio Matsuyama (Chuo Univ.)　L^p-boundedness of functions of Schrödinger operators

概要 Let $H=-\Delta+V$ be a Schrödinger operator on an arbitrary open set $\Omega\subset\mathbb{R}^d$ $(d\geq 3)$, where Δ is the Dirichlet Laplacian and the potential V belongs to the Kato class on Ω. The purpose of this paper is to show L^p–boundedness of an operator $\varphi(H)$ for any rapidly decreasing function φ on $\mathbb{R}$. $\varphi(H)$ is defined by the spectral resolution theorem. As a by-product, L^p–L^q–estimates for $\varphi(H)$ are also obtained.

5　山岸弘幸 (産業技術高専)　棒のたわみの周期境界値問題とソボレフ不等式の最良定数 ····· 15
亀高惟倫 (阪大)
永井敦 (日大生産工)

Hiroyuki Yamagishi (Tokyo Metropolitan Coll. of Indus. Tech.)
Yoshinori Kametaka (Osaka Univ.)
Atsushi Nagai (Nihon Univ.)
The best constant of Sobolev inequality corresponding to a bending problem of a beam with periodic boundary condition

概要 We consider 2-point boundary value problem for 4-th order linear ordinary differential equation which represents bending of a beam on an elastic foundation under a tension. We here treat the periodic boundary condition. Green function is the reproducing kernel for suitable set of Hilbert space and inner product. As an application, the best constants of the corresponding Sobolev inequalities are expressed as the maximum of the diagonal values of Green function.

6　新國裕昭 (前橋工科大)　Spectral structure of periodic Schrödinger operators with two potentials on the degenerate zigzag nanotubes ····· 15

Hiroaki Niikuni (Maebashi Inst. of Tech.)
Spectral structure of periodic Schrödinger operators with two potentials on the degenerate zigzag nanotubes

概要 In this talk, we study the spectra of periodic Schrödinger operators with two potentials on a quantum graph, which is related to a carbon nanotube. We show that the spectrum has the band structure. Furthermore, we deal with a coexistence problem and see the difference between one-potential case and two-potentials case.

7　日髙建 (九大数理)　準相対論的パウリ・フィールツ模型の自己共役性と基底状態の存在 ···· 15
廣島文生 (九大数理)

Takeru Hidaka (Kyushu Univ.)
Fumio Hiroshima (Kyushu Univ.)
Self-adjointness and existence of the ground state for the semi-relativistic Pauli–Fierz model

概要 The spinless semi-relativistic Pauli–Fierz Hamiltonian

$$H = \sqrt{(p \otimes 1 - A)^2 + M^2} + V \otimes 1 + 1 \otimes H_f, \quad M \geq 0,$$

in quantum electrodynamics is considered. Here p denotes a momentum operator, A a quantized radiation field, M a rest mass of a particle, V an external potential, H_f the free hamiltonian of a Boson Fock space. The self-adjointness and existence of the ground state of H are shown. It is emphasized that it includes the case of $M = 0$.

17:00〜18:00　特別講演

門脇光輝 (滋賀県大工)　Spectral analysis for wave propagation in two-layered media

Mitsuteru Kadowaki (Univ. of Shiga Pref.)
Spectral analysis for wave propagation in two-layered media

概要 In this talk, we illustrate about spectral analysis for wave propagation in two-layered media. This wave propagation is the simplest model of one which has the refracted (transmitted) waves. Our motivation is the application to scattering theory. First of all, we investigate the limit absorption principle by Mourre method and asymptotic completeness by Lax-Phillps-Enss method. Moreover, as recent result, we report asymptotic behavior in far field of the resolvent. This is joint work with H. Isozaki and M. Watanabe.

9月14日(月)　第VIII会場

9:30〜12:00

8　北川宜稔 (東大数理)　Classification of multiplicity-free holomorphic discrete series representations ····· 15

Masatoshi Kitagawa (Univ. of Tokyo)　Classification of multiplicity-free holomorphic discrete series representations

概要 In this talk, I will explain a classication of multiplicity-free restrictions of holomorphic discrete series representations with respect to symmetric subgroups. Using the theory of visible actions, T. Kobayashi gave a sufficient condition for multiplicity-freeness of holomorphic discrete series representations. For the classification, I use this condition and the well-known technique called the analytic continuation. By the analytic continuation, we can reduce the multiplicity-freeness of holomorphic discrete series representations to the multiplicity-freeness of finite-dimensional irreducible representations.

9　中濱良祐 (東大数理)　Laguerre semigroups for functions on symmetric cones and the Bessel functions ····· 15

Ryosuke Nakahama (Univ. of Tokyo)　Laguerre semigroups for functions on symmetric cones and the Bessel functions

概要 Recently the speaker got a new integral expression of the generalized I-Bessel function on a Jordan algebra, which was introduced by Dib, and got an upper estimate of it. In this talk the speaker presents this result, and its application on the estimate of some 1-dimensional holomorphic semigroup, called the Laguerre semigroup.

10　久保利久 (東大数理)　On the reducible points for the generalized Verma modules ····· 15
Haian He (BICMR)
R. Zierau (Oklahoma State Univ.)

Toshihisa Kubo (Univ. of Tokyo)　On the reducible points for the generalized Verma modules
Haian He (BICMR)
Roger Zierau (Oklahoma State Univ.)

概要 In 1980's Enright–Howe–Wallach and Jakobsen individually classified the reducible points for scalar generalized Verma modules induced from parabolic subalgebras with abelian nilpotent radicals, for which the generalized Verma modules are unitarizable. Recently, Haian He classified all the reducible points for such scalar generalized Verma modules. In this talk we will discuss about classifying reducible points for scalar generalized Verma modules induced from maximal parabolic subalgebras with two-step nilpotent radicals. This is a joint work in progress with Haian He and Roger Zierau.

11　笹木集夢 (東海大理)　Remarks on visible actions on spherical nilpotent orbits ····· 15

Atsumu Sasaki (Tokai Univ.)　Remarks on visible actions on spherical nilpotent orbits

概要 In this talk, we study a choice of a slice for a compact group action on a spherical nilpotent orbit in a complex simple Lie algebra. The main result of this talk is that one can take a slice such that its dimension equals the rank of the spherical nilpotent orbit.

概要 We consider a good situation that the Laplace transforms of powers of a positive function on a regular convex cone are equal to the negative powers of a polynomial up to constant multiple. One of our results gives a method to produce examples of such a cone with required functions recurrently. Based on an observation of the recurrent relation, we conjecture that the logarithm of the Laplace transform equals the logarithm of the reciprocal of the positive function on the cone up to constant difference.

概要 In this talk, we realize any homogeneous cone by assembling uniquely determined subcones. These subcones are realized in the cones of positive-definite real symmetric matrices of minimal possible sizes. The subcones are found through the oriented graphs drawn by using the data of the given homogeneous cones.

概要 We investigate a hypergroup arising from irreducible characters of a compact hypergroup H and a subhypergroup H_0 of H with $|H/H_0| < \infty$. The convolution of this hypergroup is introduced by inducing irreducible representations of H_0 to H and by restricting irreducible representations of H to H_0.

概要 Let H be a compact commutative hypergroup of strong type and L a discrete commutative hypergroup of strong type. We introduce a commutative hypergroup $\mathcal{K}(H, \varphi, L)$ associated with a hyperfield φ of H based on L. Moreover for the hyperfield φ we introduce the dual hyperfield $\hat{\varphi}$ of $\hat{L}$ based on $\hat{H}$ and show that $\widehat{\mathcal{K}}(H, \varphi, L) \cong \mathcal{K}(\hat{L}, \hat{\varphi}, \hat{H})$.

13:30〜14:30　特別講演

松 本　　詔 (鹿 児 島 大 理)　Weingarten calculus と 対称群の調和解析

Sho Matsumoto (Kagoshima Univ.)　Weingarten calculus and harmonic analysis on symmetric groups

概要 Weingarten calculus is a systematic method for computing integrals of polynomials with respect to the Haar measures over classical compact Lie groups. The integrals are expressed as sums of so-called Weingarten functions over permutations. The Weingarten function for the unitary group is invariant over conjugacy classes of the symmetric group, whereas the Weingarten function for the orthogonal group is invariant over double cosets of the hyperoctahedral group. We give a connection between these Weingarten functions and Jucys–Murphy elements, and study an asymptotic behavior of Weingarten functions by using an enumeration of monotone factorizations of a permutation. Furthermore, we introduce a variety of Weingarten functions associated with classical compact symmetric spaces.

9月15日(火)　　第VIII会場

9:00〜12:00

16 伊 佐 浩 史 (前 橋 工 科 大)　Divergences on the paths $A \natural_x B$ and $A \natural_{x,r} B$ ····· 15
伊 藤 公 智 (前 橋 工 科 大)
遠 山 宏 明 (前 橋 工 科 大)
亀 井 栄 三 郎
渡 邉 雅 之 (前 橋 工 科 大)

Hiroshi Isa (Maebashi Inst. of Tech.)　Divergences on the paths $A \natural_x B$ and $A \natural_{x,r} B$
Masatoshi Ito (Maebashi Inst. of Tech.)
Hiroaki Tohyama (Maebashi Inst. of Tech.)
Eizaburo Kamei
Masayuki Watanabe (Maebashi Inst. of Tech.)

概要 Amari introduced the α-divergence and Fujii reformed it to an operator valued one. Petz gave a divergence by $D_{FK} \equiv B - A - S(A|B)$, where $S(A|B)$ is relative operator entropy and we call it Petz–Bregman divergence. In this report, we will consider differences between two relative operator entropies as operator valued divergences and we represent the divergences by using Petz–Bregman divergence. Moreover, we generalize these results for expanded relative entropies and expanded operator valued divergence on the path on power mean.

17 宇 田 川 陽 一 (東 京 理 大 理)　Some properties of weighted operator means due to Pálfia and Petz ·· 10
山 崎 丈 明 (東 洋 大 理 工)
柳 田 昌 宏 (東 京 理 大 理)

Yoichi Udagawa (Tokyo Univ. of Sci.)　Some properties of weighted operator means due to Pálfia and Petz
Takeaki Yamazaki (Toyo Univ.)
Masahiro Yanagida (Tokyo Univ. of Sci.)

概要 We shall give the dual and orthogonal of general weighted operator means due to Pálfia and Petz. We shall also give characterizations of numerical and operator interpolational means due to J. I. Fujii.

概要 In this talk, some operator inequalities related to the solidarity and the generalized Tsallis relative operator entropy are shown. As an application, we show the Shannon type operator inequalities and its reverse in terms of the generalized Tsallis relative operator entropy.

概要 One of authors previously gave the inequalities among arithmetic mean, geometric mean and harmonic mean for positive operators. In this talk, we give a generalized result and an improved result for the previous result. In addition, we give a refinement of the arithmetic-geometric mean inequality under the assumption of the strict order.

概要 Considering the Fibonacci matrix, we see why the Fibonacci anyon is named after him, which is a rare observation. Moreover it leads a commutative matrix representation for general anyon in TQC via the fusion coefficient matrices, which is however not an original result.

概要 We give some characterizations of self-adjointness and symmetrisity of operator monotone means by using the Barbour transform $f \mapsto \frac{t+f}{1+f}$ and show that there are many non-symmetric operator means between the harmonic mean ! and the arithmetic mean ∇. Indeed, we show that there is a non-symmetric operator mean between any two symmetric operator means. As an application, we characterize the harmonic mean and the arithmetic mean by operator inequalities. Moreover, we characterize the parameterized harmonic mean $!_\lambda$ and the prametarized arithmetic mean ∇_λ.

概要 We study the relative position of three subspaces in a separable infinite dimensional Hilbert space. In the finite-dimensional case, Brenner described the general position of three subspaces completely. We extend it to a certain class of three subspaces in an infinite dimensional Hilbert space. We give a partial result which gives a condition on a system to have a (dense) decomposition containing a pentagon.

23 松本健吾 (上越教育大)* Strongly continuous orbit equivalence of topological Markov shifts and Cuntz–Krieger algebras ····· 15

Kengo Matsumoto (Joetsu Univ. of Edu.) Strongly continuous orbit equivalence of topological Markov shifts and Cuntz–Krieger algebras

概要 I will introduce a notion of strongly continuous orbit equivalence in one-sided topological Markov shifts. Strongly continuous orbit equivalence yields a topological conjugacy between their two-sided topological Markov shifts $(\bar{X}_A, \bar{\sigma}_A)$ and $(\bar{X}_B, \bar{\sigma}_B)$. We prove that one-sided topological Markov shifts (X_A, σ_A) and (X_B, σ_B) are strongly continuous orbit equivalent if and only if there exists an isomorphism bewteen the Cuntz–Krieger algebras $\mathcal{O}_A$ and $\mathcal{O}_B$ preserving their maximal commutative C^*-subalgebras $C(X_A)$ and $C(X_B)$ and giving cocycle conjugate gauge actions. An example of one-sided topological Markov shifts which are strongly continuous orbit equivalent but not one-sided topologically conjugate is presented.

24 小沢登高 (京大数理研) The Furstenberg boundary and C*-simplicity ····· 15

Narutaka Ozawa (Kyoto Univ.) The Furstenberg boundary and C*-simplicity

概要 A (discrete) group G is said to be C*-simple if the reduced group C*-algebra of it is simple. I will first explain Kalantar and Kennedy's characterization of C*-simplicity for a group G in terms of its action on the maximal Furstenberg boundary. Then I will talk about my result with Breuillard, Kalantar, and Kennedy about examples and stable properties of C*-simple groups.

25 長谷川慧 (九大数理) 融合積 C* 環の K 核型性 ····· 15

Kei Hasegawa (Kyushu Univ.) K-nuclearity of amalgamated free product C*-algebras

概要 We will introduce (strong) relative nuclearity for inclusions of C*-algebras with conditional expectation. We will show that full and reduced amalgamated free products of unital separable nuclear C*-algebras are K-nuclear when the inclusions are strong relative nuclear.

26 岡安類 (大阪教育大)
小沢登高 (京大数理研)
戸松玲治 (北大理) Haagerup approximation property via bimodules ····· 15

Rui Okayasu (Osaka Kyoiku Univ.)
Narutaka Ozawa (Kyoto Univ.)
Reiji Tomatsu (Hokkaido Univ.) Haagerup approximation property via bimodules

概要 We introduce a characterization of the Haagerup approximation property for a von Neumann algebra in terms of bimodules.

14:15〜16:45

27 磯野優介 (京大数理研) Unique prime factorization and bicentralizer problem for a class of type III factors ····· 15

Yusuke Isono (Kyoto Univ.) Unique prime factorization and bicentralizer problem for a class of type III factors

概要 We introduce the class $\mathcal{C}_{(\mathrm{AO})}$ of von Neumann algebras that particularly contains free (quantum) group factors and free Araki–Woods factors. We show that any tensor product factor, which consists of finitely many factors in $\mathcal{C}_{(\mathrm{AO})}$, retains each tensor component (up to stable isomorphism). This generalizes Ozawa–Popa's pioneering work for free group factors and provides a new result for free Araki–Woods factors. In order to obtain this, we show that Connes's bicentralizer problem has a positive solution for all type III_1 factors in the class $\mathcal{C}_{(\mathrm{AO})}$. This is joint work with C. Houdayer.

28 戸松玲治 (北大理)　自由積因子環の core の fullness の特徴付け ····· 15
植田好道 (九大数理)
Reiji Tomatsu (Hokkaido Univ.)　A characterization of fullness of continuous cores of free product factors
Yoshimichi Ueda (Kyushu Univ.)

概要 We sketch out the proof of our recent result concerning the fullness of the continuous core of an arbitrary type III_1 free product factor.

29 増田俊彦 (九大数理)　離散従順群の単射的因子環への外部的作用 (G-kernel) の分類について · 15
Toshihiko Masuda (Kyushu Univ.)　Classification of outer actions of discrete amenable groups (G-kernels) on injectice factors

概要 In this talk, I will explain an approach to classification of G-kernels on injective factors without use of resolution groups, which is different from Katayama–Takesaki's approach on this problem.

30 後藤聡史 (上智大理工)　Flat part commuting square に関する注意 ····· 10
Satoshi Goto (Sophia Univ.)　Remarks on the flat part commuting squares

概要 We make two remarks on the flat part commuting squares. Some applications of the remarks are given.

31 柳研二郎 (山口大理工)　忠実度とトレース距離に関連した不等式の一般化について ····· 15
Kenjiro Yanagi (Yamaguchi Univ.)　On some generalized inequalities related to fidelity and trace distance

概要 In quantum information theory the difference between two density matrices is measured by fidelity or trace distance.In the case of general positive matrices, we are interested in the inequalities related to fidelity or trace distance. In this talk we give new inequality different from the results given by Audenaert etc.

32 髙橋眞映 (東邦大理)　半単純可換 Banach 環の構成する Lau 環の乗作用素の特徴付け ····· 15
Sin-Ei Takahasi (Toho Univ.)　A characterization of multipliers of a Lau algebra constructed by semisimple commutative Banach algebras

概要 This is a research report about a multipliers of a Lau commutative Banach algebra. We firstly give a necessary and sufficient condition for a Lau type binary operation defined by two mappings to be an algebra-operation. Finally we give a characterization of multipliers of a Lau algebra constructed by semisimple commutative Banach algebras. This extends a characterization obtained recently by P. A. Dabhi.

33 阿部敏一 (新潟大自然)　距離構造から定義される代数構造 ····· 15
Toshikazu Abe (Niigata Univ.)　Algebraic structures on metric spaces

概要 In this talk, we consider metric spaces which satisfies some conditions. We introduce a binary operation which is induced by the metric. It has a gyrocommutative gyrogroup structure which is compatible with the metric structure.

34 泉池敬司 (新潟大自然・新潟大理)*　Path connected components in weighted composition operators on the disk algebra with the essential operator norm. ····· 15
泉池佑子
Keiji Izuchi (Niigata Univ./Niigata Univ.)　Path connected components in weighted composition operators on the disk algebra with the essential operator norm.
Yuko Izuchi

概要 It is studied the structure of path connected components in the space of weighted composition operators on the disk algebra with the essential operator norm topology. It is shown that the structures of path connected components with the operator norm and the essential operator norm topologies are different.

35　細川卓也 (茨城大工)
泉池敬司 (新潟大自然)
大野修一 (日本工大)
Weighted composition operators between Hilbert spaces of analytic functions in Hilbert–Schmidt norm topologies ····· 15

Takuya Hosokawa (Ibaraki Univ.)
Kei Ji Izuchi (Niigata Univ.)
Shûichi Ohno (Nippon Inst. of Tech.)
Weighted composition operators between Hilbert spaces of analytic functions in Hilbert–Schmidt norm topologies

概要 We consider weighted composition operators boundedly acting between two Hilbert spaces of analytic functions on the open unit disk, satisfying some natural hypotheses. We investigate the topological structure of the space of weighted composition operators with the Hilbert–Schmidt norm topology. These results will be involved in the investigation for the explicit cases of the classical Hardy–Hilbert space, the weighted Bergman spaces and the Dirichlet space.

17:00〜18:00　特別講演

羽鳥　理 (新潟大自然)
Isometries on substructures of function algebras and operator algebras

Osamu Hatori (Niigata Univ.)
Isometries on substructures of function algebras and operator algebras

概要 We discuss linear and non-linear isometries not only on Banach algebras themselves but on certain substructures of them. In particular, we consider in the cases of spaces of functions and algebras of matrices and operators: 1. A brief history of linear isometries including the Banach-Stone theorem; 2. Linear isometries on function algerbas and C^*-algebras; 3. Isometries on general linear groups of function algebras and unital C^*-algebras and their substructures. Related topics are also discussed.

統　計　数　学

9月13日(日)　　第VII会場

9:30〜12:00

1　久保田直樹 (日　大　理　工)　Lower Gaussian concentration for the crossing random walk in random potentials ····· 15

Naoki Kubota　(Nihon Univ.)　Lower Gaussian concentration for the crossing random walk in random potentials

概要 We consider the crossing random walk in i.i.d. nonnegative potentials on the multidimensional cubic lattice. The travel cost from the origin to a remote point is, roughly speaking, an average over all random walk paths connecting those points weighted by potentials. I will talk about lower Gaussian concentration for the travel cost.

2　竹　居　正　登 (横浜国大工)　半直線上の linearly edge-reinforced random walk について ····· 10

Masato Takei (Yokohama Nat. Univ.)　On linearly edge-reinforced random walks on the half-line

概要 We investigate the speed of linearly edge-reinforced random walks on the half-line. In the recurrent case, the movement of the random walk is quite slow. On the other hand, in the transient case, the limiting speed of the random walk is, in a sense, not affected by the reinforcement parameter.

3　阿　部　圭　宏 (京　大　理)　2次元単純ランダムウォークの局所時間の最大値と最小値 ····· 10

Yoshihiro Abe　(Kyoto Univ.)　Maximum and minimum of local times for two-dimensional random walk

概要 In this talk, I will describe results about the maximum and the minimum of local times for the simple random walk on the two-dimensional torus at time comparable to the cover time. These are analogues of estimates on the two-dimensional Gaussian free fields by Bolthausen, Deuschel, and Giacomin (2001) and Daviaud (2006), but I have different exponents from the case of the Gaussian free field.

4　福　山　克　司 (神　戸　大　理)*
久　利　典　之 (大同生命保険(株))　Metric discrepancy results for complex geometric progressions ····· 5

Katusi Fukuyama (Kobe Univ.)
Noriyuki Kuri
(Daido Life Insurance Co.)　Metric discrepancy results for complex geometric progressions

概要 The law of the iterated logarithm for discrepancies of complex geometric progressions is proved.

5　瀬戸口貴義 ((有)瀬戸口瓦工場)
高　嶋　恵　三 (岡山理大理)　孤立した大きな部分商を持つ無理数回転の discrepancy の長期的振る舞い ····· 15

Takayoshi Setokuchi
(Setokuchi Roof Tile Factory Co. Ltd.)
Keizo Takashima
(Okayama Univ. of Sci.)　Long-term behavior of discrepancies of irrational rotations based on numbers having single isolated large partial quotient

概要 Setokuchi and Takashima give general mathematical explanations for the occurrence of several parabola-like hills in the behavior of discrepancies of irrational rotations having single isolated large partial quotient, in somewhat short range of N. We extend their estimates and give some general conditions for repetitions of hills of discrepancies. We apply our results on much larger N's and explain repetitions of hills in much more longer ranges of N.

概要 We give a fomula for the density of the first hitting time of Brownian motion with constant drift and the asymptotic behavior of its tail probability. Moreover we obtain the explicit form of the expected volume of the Wiener sausage on time interval $[0, t]$ of the Brownian motion and its large time asymptotics.

概要 A diffusion process with a random potential consisting of two independent contracted self-similar processes with different indices for the right and the left hand sides of the origin is studied. The maximum process and the minimum process of the process are also investigated.

概要 We study the semi-discrete directed random polymer model introduced by O'Connell and Yor. We obtain a representation for the moment generating function of the polymer partition function in terms of a determinantal measure. This measure is an extension of the probability measure of the eigenvalues for the Gaussian Unitary Ensemble (GUE) in random matrix theory. To establish the relation, we introduce another determinantal measure on larger degrees of freedom and consider its few properties, from which the representation above follows immediately.

概要 We prove the sets of polynomials on configuration spaces are cores of Dirichlet forms describing infinite systems of interacting Brownian motions. Our result includes the case that interaction among particles is given by a pair potential of Ruelle's class and a logarithmic pair potential treated in random matrix theory.

概要 This study is an alternative approach to the fundamental theory of rough paths on the basis of fractional calculus. In this talk, using fractional derivatives, we formulate rough differential equations driven by β-Hölder rough paths with $\beta \in (1/3, 1/2]$. As the main results of this talk, we report existence and uniqueness results of solutions to rough differential equations driven by geometric β-Hölder rough paths.

14:15〜14:45

11　畑　宏明 (静岡大教育)　Risk-sensitive asset management with general factor models ····· 15

Hiroaki Hata (Shizuoka Univ.)　Risk-sensitive asset management with general factor models

概要 We consider risk-sensitive asset management on finite time horizon. In particular, we treat the risk seeking case. The returns and volatilities of the assets are random and affected by some economic factors, modeled as diffusion process. The problems become standard risk-sensitive control problems. We derive the Hamilton–Jacobi–Bellman (HJB) equations and study these solutions. And, using solutions, we construct optimal strategies and optimal values.

12　山崎和俊 (関西大システム理工)　Brownian bridge の最適二回停止問題 ····· 15

Kazutoshi Yamazaki (Kansai Univ.)　Optimal double stopping of a Brownian bridge

概要 We study optimal double stopping problems driven by a Brownian bridge. The objective is to maximize the expected spread between the payoffs achieved at the two stopping times. We study several cases where the solutions can be solved explicitly by strategies of threshold type.

15:00〜16:00　特別講演

塩沢裕一 (岡山大自然)　対称マルコフ過程の大域的性質とディリクレ形式

Yuichi Shiozawa (Okayama Univ.)　Global properties of symmetric Markov processes and Dirichlet forms

概要 We are concerned with the global path properties of symmetric Markov processes generated by regular Dirichlet forms. In particular, we characterize conservativeness and transience quantitatively by studying the upper and lower rate functions: the upper rate function describes how far particles can go for all sufficiently large time, and the lower one expresses the speed of particles escaping to infinity. Our characterizations relate these functions with the volume and coefficient growth rates.

16:15〜17:15　特別講演

廣島文生 (九大数理)　Feynman–Kac 型公式の場の量子論への応用

Fumio Hiroshima (Kyushu Univ.)　Application of Feynman–Kac type formula to quantum field theory

概要 It is proven that Feynman–Kac type formula is useful to study quantum field theory (QFT). In this talk we represent Feynman–Kac type formulae of the semigroups generated by various kinds of Schrödinger operators, which include semi-relativistic Schrödinger operators with spin 1/2 and its generalizations, and we move on discussing an application of Feynman–Kac type formula to the spectral analysis of models in QFT. We study the so called Nelson model in this talk, which is a typical model in QFT and has been studied since Nelson introduced it at 1964 from mathematical point of view. The Nelson model can be realized as a self-adjoint operator in some Hilbert space. The vector associated with the bottom of the spectrum of the Nelson model is called the ground state. In this talk (1) the existence and absence of ground state of the Nelson model on a static Lorenzian manifold, (2) the existence of a Gibbs measure associated with the Nelson model, (3) properties of ground state, and (4) renormalization of UV cutoff are shown. It is emphasized that the results derived by Feynman–Kac type formula are non-perturbative. Finally we also show applications to other models in QFT, e.g., Pauli–Fierz model, semi-relativistic Pauli–Fierz model and spin-boson model.

9月14日(月)　第VII会場

9:30〜11:30

13 酒匂宏樹 (新潟大工)
西郷甲矢人 (長浜バイオ大)
逆正弦法則, 量子古典対応, 直交多項式 ····· 15

Hiroki Sako (Niigata Univ.)
Hayato Saigo (Nagahama Inst. of Bio-Sci. and Tech.)
The arcsine law, quantum classical correspondence, and orthogonal polynomials

概要 Interacting Fock space connects the study of quantum probability theory, classical random variables, and orthogonal polynomials. It is a pre-Hilbert space associated with creation, preservation, and annihilation processes. We prove that if three processes are asymptotically commutative, the arcsine law arises as the "large quantum number limits." As a corollary, it is shown that for many probability measures, asymptotic behavior of orthogonal polynomials is described by the arcsine function. A weaker form of asymptotic commutativity provides us a discretized arcsine law.

14 田中康平 (信州大経済)
元山斉 (青学大経済)
圏論的視点からの量子確率論 ····· 15

Kohei Tanaka (Shinshu Univ.)
Hitoshi Motoyama (Aoyama Gakuin Univ.)
Quantum probability theory from the categorical viewpoint

概要 We introduce a concept of conditional measures in quantum measure spaces from a view point of Gelfand duality between classical measure spaces and quantum measure spaces. We also give categorical structures on classical and quantum measure spaces based on Bayes' rule, respectively.

15 長谷川彩子 (お茶の水女大理)
佐久間紀佳 (愛知教育大教育)
吉田裕亮 (お茶の水女大理)
On limit spectral measures of Marchenko–Pastur limit of random matrices with dependent entries and an application of fluctuations ····· 15

Ayako Hasegawa (Ochanomizu Univ.)
Noriyoshi Sakuma (Aichi Univ. of Edu.)
Hiroaki Yoshida (Ochanomizu Univ.)
On limit spectral measures of Marchenko–Pastur limit of random matrices with dependent entries and an application of fluctuations

概要 We shall investigate the limit of the empirical spectral measure of the sample covariance matrix with dependent entries. The dependence that we will discuss comes from a kind of two dimensional moving average model and is correlated across rows and columns. In this case, we will see that the empirical spectral measure converges to a compound free Poisson law. In addition, we will discuss the fluctuation of this convergence from free probability, and suggest an application to statistical data analysis of time series.

16 中津智則 (立命館大理工)
Integration by parts formulas concerning maxima of some one-dimensional SDEs with applications ····· 15

Tomonori Nakatsu (Ritsumeikan Univ.)
Integration by parts formulas concerning maxima of some one-dimensional SDEs with applications

概要 In this talk, we shall consider a one-dimensional srochastic differential equation (SDE) and deal with discrete and continuous time maximum of the solution to the SDE. Our goal is to prove integration by parts formulas for the discrete and continuous time maximum. In addition, the expressions and upper bounds of their probability density functions will be obtained by means of the IBP formulas.

17 田口　大 (立命館大理工)　Approximation for non-smooth functionals of SDEs with irregular drift 15
Hoang-Long Ngo
(Hanoi Nat. Univ. of Edu.)

Dai Taguchi (Ritsumeikan Univ.)　Approximation for non-smooth functionals of SDEs with irregular drift
Hoang-Long Ngo
(Hanoi Nat. Univ. of Edu.)

概要 In this talk, we consider the Euler–Maruyama scheme for SDEs with irregular drift and constant diffusion coefficient. We establish the rate of convergence for the Euler–Maruyama scheme in order to compute the expectation of non-smooth functionals of SDEs. We also apply our method to the study of the weak approximation of reflected stochastic differential equations whose drift is Hölder continuous. Our approach of proof are change of measures and the Girsanov theorem.

18 天羽隆史 (立命館大理工)　Convergence implications via dual flow method 15
結城　郷 (立命館大理工)
田口　大 (立命館大理工)

Takafumi Amaba (Ritsumeikan Univ.)　Convergence implications via dual flow method
Gô Yûki (Ritsumeikan Univ.)
Dai Taguchi (Ritsumeikan Univ.)

概要 Given a sequence of discrete time stochastic flow $\{X^n_{k,l}\}_{k\le l}$, $n\in\mathbb{N}$ as an approximation of a stochastic flow $\{X_{s,t}\}_{s\le t}$ on $[0,+\infty)$, we will see how the rate of convergence for their dual flows is implied from the rate of convergence of $\{X^n_{k,l}\}_{k\le l}\to\{X_{s,t}\}_{s\le t}$.

19 吉川和宏 (立命館大理工)　SLK martingales and representations of the Virasoro algebra 10
天羽隆史 (立命館大理工)

Kazuhiro Yoshikawa (Ritsumeikan Univ.)　SLK martingales and representations of the Virasoro algebra
Takafumi Amaba (Ritsumeikan Univ.)

概要 The Loewner differential equation whose driving function is a Brownian motion is called the Schramm Loewner evolution (SLE). The random coefficients of the expansion of the SLE have a hierarchy of stochastic differential equations, which induces some class of polynomials characterized by martingales. It is known that those polynomials connect the SLE to representations of the Virasoro algebra. In this talk, we introduce random coefficients based on Loewner–Kufarev equations and martingales related with the Kirillov–Neretin polynomials.

20 小川重義 (立命館大理工)　Haar 系 SFC による非因果的関数の同定 10
植村英明 (愛知教育大教育)

Shigeyoshi Ogawa (Ritsumeikan Univ.)　On the derivation of noncausal function from its Haar-SFCs
Hideaki Uemura (Aichi Univ. of Edu.)

概要 Let $f(t,\omega)$ be a noncausal random function. We consider the stochastic Fourier coefficient with respect to the orthonormal basis of Haar functions $\{H^{(n)}_k(t)\}$ (Haar-SFC in abbr.) of $f(t,\omega)$ defined by $\int_0^1 f(t,\omega)H^{(n)}_k(t)dW_t$, where $\int dW_t$ stands for some stochastic integral. The question whether we can identify the original function $f(t,\omega)$ by its Haar-SFCs arises spontaneously. We study this problem under the condition that $\int dW_t$ is the Ogawa integral, and give an affirmative answer.

11:30〜12:00　統計数学分科会総会

9月15日(火)　　第VII会場

9:30〜12:00

21　小 山 民 雄 (東大情報理工)　特殊直交群上の Fisher 分布の正規化定数が満たす微分方程式系について ····· 15

Tamio Koyama (Univ. of Tokyo)　Differential systems for the normalizing constant of Fisher distribution on the special orthogonal group

概要 We discuss a system of differential equations for the normalizing constant of Fisher distribution on the special orthogonal group. Especially, we explicitly give a set of linear differential operators which generates the annihilating ideal of the normalizing constant. For applications in statistics, differential operators annihilating the normalizing constant for the diagonal matrix are more important. We also give a new approach which obtains these operators.

22　須 藤 孝 浩 (東京理大理工)　正方分割表における一般化周辺同等性と準対称性の構造をもつモデル ·· 15
生 亀 清 貴 (東京理大理工)
富 澤 貞 男 (東京理大理工)

Takahiro Suto (Tokyo Univ. of Sci.)　An asymmetry model with m-additional parameters for square contingency tables with ordered categories
Kiyotaka Iki (Tokyo Univ. of Sci.)
Sadao Tomizawa (Tokyo Univ. of Sci.)

概要 For square contingency tables with ordered categories, this lecture proposes an asymmetry model with m-additional parameters, which indicates (1) the generalized marginal homogeneity and (2) the structure of quasi-symmetry for cumulative probabilities.The proposed model includes a modified palindromic symmetry model by Iki, Oda and Tomizawa (2014). Also the lecture gives the decomposition of the symmetry model using the proposed model.

23　渋 谷　　明 (東京理大理工)　順序カテゴリ正方分割表における対角指数対称モデルの一般化と分解 ·· 15
生 亀 清 貴 (東京理大理工)
富 澤 貞 男 (東京理大理工)

Akira Shibuya (Tokyo Univ. of Sci.)　Generalized diagonal exponent symmetry model and its orthogonal decomposition in square contingency tables with ordered categories
Kiyotaka Iki (Tokyo Univ. of Sci.)
Sadao Tomizawa (Tokyo Univ. of Sci.)

概要 For square contingency tables with ordered categories, we propose a generalized Tomizawa's (1992) diagonal exponent symmetry model. Also we give the orthogonal decomposition of proposed model.

24　前 田 良 太 朗 (東京理大理工)　順序カテゴリ正方分割表における拡張二重線形対角パラメータ対称モデル ····· 10
田 畑 耕 治 (東京理大理工)
富 澤 貞 男 (東京理大理工)

Ryotaro Maeda (Tokyo Univ. of Sci.)　Extended double linear diagonals-parameter symmetry model for contingency table
Kouji Tahata (Tokyo Univ. of Sci.)
Sadao Tomizawa (Tokyo Univ. of Sci.)

概要 For the analysis of square contingency tables with ordered categories, Tahata and Tomizawa (2010) considered the double linear diagonals-parameter symmetry model which implies the structure of both asymmetry with represent to the main diagonal and with respect to the reverse diagonal in the table. The present paper proposes extended double linear diagonals-parameter symmetry model.

概要 We consider the problem of testing equality of two mean vectors with k-step monotone missing data where two data sets have the same missing pattern. The maximum likelihood estimators (MLEs) of the mean vector and the covariance matrix under the null hypothesis are derived for the two-sample problem. Using the above results and the MLEs by Yagi and Seo (2015), we give the likelihood ratio test statistic. Further, as with the one-sample problem by Yagi and Seo (2015), we propose the approximate upper percentiles using linear interpolation based on complete data sets. Finally, we investigate the accuracy and asymptotic behavior of the approximation for χ^2 distribution by Monte Carlo simulation.

概要 We consider the problem of testing homogeneity of multivariate normal mean vectors under order restrictions when the covariance matrices are common but unknown. Sasabuchi, Tanaka, and Tsukamoto (2003, A.S.) and Sasabuchi (2007, Sankhya) proposed some test statistics for this problem. In this presentation, we show some properties of the distributions of these test statistics.

概要 In this talk, we consider two-sample tests for high-dimensional data. We first give a general high-dimensional test statistics including the Mahalanobis distance type test statistics. We give sufficient conditions for the test statistics to hold a consistency property and asymptotic normality. With the help of the properties, we discuss an optimality of the test statistics for high-dimensional data. Then, we show that the Mahalanobis distance does not always give a preferable performance for high-dimensional data.

概要 We discuss the problem of shrinkage estimation for the autocovariance matrix of a Gaussian stationary vector-valued process to improve on the usual sample autocovariance matrix with respect to the mean squares error. We propose a kind of empirical Bayes estimators when the mean of the stochastic process is zero and non-zero. We show that the shrinkage estimators dominate the usual estimators, and the asymptotic risk differences are similar to that of scalar-valued Gaussian stationary processes.

29 長幡英明 (早大理工)　高次元時系列データの判別解析及びクラスター解析 ····· 15
劉言 (早大基幹理工)
内山弘隆 (早大基幹理工)
谷口正信 (早大基幹理工)

Hideaki Nagahata (Waseda Univ.)　Discriminant and cluster analysis of high-dimensional time series data
Yan Liu (Waseda Univ.)
Hirotaka Uchiyama (Waseda Univ.)
Masanobu Taniguchi (Waseda Univ.)

概要 We introduce a class of disparities for discriminant and cluster analysis of high-dimensional time series analysis. Although a scale adjusted disparity function was proposed for high-dimensional i.i.d. data, the method may not be preferable in the case when the observations are dependent. The disparity given in this paper is based on the Mahalanobis distance with the jackknife type adjustment. We compared the error rate of several classifier by numerical experiments. Then, the proposed disparity provides smaller error rates. The performance is also verified by real data of companies listed with the first and second of the Tokyo Stock Exchange. We conclude that our adjustment method of jackknife type is suitable for the discriminant and cluster analysis of high-dimensional dependent data.

30 前園宜彦 (九大数理)　カーネル法による密度比推定量の漸近表現について ····· 10
森山卓 (九大数理)

Yoshihiko Maesono (Kyushu Univ.)　On asymptotic representation of kernel type estimator of density ratio
Taku Moriyama (Kyushu Univ.)

概要 In this talk we will discuss asymptotic properties of a kernel type estimator of a density ratio. We obtain an asymptotic representation of the estimator, which enable us to obtain an Edgeworth expansion with remainder term $o(n^{-1/2})$.

14:15〜15:15

31 高橋弘 (日大理工)　$\mathcal{M}$-dependent 確率変数列に対する Bahadur 表現について ····· 10
吉原健一 (横浜国大*)

Hiroshi Takahashi (Nihon Univ.)　A note on the Bahadur representation of sample quantiles for $\mathcal{M}$-dependent random variables
Ken-ichi Yoshihara (Yokohama Nat. Univ.*)

概要 In the case of independent random variables, Bahadur introduced a representation for a sample quantile and the empirical distribution function. Following his pioneer work, many studies have been extended the Bahadur representation. For dependence random variables, Sen obtained the first extended result to the case of m-dependent random variables. Recently, Berkes et al. introduced the notion of weakly $\mathcal{M}$-dependent random variables, which is an extension of m-dependence. In this talk, we show that the Bahadur representation holds for some weakly $\mathcal{M}$-dependent random variables.

32 荻原哲平 (統計数理研)　高頻度観測金融データに対する最尤型推定法 ····· 15

Teppei Ogihara (Inst. of Stat. Math.)　Maximum-likelihood-type estimation for high-frequency financial data

概要 In this talk, we study maximum-likelihood-type estimation for a parametric model of diffusion processes with high-frequency observations. In particular, we focus on two problems on high-frequency financial data analysis, which complicate the statistical analysis. The first one is observation noise. When we model financial market by stochastic processes, some empirical facts suggest the existence of additional noise. This observation noise is called 'market microstructure noise'. The second one is nonsynchronous observations. We observe security prices when transactions occur. So observation times must be different for different securities. We show asymptotic properties of our estimator under these problems.

33　佃　　康　司　(久留米大バイオ統計センター)　The Ewens sampling formula における大きな mutation parameter の推定問題 15

Koji Tsukuda (Kurume Univ.)　Estimating the large mutation parameter of the Ewens sampling formula

概要 In order to model partitions, the Ewens sampling formula (ESF) is sometimes used. ESF has the parameter θ called mutation parameter. To estimate θ, the maximum likelihood estimator (MLE) is frequently used. On the other hand, there is a simple consistent estimator $K_n/\log n$ of θ, where K_n is the number of distinct components of the Ewens partition. If K_n is large, two estimators get dramatically different values. In sush a case, it is considered that MLE still work whreas the other does not. So, let us assume the parameter is a power function of n and show some asymptotic behaviors of K_n. Based on the results, some simple estimators of large θ are proposed.

34　橋 本 真 太 郎 (筑波大数理物質)　Reference prior via α-divergence in a non-regular multi-parametric case
小　池　健　一 (筑波大数理物質) 15

Shintaro Hashimoto (Univ. of Tsukuba)　Reference prior via α-divergence in a non-regular multi-parametric case
Ken-ichi Koike (Univ. of Tsukuba)

概要 In Bayesian inference, the selection of priors has been an important and much-discussed problem. When we have little prior information, we need to consider 'non-informative' or 'reference' prior. In this talk, we present reference prior based on α-divergence for a non-regular multi-parametric model in the presence of nuisance parameter. As examples, we show reference priors in the case of location-scale and one-sided truncated exponential families.

15:30〜16:30　特別講演

阿　部　俊　弘 (南 山 大 理 工)　シリンダー上の確率分布とその周辺

Toshihiro Abe (Nanzan Univ.)　On some cylindrical distributions and their related topics

概要 We propose cylindrical distributions obtained by combining the sine-skewed von Mises distribution (circular part) with the Weibull distribution (linear part). This new model, the WeiSSVM, enjoys numerous advantages: simple normalizing constant and hence very tractable density, parameter-parsimony and interpretability, good circular-linear dependence structure, easy random number generation thanks to known marginal/conditional distributions, and flexibility illustrated via excellent fitting abilities. Inferential issues, such as independence testing, can easily be tackled with our model, which we apply on a distinct data set. We also introduce other new circular-linear models, based on the same idea, and compare the WeiSSVM with well-known densities from the literature. We conclude the talk by showing a straightforward extension to directional-linear cylindrical distributions and by discussing future applications of our model.

16:40〜17:40　特別講演

鎌谷研吾 (阪大基礎工)　Asymptotic theory of Markov chain Monte Carlo method in high-dimension

Kengo Kamatani (Osaka Univ.)　Asymptotic theory of Markov chain Monte Carlo method in high-dimension

概要 In this talk, it is demonstrated how the high-dimensional asymptotic theory ($d \to \infty$) of Markov chain Monte Carlo (MCMC) methods can be applied to practical Bayesian inference problems. The theory was initially studied in quantum physics community in the late 1980s, and developed in Roberts, Gelman and Gilks Ann. Appl. Probab. 1997. They proved that when the proposal variance of the random-walk Metropolis algorithm is $O(1/d)$, the Markov chain has a limiting diffusion process. By using this, they constructed a criterion for constructing a good MCMC methods.

This approach has been further developed in this twenty years by generalizing the target probability distribution and by studying other MCMC/SMC algorithms. We will review some results, including efficient MCMC strategy for heavy-tailed target distributions.

9月16日(水)　第VII会場

9:30〜12:00

35 齋藤　裕 (新潟大自然)　スカラー化手法を用いたミニマックス不等式定理の集合値拡張 ····· 10
田中　環 (新潟大自然)
山田修司 (新潟大理)

Yutaka Saito (Niigata Univ.)　A generalization of some minimax inequality theorem into set-valued maps via scalarizaion
Tamaki Tanaka (Niigata Univ.)
Syuuji Yamada (Niigata Univ.)

概要 In this talk, we propose Ricceri's theorem on Fan–Takahashi minimax inequality for set-valued maps by using the scalarization method proposed by Kuwano, Tanaka and Yamada.

36 鈴木　聡 (島根大総合理工)　準凸計画問題における解集合の特徴付けについて ····· 15
黒岩大史 (島根大総合理工)

Satoshi Suzuki (Shimane Univ.)　Characterizations of the solution set for quasiconvex programming
Daishi Kuroiwa (Shimane Univ.)

概要 In convex programming, characterizations of the solution set in terms of the subdifferential have been investigated by Mangasarian. Motivated by these results, various characterizations of the solution set for mathematical programming have been studied extensively. In this talk, we study characterizations of the solution set for quasiconvex programming in terms of quasi-subdifferential. To the purpose, we introduce a necessary and sufficient optimality condition for quasiconvex programming by quasi-subdifferential. Also, we compare our results with previous ones. Especially, we prove some of Mangasarian's characterizations as corollaries of our results.

37 盧　暁南 (名大情報)　Applications of difference families to graceful labeling of digraphs ···· 15
神保雅一 (中部大現代教育)

Xiao-Nan Lu (Nagoya Univ.)　Applications of difference families to graceful labeling of digraphs
Masakazu Jimbo (Chubu Univ.)

概要 Let G denote an additively written group of order v. Let $\mathcal{A}$ be a collection of k-subsets (base blocks) of G, such that each non-identity element of G appears exactly λ times in the multiset $\bigcup_{A\in\mathcal{A}} \Delta A$, where $\Delta A = \{a - a' \mid a, a' \in A, a \neq a'\}$. Then $\mathcal{A}$ is called a (v, k, λ) difference family in G. Furthermore, if all the base blocks of $\mathcal{A}$ are mutually disjoint, then $\mathcal{A}$ is said to be a disjoint difference family. In this talk, we discuss some relations between disjoint difference families and graceful labeling of digraphs.

概要 A graph G is *asymmetric* if it does not admit any nontrivial automorphism. In a paper, Erdős and Rényi defined the *asymmetry* of a given graph G to be the number $A(G)$ of deleted/added edges such that the resulting graph is no longer asymmetric. They showed that

$$A(G) \leq [\frac{n-1}{2}](\forall G \in \mathcal{G}_n)$$

where $\mathcal{G}_n$ denotes the set of all simple graphs with n vertices, and the bound is asymptotically best by using probabilistic methods. In this talk, we propose a measure of asymmetry of directed graphs, and discuss what an Erdős–Rényi type bound should be and whether our bound could be best asymptotically.
This is joint work with Masanori Sawa (Kobe University) and Masakazu Jimbo (Nagoya University).

概要 A famous theorem due to S. L. Sobolev (1962) states that, for a finite subgroup G of the orthogonal group $O(\mathbb{R}^d)$, a G-invariant cubature formula on the unit sphere S^d is exact for all polynomials of degree at most n if and only if it is exact for all G-invariant polynomials of degree at most n. In this talk, Sobolev's theorem is generalized for G-invariant cubature formulas for general functional spaces, together with some applications.

概要 Consider a fractional 2^m factorial design with m factors each at two levels, which is derived from a simple array (SA) of 2 symbols, where $m \geq 8$, and the five-factor and higher-order interactions are assumed to be negligible. Under these situations, if the main effect is estimable, and furthermore some of the remaining non-negligible factorial effects may or may not be estimable, then a design is said to be of resolution $\mathrm{R}^*(\{1\}|\Omega_4)$. Using the algebraic structure of the TMDPB association scheme, we give a necessary and sufficient condition for an SA to be a 2^m-BFF design of resolution $\mathrm{R}^*(\{1\}|\Omega_4)$, where the number of assemblies is less than the number of non-negligible factorial effects.

概要 The existence of pairwise additive balanced incomplete block (BIB) designs has been discussed with direct and recursive constructions in Sawa et al. (2007) and Matsubara et al. (2013). In this talk, pairwise additive 1-rotational BIB designs are proposed and some recursive methods of constructing such designs are provided. It is finally shown that no ℓ PARB$(v, 3, 1)$ exist for any $\ell \geq 2$ and $v \geq 6$, and that 2 PARB$(v, 2, 1)$ can be constructed for any $v \geq 4$.

概要 We consider Markov chain Monte Carlo methods for calculating conditional p values of statistical models for count data arising in Box–Behnken designs. The statistical model we consider is a discrete version of the first-order model in the response surface methodology. For our models, the Markov basis, a key notion to construct a connected Markov chain on a given sample space, is characterized as generators of the toric ideals for the centrally symmetric configurations of root system D_n. We show the structure of the Gröbner bases for these cases.

概要 The concept of QMC design is introduced by Brauchart et al. (2014). In this talk we consider a probabilistic generation of a sequence of QMC design by using determinatal point processes (DPPs). For example, spherical ensembles generate QMC design sequence for Sobolev space $\mathbb{H}^s(\mathbb{S}^2)$ with $1 < s < 2$. Moreover, we deal with DPPs constructed by reproducing kernel for polynomial spaces $\mathcal{P}_t(\mathbb{S}^d)$.

応　用　数　学

9月13日(日)　　第Ⅲ会場

9:30〜12:00

1　藤　本　　実 (精 華 科 学 研)　Goldbach 予想について ····· 10
上　原　邦　彦 (帝塚山大経営)

Minoru Fujimoto (Seika Science Lab.)　On the Goldbach conjecture
Kunihiko Uehara (Tezukayama Univ.)

概要 We give an estimation of the existence density for the $2d$ different primes by using a new and simple algorithm for getting the $2d$ different primes. The algorithm is a kind of the sieve method, but the remainders are the central numbers between the $2d$ different primes. We apply this algorithm to the Goldbach conjecture and conclude that the number of cases for the Goldbach conjecture is consistent with the Hardy–Littlewood paper.

2　藤　本　　実 (精 華 科 学 研)　素因数分解と NP 完全問題の限界必要計算時間の関係について ····· 10
上　原　邦　彦 (帝塚山大経営)

Minoru Fujimoto (Seika Science Lab.)　On the relation of the limit for the calculation period between the prime
Kunihiko Uehara (Tezukayama Univ.)　factorization and the NP complete problem

概要 We study the quadratic residue problem known as an NP complete problem by way of the prime number and show that the prime factorization for large numbers does not belong to the class P because of a random distribution of solutions for the quadratic residue problem.

3　新　藤　伸　夫　　任意の極大平面グラフの辺の三色分解 ····· 10

Nobuo Shindo　　3-colors solution of the edges of all maximum plane graphs

概要 In this paper, I prove that the edges of any maximum plane graph G are 3-colors soluble. First of all, I prove that if graph G without any one face is 3-colors soluble, graph G is 3-colors soluble, too. Next, we solve any one face into 3 colors. And, thirdly, we can pick up half of $(f-2)$ faces of graph G, which enable the number of cases of 3-colors solution become more than doubles about each face of half of $(f-2)$ faces of graph G. Lastly, at least one case remains when we consider along each face another half of $(f-2)$ faces of graph G. So we can prove the main theorem of this paper.

4　潮　　和　彦 (近 畿 大 理 工)　Balanced C_8-foil designs and related designs ····· 15

Kazuhiko Ushio (Kinki Univ.)　Balanced C_8-foil designs and related designs

概要 In graph theory, the decomposition problem of graphs is a very important topic. Various type of decomposition of many graphs can be seen in the literature of graph theory. This paper gives balanced C_8-foil designs and related designs.

5　佐　藤　　巖 (小 山 工 高 専)　A new determinant expression for the weighted Bartholdi zeta function
三　橋　秀　生 (宇都宮大教育)　of a digraph ····· 15
森　田　英　章 (室　蘭　工　大)

Iwao Sato (Oyama Nat. Coll. of Tech.)　A new determinant expression for the weighted Bartholdi zeta function
Hideo Mitsuhashi (Utsunomiya Univ.)　of a digraph
Hideaki Morita (Muroran Inst. of Tech.)

概要 We consider the weighted Bartholdi zeta function of a digraph D, and give a new determinant expression of it. Furthermore, we give a new decomposition formula for the the weighted Bartholdi zeta function of a group covering of D. Finally, we treat a weighted L-function of D, and give a new determinant expression of it.

概要 From Alon and Boppana, and Serre, we know that for any given integer $k \geq 3$ and real number $\lambda < 2\sqrt{k-1}$, there are only finitely many k-regular graphs whose second largest eigenvalue is at most λ. In this talk, we give the largest number of vertices of such graphs for several (k, λ).

概要 In this talk, we show a new upper bound for the competition numbers of diamond-free graphs.

概要 It is well known that the complement of a disconnected graph is connected. By this fact, it is easy to count graphs such that both of the graph and its complement are connected. In this talk, we will investigate the structure of graphs such that both of the graph and its complement have connectivity 1. This result is a generalization of results due to Akiyama and Harary (1979) and Kawarabayashi, Nakamoto, Oda, Ota, Tazawa and Watanabe (2002). By examining the structure, we can count the number of such graphs and also the number of graphs such that both itself and its complement are 2-connected.

概要 In this talk, we show that for any odd k, there exist infinitely many integers n such that the complete graph on n vertices can be embedded on some surface with every face k-gonal.

概要 A matching M of G is said to be extendable in G if M is a subset of a perfect matching of G, and a graph with at least $2m+2$ vertices in which every matching of size m is extendable is called m-extendable. Moreover, a graph with at least $2m+2$ vertices is said to be distance d m-extendable if any matching M with $|M| = m$ in which the edges lie pair-wise distance at least d is extendable. In this talk we introduce the following result: Every 5-connected triangulation of the projective plane with an even order is distance 4 m-extendable for any m.

14:15〜16:20

11 藤田慎也 (横浜市大国際総合)
古谷倫貴 (東京理大理)
Reza Naserasr (Univ. Paris-Sud 11)
小関健太 (国立情報学研・JST ERATO)
A new approach towards a conjecture on intersecting three longest paths ····· 10

Shinya Fujita (Yokohama City Univ.)
Michitaka Furuya (Tokyo Univ. of Sci.)
Reza Naserasr (Univ. Paris-Sud 11)
Kenta Ozeki (Nat. Inst. of Information / JST ERATO)
A new approach towards a conjecture on intersecting three longest paths

概要 In 1966, T. Gallai asked whether every connected graph has a vertex that appears in all longest paths. Since then this question has attracted much attention and many work has been done in this topic. One important open question in this area is to ask whether any three longest paths contains a common vertex in a connected graph. It was conjectured that the answer to this question is positive. In this paper, we propose a new approach in view of distances among longest paths in a connected graph, and give a substantial progress towards the conjecture along the idea.

12 斎藤明 (日大文理)
N. Ananchuen (Silpakorn Univ.)
W. Ananchuen (Sukhothai Thammathirat Open Univ.)
Extendability of the complementary prism of a bipartite graph ····· 15

Akira Saito (Nihon Univ.)
Nawarat Ananchuen (Silpakorn Univ.)
Watcharaphong Ananchuen (Sukhothai Thammathirat Open Univ.)
Extendability of the complementary prism of a bipartite graph

概要 The complementary prism of a graph G is the graph defined by G and its complement constructed on a set of vertices disjoint from G by joining each corresponding vertices by an edge. Janseana and Ananchuen (2014) gave a lower bound of the extendability of the complementary prism in terms of the extendabilities of G and its complement in the case that neither G nor its complement is a bipartite graph. In this talk, we discuss the case that G is a bipartite graph and give a sharp lower bound to the extendability of the complementary prism of G.

13 鈴木章斗 (信州大工)
瀬川悦生 (東北大情報)
量子ウォークのスペクトル写像定理と生成子 ····· 15

Akito Suzuki (Shinshu Univ.)
Etsuo Segawa (Tohoku Univ.)
The spectral mapping theorem and the generator of a quantum walk

概要 We study the spectral properties and asymptotic behaviour of a discrete time quantum walk in an abstract form, which includes the Grover walk on a graph, possibly infinite. For given two Hilbert spaces $\mathcal{H}$ and $\mathcal{K}$, an abstract evolution U, which is a unitary operator acting on $\mathcal{H}$, and its discriminant T, which is a self-adjoint operator acting on $\mathcal{K}$, are induced by a coisometry operator from $\mathcal{H}$ to $\mathcal{K}$ and a unitary involution on $\mathcal{H}$. We show a spectral mapping theorem form the discriminant T to the evolution U. We also construct the generator H of the evolution U in terms of the discriminant T. The asymptotic behaviour of such abstract quantum walks is classified in terms of the generators H.

概要 It is known that any infinite trees never admit localization of the Grover walk while infinite regular trees provide localization. We see that the derivation of the localization on the infinite tree is the overlap between the initial state and the eigenspace which is independent of the underlying isotropic random walk. This eigenspace is generated by infinite-length flows on the infinite tree. We suggest that the Grover walk on infinite trees is a limit of not so much the Grover walk on its n-th depth finite tree rather as a quantum walk induced by the underlying random walk with the Dirichlet cut at the n-th depth.

概要 We construct a new type of quantum walks on simplicial complexes as a natural extension of the well-known Szegedy walk on graphs. One can numerically observe that our proposing quantum walks possess linear spreading and localization as in the case of Grover walk on lattices. On the other hand, our proposing quantum walk contains an intrinsic problem for exhibiting nontrivial behavior, which is not seen in typical quantum walks such as Grover walks on graphs.

概要 We discuss the 64-bit integer output sequences of the SFMT19937 pseudorandom number generator, which was developed by Saito and Matsumoto (2008). The SFMT generators are optimized under the assumption that one will mainly be using 32-bit output sequences, so that the dimensions of equidistribution with v-bit accuuracy for 64-bit output sequences are much worse than those for 32-bit cases. We therefore study the structure of SFMT19937 and point out its weaknesses. We also apply empirical statistical tests to non-successive values of SFMT19937 and find that the generator fails them.

17　早 水 桃 子　重みつき木で表現可能な距離空間の特徴づけ ····· 15
(総合研究大学院大・統計数理研)
福 水 健 次
(統計数理研・総合研究大学院大)
Momoko Hayamizu　On minimum spanning tree-like metric spaces
(Grad. Univ. for Adv. Stud./Inst. of Stat. Math.)
Kenji Fukumizu
(Inst. of Stat. Math./Grad. Univ. for Adv. Stud.)

概要 We attempt to shed new light on the notion of 'tree-like' metric spaces by focusing on an approach that does not use the four-point condition. Our key question is: Given metric space M on n points, when does a fully labelled positive-weighted tree T exist on the same n vertices that precisely realises M using its shortest path metric? We introduce a fourth-point condition that is necessary and sufficient to ensure the existence of T whenever each distance in M is unique, and present its connection to the minimum spanning tree. We also discuss how to measure the goodness-of-fit of the minimum spanning tree to M, i.e., the spanning tree-likeness of M.

16:40〜17:40　特別講演

松 田 晴 英 (芝 浦 工 大 工)　グラフの木から連結因子へ
Haruhide Matsuda　On trees and connected factors of graphs
(Shibaura Inst. of Tech.)

概要 We'll give a talk on a survey of trees in graphs. We mainly deal with spanning trees having some particular properties concerning hamiltonian properties, for example, spanning trees with bounded degrees, with bounded number of leaves, or with bounded number of branch vertices. This topic is closely related to a connected factor, in particular, a connected $[1,k]$-factor. For two integers a and b with $a \leq b$, an $[a,b]$-factor is a spanning subgraph in which each vertex has degree between a and b. For an integer $k \geq 2$, a k-tree is a tree with the maximum degree at most k. Thus a graph G has a spanning k-tree if and only if G has a connected $[1,k]$-factor.
We also consider the relationship between spanning trees with some properties and connected factors.

9月14日(月)　第Ⅲ会場

9:15〜11:45

18　堀 口 俊 二 (新潟産大経済)　拡張 Halley 法 (土倉*・堀口・村瀬・Halley 法) の曲線の凹凸と曲率による収束比較式 ····· 10
Shunzi Horiguchi　Expressions represented by the unevenness and curvature that compare the convergences of expanded Halley method (Tsuchikura–Horiguchi–Murase–Halley method)
(Niigata Sangyo Univ.)

概要 Section 1 gives the definition of the function $g(t)$ obtain from $y = f(x)$. Section 2 gives the Halley method and extended Halley method (Tsuchikura–Horiguchi–Murase–Halley method). Section 3 gives expressions represented by the unevenness and curvature that compare the convergences of expanded Halley method (Tsuchikura–Horiguchi–Murase–Halley method).

19　堀口俊二 (新潟産大経済)　3つの拡張 Halley 法 ····· 15

Shunzi Horiguchi (Niigata Sangyo Univ.)　Extensions of three types of Halley method

概要 Section 1 gives the definition of the function $g(t)$ obtain from $y = f(x)$. section 2 gives the Newton method and extended Newton method (Tsuchikura–Horiguchi method). Section 3 gives the Halley method and three types of extended Halley method. Section 4 gives convergences equation of the extended Newton method and extended Halley method.

20　芳木武仁 (東大数理)　The improved order of the worst case error for α-smooth functions ··· 15
合田　隆 (東　大　工)
鈴木航介 (東大数理)

Takehito Yoshiki (Univ. of Tokyo)　The improved order of the worst case error for α-smooth functions
Takashi Goda (Univ. of Tokyo)
Kosuke Suzuki (Univ. of Tokyo)

概要 Quasi Monte Carlo(QMC) integration is one of the methods for numerical integration. We approximate the integration value $I(f)$ of an integrable function f by the average $I_P(f) = \frac{1}{|P|}\sum_{x\in P} f(x)$ over a finite point set P. We consider the function space H_α including functions whose mixed partial derivatives up to order α in each variable are continuous. If we can find a point set P whose worst case error $wce(H;P) = \sup_{f\in H_\alpha, \|f\|_{H_\alpha}\le 1} |I(f) - I_P(f)|$ is small, the integration error for $f \in H_\alpha$ by P can be small. Until now, the constructions of point sets satisfying $wce(H;P) \in O(N^{-\alpha}(\log N)^{s\alpha})$ are known. In this talk we give the existence of point sets satisfying $wce(H;P) \in O(N^{-\alpha}(\log N)^{\frac{s-1}{2}})$, which improves the previous result.

21　J. Dick (Univ. New South Wales)　Construction of interlaced polynomial lattice rules achieving accelerating convergence for infinitely differentiable functions ····· 15
鈴木航介 (東大数理)
合田　隆 (東　大　工)
芳木武仁 (東大数理)

Josef Dick (Univ. New South Wales)　Construction of interlaced polynomial lattice rules achieving accelerating convergence for infinitely differentiable functions
Kosuke Suzuki (Univ. of Tokyo)
Takashi Goda (Univ. of Tokyo)
Takehito Yoshiki (Univ. of Tokyo)

概要 We study multivariate integration over the s-dimensional unit cube in a weighted space of infinitely differentiable functions. It is known from the recent result by Suzuki that there exists a good quasi-Monte Carlo (QMC) rule which achieves an accelerating convergence of the worst-case error in this function space, and moreover, that this convergence behavior is independent of the dimension under a certain condition on the weights. In this talk we provide a constructive approach to find a good QMC rule achieving such a dimension-independent accelerating convergence of the worst-case error. Specifically we prove that interlaced polynomial lattice rules with an interlacing factor chosen properly depending on the number of points and the weights can be constructed using a fast component-by-component algorithm to achieve a dimension-independent accelerating convergence.

22 遠藤(渡邊)隆子 (お茶の水女大理)　2 相系量子ウォークの極限分布とトポロジカル絶縁体の数理 ····· 15
今野紀雄 (横浜国大工)
小布施秀明 (北大工)

Endo(Watanabe) Takako (Ochanomizu Univ.)
Norio Konno (Yokohama Nat. Univ.)
Hideaki Obuse (Hokkaido Univ.)

Relation between two-phase quantum walk and the topological numbers

概要 We treat two kinds of position-dependent quantum walks (QWs) in one dimension, which is considered as mathematical models of topological insulator. We call the QWs, "the complete two-phase QW" and "the two-phase QW with one defect". Both of the models have two different time-evolution operators in positive and negative parts, however, the complete two-phase QW does not have defect. We exhibit two kinds of limit theorems concerning "localization" and "the ballistic spreading" which are the characteristic behaviors in the long-time limit for discrete-time QWs in one dimension. The analysis is based mainly on the generating function methods. Next, we calculate the topological invariants from the time-evolution operator corresponding to the two spatial regions of the complete two-phase QW. We note that the single defect prevents to apply the discussion of topological invariants directly, however, we show that for the two-phase QW with defect, we can argue localization at the origin from a viewpoint of topological insulator. Then, we give the relation between the localization of the complete two-phase QW with topological invariants in concrete cases.

23 三橋秀生 (宇都宮大教育)　有限グラフ上の離散時間四元数量子ウォーク ····· 15
今野紀雄 (横浜国大理工)
佐藤巖 (小山工高専)

Hideo Mitsuhashi (Utsunomiya Univ.)
Norio Konno (Yokohama Nat. Univ.)
Iwao Sato (Oyama Nat. Coll. of Tech.)

The discrete-time quaternionic quantum walk on a graph

概要 The quaternionic quantum walk was formulated by the first author as a generalization of discrete-time quantum walks recently. We treat the right eigenvalue problem of quaternionic matrices to analysis the spectra of its transition matrix. The way to obtain all the right eigenvalues of a quaternionic matrix is given. From the unitary condition on the transition matrix of the quaternionic quantum walk, we deduce some properties about it. Our main results determine all the right eigenvalues of a quaternionic quantum walk by use of those of the corresponding weighted matrix.

24 太田克弘 (慶大理工)　グラフが同じ長さの点素な偶閉路を含むための次数条件 ····· 15
江川嘉美 (東京理大理)
藤田慎也 (横浜市大国際総合)
佐久間雅 (山形大地域教育)

Katsuhiro Ota (Keio Univ.)
Yoshimi Egawa (Tokyo Univ. of Sci.)
Shinya Fujita (Yokohama City Univ.)
Tadashi Sakuma (Yamagata Univ.)

A degree condition for a graph to contain disjoint cycles of the same even length

概要 We have proved that for any $k \geq 2$ there exists an integer c_k such that if G is a graph of order at least c_k with minimum degree at least $2k+1$, then G contains k disjoint cycles of the same even length. The minimum degree condition is sharp because $(2k-1)K_1 + mK_2$ has minimum degree $2k$ but does not contain k disjoint even cycles. Our result is an analogue of Egawa's result on disjoint cycles of the same length.

25 江川嘉美 (東京理大理)　小さい奇位数道を持たない path-factor の存在 ····· 15
古谷倫貴 (東京理大理)
小関健太
(国立情報学研・JST ERATO)

Yoshimi Egawa (Tokyo Univ. of Sci.)　The existence of a path-factor without small odd paths
Michitaka Furuya (Tokyo Univ. of Sci.)
Kenta Ozeki
(Nat. Inst. of Information / JST ERATO)

概要 In this talk, we research a sufficient condition for the existence of a $\{P_2, P_{2k+1}\}$-factor. We prove that for $k \geq 3$, there exists $\varepsilon_k > 0$ such that if a graph G satisfies $\sum_{0 \leq j \leq k-1} c_{2j+1}(G-S) \leq \varepsilon_k |S|$ for all $S \subseteq V(G)$, then G has a $\{P_2, P_{2k+1}\}$-factor, where $c_i(G-S)$ is the number of components C of $G-X$ with $|V(C)| = i$. On the other hand, we construct infinitely many graphs having no $\{P_2, P_{2k+1}\}$-factor such that $\sum_{0 \leq j \leq k-1} c_{2j+1}(G-S) \leq \frac{16k+71}{36k-40}|S| + \frac{16k+71}{72k-80}$ for all $S \subseteq V(G)$.

26 安藤清　Conditions for k-connected graphs to have a contractible edge ····· 15
(国立情報学研・JST ERATO)

Kiyoshi Ando　Conditions for k-connected graphs to have a contractible edge
(Nat. Inst. of Information / JST ERATO)

概要 An edge in a k-connected graph is said to be k-contractible if the contraction of the edge results in a k-connected graph. Let G be a k-connected graph with $k \geq 5$. Ando and Kawarabayashi proved that if G has neither K_5^- nor $5K_1 + P_3$ and $\delta(G) \geq k+1$, then G has a k-contractible edge. Yang and Sun proved that if G has no $K_1 + C_4$ and $\deg_G(u) + \deg_G(v) \geq 2k+2$ for any adjacent vertices u and v, then G has a k-contractible edge. We give a common extension of the above two results.

13:15〜14:15　特別講演

落合啓之　CG 映像制作の数理
(九大 IMI・JST CREST)

Hiroyuki Ochiai　Mathematics for image synthesis
(Kyushu Univ. / JST CREST)

概要 Computer graphics (CG) is increasingly transforming every aspect of image creation and processing, and is an integration of technology and science. In this talk, we introduce our mathematical approach to CG, especially for making animations directable. A part of this talk is based on an experience in the CREST project "Mathematics for Expressive Image Synthesis" (team leader: Ken Anjyo) approved by "Alliance for breakthrough between mathematics and sciences" (research director: Yasumasa Nishiura) supported by JST.

9月15日(火)　第III会場

9:30〜11:55　特別セッション「量子ウォークと関連する話題」

今野紀雄 (横浜国大工)　量子ウォークの数理的構造 ····· 45

Norio Konno (Yokohama Nat. Univ.)　Mathematical structure of the quantum walk

概要 The quantum walk is a quantum version of the classical random walk and has been largely investigated for the last decade. The striking property of the quantum walk is the spreading property of the walker. The standard deviation of the walker's position grows linearly in time, quadratically faster than classical random walk, i.e., ballistic spreading. On the other hand, a walker stays at the starting position: localization occurs. Interestingly, a quantum walker has both ballistic spreading and localization. A new type of limit theorems explains this property. In this talk, we give a brief review of the quantum walk from a mathematical point of view.

概要 Discrete-time quantum walks (DTQWs) are defined as quantum-mechanical analogues of classical random walks. The concept of DTQWs was first considered by Feynman and then introduced in greater generality by Gudder, Aharonov et al, Meyer, Ambainis et al. They have been realized experimentally in various physical systems and are important in many fields, from fundamental quantum physics to quantum algorithm and condensed matter physics. It has been shown that several DTQWs on a line admit a continuous limit identical to the propagation equations of a massive Dirac fermion and those of massless Dirac fermion equations. Furthermore, the relationship between DTQWs and artificial electric and gravitational fields has been shown. Thus, DTQWs can be regarded as quantum dynamical simulators.
In this talk, I would like to introduce the physical implementation of DTQWs and the relationship between the DTQWs and the quantum dynamical simulators.

概要 A quantum walk (QW) describes quantum dynamics of particles, which corresponds to the classical random walk when quantumness is lost. One of remarkable properties of QWs is localization which states that a probability to find walkers at an initial position in the infinite time limit is kept to be finite. Since localization of QWs had been mathematically identified on the two-dimensional QW in 2004 first time, this phenomenon has been intensively studied. So far, it is mathematically clarified that localization occurs even in the one-dimensional QW on a half line or a spatially inhomogeneous QW.
Recently, localization of QWs has attracted attentions from a quite different direction, that is, topological insulators. The topological insulator is new topological states of quantum matter, which have been one of the central research issues in the condensed matter physics since a discovery of the corresponding new material in 2005, though the first (rather old) example of topological insulators is the integer quantum Hall insulator found in 1980. The wave function of these new materials exhibits a finite integer (or $\mathbb{Z}_2$) topological number. When the topological number is discontinuously varied in space, i.e., by attaching two materials whose topological numbers are different or exposing the material in vacuum whose topological number is zero, there appear surface states localized near the interface. Now, it gets to understand that several examples of localization of QWs can be related to the surface states of topological insulators.
In this talk, I will explain the relation between localization of QWs and the topological insulator and present recent developments in this direction.

14:15〜17:25

概要 In this talk, we present a mathematical and algorithmic framework for the continuation of point clouds by persistence diagrams. The persistence diagram represents homological information of an input point cloud (a coordinate data of finite points in a Euclidean space). This framework solves the inverse problem from persistence diagrams to point cloud data by deforming the point cloud data.

概要 Persistent homology and its application to topological data analysis for the actual data are studied in recent years. However, a study of statistical data analysis using persistent homology is developing. Here, we apply kernel methods, which are widely used in machine learning, for persistence diagrams, a representation of persistent homology. In this talk, we construct a kernel function on persistence diagrams and show the stability theorem for the kernel function.

概要 In this talk we study fractal feature analysis of the spatio-temporal patterns created by the symmetric two-dimensional elementary cellular automata. We find that six patterns of all spatio-temporal patterns are represented by Lebesgue's singular function, which is a self-affine map. The relation among the six patterns are also discussed.

概要 We provide an effective tracing method for computing trajectories near slow manifolds in fast-slow systems. Our method is based on a topological tool called covering relations. The result leads to an analogue of shadowing lemma in fast-slow systems. This technique not only prove the existence of trajectories near slow manifolds but also gives us easy implementations for validating such trajectories in a wide range, via rigorous numerics. Our procedure is available to validate trajectories not only for sufficiently small $\epsilon > 0$ but all ϵ in a given half-open interval $(0, \epsilon_0]$.

概要 A direct method and a level-set method of an image segmentation will be studied.

概要 Let $\{X(t)\}$ be the Lévy process which consists of a constant positive drift and a negative compound Poisson Process whose common distribution is F. We consider that the first hitting time T_0 of $\{X(t)\}$ to the negative domain. In the Lundberg model, the T_0 is a ruin time of an insurer.
In this lecture, we present an exact formula of the Laplace–Fourier transform of the joint distribution of the first hitting time and the first hitting place

$$v(x) \equiv \mathbf{E}_x\big[e^{-\alpha T_0 + i\beta X(T_0)}\big], \quad x \geq 0,\ \alpha \geq 0,\ \beta \in \mathbb{R}^1,$$

where F is a "linear combination of delta measures."

概要 In the previous paper, I characterized some dynamic aspects on dynastic utility incorporating two-sided altruism with discrete-time OLG settings. In its extension, here I formulate the continuous-time version of the optimal control problem with quasi-geometric discounting as well as the corresponding Hamilton–Jacobi–Bellman equation, and derive some results in a time-consistency context. Fixed points and contraction arguments in some functional spaces are also shown.

概要 An exogenous type microbial depolymerization process is studied. A mathematical model is described. Inverse problems for a time factor and a molecular factor are formulated. Numerical techniques are illustrated, and numerical results are introduced.

概要 The Newton method in calculations of a bifurcation set requires differential coefficients of second order, which make its dimension of differential coefficients extremely large in size, consequently it is difficult to deal with the coefficients. A computational algorithm using the bisection method for a bifurcation set is applied to a tangent bifurcation of a equilibrium point.

36 本田あおい (九工大情報工)
岡崎悦明 (ファジィシステム研)
Inclusion-exclusion integral(包除積分) —非加法的単調測度による積分— ····· 15

Aoi Honda (Kyushu Inst. of Tech.)
Yoshiaki Okazaki (Fuzzy Logic Systems Inst.)
Inclusion-exclusion integral —Integral with respect to nonadditive monotone measure—

概要 An integral with respect to the nonadditive monotone measure is proposed. This integral is a generalization of the Lebesgue integral and also the Choquet integral. It has appropriate properties as an integral and can be applicable to real data analysis.

37 坂口文則 (福井大工)
ベクトルの準直交化を用いた微分方程式の整数型解法と収束の速い一般化連分数との 2 つの接点 ····· 15

Fuminori Sakaguchi (Univ. of Fukui)
Two possible relationships between rapidly converging generalized continued fractions and an integer-type algorithm for ODEs using quasi-orthogonalizations

概要 In this study, we observe two possible relationships between rapidly converging generalized continued fractions and an integer-type high-accuracy algorithm for linear higher-order ODEs using quasi-orthogonalizations of integer-valued vectors which was proposed recently by the author and M. Hayashi. One possible relationship is between continued fractions and numerical ratios among expansion coefficients calculated by the algorithm, where numerical ratios often coincide just with convergents of canonical continued fractions of true analytical ratios. The other is an application of rapidly converging generalized continued fractions to high-accuracy calculation of eigenvalues of differential operators by means of the integer-type algorithm.

9月16日(水)　第Ⅲ会場

9:30〜12:00

38 渡利正弘 (沖縄工高専)
Branching pattern models of two subtropical tree species in Okinawa Island I ····· 15

Masahiro Watari (Okinawa Nat. Coll. of Tech.)
Branching pattern models of two subtropical tree species in Okinawa Island I

概要 Watanabe studied the branching patterns and the subsequent elongations of *Psychotria rubra* and *Psychotria manillensis* in Okinawa Island. By using Watanabe's results, we introduce branching pattern models for shrub *Psychotria* species in Okinawa Island. We also construct a deterministic algorithm for these branching pattern models.

39 渡利正弘 (沖縄工高専)
Branching pattern models of two subtropical tree species in Okinawa Island II ····· 10

Masahiro Watari (Okinawa Nat. Coll. of Tech.)
Branching pattern models of two subtropical tree species in Okinawa Island II

概要 In the previous talk entitled "Branching pattern models of two subtropical tree species in Okinawa Island I", we introduced branching pattern models for shrub *Psychotria* species in Okinawa Island. The deterministic algorithm was also constructed. In this talk, We determine the datum of the first, second and third year branching pattern models for *Psychotria* species by applying the algorithm. For two *Psychotria* species *P. rubra* and *P. manillensis*, we also compute the occurrence probabilities of them.

概要 A species is said to be semelparous if it reproduces only once in its lifetime immediately before death. The semelparous life cycle is known as one of the key factors generating population cycles. In order to understand the situation that such population cycles appear stably, we establish a general method for evaluating the stability of cycles bifurcating from the extinction equilibrium point in nonlinear semelparous Leslie matrix models. The method is established by justifying a continuation approximation method that derives a certain Lotka-Volterra equation from a nonlinear semelparous Leslie matrix model. We also give some applications for the general method.

概要 It is considered that enstrophy dissipation in weak solutions of Euler equations are closely related with the turbulence phenomena in two dimension. However, it is uncertain what kind of weak solutions can dissipate. Under such a background, I am trying to gain such dissipating solutions by using Euler-α equations. Specially, I am studying the α-point-vortex system (α-PV) which is derived from Euler-α equations with Delta function initial data. In 3-body problem for α-PV, enstrophy dissipating solutions have already been constructed with assistance of numerical calculation, which is not rigorous mathematically. I proved the existence of such dissipating solutions rigorously.

概要 Phyllotactic patterns in plants are well known to be related to the golden ratio. Actually, many mathematical models using the theoretical inhibitory effect were proposed to reproduce these phyllotactic patterns. In 1996, Douady and Couder introduced a model using magnetic repulsion and succeeded in reproducing phyllotactic patterns numerically. On the other hand, it was recently revealed in biological experiments that a plant hormone, auxin, regulates the phyllotactic formation as an activator. Then, there arises a natural question as to how the inhibitory effect can be related to the auxin. In this presentation, we propose a reaction diffusion model based on auxin behavior in plant tips. The relationship between Douady and Couder's model and our model is shown by singular limit analysis.

概要 In this talk, we deal with a chemotaxis-growth system which includes a nonlinear growth term with Allee effect from the viewpoint of pattern formation. We discuss global structures of stationary solutions of the system.

概要 We consider a quasi-linear parabolic partial differential equations which has blow-up faster than the rate of self similar solutions. We call them "Type II blow-up solutions". In this talk, we provide some profile for "Type II blow-up solutions".

概要 Fingering patterns, formed by a radially growing interface in a Hele-Shaw cell, are investigated in case of taking the inertial effect into consideration. Compared with the previous studies which have been carried out under the assumption that the effect of inertia is negligible, some experimental results suggested that it is not always negligible even for the case of the small Reynolds number. We here carry out weakly nonlinear stability analysis, and then investigate the effect of inertia on the fingering patterns. Our numerical results indicate that the inertial effect stabilizes the interface and suppresses the tip-splitting phenomena of the fingers.

概要 The solutions to the one-phase interior or the classical Hele-Shaw problem are discretized in space by means of the method of fundamental solutions combined with the discrete asymptotic uniform distribution method, and then a system of ordinary differential equations is obtained, which is solved by the usual fourth order Runge–Kutta method. The one-phase interior Hele-Shaw problem has curve-shortening (CS), area-preserving (AP) and barycenter-fixed (BF) properties. Under our numerical scheme, a descrete version of CS-, AP- and BF-properties hold, while simple boundary element method does not satisfy these properties in general. The one-phase exterior Hele-Shaw problem and the one-phase interior Hele-Shaw problem with sink/source points can also be treated. In each problem, a non-trivial exact solution is constructed and an experimental order of convergence is shown.

14:15〜16:45

概要 We consider finite element solutions when triangles are almost flat. Since the maximum angle condition is violated in this case, the convergence of them is not obvious. We will show that the solutions converge weakly in H^1 to some function which may be completely different from the exact solution.

48 佐々木多希子 (東 大 数 理)
太 田 雅 人 (東京理大理)
抽象的 Cauchy 問題に対する splitting method の誤差解析 ····· 15

Takiko Sasaki (Univ. of Tokyo)
Masahito Ohta (Tokyo Univ. of Sci.)
Error analysis of splitting methods for abstract Cauchy problems

概要 We consider splitting methods for abstract Cauchy problems. A large number of articles are devoted to the numerical study of splitting methods for the various PDEs. However, there are only a few general results concerning the order of convergence. We will show that a second order convergence of a Strang type splitting scheme for abstract Cauchy problems.

49 高 安 亮 紀 (早 大 理 工)
松 江 　 要 (統 計 数 理 研)
佐々木多希子 (東 大 数 理)
田 中 一 成 (早 大 理 工)
水 口 　 信 (早 大 理 工)
大 石 進 一 (早 大 理 工)
Verified numerical enclosure of blow-up time for ODEs ····· 15

Akitoshi Takayasu (Waseda Univ.)
Kaname Matsue (Inst. of Stat. Math.)
Takiko Sasaki (Univ. of Tokyo)
Kazuaki Tanaka (Waseda Univ.)
Makoto Mizuguchi (Waseda Univ.)
Shin'ichi Oishi (Waseda Univ.)
Verified numerical enclosure of blow-up time for ODEs

概要 This talk is concerned with a blow-up problem of an autonomous system of ordinary differential equations (ODEs). We introduce a numerical method for rigorously enclosing the blow-up time of solutions to ODEs. Our method is based on the Poincaré compactification and verified numerical computations. The method verifies whether a solution of ODEs blows-up in finite time. Then the blow-up time is enclosed in a time interval.

50 渡 部 善 隆
(九大情報・JST CREST)
Kolmogorov 問題の精度保証付き数値計算に対するいくつかの考察 ···· 15

Yoshitaka Watanabe
(Kyushu Univ./JST CREST)
Some consideration of numerical verifications for the Kolmogorov problem

概要 Some computer-assisted proofs of nontrivial steady-state solutions for the Kolmogorov flows are presented. The method is based on the infinite-dimensional fixed-point theorem using a Newton-like operator with a numerical verification algorithm that automatically generates a set that includes the exact nontrivial solution. When discussing the numerical results, we consider the effects of rounding errors in the floating point computations. This is a continuation of our study that was presented in J. Comp. Appl. Math. 223 (2009) 953–966.

51 木 下 武 彦
(京大学際融合教育研究推進センター・京大数理研)
渡 部 善 隆
(九大情報基盤研究開発センター・JST CREST)
中 尾 充 宏 (佐世保工高専)
H^3 正則性を持つ一般多角形領域上の Poisson 方程式の解について ···· 10

Takehiko Kinoshita
(Kyoto Univ./Kyoto Univ.)
Yoshitaka Watanabe
(Kyushu Univ./JST CREST)
Mitsuhiro T. Nakao
(Sasebo Nat. Coll. of Tech.)
Some remarks for the solutions of Poisson equations with H^3 regularities on the polygonal domain

概要 We consider an adhesive obstacle problem with a higher order term. This problem models the shape of membranes on a ripped surface. From the view point of material science, this problem should be simulated. However, it has many difficulties and thus we cannot apply conventional computational methods straightforward. Therefore, we deal with the problem in the framework of Γ-convergence.
In this talk, we discretize the functional for this problem on the space of piecewise linear continuous functions. We also regularize the characteristic function appearing in the adhesion term, since the characteristic function is not differentiable. Then, we get the discretized and regularized functional. We show that this functional Γ-converges to the original functional in the Sobolev space H^1.

概要 Error estimates of a time implicit particle method for the heat equation are established. The particle method is a general class describing particle methods used practically as Smoothing Particle Hydrodynamics. By virtue of a stability analysis based on an energy inequality by a discrete Sobolev norm with respect to the space, the error estimates with unconditional stability are obtained if the time discretization is implicit.

概要 For eigenvalue problems of self-adjoint differential operators, a universal framework is proposed to give verified lower and upper bounds for their eigenvalues. In the case of the Laplacian operator, by applying Crouzeix–Raviart finite elements, an efficient algorithm is developed to bound the eigenvalues for the Laplacian defined in 1D, 2D and 3D spaces. For eigenvalue problem of Biharmonic operator, Fujino–Morley finite element is used to give explicit lower bounds. Particularly, for nonconvex domains, for which case there may exist singularities of eigenfunctions around re-entrant corners, the proposed algorithm can easily provide eigenvalue bounds.

概要 The charge simulation method is a fast numerical technique for solving potential problems. In this talk, we investigate the charge simulation method using dummy points and weighted average condition. By using dummy points, we can obtain invariant numerical scheme without assuming so-called zero-average condition. Then we can add one more condition. One candidate is to assume some weighted-average condition. We show some mathematical and numerical aspect, and apply it to other problem such as biharmonic problem.

17:00〜18:00　特別講演

宮 路 智 行 (明 大 M I M S)　非線形・非平衡下でのビリヤード問題:計算機援用解析

Tomoyuki Miyaji (Meiji Univ.)　A billiard problem in nonlinear and nonequilibrium problem: a computer-assisted analysis

概要 We study a system of ordinary differential equations in R^4, which is a mathematical model for describing a two-dimensional motion of a camphor disk floating on water. The camphor disk moves as if it is a billiard ball: it repeats a uniform motion and a reflection. Unlike an ordinary billiard ball, the camphor disk reflects without hitting against a wall, and an angle of reflection is smaller than that of incidence. As a result, when the domain is square, it tends to a limit cycle whose trajectory approaches each wall in turn drawing a square-like shape. Since this "billiard ball" is driven by nonlinear and nonequilibrium phenomenon, we call it a nonequilibrium billiard ball. In this talk, we consider the case where the domain is a rectangular and vary its aspect ratio as a bifurcation parameter. Previous studies by Mimura et al. showed that a quasi-periodic motion and a chaotic motion can arise depending on the aspect ratio. We apply the bifurcation theory and numerical computation to reveal why and how such a motion occurs. We find that the key is a Hopf–Hopf bifurcation with D_2-symmetry.

トポロジー

9月13日(日)　第V会場

9:50〜12:00

1 瀧村祐介 (学習院中)　Strong and weak (1, 2, 3) homotopies on knot projections ····· 15
伊藤昇 (早大高等研)

Yusuke Takimura　Strong and weak (1, 2, 3) homotopies on knot projections
(Gakushuin Boys' Junior High School)
Noboru Ito　(Waseda Univ.)

概要 An image of a generic immersion from a circle into a 2-spehre is called a knot projection. It is well-known that any two knot projections are related by a finite sequence consisting of local replacements of knot projections of three types, called Reidemeister moves. This study introduces an equivalence relation for knot projections called weak (1, 2, 3) homotopy, which consists of Reidemeister moves of type 1, weak type 2, and weak type 3 and defines the first non-trivial invariant under weak (1, 2, 3) homotopy. By using this invariant, we show that there exists an infinite number of weak (1, 2, 3) homotopy equivalence classes of knot projections. By contrast, if we choose the other variants of a triple type, all equivalence classes of knot projections are contractible.

2 伊藤昇 (早大高等研)　Based chord diagrams for spherical curves ····· 10
Noboru Ito　(Waseda Univ.)　Based chord diagrams for spherical curves

概要 This study suggests the first approach for developing a frame work to produce invariants of base-point-free generic spherical curves under some chosen local moves from Reidemeister moves using based chord diagrams. A chord diagram is a configuration of paired points on a circle, while a based chord diagram is a chord diagram having a base point. Though base-point-free invariants are considered for the framework, using based chord diagrams is advantageous. Reidemeister moves are local replacements that consist of five local moves: first, strong second, weak second, strong third, and weak third. Here, weak moves do not change Seifert circles obtained by spherical curves. Our invariants not only contain a linear sum of Arnold's invariants but also new invariants.

3 村尾智 (筑波大数理物質)　On the extension of a fundamental theorem in braid theory for handlebody-braids ····· 10

Tomo Murao (Univ. of Tsukuba)　On the extension of a fundamental theorem in braid theory for handlebody-braids

概要 Trivalent braids and handlebody-braids are extensions of braids. Ishihara and Ishii proved that the map taking a regular neighborhood induces a one-to-one correspondence between the set of the IH-equivalence classes of trivalent braids and that of the equivalence classes of handlebody-braids. Birman proved that two braids are equivalent if and only if their presentations are related by the braid relations. However such a theorem has not been established yet for handlebody-braids. In this talk, we show such a theorem for trivial handlebody-braids obtained from 3-braids with bind maps.

4 鈴木正明 (明大総合数理)　Non-meridional epimorphisms of knot groups ····· 10
Jae Choon Cha (POSTECH)

Masaaki Suzuki　(Meiji Univ.)　Non-meridional epimorphisms of knot groups
Jae Choon Cha　(POSTECH)

概要 We show that there are infinitely many pairs of prime knots which admit non-meridional epimorphisms but do not admit meridional epimorphisms.

概要 We study the relation between the maximum z-degree of Kauffman polynomial and the determinant for a quasi-alternating link. This gives a stronger criterion for deciding whether a non-alternating link is quasi-alternating or not than the known criterion in terms of Q-polynomials. Also, we determine all quasi-alternating links with determinant 5.

概要 The first cohomology of a knot group with $sl(2;\mathbb{C})$-coefficients is isomorphic to the Zariski tangent space of the space of conjugacy classes of representations. In this talk we consider $\mathbb{C}^2$-coefficients cases. Because $SL(2;\mathbb{C})$ can be considered to be a subgroup of the extended group $SL(2;\mathbb{C}) \ltimes \mathbb{C}^2$, then $\mathbb{C}^2$-coefficients cohomology can be consider as a subspace of the one with $sl(2;\mathbb{C}) \oplus \mathbb{C}^2$. Furthermore the twisted Alexander polynomial can be appeared as an obstruction of deformations of an irreducible representation.

概要 We give a generalization of Jones–Kawamuro conjecture, an inequality between the self-linking number and the braid indices of closed braids, for general open books.

概要 A multiple conjugation quandle is a quandle with partial group operations. A multiple conjugation quandle was introduced for colorings of a handlebody-knot, whose diagram is a diagram of a spatial trivalent graph. We introduce homology theory for a multiple conjugation quandle. The homology theory unifies homology theories for groups and quandles. We also introduce a cocycle invariant for handlebody-knots.

概要 Heegaard Floer d-invariant (correction term) is an invariant of rational homology 3-spheres associated with Spin^c structure. In particular, the d-invariant of 1-surgeries along knots in S^3 has been investigated as a ($2\mathbb{Z}$-valued) knot concordance invariant d_1. In this talk, we give an evaluation of d_1 for the $(2,q)$-cable of any knot K. This evaluation does not depend on the knot type of K, and if K belongs to a certain class which contains any negative knot, then the equality holds. As a corollary, we show that the relationship between d_1 and Heegaard Floer τ-invariant is very weak in general.

10　原 田 新 也 (東工大情報理工)　Hasse–Weil zeta functions of SL_2-character varieties of certain closed arithmetic hyperbolic 3 manifolds ····· 10

Shinya Harada (Tokyo Tech)　Hasse–Weil zeta functions of SL_2-character varieties of certain closed arithmetic hyperbolic 3 manifolds

概要 Hasse–Weil type zeta functions of the hyperbolic components of the SL_2-character varieties of certain closed arithmetic hyperbolic 3 manifolds are shown to be equal to the Dedekind zeta functions of their trace fields under some conditions.

11　山 田 裕 一 (電　通　大)　Four dimensional manifolds constructed by lens space surgeries ····· 10
丹 下 基 生 (筑波大数理物質)

Yuichi Yamada (Univ. of Electro-Comm.)　Four dimensional manifolds constructed by lens space surgeries
Motoo Tange (Univ. of Tsukuba)

概要 We study pairs of Dehn surgeries along distinct knots that yield the same (orientation-preserved or -reversed) lens spaces. We decide the complete list of pairs of which one is a torus knot and the other is a Type VII or VIII knot (called "knots in genus one fibered surfaces"). It consists of six sequences. This is related to lens spaces smoothly embedded in the connected sum of two copies of complex projective planes.

14:15〜15:15　特別講演

野 原 雄 一 (香 川 大 教 育)　Lagrangian fibrations on Grassmannians and mirror symmetry

Yuichi Nohara (Kagawa Univ.)　Lagrangian fibrations on Grassmannians and mirror symmetry

概要 Mirror symmetry is a duality between symplectic geometry on a Käler manifold X and complex geometry on another Kähler manifolds $X^\vee$ (and vice versa). Strominger, Yau, and Zaslow conjectured that $X^\vee$ can be obtained by dualizing Lagrangian torus fibers of a (special) Lagrangian fibration on X. Fukaya, Oh, Ohta, and Ono developed Lagrangian intersection Floer theory for Lagrangian torus fibers of toric moment maps and mirror symmetry for compact toric manifolds. In this talk we discuss Lagrangian torus fibrations on the Grassmannian of two planes in $\mathbb{C}^n$ and relation to mirror symmetry.

15:30〜17:15

12　中 村 伊 南 沙 (東　大　数　理)　チャート付き 1-ハンドルを付加して得られる 2 次元ブレイド ····· 10

Inasa Nakamura (Univ. of Tokyo)　On addition of 1-handles with chart loops to 2-dimensional braids

概要 A 2-dimensional braid over an oriented surface-knot F is presented by a graph called a chart on a surface diagram of F. We consider 2-dimensional braids obtained from addition of 1-handles equipped with chart loops. We investigate how much we can simplify such 2-dimensional braids.

13　大 場 貴 裕 (東 工 大 理 工)　コンパクト Stein 曲面とブレイド状曲面 ····· 15

Takahiro Oba (Tokyo Tech)　Compact Stein surfaces and braided surfaces

概要 Loi and Piergallini showed that any compact Stein surface is the total space of a simple branched covering of a 4-ball whose branch set is a positive braided surface. They also showed that the opposite is true. Unfortunately, although the fact is well-known, little is known about how Stein structures behave towards positive braided surfaces. In this talk, we give an infinite family of positive braided surfaces as branch sets of simple branched coverings whose total spaces are all diffeomorphic but admit mutually different Stein structures.

概要 A chart represents a surface-link in 4-space. We show that there does not exist any C-minimal 5-chart with exactly four crossings which represents a disjoint union of spheres.

概要 Smith constructed a genus-3 Lefschetz pencil on the 4-torus by taking a branched covering of a singular variety. In this talk, we will give vanishing cycles of this pencil explicitly.

概要 We obtain a finite generating set for the level 2 twist subgroup of the mapping class group of a closed non-orientable surface. The generating set consists of crosscap pushing maps along non-separating two-sided simple loops and squares of Dehn twists along non-separating two-sided simple closed curves. As an application, we calculate the first homology group of the level 2 twist subgroup for genus $g \geq 5$ and $g = 3$.

概要 We consider the set of simple closed curves on a surface as a subset of its mapping class group and derive a condition equivalent to its linearity. We also apply our argument to show that an arbitrary homomorphism of the mapping class group is injective up to center if and only if it can detect the geometric intersection among the simple closed curves.

概要 We study relations in the tautological algebra of the mapping class group by using representation theory.

9月14日(月)　第X会場

10:30〜10:45　2015年度日本数学会幾何学賞授賞式

10:50〜11:50　2015年度日本数学会幾何学賞受賞特別講演

入谷　寛 (京　大　理)　トーリック多様体のミラー対称性

Hiroshi Iritani (Kyoto Univ.)　Mirror symmetry for toric varities

概要 I will explain a mirror construction for the big equivariant quantum cohomology of toric varieties via shift operators of equivariant parameters. Shift operators in equivariant quantum cohomology have been introduced in the work of Braverman, Okounkov, Maulik and Pandharipande and can be regarded as equivariant lifts of the Seidel representation. These operators naturally define a mirror Landau–Ginzburg potential and a primitive form. I will also explain that shift operators are closely related to the Gamma structure in quantum cohomology.

13:15〜14:15　2015年度日本数学会幾何学賞受賞特別講演

佐伯　修 (九　大　I M I)　安定写像と多様体のトポロジー

Osamu Saeki (Kyushu Univ.)　Stable maps and topology of manifolds

概要 In this talk, we consider generic smooth maps, called stable maps, between manifolds that are singular in general, and see how their topology and their singularities are related to the differential topology of the manifolds over which the maps are defined. When the singularities are relatively mild, we will see that the existence of such maps gives strong restrictions to the topology of the manifolds. We also review the theory of singular fibers of stable maps and present its applications to the cobordism theory of maps and manifolds together with applications to the visualization of scientific data.

9月15日(火)　第V会場

9:50〜12:00

19　中山裕道 (青学大理工)　弧状連結ではないが連結な極小集合を持つ曲面の微分同相写像の構成 · · 15

Hiromichi Nakayama (Aoyama Gakuin Univ.)　Surface diffeomorphisms with connected but not path-connected minimal sets containing arcs

概要 The Warsaw circle is obtained by joining the boundary of the closure of the graph of sin 1/x $(-1/\pi \leq x \leq 1/\pi)$. It is well-known as an example of a connected but not path-connected compact set. Inserting such components almost everywhere along the circle, we obtain the Warsaw circle with infinitely many singular arcs, denoted by X. In 1955, Gottschalk and Hedlund introduced a minimal homeomorphism on this set. However this homeomorphism is defined only on this set. In 1991, Walker first constructed a homeomorphism of the cylinder whose minimal set is X. However, his homeomorphism cannot be a diffeomorphism. In this talk, we will construct a C^∞ diffeomorphism of the cylinder with a compact connected but not path-connected minimal set containing arcs.

20　山本卓宏 (九州産大工)　境界付き曲面上のモース関数の同境群 · 15

Takahiro Yamamoto (Kyushu Sangyo Univ.)　Cobordism group of Morse functions on surfaces with boundary

概要 This is a joint work with Osamu Saeki. We consider Morse functions on compact manifolds possibly with boundary, and define their admissible cobordism group, based on generic maps into the plane that are submersions near the boundary. Furthermore, we show several cobordism groups of such Morse functions.

21　粕 谷 直 彦 (青学大社会情報)　偶数次元ユークリッド空間の概複素部分多様体 ····· 15
A. J. Di Scala (Politecnico di Torino)
D. Zuddas (KIAS)
Naohiko Kasuya (Aoyama Gakuin Univ.)　Almost complex submanifolds in the even dimensional Euclidean spaces
Antonio Jose Di Scala (Politecnico di Torino)
Daniele Zuddas (KIAS)

概要 We prove that any compact almost complex manifold (M, J) of real dimension $2m$ admits a pseudo-holomorphic embedding in $(\mathbb{R}^{4m+2}, J')$ for some positive almost complex structure J'. Moreover, we give a necessary and sufficient condition, expressed in terms of the total Chern class $c(M, J)$, for the existence of an embedding or an immersion in $(\mathbb{R}^{4m}, J')$ for some J'.

22　粕 谷 直 彦 (青学大社会情報)　$\mathbb{R}^4$ 上のケーラーでない複素構造 ····· 15
A. J. Di Scala (Politecnico di Torino)
D. Zuddas (KIAS)
Naohiko Kasuya (Aoyama Gakuin Univ.)　Non-Kähler complex structures on $\mathbb{R}^4$
Antonio Jose Di Scala (Politecnico di Torino)
Daniele Zuddas (KIAS)

概要 We construct uncountably many complex structures J defined on $\mathbb{R}^4$ and a surjective holomorphic map $f : (\mathbb{R}^4, J) \to \mathbb{C}P^1$ such that the only singular fiber is an immersed holomorphic sphere, and the regular ones are either holomorphic tori or holomorphic annuli. Such complex structures are not Kähler, can not be covered by a single complex coordinate system and the only holomorphic functions are the constants.

23　安 井 弘 一 (広 島 大 理)　Corks, exotic 4-manifolds and knot concordance ····· 15
Kouichi Yasui (Hiroshima Univ.)　Corks, exotic 4-manifolds and knot concordance

概要 We give a method for producing framed knots which represent homeomorphic but non-diffeomorphic (Stein) 4-manifolds, using corks and satellite maps. To obtain the method, we introduce a new description of cork twists. As an application, we construct knots with the same 0-surgery which are not concordant for any orientations. This disproves the Akbulut–Kirby conjecture given in 1978.

24　S. Akbulut (Michigan State Univ.)　Contact 5-manifolds admitting open books with exotic Stein pages ··· 10
安 井 弘 一 (広 島 大 理)
Selman Akbulut (Michigan State Univ.)　Contact 5-manifolds admitting open books with exotic Stein pages
Kouichi Yasui (Hiroshima Univ.)

概要 We construct a contact 5-manifold supported by infinitely many distinct open books with the identity monodromy and pairwise exotic Stein pages (i.e. pages are pairwise homeomorphic but non-diffeomorphic Stein fillings of a fixed contact 3-manifold), moreover we describe a process of generating infinitely many such examples. In contrast to this result, on each of $\#_n S^2 \times S^3$ and $\#_n S^2 \tilde{\times} S^3$ $(n \geq 2)$ we construct infinitely many open books with pairwise exotic Stein pages (and identity monodromy) supporting mutually distinct contact structures.

25 堀内智広 (中大理工)　Reeb components of leafwise complex foliations and their symmetries
三松佳彦 (中大理工) 15

Tomohiro Horiuchi (Chuo Univ.)　Reeb components of leafwise complex foliations and their symmetries
Yoshihiko Mitsumatsu (Chuo Univ.)

概要 We determine the group of leafwise holomorphic smooth automorphisms for Reeb components of certain type in the case of complex leaf dimension 1 and 2.

26 森　淳秀 (阪市大数学研)*　接触構造と葉向シンプレクティック葉層 15

Atsuhide Mori (Osaka City Univ.)　Contact structures and leafwise symplectic foliations

概要 Suppose that a 1-form α and a 2-form ω on a closed oriented $(2n+1)$-manifold M satisfy $\alpha \wedge \omega^n > 0$. Then, putting $\tau = \omega - d\alpha$, we say that the pair (α, τ) is a twisted Jacobi structure. If $(\alpha, \varepsilon\tau)$ is a twisted Jacobi structure for any $\varepsilon \in (0, 1]$, we say that α is an $\varepsilon\tau$-confoliation form. Suppose that the binding N of a supporting open-book decomposition of a contact manifold M admits a non-singular closed 1-form ν such that, for a suitable contact form α of N, the half-line $\nu + t\alpha$ $(t \geq 0)$ consists of $\epsilon\tau$-confoliation forms. Then we show that the half-line extends to a non-linear family of $\epsilon\tau$-confoliation forms which starts from a leafwise (almsot) symplectic foliation and goes through adapted contact forms on M.

14:15〜15:45

27 松橋英市 (島根大総合理工)　Arcwise increasing map について 10
B. Espinoza
(Univ. of Pittsburgh at Greensburg)

Eiichi Matsuhashi (Shimane Univ.)　Arcwise increasing maps
Benjamin Espinoza
(Univ. of Pittsburgh at Greensburg)

概要 A surjective continuous map $f : [0, 1] \to X$ is called an *arcwise increasing map* if for every two closed subintervals A and B of $[0, 1]$ such that A is a proper subset of B, $f(A)$ is a proper subset of $f(B)$. A continuum X is said to *admit an arcwise increasing map* if there is an arcwise increasing map from $[0, 1]$ onto X. In this talk I will talk about a characterization of Peano continua with no free arcs using arcwise increasing maps. Also, a characterization of dendrites that admit arcwise increasing maps are presented.

28 韓　呼和 (横浜国大環境情報)　The spherical dual transform is an isometry for spherical Wulff shapes
西村尚史 (横浜国大環境情報) 15

Huhe Han (Yokohama Nat. Univ.)　The spherical dual transform is an isometry for spherical Wulff shapes
Takashi Nishimura
(Yokohama Nat. Univ.)

概要 A spherical Wulff shape is the spherical counterpart of a Wulff shape which is the well-known geometric model of a crystal at equilibrium introduced by G. Wulff in 1901. As same as a Wulff shape, each spherical Wulff shape has its unique dual. The spherical dual transform for spherical Wulff shapes is the mapping which maps a spherical Wulff shape to its spherical dual Wulff shape. In this talk, it is presented that the spherical dual transform for spherical Wulff shapes is an isometry with respect to the Pompeiu–Hausdorff metric.

概要 We introduce a new parameter, the affine twist parameter for the affine Lorentz deformation of a hyperbolic surface. We show that two affine Lorentz deformation can be glued by affine twist parameter. We also show that the affine Lorentz deformation space can be parametrized by Margulis invariants and affine twist parameters. The affine twist parameter is canonically regarded as a correspondence to the Fenchel–Nielsen twist parameter in Teichmüller theory.

概要 The modular representations of some Weyl groups are considered. If two compact connected Lie groups are locally isomorphic, the complex representations of their Weyl groups are equivalent. However, the integral representations need not be equivalent. Under the mod 2 reductions, we consider the structure of invariant rings for symplectic groups.

概要 We show that a simplicial 2-sphere satisfying a certain condition is the underlying simplicial complex of a non-singular complete fan in $\mathbb{R}^3$.

概要 We can construct a simple polytope from a finite simple graph by truncating faces of a simplex. The resulting simple polytope is called a graph associahedron, and is a Delzant polytope. We can associate a toric manifold with a finite simple graph through this construction. In this talk, we characterize a connected finite simple graph for which the set of facet vectors of the graph associahedron is a root system.

概要 Hessenberg varieties (in type A) are subvarieties of the full flag variety. Their geometry and topology have been studied since the late 1980s by De Mari, Shayman, Procesi. This subject lies at the intersection of, and makes connections between, many research areas such as: geometric representation theory, combinatorics, and algebraic geometry and topology. In this talk we consider two extreme cases: one is regular nilpotent and the other is regular semisimple. We give an explicit description of the cohomology ring of regular nilpotent Hessenberg varieties and then explain its relation to the cohomology ring of regular semisimple Hessenberg varieties.

16:15〜17:15　特別講演

呂　　志 (復　旦　大)　Equivariant unitary bordism and equivariant cohomology Chern numbers

Zhi Lu　(Fudan Univ.)　Equivariant unitary bordism and equivariant cohomology Chern numbers

概要 By using the universal toric genus and the Kronecker pairing of bordism and cobordism, we show that the integral equivariant cohomology Chern numbers completely determine the equivariant geometric unitary bordism classes of closed unitary G-manifolds, which gives an affirmative answer to the conjecture posed by Guillemin–Ginzburg–Karshon in their book [Moment maps, cobordisms, and Hamiltonian group actions. Mathematical Surveys and Monographs, **98**. American Mathematical Society, Providence, RI, 2002], where G is a torus. As a further application, we also obtain a satisfactory solution of [Question (A), §1.1, Appendix H] of the above book on unitary Hamiltonian G-manifolds. In particular, our approach can also be applied to the study of $(\mathbb{Z}_2)^k$-equivariant unoriented bordism. This is a joint work with Wei Wang.

無　限　可　積　分　系

9月13日(日)　　第IV会場

9:30〜12:00

1　大久保勇輔 (名大多元数理)
粟田英資 (名大多元数理)
藤野弘基 (名大多元数理)
Ding–Iohara 代数のレベル 2 表現の結晶化 ····· 15

Yusuke Ohkubo (Nagoya Univ.)
Hidetoshi Awata (Nagoya Univ.)
Hiroki Fujino (Nagoya Univ.)
Crystallization of the level 2 representation of the Ding–Iohara algebra

概要 In this talk, we will explain the $q \to 0$ limit of the level 2 representation of the Ding–Iohara algebra. We call works at this limit "crystallization" after one of the quantum groups. This specialization also correspond to the limit from Macdonald polynomials to Hall–Littlewood polynomials. Using the theory of Hall–Littlewood polynomials, in the crystallized case we can solve some problems. For example, we obtain a formula of the 4 point correlation function of a certain operator.

2　松本拓也
(名大高等研究院・名大多元数理)
中心拡大された超リー代数 $\mathfrak{sl}(2|2)$ に付随する量子アファイン代数について ····· 15

Takuya Matsumoto
(Nagoya Univ./Nagoya Univ.)
Quantum affine algebra associated with the centrally extended Lie superalgebra $\mathfrak{sl}(2|2)$

概要 We propose a quantum affine algebra associated with the centrally extended Lie superalgebra $\mathfrak{sl}(2|2)$. This algebra plays important roles in both the gauge/gravity (AdS/CFT) correspondence and one dimensional Hubbard model. After reviewing the physical motivations, we define the quantum affine algebra in terms of the Chevalley–Serre generators. If time allows, we also discuss the Yangian degeneration when the deformation parameter q goes to 1.

3　髙﨑金久 (近畿大理工)
中津了勇 (摂南大理工)
Closed vertex 上の位相的弦理論の開弦振幅 ····· 15

Kanehisa Takasaki (Kinki Univ.)
Toshio Nakatsu (Setsunan Univ.)
Open string amplitudes of topological string theory on closed vertex

概要 The partition function, or open string amplitude, of topological string theory on the so called "closed vertex" was calculated some ten years ago by an algebro-geometric method and the method of topological vertex. This talk presents two results on open string amplitudes thereof. First, part of open string amplitudes can be calculated by the method of topological vertex. Second, single-variate generating functions of these amplitudes satisfy a q-difference equation. The result on the q-difference equation shows a similarity with the A-polynomials of knot invariants.

概要 We identify the algorithm for constructing steady states of the n-species totally asymmetric simple exclusion process (TASEP) on L site periodic chain by Ferrari and Martin with a composition of combinatorial R for the quantum affine algebra $U_q(\widehat{sl}_L)$ in crystal base theory. Based on this connection and the factorized form of the R matrix derived recently from the tetrahedron equation, we establish a new matrix product formula for the steady state of the TASEP which is expressed in terms of corner transfer matrices of the q-oscillator valued five-vertex model at $q = 0$.

概要 Generalized cluster algebras were introduced by Chekhov and Shapiro around 2011. It has been known since then that they are as good as ordinary cluster algebras in various aspects. In this talk I explain how to quantize the y-variables of generalized cluster algebras using generalizations of quantum dilogarithm, following the method of Fock and Goncharov for ordinary cluster algebras. As a byproduct we obtain a generalized dilogarithm identity associated with any period of a quantum cluster algebra.

概要 For the symplectic Grassmannians, we prove a closed formula for the torus equivariant Schubert classes. More precisely, the corresponding double Schubert polynomial is expressed as a sum of Pfaffians with entries written in terms of the double theta polynomials introduced by E. Wilson. The result gives a proof to the conjecture of Wilson which states that the formula written in terms of raising operators represents the equivariant Schubert class.

概要 For a vector bundle with a symplectic structure over a smooth variety, we consider the degeneracy loci with respect to a fixed isotropic flag. We obtained an explicit formula for the structure sheaves of the degeneracy loci in the Grothendieck group of algebraic vector bundles on the base variety. The formula is written as a sum of Pfaffians with entry given in terms of K-theoretic Segre classes of the vector bundles involved.

14:15〜15:15　特別講演

桑 原 敏 郎 (Higher School of Economics)　シンプレクティック多様体上のジェット束の変形量子化と頂点代数

Toshiro Kuwabara (Higher School of Economics)　Jet bundles on symplectic manifolds and vertex algebras

概要 For a symplectic manifold, the Jet bundle (of its structure sheaf) is an infinite-dimensional vector bundle equipped with a structure of a sheaf of vertex Poisson algebra, which is induced from the Poisson algebra structure given by the symplectic form. In this talk, we discuss sheaves of (h-adic) vertex algebras which are obtained as a deformation-quantization of the Jet bundle.

9月14日(月)　第IV会場

9:30〜12:00

概要 In this talk, we study the string equation of type (2,2n+1), which is derived from 2D gravity theory or the string theory. We consider the equation as a $2n$-th order analogue of the first Painlevé equation, take the autonomous limit, and find its solutions concretely expressed by the Weierstrass' elliptic function $\wp(z)$.

概要 We study Padé approximation problems of the differential grid, related to all the q-Painlevé equations of types from $E_6^{(1)}$ to $(A_2+A_1)^{(1)}$. Then, by solving those problems, we can derive the evolution equations, the scalar Lax pairs and the determinant formulae of special solutions for the corresponding q-Painlevé equations.

概要 We construct rational solutions to the q-Sasano system of type $D_7^{(1)}$. We observe that a family of Laurent polynomials appear, which are invariant under the aciton of Weyl group of type D_5.

概要 We will show a connection formula for the Jackson integral of type BC_n in the form of a Sears–Slater type expansion. The coefficients of this expansion are expressed by certain elliptic Lagrange interpolation functions. Analyzing basic properties of the elliptic Lagrange interpolation functions, an explicit determinant formula is provided for a fundamental solution matrix of the associated system of q-difference equations.

概要 We will introduce a new exceptional orthogonal polynomial system from the Bannai–Ito polynomials through the generalized Darboux transformation.

概要 We present solutions to monodromy preserving deformation which are expressed in terms of dilogarithm function.

概要 We introduce a family of commutative rational maps on a toric network, by using the double affine Weyl group action on the network. We show that the maps are linearized on the Jacobian variety of the spectral curve, and solve the initial value problem using Riemann theta functions.

概要 I will discuss the relation between the totally positive part of the iso-spectral set of classical integrable systems and the positive structure of singular curves. In this talk, I will deal with the specific case of the full Kostant–Toda hierarchy.

13:00〜14:00　特別講演

概要 Consider the Kac–Moody algebra associated to any symmetrizable generalized Cartan matrix. Denote the lower Chevalley generators by f_i (dependent variables), the coroots by $\alpha_i^\vee$ (parameter variables), and the exponentials of the fundamental weights by τ_i (τ-variables). These variables of type $A_l^{(1)}$ for $l = 1, 2, 3$ are identified with the corresponding variables of the Painlevé II, IV, and V, respectively. Then the commutative Poisson algebra generated by these variables is naturally defined and a certain birational Weyl group action on the Poisson algebra is also constructed. The τ-variables are the exponentials of the canonically conjugate variables of the parameter variables. (Note that the parameter variables are not Poisson-central.) Elements of the orbit of the τ-variables are called the classical τ-functions and are Poisson-polynomials in the dependent variables. We shall canonically quantize this situation. We shall define the non-commutative algebra generated by the same (but non-commutative) variables and construct a certain birational Weyl group action on the non-commutative algebra. The quantized τ-variables commute with the quantized dependent variables and satisfy the commutation relations $\tau_i \alpha_j^\vee \tau_i^{-1} = \alpha_i^\vee + \delta_{ij}$. Then we shall obtain the quantized τ-functions as elements of the orbit of quantized τ-variables and can prove the polynomiality of the quantized τ-functions. The main ingredients of the proof of the polynomiality are the translation functors in the representation theory of the Kac–Moody algebra. We can generalize these results to the case of the quantized enveloping algebra.