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日本数学会

2013年度秋季総合分科会

英　文　サ　マ　リ　集

2013年9月

於　愛媛大学

2013/08/17 11:07 作成

2013　日本数学会
秋季総合分科会プログラム

期　日　9月24日（火）～9月27日（金）
会　場　愛媛大学城北キャンパス
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会場 日時	第Ⅰ会場 グリーンホール	第Ⅱ会場 共通教育講義棟 講11	第Ⅲ会場 共通教育講義棟 講21	第Ⅳ会場 共通教育講義棟 講24	第Ⅴ会場 共通教育講義棟 講35	第Ⅵ会場 共通教育講義棟 講45	第Ⅶ会場 法文学部講義棟 201	第Ⅷ会場 工学部4号館 E411	第Ⅸ会場 工学部4号館 E421
24日 （火）	代数学 9:00～12:00 14:15～16:45	函数方程式論 9:20～12:00 14:15～16:30	実函数論 9:00～12:05 14:20～16:15	函数解析学 9:30～11:50	トポロジー 9:00～12:00 14:15～16:00	幾何学 9:15～12:00 14:15～16:00	応用数学 9:45～12:00 14:15～16:30	統計数学 9:30～12:00 14:15～14:45	無限可積分系 9:30～12:00 14:15～16:20
	企画特別講演　13:00～14:00								
	特別講演 17:00～18:00	特別講演 16:45～17:45	特別講演 16:30～17:30	特別講演 14:15～15:15	特別講演 16:20～17:20	特別講演 16:15～17:15	特別講演 16:50～17:50	特別講演 15:00～16:00 16:15～17:15	特別講演 16:30～17:30
25日 （水）	代数学 9:00～12:00	函数方程式論 9:00～12:00	実函数論 9:00～11:55 13:00～13:15	函数解析学 9:30～11:50	幾何学・トポロジー (教育学部2号館大講義室)		応用数学 9:45～12:00	統計数学 9:15～11:50	無限可積分系 9:30～12:00
	特別講演 13:15～14:15	特別講演 13:15～14:15	特別講演 13:20～14:20		特別講演 10:50～11:50 13:15～14:15		特別講演 13:00～14:00		特別講演 13:00～14:00
	日本数学会賞授賞式（ひめぎんホール　サブホール）……(15:00～15:30) 総合講演（　〃　）　日本数学会賞秋季賞受賞者……(15:45～16:45) 大島利雄（城西大理）……(17:00～18:00) 懇親会（校友会館　セ・トリアン）……(18:20～20:20)								
26日 （木）	代数学 9:00～11:25 14:15～16:00	函数方程式論 9:00～12:00 14:15～16:30	函数論 10:00～12:00 14:15～15:00	函数解析学 9:30～12:00 14:15～15:45	トポロジー 9:00～12:00 14:15～16:00	幾何学 9:00～12:00 14:15～16:00	応用数学 9:30～10:20 14:15～17:45 特別セッション 10:30～12:00	統計数学 9:00～12:00	数学基礎論 および歴史 9:30～10:55 15:25～16:50
	企画特別講演　13:00～14:00								
	特別講演 16:15～17:15	特別講演 16:45～17:45	特別講演 15:10～16:10	特別講演 16:00～17:00	特別講演 16:20～17:20	特別講演 16:15～17:15		特別講演 14:30～15:30 15:45～16:45	特別講演 14:15～15:15
27日 （金）	代数学 9:30～12:00 14:15～15:30	函数方程式論 9:00～12:00 14:15～16:30	函数論 9:00～10:45	函数解析学 9:30～12:00			応用数学 9:00～12:00 14:15～16:45	統計数学 9:15～12:00	数学基礎論 および歴史 10:00～11:25
	企画特別講演　13:00～14:00								
	特別講演 15:45～16:45	特別講演 16:45～17:45	特別講演 11:00～12:00	特別講演 14:15～15:15			特別講演 17:00～18:00		特別講演 14:15～15:15

総 合 講 演

9月25日(水) ひめぎんホール サブホール

日本数学会賞秋季賞受賞者 ····· (15:45〜16:45)

大 島 利 雄 (城 西 大 理) 多項式係数の線型常微分方程式 ····· (17:00〜18:00)

概要 A recent study enables us to analyze the general structure of linear ordinary differential equations with polynomial coefficients. We study the operations on the equations, such as, the middle convolutions by Katz, Gauge transformations, Laplace transformations, confluences and unfoldings of the equations. We define generalized Riemann schemes which describe local structure of the equations at their singular points and classifies the equations by their spectral types. The important invariant is the index of rigidity, which corresponds to the dimension of the moduli space describing the difference between the local structure and global structure. When the dimension is zero, the spectral type is called rigid. When the equation is Fuchsian, the operations correspond to the Weyl group of a Kac-Moody root system and it is possible for us to understand the problems to get series expansions and integral representations of their solutions, connection formula, contiguity relations, polynomial solutions, structure of the monodromy and its irreducibility. If the equation is Fuchsian and has a rigid spectral type, we give a simple explicit algorithm to have explicit answers to these problems. A similar study is now developing to equations having irregular singularities. For example, the structure of equations with unramified irregular singularities are classified by a Kac-Moody root system and a classical limit of our study corresponds to resolutions of singularities of plane algebraic curves in a two-dimensional symplectic vector space under symplectic birational transformations.

企 画 特 別 講 演

9月24日(火)

第I会場

庄 司 俊 明 (名大*・Dongji Univ.)♯　エキゾチック対称空間とコストカ多項式 ····· (13:00〜14:00)

概要　It is well-known that the set of nilpotent orbits for GL_n is canonically in bijection with the set of irreducible representations of the symmetric group S_n of degree n, through the Springer correspondence. It is also known that Kostka polynomials are realized geometrically in terms of the intersection cohomology of the closure of nilpotent orbits. The Springer correspondence and Kostka polynomials are mutually closely related via the theroy of character sheaves on GL_n. The theroy of character sheaves for reductive algebraic groups was established by Lusztig in 1980's. After that Ginzburg extended the notion of character sheaves to the case of symmetric spaces.
These are already classical results. However, recently interesting generalizations were found by various people. First, let $G = GL(V)$ for a finite dimensional vector space V. We consider the variety $X_0 = G \times V$ with the diagonal G-action. It was shown by Finkelberg–Ginzburg–Travkin, and Achar–Henderson, that there exists a natural generalization of the classical results to the case of X_0. Next, let V be a symplectic vector space, and put $G = GL(V), K = Sp(V)$. We consider the variety $X = G/K \times V$, with the diagonal K-action. We call X an exotic symmetric space, based on the relationship with the exotic nilpotent cone introduced by Kato. X is a generalization both of the symmetric space G/K and of $G \times V$. The specific symmetric space G/K was studied extensively by Bannai–Kawanaka–Song, Grojnowski, and Henderson. One can show that there exists a natural generalization of classical results also to X, more natural in some sense than the case of G/K or of $G \times V$. In this talk, I would like to explain about these subjects.

第II会場

小 林 良 和 (中 大 理 工)♯　バナッハ空間における非線形発展作用素と常微分方程式 ··· (13:00〜14:00)

概要　In this talk we are concerned with the relationship between nonlinear nonautonomous differential equations and nonlinear evolution operators in Banach spaces.
The existence and uniqueness of local solutions of initial value problems for the differential equations are discussed in a general setting. The continuous dependence of solutions on the initial conditions and global existence of solutions are also investigated.
The associated evolution operators turn out to be quasi-contractive with respect to metric-like functionals. One of the main theorems gives a characterization of the continuous generators of the evolution operators in a wide class.
The results are applied to the initial value problem for a quasilinear wave equation with weak dissipation.

9月26日(木)

第I会場

特別招待講演(大韓数学会)

Seok-Jin Kang (Seoul Nat. Univ.)　Khovanov–Lauda–Rouquier algebras and 2-representation theory ····· (13:00〜14:00)

第 VII 会場

松 原　仁 (公立はこだて未来大)♯ プロ棋士に勝ったコンピュータ将棋 ····· (13:00〜14:00)

概要 Artificial intelligence (AI) is a branch of computer science that studies and develops intelligent programs and robots. Games are considered as good targets of AI research. From about 1950 many AI researchers developed (western) chess programs and computer chess "Deep Blue" beat the human chess world champion "Gary Kasparov" in 1997. One of the next games to chess is Shogi (Japanese chess). Shogi is similar to chess, but in Shogi players can reuse pieces captured from the opponents. So search space of Shogi is much larger than that of chess and to develop strong Shogi programs is much difficult than to develop strong chess programs. From about 1975 some AI researchers developed Shogi programs and "Ponanza", "Tsutsukana" and "GPS shogi" beat human professional players this year. In this talk history of computer Shogi and some effective computer Shogi techniques are presented. We believe some Shogi program will beat top class professional players in several years.

9月27日(金)

第 I 会場

三 輪 哲 二 (京大国際高等教育院)♯ Algebraic analysis and exactly solvable models ····· (13:00〜14:00)

概要 I review the method of algebraic analysis in the study of special functions which arise from exactly solvable models in statistical mechanics. Theories, successfully applied, are deformation theory of holonomic systems of differential equations and representation theory of quantum affine Lie algebras.

第 II 会場

藤 原 耕 二 (京　大　理)♯ 群の擬ツリーへの作用 ····· (13:00〜14:00)

概要 Geometric group theory studies (mostly discrete) groups using geometric viewpoints and tools. It has been successful in the last 30 years and hyperbolicity in the sense of Gromov has been playing an essential role.

Before that time Serre realized that actions on simplicial trees are very useful to study groups, and developed a rich theory on the structure of group with actions on trees.

In a joint work with Bestvina and Bromberg I study group actions on "quasi-trees". A quasi-tree is a graph which is "quasi-isometric" to a tree. They are more flexible than trees, a vast class of groups admits actions on them, and it turns out that actions on quasi-trees also give much information on the groups.

I will discuss a construction of group actions on quasi-trees and its application. The construction is elementary and the hyperbolicity is behind the construction.

第 VIII 会場

蓮 尾 一 郎 (東大情報理工)♯ 超準解析による物理情報システムの形式検証 —離散から連続・ハイブリッドへ ····· (13:00〜14:00)

概要　Hybrid systems are those which exhibit both discrete “jump” and continuous “flow” dynamics. Their importance—as components of cyber-physical systems—is paramount now that more and more physical systems (cars, airplanes, etc.) are controlled with computers.

There are naturally two directions towards the study of hybrid systems: from control theory (originally continuous) and from formal verification (originally discrete). Our approach belongs to the latter camp—in particular it originates from deductive verification, where properties of systems are proved as theorems (desirably automatically). For us a big challenge is therefore how to incorporate continuous “flow” dynamics. Many existing techniques cope with this challenge by including differential equations explicitly. This incurs a difficult (and very interesting) question of how to handle differential equations in a deductive framework that is originally discrete.

In our project we take a different path of “turning flow into jump”—more precisely into infinitely many jumps each of which is infinitesimal (i.e. infinitely small). This makes everything discrete, to which all the discrete techniques accumulated in the community of formal verification readily apply. This venture is mathematically supported by nonstandard analysis, where we can rigorously speak about infinites and infinitesimals. To put it differently: the celebrated transfer principle in nonstandard analysis states that reals and hyperreals (including infinitesimals) have the same logical theory; our results extend this coincidence to semantics of programs and program logics such as the Floyd–Hoare one.

The talk is based on the speaker’s joint work with Kohei Suenaga (Kyoto U.) and Hiroyoshi Sekine (U. Tokyo).

数 学 基 礎 論 お よ び 歴 史

9月26日(木)　　第IX会場

9:30〜10:55

1　増 田　　茂 (京 大 数 理 研)♯　The Kepler problems affected the Schrödinger equations ····· 20

Shigeru Masuda (Kyoto Univ.)♯　The Kepler problems affected the Schrödinger equations

概要　Kepler (1571–1630) proposes laws on the motions of planets in reserving many analytical open problems. Many mathematicians devote themselves to the Kepler problems. Lagrange calculates the elliptic orbit with the trigonometric series. Laplace studies many sorts of celestial mechanics, including the problem of secular inequality (secular variation). Poisson discuss the problem of secular inequality of Kepler's third law problem. Gauss caluculates the pertubation of a planet in accordance with the Kepler's second law. On the other hand, Boltzmann proposes the gas theory and the entropy theory in 1898, as the last microscopically descriptive type of equations such as the original Navier–Stokes equations. Schrödinger (1887–1961), in 1926, bases his original quantum theory on these classical mechanics of Kepler motion and the molecular motion theory. We like to document these mathematical topics.

2　増 田　　茂 (京 大 数 理 研)♯　The Fourier's heat communication theory and Boltzmann's gas transport equations ····· 20

Shigeru Masuda (Kyoto Univ.)♯　The Fourier's heat communication theory and Boltzmann's gas transport equations

概要　Fourier (1768–1830)'s first academic work is about the communication of heat of disjoint masses, namely, n-body problem, in which he extends it from the disjoint masses to continuum, however, he discuss only the infinitesimal material without the word: molecule, while the contemporaries, such as Navier, Poisson and Cauchy, use it discussing the formulation of fluid dynamics. After his manuscript version 1807–11, Fourier published "The Analytical Theory of Heat" in 1822, in which he arranges the theory of trigonometric series before the communication theory and adds the new conception: continuum. As another paper 1820, (unpublished until 3 years after his death,) he proposes finally the equations of motion of heat in fluid in handling the molecular action, that is the topics we like to document as one of the preceding modeling of the transport equations by Boltzmann (1844–1906) in 1895.

3　田 中 昭 太 郎　　＊　分数関数のベキ級数表示 3 —J. ベルヌイ, ド・モァブル, オイラー, ローラン, ハーディ, 藤原松三郎— ····· 20

Shotaro Tanaka　　＊　Representation of fractional functions using power series 3

概要　This work will be a branch of high school mathematics. We shall investigate the history of that. J. Bernoulli "Tractatus" is the historical starting point. $\Sigma_0(a+nc)/bd^n \Rightarrow (ad^2-ad-cd)/(bd^2-2bd+b)$. De Moivre "Miscellanea" $a+bx+P+Q+\cdots \Rightarrow \{a+(b-fa)x\}/(1-fx-gx^2)$. L. Euler "Infinitorum" $(1-z)/(1-z-2z^2) \Rightarrow (1/3)\Sigma_0\{(-1)^n+2^{n+1}\}z^n$. It is said that A. Laurent found his series in 1843, i.e. {function $\Rightarrow$ Laurent's series}. G. H. Hardy "Course" {equations $a_n-a_{n-1}-2a_{n-2}=0, (a_0,a_1)$: any} $\Rightarrow \Sigma_0\{(-1)^nA_1+(n+1)A_2\}x^n$. M. Fujiwara "Algebra I" $(x-1)/(2x^2+x-1) \Rightarrow \Sigma_0(-1)^nx^{-n-1}+(-1/3)\Sigma_0(1/2)^nx^{-n-1}$. How is the fraction $(1-z)/(1-z-2z^2)$ represented in whole domain?

概要　We gave some remarks on the calculation by Takakazu Seki a few years. Seki found the so-called Aitken's delta-sequenced process in his theory, but there were some errors in his calculation and he only claimed that his approximate number of pi was a bit less than 3.14159265359. Katahiro Takebe followed Seki's method and discovered another method of calculation of pi. When did Takebe verify Seki's calculation?

14:15〜15:15　特別講演

小 林 龍 彦　♯
(前橋工科大*•四日市大関孝和数学研)
Tatsuhiko Kobayashi　♯
(Maebashi Inst. of Tech.*/Yokkaichi Univ.)

関孝和, 建部賢弘, そして中根元圭

Takakazu Seki, Katahiro Takebe, and Genkei Nakane

概要　Takakazu Seki (?–1708) who calls a founder of pre-modern Japanese mathematics was a vassal of the Kofu Clan. It seems that he served his master, Tsunashige Tokugawa, around 1665. Main affairs in his young age was guarding the Clan master, and in his middle age he engaged in survey of the Kofu Clan estates or in an auditor. Then occasionally he complied with request of Japanese confectionery storekeepers want to meet his master. Work of his later years was keeping assetes of a successor of the sixth shogun as an auditor in Nishi-no-maru of Edo castle. Katahiro Takebe (1664–1739) became a pupil of T. Seki in 1676. And he also served as a vassal of the Kofu Clan to Tsunatoyo Tokugawa in 1692. His main business at the Kofu Clan house was of taking care his master. After Yoshimune Tokugawa was inaugurated as the eighth shogun of the Edo shogunate, K. Takebe helped calendar reform by Y. Tokugawa as a mathematical science adviser. On the other hand, he had participated making of Japanese map. Genkei Nakane (1662–1733) has first studied calendar under Harumi Shibukawa in Kyoto, while learned mathematics from Yoshizane Tanaka. Then he got a position as a public official at the Kyoto silver foundry in 1711. He also contributed to calendar reform by the eighth shogun Y. Tokugawa, since he had encountered with K. Takebe. As slightly above-mentioned, in this lecture we would like to refer to life of three mathematicains and role in the Edo shogunate.

15:25〜16:50

概要　Given a polygon, its isoperimetric ratio denotes the ratio of the square of the perimeter to the area. Let c be the isoperimetric ratio of the regular triangle. We observe (1) Every convex quadrilateral is affine-equivalent to a quadrilateral whose isoperimetric ratio is less than c. (2) This result is optimal; We cannot replace c by a smaller number. We discuss an application of the above result to complexity measure of street patterns. The talk is a summary of our paper in the proceeding of The World Congress on Engineering 2013, July 2013, Imperial College London, UK.

概要　Brattka, Miller, and Nies showed in 2011 that a real number is computably random if and only if every nondecreasing computable real function is differentiable at it. They asked whether the same thing can be said for polynomial-time randomness and polynomial-time computability. We point out that much of the ideas in their argument can be organized into several computational steps related to martingales with various "bases" for real numbers, in a slightly generalized sense. We then show that a simple modification in one of the steps makes the computation efficient and yields the polynomial-time version of the theorem. (A. Nies has also obtained the polynomial-time version using different techniques.)

概要　We concentrate on the class of sheaves satisfying a certain finiteness condition on sections, and give a both-way translation between such sheaves and concrete domains which is known as models of the sequentiality of higher-order computation. This viewpoint enables us to remove several technical conditions required in the ordinary definition of concrete domains.

概要　Temporal logics ECTL and ECTL$^+$ are subsystems of the full computation tree logic CTL*. Last year, the first author gave a Hilbert-style axiomatization for ECTL. We extend this result to ECTL$^+$, and we try to extend it to CTL*. We hope this will refine the results by Reynolds (2001, 2005).

概要　To show the term existence property (TEP) of intuitionistic predicate logic, Prawitz first proved a weak variant of TEP and next applied the disjunction property. Doorman extended this result to the setting of languages having function symbols. We call this weak variant of TEP the Prawitz–Doorman term existence property (PD-TEP), and consider this property in intermediate predicate logics with languages having function symbols. We give a sufficient condition of PD-TEP by making use of Kripke semantics. Then, We show that TEP does not follow from the PD-TEP. That is, PD-TEP is definitely a weak variant of TEP.

9月27日(金)　第IX会場

10:00〜11:25

概要　DIFF(M): -MATHEMATICS:
AUT(M): -MATHEMATICS:

概要　We shall define liar-type inconsistency within propositional logic and show a proof of the incompleteness theorem based on the existence of a liar-type inconsistency, which is a generalization of the standard proof of the incompleteness theorem based on the liar paradox. We shall expand these argument to predicate logic and generalize proofs of the incompleteness theorem based on Yablo's paradox which is a liar-like paradox without self-reference. Furthermore, we show that there is no liar-type inconsistency without self-reference in the sense of Yablo which can be formalized within propositional logic.

概要　Priest showed that arithmetical formalization of Yablo's paradox leads to Gödel's first incompleteness theorem. Kikuchi and Kurahashi, and Cieśliński and Urbaniak gave proofs of the second incompleteness theorem based on Priest's formalization of Yablo's paradox. We investigate the incomplete phenomenon of the formalizations $Y^R(x)$ of Yablo's paradox using Rosser's provability predicates, and prove that for each theory which is not Σ_1-sound, the undecidability of each instance of $Y^R(x)$ is dependent on the choice of a standard proof predicate. We prove our results by using the technique of Guaspari and Solovay.

概要　We prove that the concatenation theory WTC minus the axiom of identity is a minimal essentially undecidable theory. Moreover, we prove that Grzegorczyk's theory TC is also a minimal essentially undecidable theory. This result is a positive answer to the question raised by Grzegorczyk and Zdanowski.

概要　For κ regular $< \lambda$ a cardinal, let $\mathcal{P}_\kappa\lambda = \{x \subset \lambda : |x| < \kappa\}$. $X \subset \mathcal{P}_\kappa\lambda$ is unbounded if $\forall x \in \mathcal{P}_\kappa\lambda\ \exists y \in X(x \subset y)$. If κ is not inaccessible, there can be unbounded sets with cardinality $< |\mathcal{P}_\kappa\lambda|$. We observe the ideal generated by such unbounded sets and the bounded sets.

概要　Recently, David Asperó and Miguel Angel Mota discover a new method of iterated forcing using models as side conditions. The side condition method of models is introduced by Stevo Todorčević in 1980s. Asperó–Mota iteration enable us to force some Π_2-statements with the continuum greater than $\aleph_2$. By using Asperó–Mota iteration, it is proved that it is consistent that $\diamondsuit$ fails, there are no weak club guessing ladder systems, $\mathfrak{p} = \mathrm{add}(\mathcal{N}) = 2^{\aleph_0}$ which are greater than $\aleph_2$ and $\mathsf{MA}_{\aleph_1}$ fails.

概要　There are several ways of constructing the structure $\mathbf{R}$ of real numbers as an ordered field. Among such constructions, one using Dedekind cuts and one using Cauchy sequences are particularly well-known. A somewhat less known alternative is one using nonprincipal ultrafilter: Let $\mathbf{Q}^*$ be the ultrapower of the field $\mathbf{Q}$ of rationals by a non-principal ultrafilter. If we set F to be the set of finite elements in $\mathbf{Q}^*$ and I to be the set of inifinitesimals, then F/I becomes a complete ordered field, hence it is isomorphic to $\mathbf{R}$.
We modify this ultrapower construction and present a new method for constructing countable real closed fields from a $\mathbf{Q}$-type ordered field.

14:15〜15:15　特別講演

概要　In the late 1980s, Hrushovski modified the Fraïssé construction of homogeneous universal relational structures to obtain counter-examples to two famous conjectures by Lachlan and Zilber. He defined a class $\mathbf{K}$ of finite L-structures derived from a predimension, and constructed new infinite structures by amalgamating the elements of $\mathbf{K}$. His structures are called $\mathbf{K}$-generic, and his techniques are still being applied to construct new ones. However, all known generic structures were strictly stable or ω-stable. In 1993, Baldwin asked a question whether there is a strictly superstable generic structure or not. To his question, I gave a generic structure whose theory is strictly superstable. In my talk, I will explain related topics to this result.

代　数　学

9月24日(火)　　第I会場

9:00〜12:00

概要　Given positive integers n, m, s and a prime p, we cosider a problem whether certain differences of binomial coefficients depending on m, n, and p are divisible by the s-th power of p or not and we state some results which is obtained by numerical experiments.

概要　For continued fraction expansions with even period, we introduce a notion of primary symmetric parts of extremely large end (ELE) for solving Gauss' class number problem for real quadratic fields.

概要　We give a construction of primary symmetric parts of extremely large end (ELE).

概要　Let $s_1 = \sigma_1 + it$ and $s_2 = \sigma_2 + it$ with $\sigma_1, \sigma_2, t \in \mathbb{R}$. For certain σ_1 and σ_2 we study mean values $\int_2^T |\zeta_2(s_1, s_2)|^2 dt_1$ and $\int_2^T |\zeta_2(s_1, s_2)|^2 dt_2$, where $\zeta_2(s_1, s_2)$ is Euler double zeta function.

概要 Convergence of Euler products in the critical strip is directly related to a proof of the Riemann hypothesis. Moreover its behavior on the critical line, which is called the deep Riemann hypothesis, was recently proved by Kimura–Koyama–Kurokawa over function fields in case the L-function is regular at $s = 1$. In this talk we generalize their results to the Selberg zeta functions of principal congruence subgroups over function fields. We show the convergence of Euler products and establish the relation to the values of Selberg zeta functions.

概要 Mertens gave the approximate formula of partial Euler product for Riemann zeta function at $s = 1$, which is called Mertens' theorem. In this talk, we shall consider Mertens' theorem and prime number theorem for Selberg class.

概要 We prove upper and lower bounds on the supremum of the function $S_1(t)$ under the Riemann Hypothesis. The function $S_1(t)$ is defined by the integration of the argument of the Riemann zeta-function. The same type of results on the supremum of $S(t)$ under the Riemann Hypothesis have already been obtained by Korolev. Our result is based on the idea of the paper of Korolev.

概要 We give a result on the asymptotic behavior of multiple zeta-functions near non-positive integers. By using that result, we evaluate limit values of multiple zeta-functions at non-positive integers.

概要 Matsumoto and Tsumura proved mean value theorems for the Eular–Zagier double zeta-function. In this talk, we consider mean value theorems for the Mordell–Tornheim double zeta-function.

10　田　中　　諒 (名大多元数理)♯　Hurwitz–Lerch 及び Mordell–Tornheim 型を含む一般的な多重ゼータ関数の関数等式 ····· 15

Ryo Tanaka　(Nagoya Univ.)♯　Functional equations for general multiple zeta functions including Hurwitz–Lerch and Mordell–Tornheim types

概要　Although the functional equation for the Euler–Zagier double zeta function $\zeta_{EZ,2}$ has been developed by previous studies, there is not enough information known about the functional equation of the other multiple zeta functions. Here, firstly I am going to introduce a general multiple zeta function $\psi_{\Omega}^{\mathbf{\Delta}}$ and show its functional equation. Secondly, since the class of $\psi_{\Omega}^{\mathbf{\Delta}}$ does not include some important multiple zeta functions such as $\zeta_{EZ,2}$, I am going to explain how to approximate such functions by using $\psi_{\Omega}^{\mathbf{\Delta}}$ and construct their functional equations. By this method, we can obtain functional equations for a huge range of multiple zeta functions including Mordell–Tornheim type which is generalization of $\zeta_{EZ,2}$.

11　塩　見　大　輔 (山　形　大　理)*　Non-ordinary cyclotomic function fields ····· 10

Daisuke Shiomi (Yamagata Univ.)*　Non-ordinary cyclotomic function fields

概要　In this talk, we talk about the p-rank of the Jacobian of cyclotomic function fields. The main result of this talk is to prove that there are infinity many non-ordinary cyclotomic function fields.

12　黒　沢　　健 (東 京 理 大 理)♯　Fibonacci 数に関する無限積の超越性 ····· 10

Takeshi Kurosawa (Tokyo Univ. of Sci.)♯　Transcendence of infinite products with Fibonacci numbers

概要　We discuss transcendence of certain infinite products including Fibonacci and Lucas sequence. These infinite products are expressed by special values of Mahler functions. Using the Mahler theory, we give necessary and sufficient conditions for the algebraicity of the infinite products and concrete expressions for the infinite products to be algebraic.

13　立　谷　洋　平 (弘 前 大 理 工)♯　周期列を係数とするランベルト級数の値の無理性について ····· 10

Yohei Tachiya (Hirosaki Univ.)♯　Irrationality of Lambert series associated with periodic sequence

概要　Let q be an integer with $|q| > 1$ and $\{a_n\}_{n\geq 1}$ be an eventually periodic sequence of rational numbers, not identically zero from some point on. Then the number $\sum_{n=1}^{\infty} a_n/(q^n-1)$ is irrational. This generalizes a result of Erdős who treated the case of $a_n = 1$ $(n \geq 1)$.

14:15〜16:45

14　名　越　弘　文 (群 馬 大 理 工)*　Independence of L-functions and the Nevanlinna characteristic ····· 10

Hirofumi Nagoshi (Gunma Univ.)*　Independence of L-functions and the Nevanlinna characteristic

概要　In 1900 Hilbert stated that the Riemann zeta-function $\zeta(s)$ does not satisfy any nontrivial algebraic differential equation whose coefficients are rational functions. This property of $\zeta(s)$ has been strengthened (at least) in two directions. One is due to Voronin and the other is from the viewpoint of the Nevanlinna theory. In this talk, further extensions of these results will be given. The case of not only the Riemann zeta-function $\zeta(s)$ but also general L-functions will be discussed.

概要　It is known that the joint universality theorem holds for a pair of automorphic L-functions. In this talk, we give two examples of any number of automorphic L-functions with joint universality property.

概要　In order to find irreducible polynomials over $\mathbb{F}_2$ efficiently, the method using Swan's theorem is known. Swan's theorem determines the parity of the number of irreducible factors of a polynomial f over $\mathbb{F}_2$ with no repeated root, by using the discriminant $\mathrm{D}(\tilde{f})\pmod 8$, where $\tilde{f}$ is a monic polynomial over $\mathbb{Z}_2$ such that $\tilde{f} \equiv f \pmod 2$. In the lecture, we will give the formula for the discriminant $\mathrm{D}(\tilde{f})\pmod 8$ for a polynomial f over $\mathbb{F}_2$ with no repeated root. By applying this formula to various types of polynomials, we shall get the parity of the number of irreducible factors of them.

概要　In previous works we proved that, over number fields, there are at most elliptic points on Shimura curves of $\Gamma_0(p)$-type for every sufficiently large prime number p under a mild assumption. In this talk, we report the non-existence of elliptic points on Shimura curves of $\Gamma_0(p)$-type. We also give a numerical example.

概要　In imaginary quadratic fields, we consider conditions such that exponents of ideal class groups are equal to two.

概要　Let K be a p-adic field and E an elliptic curve over K with potentially good reduction. In this talk, we show that for some large Galois extension L containing the field $K(\mu_{p^\infty})$ in a fixed algebraic closure of K, all the cohomology groups of $\rho(G_L)$ with values in $V_p(E)$ vanish; where ρ is the homomorphism giving the action of G_K on the vector space $V_p(E)$.

概要　Honda proved that a formal group associated to the formal completion along the zero section of the Néron model over $\mathbb{Z}$ of an elliptic curve E over $\mathbb{Q}$ is strongly isomorphic over $\mathbb{Z}$ to the formal group obtained from the L-series attached to the l-adic representations of $\mathrm{Gal}(\bar{\mathbb{Q}}/\mathbb{Q})$ on E. Deninger–Nart generalized Honda's theorem to abelian varieties over $\mathbb{Q}$ of GL_2-type with real multiplication. In this talk, we give a generalization of that with complex multiplication. As an application, we give a method to calculate the coefficients of the L-series attached to the l-adic representations on Jacobian varieties of GL_2-type.

概要　We describe the trace formula for Jacobi forms of prime odd power level, and consider about the 'Hecke structure' of the Jacobi form space in the case of prime power level. Moreover, we discuss about the existence of the level-index changing operator on Jacobi forms in the case of prime odd power level.

概要　In the previous meeting, we introduced a strange mod 23 congruence property satisfied by Igusa's cusp form of weight 35. At that time, we remarked that there is another mod 23 congruence at weight 12. Namely, it is interpreted that the weight 35 comes from the sum of the congruence prime 23 and the corresponding weight 12. Mizumoto proved the existence of a similar congruence mod 31 at weight 16. Therefore it is expected that there is a cusp form of weight $47 = 16 + 31$. In this talk, we report that we can construct the cusp form explicitly. Finally, we present a conjecture concerning the congruence property.

概要　Let G be a connected reductive algebraic group defined over a number field k. We introduce the Ryshkov domain R for the arithmetical minimum function m_Q defined from a height function associated to a maximal k-parabolic subgroup Q of G. The domain R is a $Q(k)$-invariant subset of the adele group $G(A)$. We show that a fundamental domain Ω for $Q(k)\backslash R$ gives a fundamental domain for $G(k)\backslash G(A)$. Furthermore, we see that any local maximum m_Q is attained in the boundary of Ω.

Kohei Katata (Ehime Univ.)*
Miki Hirano (Ehime Univ.)
Yoshinori Yamasaki (Ehime Univ.)

On Ramanujan circulant graphs

概要　It is known that Ramanujan graphs are good graphs not only in communication network but also in number theory. Because they are closely related to the Riemann conjecture for the Ihara zeta function. For example, a complete graph which has more than three vertices is a Ramanujan graph. Now, consider a given family of graphs and $\mathfrak{X}_n$ the subset of graphs which have n vertices. In each $\mathfrak{X}_n$, what we want to know is the greatest lower bound of a valency which garantees the Ramanujan property. We study the set of all connected Cayley graphs on cyclic groups of odd order. Then we obtain that our question is related to the Hardy–Littlewood conjecture.

17:00〜18:00　特別講演

Y. Flicker (Ohio State Univ. • Ariel Univ.)

Counting local systems via automorphic forms

Yuval Flicker (Ohio State Univ. / Ariel Univ.)

Counting local systems via automorphic forms

概要　In the talk, we shall state precisely, explain and motivate the following result.
Let X_1 be a curve of genus g, projective and smooth over $\mathbb{F}_q$. Let $S_1 \subset X_1$ be a reduced divisor consisting of N_1 closed points of X_1. Let (X, S) be obtained from (X_1, S_1) by extension of scalars to an algebraic closure $\mathbb{F}$ of $\mathbb{F}_q$. Fix a prime ℓ not dividing q. The pullback by the Frobenius endomorphism Fr of X defines a permutation Fr^* of the set of isomorphism classes of rank n irreducible $\overline{\mathbb{Q}}_\ell$-local systems on $X - S$. It maps to itself the subset of those classes for which the local monodromy at each $s \in S$ is unipotent, with a single Jordan block. Let $T(X_1, S_1, n, m)$ be the number of fixed points of Fr^{*m} acting on this subset. When $N_1 \geq 2$ we show that $T(X_1, S_1, n, m)$ is given by a formula reminiscent of a Lefschetz fixed point formula: the function $m \mapsto T(X_1, S_1, n, m)$ is of the form $\sum n_i \gamma_i^m$ for suitable integers n_i and "eigenvalues" γ_i. We use Lafforgue to reduce the computation of $T(X_1, S_1, n, m)$ to counting automorphic representations of $\mathrm{GL}(n)$, and the assumption $N_1 \geq 2$ to move the counting to the multiplicative group of a division algebra, where the trace formula is easier to use.

9月25日(水)　第I会場

9:00〜12:00

概要　Let G be a finite connected simple graph and I_G the toric ideal of the edge ring $K[G]$ of G. In the present paper we study finite graphs G with the property that I_G is generated by quadratic binomials and I_G possesses no quadratic Gröbner basis. First, we give a nontrivial infinite series of finite graphs with the above property. Second, we implement a combinatorial characterization for I_G to be generated by quadratic binomials and, by means of the computer search, we classify the finite graphs G with the above property, up to 8 vertices.

概要　Let $\mathcal{P} \subset \mathbb{R}^N$ be an integral convex polytope of dimension d and write $k\mathcal{P}$, where $k = 1, 2, \ldots$ for dilations of $\mathcal{P}$. We say that $\mathcal{P}$ is normal if, for any integer $k = 1, 2, \ldots$ and for any $\alpha \in k\mathcal{P} \cap \mathbb{Z}^N$, there exist $\alpha_1, \ldots, \alpha_k$ belonging to $\mathcal{P} \cap \mathbb{Z}^N$ such that $\alpha = \alpha_1 + \cdots + \alpha_k$. A fundamental question is to determine the integers $k > 0$ for which the dilated polytope $k\mathcal{P}$ is normal. In this talk, combinatorial invariants related to the normality of dilated polytopes will be proposed and studied.

概要　In this talk, for the investigation of the behavior of roots of Ehrhart polynomials of reflexive polytopes, we consider the problem of which Ehrhart polynomials of reflexive polytopes form an orthogonal polynomial system with respect to some positive-definite moment functional. In particular, we concentrate on the Ehrhart polynomials of reflexive polytopes satisfying a certain three-terms recurrence formula. Moreover, we present several examples of reflexive polytopes whose Ehrhart polynomials satisfy such a three-terms recurrence formula.

概要　Ohsugi and Hibi [1] showed that semi-group rings arising from two way subtable sum problems are normal if and only if the subtables are either diagonal or triangular. In this lecture, I talk about Hilbert basis of semi-group ring if the subtable is main diagonal and $n \geq 3$, call the main diagonal model.

概要　In KLR algebras, there are trivial idempotents called KLR idempotents. It is clear that there exists KLR idempotent which is not primitive in general. But in cyclotomic KLR algebras, it can be happen that all nonzero KLR idempotents are primitive. In this talk, we will determine when that happens in the type is essentially $A_n^{(1)}$.

概要　Let G be a simple undirected graph on n vertices, S polynomial ring in n variables over field K, and $I(G) \subset S$ denote associated edge ideal of G. We say a graph G is (sequentially) Cohen–Macaulay if $S/I(G)$ is has this property. A classification of Cohen–Macaulay finite graphs is given for bipartite graphs by Herzog and Hibi. In this talk, we give a necessary graph's condition for bipartite graph G to be sequentially Cohen–Macaulay.

概要　Let S be a polynomial ring over a field K and I a squarefree monomial ideal of S. The arithmetical rank of I is defined as a minimum number u of elements $q_1, \ldots, q_u \in I$ which generate I up to radical. If it is equal to the height of I, then I is said to be set-theoretic complete intersection. In this talk, we will show that a Gorenstein monomial ideal of height 3 is set-theoretic complete intersection.

概要　We will study finite Abelian cover of normal graded singularities in terms of Pinkham–Demazure's construction. We will define the new subgroup $Cl^0(R)$ of the torsion part of the divisor class group Cl(R) of normal graded ring. For a finite subgroup G of Cl(R), we show $G/Cl^0(R) \cap G$ is cyclic. Taking the Kummer cover of Proj(R) by $Cl^0(R) \cap G$, the standard generator of $G/Cl^0(R) \cap G$ gives the Demazure divisor of an Abelian cover of R by G.

33　中　嶋　祐　介 (名大多元数理)♯　2 次元巡回商特異点における Cohen–Macaulay 加群の dual F-signature について ····· 15

Yusuke Nakajima (Nagoya Univ.)♯　Dual F-signature of Cohen–Macaulay modules over cyclic quotient surface singularities

概要　The notion of F-signature is defined by Huneke and Leuschke. It is known that the F-signature characterizes some singularities. This notion is extended to finitely generated modules and called dual F-signature. In this talk, we determine the dual F-signature of a certain class of Cohen–Macaulay modules (so-called "special") over cyclic quotient surface singularities.

34　松　岡　　学 (大阪樟蔭女大)*　直和因子条件をもつ環と線形符号 ····· 10

Manabu Matsuoka (Osaka Shoin Women's Univ.)*　Rings with direct summand conditions and linear codes

概要　For a ring R, we consider the condition that every finitely generated free submodule N of a finitely generated free R-module M is a direct summand of M. For example QF rings satisfy this condition. Y. Hirano studied this rings. By the way, since several years, codes over finite Frobenius rings draw considerable attension in coding theory. J. A. Wood established the extension theorem and MacWilliams identities over finite Frobenius rings. In this talk, we study the rings with the direct summand condition and give the applications to coding theory.

35　亀　山　統　胤 (信　州　大　工)♯　Constructions of Auslander–Gorenstein local rings ····· 10
星　野　光　男 (筑波大数理物質)
古　賀　寛　尚 (筑波大数理物質)

Noritsugu Kameyama (Shinshu Univ.)♯　Constructions of Auslander–Gorenstein local rings
Mitsuo Hoshino (Univ. of Tsukuba)
Hirotaka Koga (Univ. of Tsukuba)

概要　We provide a systematic construction of $\mathbb{Z}/n\mathbb{Z}$-graded rings A starting from an arbitrary ring R and show that under mild assumptions A is an Auslander–Gorenstein local ring if and only if so is R. Next, for each A we construct a ring Λ containing A as a fixed subring of a certain automorphism and show that all the rings R, A and Λ are Auslander–Gorenstein if so is one of them.

13:15〜14:15　特別講演

髙　木　俊　輔 (東　大　数　理)♯　F 特異点と極小モデル理論に現れる特異点

Shunsuke Takagi (Univ. of Tokyo)♯　F-singularities and singularities in the minimal model program

概要　F-singularities are classes of singularities in positive characteristic defined using the Frobenius morphism. F-singularities (partly) conjecturally correspond via reduction modulo $p > 0$ to singularities associated to the minimal model program in characteristic zero. In this talk, I will explain recent developments on this conjectured correspondence and how it relates to a problem on the existence of a positive density set of places with ordinary reduction for a projective variety over a number field.

9月26日(木)　第I会場

9:00〜11:25

36 松澤　翔 (静岡大理)♯ 3次元 quadratic AS-regular algebra の分類 ····· 10
金　加喜 (静岡大理)
松本英鷹 (静岡大創造科学技術)

Sho Matsuzawa (Shizuoka Univ.)♯ Classification of 3-dimensional quadratic AS-regular algebras
Gahee Kim (Shizuoka Univ.)
Hidetaka Matsumoto (Shizuoka Univ.)

概要　Noncommutative algebraic geometry is the field of studying noncommutative rings by using methods of algebraic geometry. Algebras having a "one-to-one" correspondence with geometric pairs (E, σ) are called geometric. Since 3-dimensional quadratic AS-regular algebras are geometric, they can be classified by (E, σ). In this talk, we will try to answer the question which 3-dimensional quadratic AS-regular algebras are isomorphic or Morita equivalent in terms of their defining relations.

37 上山健太 (静岡大理)♯ Finite Cohen–Macaulay representation type and noncommutative graded isolated singularities ····· 15

Kenta Ueyama (Shizuoka Univ.)♯ Finite Cohen–Macaulay representation type and noncommutative graded isolated singularities

概要　Isolated singularities play an important role both in algebraic geometry and commutative ring theory. Moreover, a commutative local Cohen–Macaulay ring of finite Cohen–Macaulay representation type is known to be an isolated singularity. In this talk, we give a noncommutative graded analogue. Namely, we show that if A is an AS-Cohen–Macaulay algebra of finite Cohen–Macaulay representation type, then A is a noncommutative graded isolated singularity.

38 古谷貴彦 (明海大歯)♯ Some self-injective algebras with finite Hochschild cohomology ····· 10
速水孝夫 (北海学園大工)

Takahiko Furuya (Meikai Univ.)♯ Some self-injective algebras with finite Hochschild cohomology
Takao Hayami (Hokkai-Gakuen Univ.)

概要　In this talk, we give the dimensions of the Hochschild cohomology groups of some self-injective special biserial algebras whose Grothendieck groups are of rank four. This result provides us with a negative answer to a question of D. Happel.

39 古賀寛尚 (筑波大数理物質)♯ Finiteness of selfinjective dimension and associated invariants under derived equivalences ····· 15

Hirotaka Koga (Univ. of Tsukuba)♯ Finiteness of selfinjective dimension and associated invariants under derived equivalences

概要　We provide some conditions which are stable under derived equivalences. Using these conditions, we characterize artin algebras of finite selfinjective dimension.

概要 I talk about a one point extension algebra of a quiver algebra over a field defined by two cycles and a quantum-like relation. We determine the Hochschild cohomology ring modulo nilpotence.

概要 If B is the class of all modules M/N such that N is essential in M, a torsion theory $(\mathcal{T},\mathcal{F})$ generated by B is called the Goldie torsion theory. In this talk we generalize the Goldie torsion theory by using a hereditary torsion theory.

概要 We define the extension group between an atom and an object in a locally noetherian Grothendieck category as a module over a skew field. We show that the dimension of the i-th extension group between an atom and an object coincides with the i-th Bass number of the object with respect to the atom. As an application, we give a bijection between E-stable subcategories closed under arbitrary direct sums and direct summands and subsets of the atom spectrum and show that such subcategories are also closed under extensions, kernels of epimorphisms, and cokernels of monomorphisms.

概要 A pivotal object is a pair (X,ϕ) consisting of an object X of a tensor category and an isomorphism ϕ from X to the double dual of X. Motivated by the Frobenius–Schur theory, I am interested in pivotal objects which are "canonical" in a certain sense. In this talk, I introduce a canonical pivotal object $(A_{\mathcal{C}},\phi_{\mathcal{C}})$ in a finite tensor category, which I call the adjoint object. The adjoint object extends the notion of the adjoint representation of Hopf algebras and has some interesting properties. For example, for each n, there is an isomorphism between $\mathrm{Hom}_{\mathcal{C}}(1,A_{\mathcal{C}}^{\otimes n})$ and the endomorphism algebra of the functor $\mathcal{C}^n\to\mathcal{C}$ induced by the tensor product.

概要 For an A-coring C and a B-coring D, we define a *generalized coderivation* and a *generalized inner coderivation* between (C,D)-bicomodules. We show that an A-coring C is coseparable if and only if, for any B-coring D, all generalized coderivations between (C,D)-bicomodules are generalized inner coderivations.

45　津野祐司 (千葉工大)*　Central cleft extensions for free Hopf algebras ····· 15

Yuji Tsuno (Chiba Inst. of Tech.)*　Central cleft extensions for free Hopf algebras

概要　This is joint work with Akira Masuoka. Hopf–Galois extensions are quantum analogues of torsors. Moreover, the concept of cleft extensions, or equivalently of crossed products, for a Hopf algebra is a generalization of Galois extensions with normal basis and of crossed products for a group. Mitsuhiro Takeuchi constructed free Hopf algebras generated by coalgebras. Let $H(C)$ be the free Hopf algebra generated by a coalgebra C. Then we obtain that every central $H(C)$-cleft extension over an arbitrary commutative algebra is trivial.

14:15〜16:00

46　庭崎隆 (愛媛大教育・学生支援機構)*
淺井恒信 (近畿大理工)　自己準同型写像の個数による例外 2 群の特徴付け ····· 10

Takashi Niwasaki (Ehime Univ.)*
Tsunenobu Asai (Kinki Univ.)　A characterization of exceptional 2-groups by the numbers of the endomorphisms

概要　This is a joint work with Yugen Takegahara (Muroran Institute of Technology) and Naoki Chigira (Kumamoto University). As an application of our results on the crossed homomorphisms of groups, we can prove the following.
Let P be a 2-group. If the number of the endomorphisms of P is not divisible by 8, then P is an exceptional 2-group, namely, one of a cyclic, a dihedral, a generalized quaternion and a semidihedral 2-group.

47　飛田明彦 (埼玉大教育)*　Extraspecial p-群の mod p コホモロジーと両側 Burnside 環の作用について ····· 10

Akihiko Hida (Saitama Univ.)*　On the mod p cohomology of the extraspecial p-group and the action of the double Burnside algebra

概要　Let p be an odd prime. Let E be the extraspecial p-group of order p^3 and exponent p. We consider the action of the double Burnside algebra on the mod p cohomology ring of E and determine the composition factors.

48　越谷重夫 (千葉大理)
R. Kessar (City Univ. London)
M. Linckelmann (City Univ. London)　標数 2 のモジュラー表現論におけるアルペリン予想および弱ブルエ予想 ····· 15

Shigeo Koshitani (Chiba Univ.)
Radha Kessar (City Univ. London)
Markus Linckelmann (City Univ. London)　The Alperin weight conjecture and Broue conjecture in modular representation theory

概要　We will be discussing Alperin's weight conjecture and Broué's abelian defect group conjecture for perfect isometries for 2-blocks of finite groups with elementary abelian defect group of order 8. This is joint work with R. Kessar and M. Linckelmann.

概要　We will be discussing Broue's abelian defect group conjecture in modular representation theory of finite groups. We will be talking about especially three cases, namely, the Harada–Norton sporadic simple group, the double cover of the Higman–Sims sporadic simple group and the third Conway sporadic simple group.

概要　Let $L = A + B$ be a factorized Lie algebra by two subalgebras A and B. For a subalgebra H of L we introduced its factorizer $X(H)$ and investigated some basic properties of $X(H)$. We also proved that if A satisfies the maximal (resp. minimal) condition on ideals and B satisfies the maximal (resp. minimal) condition on subalgebras, then L satisfies the maximal (resp. minimal) condition on ideals.

概要　Lian–Linshaw–Song introduced a vertex-algebraic analogue of the equivariant cohomology of smooth manifolds with an action of a Lie group by using their small chiral de Rham complex. We generalize the small chiral de Rham complex by using Lie algebroids and construct a vertex-algebraic analogue of the equivariant Lie algebroid cohomology. We introduce a special kind of complex and present its property to compute in the case of some class of Lie algebroids associated with an infinitesimal action of a Lie algebra on a manifold.

概要　We introduce a notion of intermediate vertex subalgebras of lattice vertex operator algebras, as a generalization of the notion of principal subspaces. We give bases and the graded dimensions of such subalgebras. As an application, we show that the characters of some modules of an intermediate vertex subalgebra between E_7 and E_8 lattice vertex operator algebras satisfy some modular differential equations. This result is an analogue of the result concerning the "hole" of the Deligne dimension formulas and the intermediate Lie algebra between the simple Lie algebras E_7 and E_8.

16:15〜17:15　特別講演

宮 本 雅 彦 (筑波大数理物質)♯　頂点作用素代数に関する軌道予想について

Masahiko Miyamoto (Univ. of Tsukuba)♯　On orbifold conjecture about vertex operator algebras

概要　In order to explain the moonshine phenomenon on the monster simple group and the modular functions, Bocherds has introduced a concept of vertex operator algebra (shortly VOA) as an algebraic version of conformal field theory. One of the main targets in the research of VOA is a construction of VOAs V of finite type, that is, V has only finitely many simple modules and every finitely generated module (including weak module) has a composition series. An orbifold conjecture says that for a simple vertex operator algebra V of finite type and a finite automorphism group G, a fixed point subVOA V^G is also of finite type. We prove that this orbifold conjecture is true for solvable automorphism groups G. We will also discuss cases where G are non-abelian simple groups.

9月27日(金)　第I会場

9:30〜12:00

53　簗 場 広 子 (広 尾 学 園)♯　擬素数の決定について ····· 10
塩 谷　祈 (広 尾 学 園)

Hiroko Yanaba (Hiroo Gakuen)♯　On pseudo primes
Inoru Shioya (Hiroo Gakuen)

概要　Let $\sigma(a)$ denote the number of divisors of a positive integer a.
$5\sigma(a) = 9a + 90$, if $a = 10p$, where p is a prime $\neq 2, 5$.
Conversely, suppose that $5\sigma(a) = 9a + 90$. If $a = 10n, n$ being a positive integer, then i) n is a prime $\neq 2, 5$ or ii) $n = 2^2, 5^2$, which are called pseudo primes.

54　飯 高　茂 (学 習 院 大*)♯　Hartshorne の等式とその応用 2 ····· 15

Shigeru Iitaka (Gakushuin Univ.*)♯　Hartshorne's identities and their applications 2

概要　Some relations among birational invariants of algebraic plane curves are discussed.
Four Hartshorne's identities are presented. As applications, types where $\omega - g \leq 10$ are enumerated.

55　渡 邉 健 太 (阪　大　理)*　平面曲線の二重被覆の拡張と二重被覆型のワイヤストラス半群について ····· 10

Kenta Watanabe (Osaka Univ.)*　On extensions of a double covering of plane curves and Weierstrass semigroups of the double covering type

概要　Let C be a smooth plane curve of degree d, P be a point on C, and let $\pi : \tilde{C} \to C$ be a double covering of the curve C with the branch point P. In this talk, we give a best possible sufficient condition for the double covering π to extend to a double covering $\tilde{\pi} : X \to \mathbb{P}^2$ branched along a reduced divisor of degree six which intersects transversally the curve C at $6d$ smooth points containing P, by computing the Weierstrass semigroup of the ramification point $\pi^{-1}(P)$.

概要　We establish an elementary bound for numbers of points of surfaces in the projective 3-space over finite fields, and also give the complete list of surfaces that attain the elementary bound. This is a joint work with Seon Jeong Kim (Gyeongsang National University, Korea).

概要　Any genus two fibration on rational surface with Picard number eleven can be considered as a pencil of plane curves of degree thirteen with a quintuple point and nine quadruple points through a birational morphism. We consider the case where the fibrations have three singular fibres of types (V) in the sense of Horikawa, and write down the defining equations of the pencils with three parameters. Furthermore, we describe irreducible singular fibres, which are at most two.

概要　It is known that a non-symplectic automorphism of order 32 on a $K3$ surface does not act trivially on the Néron–Severi lattice. Oguiso gave an example of a $K3$ surface with a non-symplectic automorphism of order 32 which acts on the Néron–Severi lattice as an involution. In this talk, we see that a pair of a $K3$ surface and its non-symplectic automorphism of order 32 is isomorphic to Oguiso's example.

概要　Let D_1 and D_2 be two distinct theta divisors on a two-dimensional Jacobian variety X, and let $\mathcal{L}$ be the locally constant sheaf associated to a many-valued function on X infinitely ramified along $D_1 \cup D_2$. We discussed the cohomology group $H^p(X - D_1 \cup D_2, \mathcal{L})$, and made clear the structure of the non-vanishing cohomology group $H^2(X - D_1 \cup D_2, \mathcal{L})$.

概要　In this talk, I explain recent results on the minimal model theory in positive characteristic. The main theorem is the minimal model program for threefolds in characteristic $p > 5$. More precisely, if $p > 5$, then every smooth projective threefold is birational to a terminal projective threefold which is minimal or has a structure of Mori fiber space. This is a joint work with Paolo Cascini and Chenyang Xu.

61　古 川 勝 久 (早大基幹理工)♯　Cohomological characterization of hyperquadrics of odd dimensions in characteristic two ····· 15

Katsuhisa Furukawa (Waseda Univ.)♯　Cohomological characterization of hyperquadrics of odd dimensions in characteristic two

概要　S. Mori gave characterization of projective spaces in arbitrary characteristic $p \geq 0$ by ampleness of tangent bundles. J. Wahl characterized projective spaces in $p = 0$ by a cohomological condition; also, he remarked that a counter-example in $p = 2$ is constructed from hyperquadrics Q_{2n-1} $(n > 1)$. This is caused by a common point which every embedded tangent space to the quadric contains. In general, a projective variety in P^N is said to be strange if it admits such a common point. A non-linear smooth curve is strange if and only if it is conic in $p = 2$ (E. Lluis, P. Samuel). S. Kleiman and R. Piene showed that a non-linear smooth hypersurface in P^N is strange if and only if it is Q_{2n-1} in $p = 2$. We prove that, a non-linear smooth complete intersection in P^N is strange if and only if it is a quadric in P^N of odd dimension in $p = 2$; these are also equivalent to a cohomological condition.

62　天 野 通 大　♯　Witt vectors のある準同型写像の核について ····· 10

Michio Amano　♯　On the kernels of certain homomorphisms of the Witt vectors

概要　In this talk, we discuss on kernels of T-map defined by T. Sekiguchi and N. Suwa. T-map is a homomorphism on the Witt vectors. Our main result is a relation between a kernel of the T-map and a certain Frobenius type kernel. After this, we consider its application.

14:15〜15:30

63　山 崎 愛 一 (京　大　理)♯　$z^2 = P(x)y^2 + Q(x)$ の有理性問題 ····· 10

Aiichi Yamasaki (Kyoto Univ.)♯　Rationality of $z^2 = P(x)y^2 + Q(x)$

概要　The necessary and sufficient condition for the rationality of the surface $z^2 = P(x)y^2 + Q(x)$ is given as follows. Let $s = s_1 + s_2 + s_3 + s_4$, where s_1 (resp. s_2, resp. s_3) is the number of $c \in \overline{k}$ such that $P(c) = 0$ and $Q(c) \notin k(c)^2$ (resp. $Q(c)$=0 and $P(c) \notin k(c)^2$, resp. $P(c) = Q(c) = 0$ and $-Q/P(c) \notin k(c)^2$). $s_4 = 0$ or 1 and $s_4 = 1$ if and only if one of the following three conditions is satisfied (1) $\deg P$ even, $\deg Q$ odd, $p_0 \notin k^2$, (2) $\deg P$ odd, $\deg Q$ even, $q_0 \notin k^2$, (3) $\deg P$ odd, $\deg Q$ odd, $-q_0/p_0 \notin k^2$. Here p_0 (resp q_0) is the coefficient of the highest degree term of P (resp. Q).
(1) When $s \geq 4$, $k(x, y, z)$ is not rational over k. (2) When $s = 2$ or 3, $k(x, y, z)$ is rational over k. (3) The case $s = 1$ can not happen. (4) When $s = 0$, $k(x, y, z)$ is rational over k except the following case. Both of $\deg P$ and $\deg Q$ are even and $a^2p_0 + b^2q_0 = c^2$ has no non-zero solution (a, b, c) in k.

64　巴 山 竜 来 (清 華 大 M S C)♯　Boundary component structure of period domains ····· 15

Tatsuki Hayama (National Tsing Hua Univ.)♯　Boundary component structure of period domains

概要　I will introduce resent results on boundary component structures of period domains and Mumford–Tate domains.

概要　S. Mori and Yu. Prokhorov positively proved the conjectural form of the rationality criterion for conic bundles posed by V. A. Iskovskikh, recently. Moreover, as succeeding to their works, V. V. Shokurov proposed some kinds of coarse moduli for several equivalence relations involving to Fano type varieties as outputs on runnig LMMP, based on his "geography of log models". In this talk, I will try to consider a variant of Iskovskikh's rationality criterion for conic bundles in the case of some kinds of limiting polarized (log) pairs.

概要　A Fano manifold X with nef tangent bundle is of flag-type if it has the same type of elementary contractions as a complete flag manifold. In this talk we present a method to associate a Dynkin diagram $\mathcal{D}(X)$ with any such X, based on the numerical properties of its contractions. We then show that $\mathcal{D}(X)$ is the Dynkin diagram of a semisimple Lie group. As an application we prove that Campana–Peternell conjecture holds when X is a flag-type manifold whose Dynkin diagram is of classical type.

概要　In this talk, I will talk about the classification of Fano manifolds with a birational type extremal contraction whose third exterior power of tangent bundle $\Lambda^3 T_X$ is nef on every rational curves.

概要　In this talk, we study singular metrics of line bundles with non-algebraic singularities, their multiplier ideal sheaves and a Nadel type vanishing theorem, from the view point of complex geometry. The Nadel vanishing theorem can be seen as an analytic version of the Kawamata–Viehweg vanishing theorem of algebraic geometry. The main purpose of this talk is to establish such a theorem for the multiplier ideal sheaf of a metric with minimal singularities, for the cohomology with values in a big line bundle.

15:45〜16:45　特別講演

概要　Let X be a projective variety of dimension n and let L be a nef and big Cartier divisor on X. Then the pair (X, L) is called a quasi-polarized variety. In this talk, we consider the case where X is smooth and we study the dimension of global sections of adjoint bundles. In particular, we focus on the following two cases: (a) $h^0(K_X + mL)$ and (b) $h^0(m(K_X + L))$, where m is a positive integer. First, as an example of the case (a), we consider Beltrametti–Sommese's conjecture whose statement is the following: "If X is smooth, L is ample and $K_X + (n-1)L$ is nef, then $h^0(K_X + (n-1)L) > 0$." In order to study this conjecture, we use the ith sectional geometric genus $g_i(X, L)$ of (X, L), which is defined for every integer i with $0 \leq i \leq n$. This invariant is thought to be a generalization of classical invariants (the degree L^n and the sectional genus of (X, L)). In this talk, we explain how this conjecture relates to the sectional geometric genus. Next, as an example of the case (b), we study the following problem: "For fixed positive integer n, let $N(n)$ be the smallest positive integer among natural numbers P which satisfy the following: $h^0(m(K_X + L)) > 0$ holds for any integer m with $m \geq P$ and any smooth quasi-polarized varieties (X, L) with $\dim X = n$ such that $K_X + L$ is nef. Then study an upper bound for $N(n)$." In order to consider this problem, we need another invariant which is the multiple line bundles' version of the sectional geometric genus. So we introduce this invariant and explain the proof of the most recent result about this problem.

幾　何　学

9月24日(火)　　第VI会場

9:15〜12:00

概要　With Mr. Mikio Sato's words, we succeeded in an understanding of the physical concept of "phase transition", "mean field approximation", "symmetry", "symmetry breaking", "scale invariance", "renormalization", while solving economic phenomena. We feel that it stepped forward one step with new economics, physics, mathematics, history, etc.

概要　Generally geodesics of Finsler space depends on the direction. For two points p, q in the space, the geodesic line which leaves from q for p is different from a geodesic line toward q from p. In my lecture, I consider the relations of the tangent vectors at endpoints p, q of each geodesic line. Finally, using a provided result, I show one proposition about the conjugate point.

概要　In this talk, we define an evolute and an involute of a front in the Euclidean plane and we consider about relationship between evolutes and involutes of fronts. By using a moving frame of a front and the curvature of the Legendre immersion, we can observe that the evolute and the involute of the front are corresponding to the differential and integral in classical calculus.

概要　It is well known that the projective duality can be understood in the context of A_n-type. In this talk, we construct explicitly a flag manifold, its triple-fibration and a differential system which have D_4 symmetry and conformal triality. Then we give the generic classification result for singularities of the tangent surfaces to associated integral curves, which exhibits the triality. The classification is performed in terms of the classical theory on root systems combined with the singularity theory of mappings.

概要　We show a duality which arises from distributions of Cartan type with growth (2, 3, 5) from the view point of geometric control theory. In fact we consider the space of singular (or abnormal) paths on a given five dimensional space endowed with a Cartan distribution, which form another five dimensional space with a cone structure. We regard the cone structure as a control system and show that the space of singular paths of the cone structure is naturally identified the original space. Moreover we observe the asymmetry on this duality in terms of singular paths.

概要　We compute sectional curvatures of all ruled real hypersurfaces in a nonflat complex space form.

概要　We classify all normal real hypersurfaces in a nonflat complex space form and investigate their geometric properties.

概要　The Möbius energy was introduced by O'Hara in 1991 as an energy of knots. It is well-known that the energy has the Möbius invariance. In this talk, a decomposition theorem of the Möbius energy is shown. The energy is decomposed into three terms, each of which has the Möbius invariance. The first term of decomposition characterizes the natural domain $H^{1,\infty} \cap H^{\frac{3}{2}}$ of the energy, where $H^{\alpha,p}$ is the fractional order Sobolev space, and $H^{\alpha,2} = H^{\alpha}$. The second term defines a functional which is essentially the same as the O'Hara–Solanes energy which was introduced by them in the different approach.

9　嶺 山 良 介 (阪　大　理)♯　Coxeter 群の Cannon–Thurston 写像について ····· 15

Ryosuke Mineyama (Osaka Univ.)♯　On Cannon–Thurston maps for Coxeter groups

概要　For a Coxeter group W we have an associating bi-linear form B on suitable real vector space. We assume that B has signature $(n-1,1)$ and for any sub-matrix whose rank $n' \geq 3$ has also signature $(n'-1,1)$. Under these assumptions, we see that there exists the Cannon–Thurston map for W, that is, a W-equivariant continuous surjection from the Gromov boundary of W to the limit set of W. To see this we construct an isometric action of W on an ellipsoidal region with the Hilbert metric. As a consequence, we see that the limit set of W coincides with the set of accumulation points of roots of W.

10　東 谷 章 弘 (阪 大 情 報)♯　無限 Coxeter 群のルートの漸近挙動 ····· 15
嶺 山 良 介 (阪　大　理)
中 島 規 博 (北　大　理)

Akihiro Higashitani (Osaka Univ.)♯　Asymptotic behavior of roots of infinite Coxeter groups
Ryosuke Mineyama (Osaka Univ.)
Norihiro Nakashima (Hokkaido Univ.)

概要　In this talk, we investigate the set of accumulation points of normalized roots of infinite Coxeter groups. We prove the conjecture on the limit set of roots of infinite Coxeter groups of rank n in the case where the equipped Coxeter matrices have the signature $(n-1,1)$.

14:15〜16:00

11　八 ツ 井 智 章　♯　Sub-conformal 基本階別リー環の延長について ····· 10

Tomoaki Yatsui　♯　On the prolongation of sub-conformal fundamental graded Lie algebras

概要　We first introduce the notion of subconformal fundamental graded Lie algebras. Further we investigate the structure of the prolongation of subconformal fundamental graded Lie algebras. In particular we state the classification of the prolongations of sub-conformal fundamental graded Lie algebras of semisimple type.

12　今 井 悠 人 (早 大 理 工)♯　On the quarternification of the Lie algebra $Map(S^3, \mathfrak{g})$ and its extensions ····· 10
郡　敏 昭 (早 大 理 工)

Yuto Imai (Waseda Univ.)♯　On the quarternification of the Lie algebra $Map(S^3, \mathfrak{g})$ and its extensions
Tosiaki Kori (Waseda Univ.)

概要　Let $(\mathfrak{g}, [\ ,\ ]_{\mathfrak{g}})$ be a complex Lie algebra and $U(\mathfrak{g})$ be the enveloping algebra of $\mathfrak{g}$. Let H be the quarternions and $S^3\mathbf{H}$ be the space of $\mathbf{H}$-valued mappings on S^3. We introduce a Lie algebra structure on $S^3\mathfrak{g}^{\mathbf{H}} = S^3\mathbf{H} \otimes U(\mathfrak{g})$. Then we introduce a 2-cocycle on $S^3\mathfrak{g}^{\mathbf{H}}$ and the corresponding central extension $S^3\mathfrak{g}^{\mathbf{H}} \oplus (\mathbf{C}a)$. As a Lie subalgebra of $S^3\mathbf{H}$ we have the Lie algebra of Laurent polynomial spinors $\mathbf{C}[\phi^{\pm(m,l,k)}]$. Then $\mathbf{C}[\phi^{\pm(m,l,k)}] \otimes U(\mathfrak{g})$ is a Lie subalgebra of $S^3\mathfrak{g}^{\mathbf{H}}$. Its central extension $\widehat{\mathfrak{g}}(a)$ is obtained as a Lie subalgebra of $S^3\mathfrak{g}^{\mathbf{H}} \oplus (\mathbf{C}a)$. Finally we have a Lie algebra $\widehat{\mathfrak{g}}$ which is obtained by adding to $\widehat{\mathfrak{g}}(a)$ a derivation d. When $\mathfrak{g}$ is a simple Lie algebra, $\widehat{\mathfrak{g}}$ is an infiite dimensional simple Lie algebra. We shall investigate the root space decomposition and Chevalley generator of $\widehat{\mathfrak{g}}$.

概要　A Lie hypersurface in a complex hyperbolic space is an orbit of a cohomogeneity one action without singular orbit. In this talk, we present a classification of Ricci soliton Lie hypersurfaces in complex hyperbolic spaces.

概要　An antipodal set in a Riemannian symmetric space is a subset where the restriction of the symmetry at each point is the identity, which was introduced by Chen and Nagano. We reduce the problem of classifying all maximal antipodal sets in the oriented real Grassmann manifold $\tilde{G}_k(\mathbf{R}^n)$ consisting of oriented subspaces of dimension k in the real vector space of dimension n to that of classifying all maximal subsets satisfying certain conditions in the set consisting of subsets of cardinality k in $\{1, ..., n\}$. Using this reduction we classify all maximal antipodal sets in $\tilde{G}_k(\mathbf{R}^n)$ for $k \leq 4$.

概要　We give a different proof of a theorem of O. Loos which characterizes maximal tori of extrinsically symmetric spaces. On the way we show same facts on certain symmetric subspaces, so called meridians, which previously have been known only using classification.

概要　The group generated by reflections with respect to facets of a Coxeter polytope in n-dimensional hyperbolic space $\mathbb{H}^n$ is called a hyperboric Coxeter group. By the results of Cannon, Wagreich and Parry, it is known that the growth rate of a cocompact Coxeter group in $\mathbb{H}^2$ and $\mathbb{H}^3$ is a Salem number. On the other hand, Kerada defined a j-Salem number, which is a generalization of a Salem number. In this talk, I will present that we realize infinitely many 2-Salem numbers as the growth rates of cocompact Coxeter groups in $\mathbb{H}^4$. Our Coxeter polytopes are constructed by successive gluing of Coxeter polytopes which we call Coxeter dominoes.

概要　In this talk, we consider the Dirichlet problem on weighted graphs with nonnegative coarse Ricci curvature. For a finite region, if a lower bound of the coarse Ricci curvature is nonnegative and if the given function on the boundary is 1-Lipschitz, so is the solution of the problem. As an application, we prove that the existence of a solution for the Dirichlet problem on infinite region.

概要　Huisken studied the mean curvature flow when the ambient space is the Euclidean space and proved that if the mean curvature flow has the type I singularity then there exists a smoothly convergent subsequence of the rescaling such that its limit satisfies the self-similar solution equation. In our previous work, we proved the similar results of Huisken when the ambient space is a Riemannian cone manifold. At that time, we added some more conditions to the original definition of type I singularity and we called it the type I_c singularity. In this talk, we report that the definition of the type I_c singularity in our previous work can be improved.

16:15〜17:15　特別講演

糟 谷 久 矢 (東 工 大 理 工)♯　Cohomologies and deformations of solvmanifolds
Hisashi Kasuya (Tokyo Tech)♯　Cohomologies and deformations of solvmanifolds

概要　Let G be a simply connected solvable Lie group with a cocompact discrete subgroup Γ. We call G/Γ a solvmanifold. In this talk, I explain how to compute the de Rham, Dolbeault and Bott–Chern cohomologies of solvmanifolds. Moreover, by these computations, I explain our study of Hodge theory and deformations of solvamanifolds.

9月25日(水)　教育学部2号館大講義室

10:50〜11:50　2013年度幾何学賞受賞特別講演 (トポロジー分科会と合同)

山ノ井克俊 (東 工 大 理 工)♯　有理型函数の導関数の値分布
Katsutoshi Yamanoi (Tokyo Tech)♯　Value distribution of derivatives of meromorphic functions

概要　We discuss about the following two problems in value distribution of derivatives of meromorphic functions in the plane:
Conjecture of Gol'dberg, middle 1980-s: For every transcendental meromorphic function in the plane, the frequency of distinct poles is governed by the frequency of zeros of the second derivative.
Conjecture of Mues, 1971: For every non-constant meromorphic function in the plane which has primitive, the summation of the defects $\delta(a)$ over all complex numbers a is not greater than 1.
Our discussion is based on two developments in Nevanlinna theory, which are interesting for their own sake. The first one is a generalization of the second main theorem (SMT) for small moving targets, which gives a complete answer to Nevanlinna's old question dating back to 1920s. The other is a solution to reversion problem of SMT.
We shall also discuss about the background of the theory and related topics.

13:15〜14:15　2013年度幾何学賞受賞特別講演 (トポロジー分科会と合同)

河 野 俊 丈 (東 大 数 理)♯ Braids, quantum symmetry and hypergeometric integrals

Toshitake Kohno (Univ. of Tokyo)♯ Braids, quantum symmetry and hypergeometric integrals

概要 The idea of constructing representations of fundamental groups by the monodromy of logarithmic connections goes back to Poincaré and Lappo-Danilevsky. In 1970's a relationship between nilpotent completions of fundamental groups and iterated integrals was established by K. T. Chen. Subsequently, Aomoto described the unipotent monodromy of the fundamental group of the complement of a complex hypersurface by iterated integrals of logarithmic forms.

After reviewing these historical aspects, I will apply such technique to representations of braid groups. For braid groups there is an important flat connection called KZ connection. On the other hand, there is a topological way to construct representations of braid groups, namely homological representations. These representations of braid groups are defined as the action of the mapping class group of a punctured disk on the homology of an abelian covering of its configuration space. They were extensively studied by Krammer and Bigelow.

We show that specializations of the homological representationsof braid groups are equivalent to the monodromy of the KZ equation with values in the space of null vectors in the tensor product of Verma modules when the parameters are generic. Here the representations of the solutions of the KZ equation by hypergeometric integrals due to Schechtman, Varchenko and others play an important role. By this construction we recover quantum symmetry of the monodromy of KZ connection due to Drinfel'd and myself by means of the action of the quantum groups on twisted cycles. In the case of special parameters corresponding to conformal field theory, we show that KZ connection can be regarded as Gauss–Manin connection.

We also discuss the representations of mapping class groups appearing in the monodromy of conformal filed theory for Riemann surfaces. We explain a joint work with Funar concerning a description of the image and the kernel of the monodromy of conformal field theory and give some applications.

9月26日(木)　　第VI会場

9:00〜12:00

概要 Triangular integrals for given 2-, 3- and 4-variable functions are respectively and precisely defined as the single limits of double, triple and quadruple sums in detail. A corollary of the divergence theorem is used to verify the triangular integral value. In the calculation processes of triangular integrals for 2-, 3- and 4-variable functions, the indices of the sequence of the integrand must coincide with those of the corresponding integral variable to calculate the correct integral value. In triangular triple integral, one kind of the two sets of increments is inappropriate for the convergence of numerical values, but the other kind is able to calculate numerical values by a computer algebra system.

概要　We investigate the Langr's problem in elementary geometry from the viewpoint of invariant theory. We first determine the generators of invariants of quadrangles in terms of coordinates, and next find the relations of these fundamental invariants. The ratio of two quadrangles appeared in Langr's problem can be expressed in terms of these invariants, and from the viewpoint of invariant theory, we may consider these two quadrangles to be "almost" similar in spite of their appearance.

概要　We show that every connected graph can be realized as the cut locus of some point on some Riemannian surface S which, in some cases, has constant curvature. We study the stability of such realizations, and their generic behavior.

概要　We introduce the notion of weakly locally Lipschitz contractibility for metric spaces. Many fundamental objects in metric geometry, for instance, normed spaces, CAT-spaces and Alexandrov spaces satisfy this condition. We consider the category of all pairs of weakly locally Lipschitz contractible spaces as objects together with all locally Lipschitz maps as morphisms. We report that the singular Lipschitz (and usual singular) homology is naturally isomorphic to the homology of integral currents with compact support on this category.

概要　We consider the set $\mathcal{M}$ of all isometry classes of Alexandrov spaces of curvature ≥ -1 and of fixed dimension having upper diameter bound and lower volume bound, and prove that there exists a constant N depending on the parameters determining $\mathcal{M}$ such that every space in $\mathcal{M}$ can be covered by at most N strongly Lipschitz contractible balls. Also, we prove that there exists a constant N' depending on $\mathcal{M}$ such that every space in $\mathcal{M}$ can be covered by at most N' strongly Lipschitz contractible and convex regions.

24　豊田　哲（鈴鹿工高専）*　非線形スペクトルギャップに関するグラフの最適実現 …… 15
近藤剛史（東北大理）

Tetsu Toyoda *　(Suzuka Nat. Coll. of Tech.)
Takefumi Kondo (Tohoku Univ.)

Optimal realizations with respect to nonlinear spectral gaps

概要　We can define an optimal metric on a finite connected weighted graph from the viewpoint of nonlinear spectral gaps. Such metrics may not be unique, but, among them, there is a path metric which is invariant under the graph automorphism group. By using this, we can obtain the exact value of the infimum of the nonlinear spectral gaps for edge-transitive graphs.

25　近藤剛史（東北大理）*　Gromov による $\mathrm{Cycl}_k(0)$ 空間と Wirtinger 空間 …… 10
豊田　哲（鈴鹿工高専）

Takefumi Kondo (Tohoku Univ.) *
Tetsu Toyoda
(Suzuka Nat. Coll. of Tech.)

$\mathrm{Cycl}_k(0)$ space and Wir_k space

概要　M. Gromov introduced the notions of $\mathrm{Cycl}_k(0)$ spaces and Wir_k spaces for $k \geq 4$, and he asked whether the $\mathrm{Cycl}_4(0)$ property implies the Wir_k property for any $k \geq 5$. We partly answer this question. We also present characterizations of $\mathrm{Cycl}_4(0)$ spaces and Wir_4 spaces by means of the nonlinear spectral gaps.

26　見村万佐人（東北大理）*　多分割等周定数・エクスパンダー族と有限ケーリーグラフ …… 15

Masato Mimura (Tohoku Univ.) *

Multi-way isoperimetries, expanders, and finite Cayley graphs

概要　We study universal inequalities among multi-way isoperimetric constants of a finite Cayley graph, on which Koji Fujiwara has raised a question. As a byproduct, we show that the corresponding group action has a certain symmetry if a vertex-transitive finite graph has a large gap between n-way and $(n-1)$-way isoperimetric constants.

27　見村万佐人（東北大理）*　有限グラフのバナッハスペクトルギャップの補外法 …… 15

Masato Mimura (Tohoku Univ.) *

Extrapolation of Banach spectral gaps of finite graphs

概要　We study the Banach spectral gaps of exponent p of a finite graph. For a Banach space whose unit sphere is biuniformly homeomorphic to that of the Hilbert space, we make a estimate of that of exponent any p in $[1, \infty)$ from the classical spectral gap of the combinatorial Laplacian. As byproducts, we obtain generalizations of Ozawa's nonembeddability result of expander graphs, Matousek's extrapolation, and Matousek's result on the worst order of the distortion of expander graphs into L^p-spaces.

概要　On the Sierpiński gasket, Kigami [Math. Ann. **340** (2008), 781–804] has introduced the notion of the measurable Riemannian structure, with which the "gradient vector fields" of functions, the "Riemannian volume measure" and the "geodesic metric" are naturally associated. Kigami has also proved in the same paper the two-sided Gaussian bound for the corresponding heat kernel, and the author has further shown several detailed heat kernel asymptotics, such as Varadhan's asymptotic relation, in a recent paper [Potential Anal. **36** (2012), 67–115]. In the talk, a complete description of the structure of minimal geodesics is presented for this case, and as an application the curvature-dimension condition of Sturm and Lott–Villani and the measure contraction property of Ohta and Sturm, which both refer to Ricci curvature lower bound, are shown to be invalid in this setting.

概要　We introduce cutting construction of possibly non-compact symplectic toric manifolds and describe explicitly canonical Kähler structure on symplectic toric manifolds, in particular, symplectic cones that correspond to a weakly convex good cone. As an application we define canonical almost contact metric structure on compact connected contact toric manifolds of non-Sasakian type. We further prove there are no toric Sasakian structures on these manifolds.

概要　We prove a result about homological rigidity of Lagrangian submanifolds whose first homologies are 3-torsion of a complex projective space. In the case that the dimensions are 5, 8 and 26, each cohomology group with Z/2Z-coefficient is isomorphic to that of a certain homogeneous Lagrangian submanifold under a little additional conditions.

14:15〜16:00

概要　We define the quaternionic mean curvature of a hypersurface in a quaternionic Kähler manifold. For a family of horospheres orthogonal to a geodesic γ, quaternionic mean curvature satisfies the Riccati type inequality along γ. By applying the Sturm–Green-type lemma, we show the rigidity theorem for asymptotically harmonic quaternionic Kähler Hadamard manifolds, which characterizes quaternionic hyperbolic spaces.

概要　At first, we introduce the definition of complex almost contact metric structures on odd-dimensional complex manifolds. For example, it is known that $\mathbb{C}^{2n+1}$ and $\mathbb{C}P^{2n+1}$ admit this structure. Roughly speaking, a complex almost contact metric structure on a complex manifold is a pair of two almost contact metric structures which transform to each other by its complex structure. In this presentation, we focus on the product space of two odd-dimensional spheres, and show that 3-Sasakian structures on S^{4p+3} and S^{4q+3} induce a complex almost contact metric structure on $S^{4p+3} \times S^{4q+3}$.

概要　In this talk, we consider a sequence of orbifold Kähler–Einstein metrics or orbifold normalized Kähler–Ricci flows on a projective manifold with ample log-canonical bundle for a simple normal crossing divisor. Tian–Yau, S. Bando and H. Tsuji established that the sequence of the orbifold Kähler–Einstein metrics converged to the complete Kähler–Einstein metric of negative Ricci curvature on the complement of the boundary divisor. The main purpose of this talk is to show that such a convergence is also true on the boundary for both of the orbifold Kähler–Einstein metrics and the orbifold normalized Kähler–Ricci flows.

概要　I suppose that n is an integer > 2 and that P_1, P_2 are two special Lagrangian planes in $\mathbb{C}^n$ intersecting transversely at one point. Lawlor constructs (supposing an angle condition) a properly embedded special Lagrangian submanifold of $\mathbb{C}^n$ diffeomorphic to $\mathbb{R} \times S^{n-1}$ and asymptotic at infinity to $P_1 \cup P_2$ with multiplicity 1. I'll talk about its uniqueness (up to re-scaling and translation) under certain topological conditions.
Here is a sketch of the proof; I'd like to thank Dominic Joyce for his useful suggestion. From a computation by Abouzaid–Smith we get the uniqueness of the quasi-isomorphism class of exact special Lagrangian necks in a certain Fukaya category. It suffices therefore to make a non-compact version of a uniqueness theorem of Thomas–Yau. I'll do it under a certain topological condition.

概要　We would like to discuss the ADHM construction of noncommutative instantons.

概要　Generalized complex structures are geometric structures on a manifold introduced by Hitchin which are hybrids of ordinary complex structures and symplectic structures. In this talk, we will explain a new construction of generalized complex 4-manifolds by logarithmic transformations with arbitrary multiplicity. This construction is a generalization of Cavalcanti and Gualtieri's construction for logarithmic transformations with multiplicity 0. Applying a technique of (broken) Lefschetz fibrations, we also give twisted generalized complex structures with arbitrary large numbers of connected components of type changing loci.

16:15〜17:15　特別講演

概要　In any robust surface theory, it is essential to have a large collection of interesting examples. One of the interesting classes of surfaces to study are the zero mean curvature surfaces of mixed type in Lorentz–Minkowski 3-space, which, roughly speaking, are smooth surfaces of mixed causal type with mean curvature, wherever it is well defined, equal to zero. Several authors have found such examples, all of which have simple topology. The main goal of this talk is to provide a concrete example of a family of such surfaces with nontrivial topology.

函　数　論

9月26日(木)　　第Ⅲ会場

10:00〜12:00

1　田 中 清 喜 (阪 市 大 理)♯　Representations and interpolating sequence for harmonic Bergman functions ····· 10
Kiyoki Tanaka (Osaka City Univ.)♯　Representations and interpolating sequence for harmonic Bergman functions

概要　We consider the harmonic Bergman spaces on a smooth bounded domain. It is well known that the harmonic Bergman space has the reproducing kernel called the harmonic Bergman kernel. In this talk, we discuss the interpolating sequence for harmonic Bergman functions.

2　本 田 竜 広 (広 島 工 大 工)♯　Starlike harmonic mappings on the unit disc ····· 15
濱 田 英 隆 (九 州 産 大 工)
Kwang Ho Shon (Pusan Nat. Univ.)
Tatsuhiro Honda ♯ (Hiroshima Inst. of Tech.)　Starlike harmonic mappings on the unit disc
Hidetaka Hamada (Kyushu Sangyo Univ.)
Kwang Ho Shon (Pusan Nat. Univ.)

概要　Let f be a harmonic mapping on the unit disc Δ in $\mathbb{C}$. We give some condition for f to be a quasiconformal homeomorphism on Δ and to have a quasiconformal extension to the whole plane $\overline{\mathbb{C}}$. We also obtain quasiconformal extension results for starlike harmonic mappings of order $\alpha \in (0,1)$.

3　宮 地 秀 樹 (阪　大　理)♯　Unification of extremal length geometry of Teichmüller space via intersection number and its application ····· 15
Hideki Miyachi (Osaka Univ.)♯　Unification of extremal length geometry of Teichmüller space via intersection number and its application

概要　In this talk, I will talk Thurston theory with extremal length on Teichmüller space. As an application, I will give a rigidity theorem for certain mappings on Teichmüller space. Indeed, I will introduce a class of mappings which are recognized as “coarsification” of isometries which are rigid at infinity.

4　小 森 洋 平 (早 大 教 育)*　トーラス上のリーマン面の退化族について ····· 15
Yohei Komori (Waseda Univ.)*　On degenerate families of Riemann surfaces over elliptic curves

概要　We construct degenerate families of Riemann surfaces over elliptic curves and study singular fibers and holomorphic sections of them.

5 柳 下 剛 広 (早 大 理 工)♯ p 乗可積分タイヒミュラー空間への複素構造の導入 —基本領域による単位円板の分割の応用 ····· 15

Masahiro Yanagishita (Waseda Univ.)♯ Introduction of a complex structure on the p-integrable Teichmüller space —application of a partition of the unit disk by fundamental regions

概要 The Teichmüller space is the deformation space of Fuchsian groups acting on the unit disk of the complex plane and the p-integrable Teichmüller space is the metric subspace of the Teichmüller space, which is composed of the Teichmüller equivalence classes with p-integrable Beltrami coefficients as their representatives. Here a Beltrami coefficient is p-integrable if it is p-integrable with respect to the Poincaré metric on the unit disk. A complex structure is introduced on the Teichmüller space by a canonical embedding into a Banach space. In this talk, we introduce a complex structure on the p-integrable Teichmüller space by the similar method. In this argument, we apply a partition of the unit disk by fundamental regions.

6 諸 澤 俊 介 (高 知 大 理)♯ $f_a(z) = z + e^z + a$ へのある多項式列の力学的収束について ····· 15

Shunsuke Morosawa (Kochi Univ.)♯ Dynamical convergence of a certain polynomial family to $f_a(z) = z + e^z + a$

概要 Transcendental entire functions $f_a(z) = z + e^z + a$ may have Baker domains or wandering domains, which never appear in a dynamics of polynomials. We consider a sequence of polynomials $P_{a,d}(z) = (1+a/d)z+(1+z/d)^{d+1}+a$, which converges uniformly on compact sets to f_a as $d \to \infty$. We show its dynamical convergence under an assumption on *hyperbolicity*, even though f_a has a Baker domain or a wandering domain.

14:15〜15:00

7 奥 山 裕 介 (京都工繊大工芸)♯ Equilibrium measures and ergodic properties for uniformly quasiregular dynamics ····· 10

Yûsuke Okuyama (Kyoto Inst. Tech.)♯ Equilibrium measures and ergodic properties for uniformly quasiregular dynamics

概要 We construct the equilibrium measure of a uniformly quasiregular endomorphism on an oriented, connected, and closed Riemannian manifold of dimension more than one, and establish its dynamical and ergodic properties.

8 奥 山 裕 介 (京都工繊大工芸)♯ A rescaling principle for an isolated essential singularity of a quasiregular mapping ····· 10

Yûsuke Okuyama (Kyoto Inst. Tech.)♯ A rescaling principle for an isolated essential singularity of a quasiregular mapping

概要 We establish a rescaling principle for an isolated essential singularity of a quasiregular mapping.

9 奥 山 裕 介 (京都工繊大工芸)♯ Accumulation of periodic points in local uniformly quasiregular dynamics ····· 10

Yûsuke Okuyama (Kyoto Inst. Tech.)♯ Accumulation of periodic points in local uniformly quasiregular dynamics

概要 We generalize the *density of repelling periodic points in the Julia set* in complex dynamics to a class of *local* uniformly quasiregular mappings introduced by Hinkkanen, Martin, and Mayer.

15:10〜16:10　特別講演

D. Drasin　(Purdue Univ.)♯　Sharpness of Rickman's Picard theorem

David Drasin　(Purdue Univ.)♯　Sharpness of Rickman's Picard theorem

9月27日(金)　第Ⅲ会場

9:00〜10:45

10　鍋島克輔 (徳島大総合)♯　パラメータ付き局所コホモロジーを用いた Tjurina stratification の計算

田島慎一 (筑波大数理物質)　…… 15

Katsusuke Nabeshima (Univ. of Tokushima)♯　On the computation of Tjurina stratification using local cohomology with parameters

Shinichi Tajima (Univ. of Tsukuba)

概要　Algebraic local cohomology classes attached to semi-quasihomogeneous hypersurface isolated singularities are considered. A new effective method to compute Tjurina stratifications associated with μ-constant deformation $f_t \in (\mathbb{C}[t_1,\ldots,t_m])[x_1,\ldots,x_n]$ of weighted homogeneous isolated singularities is proposed, where $x_1,\ldots,x_n$ are variables and $t_1,\ldots,t_m$ are parameters. In 1989, B. Martin and G. Pfister constructed an algorithm of computing parameter dependency of Tjurina numbers of μ-constant deformations of quasi-homogeneous hypersurface isolated singularities. We propose an alternative approach, in a context of computational algebraic analysis, to compute Tjurina stratifications of μ-constant deformations. The key idea in this approach is the use of algebraic local cohomology classes (with parameters). The proposed method has already been implemented in a computer algebra system Risa/Asir.

11　田島慎一 (筑波大数理物質)*　Newton filtration と local cohomology …… 15

Shinichi Tajima (Univ. of Tsukuba)*　Newton filtration and local cohomology

概要　A new framework to study, in the context of Computational Algebraic Analysis, local analytic properties of Newton non-degenerate hypersurface isolated singularities is proposed. The key idea in this approach is notion of Newton filtration on local cohomology.

12　中根静男 (東京工芸大)♯　Relations between saddle sets for Axiom A polynomial skew products on $\mathbb{C}^2$ …… 15

Shizuo Nakane (Tokyo Polytechnic Univ.)♯　Relations between saddle sets for Axiom A polynomial skew products on $\mathbb{C}^2$

概要　We give a sufficient condition for Axiom A polynomial skew products on $\mathbb{C}^2$ to have no relations between the saddle sets over base Julia set and over base sink set. Non-existence of the relations is closely related to the continuity of the fiber Julia sets. We also give a sufficient condition for them to be vertically expanding over base filled julia set.

13　児玉秋雄 (金沢大理工)*　On the holomorphic automorphism group of a generalized complex ellipsoid …… 15

Akio Kodama (Kanazawa Univ.)*　On the holomorphic automorphism group of a generalized complex ellipsoid

概要　In this talk, we completely determine the structure of the holomorphic automorphism group of a generalized complex ellipsoid. This is a natural generalization of a result due to Landucci. Also this gives an affirmative answer to an open problem posed by Jarnicki and Pflug.

概要 Weierstrass' $\wp$-function was generalized as a $\overline{\partial}$-closed (n-1,n-1)-form $\wp^{ij}$ on an abelian variety by Zappa. We further generalize Zappa's result to quasi-abelian varieties.

11:00〜12:00 特別講演

概要 We investigate bifurcations of semi-parabolic fixed points of mappings in complex dimension 2. The intrinsic structure of a semi-attracting fixed point is analyzed and applied to show the discontinuity properties of (filled) Julia sets of Hénon mappings on the parameters.

函 数 方 程 式 論

9月24日(火)　第Ⅱ会場

9:20〜12:00

1 反 田 美 香 (近畿大総合理工)♯ Gauss の超幾何微分方程式の Voros 係数の全 Stokes 領域における Borel 和
青 木 貴 史 (近 畿 大 理 工) 15

Mika Tanda (Kinki Univ.)♯ Borel sums of the Voros coefficients of the Gauss hypergeometric differential equation in all Stokes regions
Takashi Aoki (Kinki Univ.)

概要 We define the Voros coefficients of the Gauss hypergeometric differential equation with a large parameter for each regular singular point. Explicit forms of the Voros coefficients are given. Moreover, we compute the Borel sums of the Voros coefficients in each Stokes region.

2 高 橋 甫 宗 (近畿大総合理工)♯ 合流型超幾何微分方程式の Voros 係数 15
反 田 美 香 (近畿大総合理工)
青 木 貴 史 (近 畿 大 理 工)

Toshinori Takahashi (Kinki Univ.)♯ The Voros coefficients of the confluent hypergeometric differential equations
Mika Tanda (Kinki Univ.)
Takashi Aoki (Kinki Univ.)

概要 We define the Voros coefficients of the Kummer confluent hypergeometric differential equation with a large parameter for each singular point. Explicit forms of them and their Borel sums are given.

3 岩 木 耕 平 (京 大 数 理 研)♯ Quasi-linear Stokes phenomenon for the second Painlevé transcendents and the exact WKB analysis 15

Kohei Iwaki (Kyoto Univ.)♯ Quasi-linear Stokes phenomenon for the second Painlevé transcendents and the exact WKB analysis

概要 Alexander Its and Andrei Kapaev derived certain formulas which describe “quasi-linear Stokes phenomena” occurring to solutions of the second Painlevé equation, through the Riemann–Hilbert method. In this talk we show that these formulas can be derived through the exact WKB analysis.

4 佐々木良勝 (広 島 大 理)♯ Value distribution of the string equation of type (2,5) 10

Yoshikatsu Sasaki (Hiroshima Univ.)♯ Value distribution of the string equation of type (2,5)

概要 In this talk, we study the string equation of type (2,5), which is an analogue of the first Painlevé equation in some sence. By use of the ordinary notations and well known results of the value distribution theory or the Nevanlinna theory, we show that the string equation of type (2,5) admits no rational solution, and we give a lower estimate of the growth order of the arbitrary solution to the equation.

概要　We consider non autonomous Lotka–Volterra competition systems with finite delays. Under certain conditions we show that such systems are permanent.

概要　We consider an initial value problem of the differential equation denoted in the title. For this, we transform the differential equation into a two dimensional autonomous system which has a centre as its critical point. Depending on its orbit, we state the analytical expressions of the solutions of the initial value problem which show the asymptotic behaviour of the solutions.

概要　The system considered in this talk is $x' = -e(t)x + f(t)\phi_{p^*}(y)$, $y' = -g(t)\phi_p(x) - h(t)y$ where p and p^* are positive numbers satisfying $1/p + 1/p^* = 1$, and $\phi_p(z) = |z|^{p-2}z$. This system is referred to as a half-linear system. In the special case in which $p = 2$, the system mentioned above becomes a two-dimensional linear system. As is well known, the zero solution of the linear system is stable if it is attractive. This relation is given by the estimates of a fundamental matrix for the linear system. In the general case, where $p \neq 2$, however, the concept of fundamental matrices does not apply, because the solution space of the half-linear system is not additive. Will the attractivity guarantee the stability of the zero solution of the half-linear system?

概要　We consider the second-order nonlinear differential equation $(\varphi(x'))' + \lambda\varphi(x) = 0$, where λ is positive and φ is strictly increasing, odd, bijective and continuous function. Using phase plane analysis and time maps, we obtain necessary and sufficient conditions for the initial value problem to have a unique global solution. Moreover, we also show that the equation with the damping term $(\varphi(x'))' - \mu\varphi(x') + \lambda\varphi(x) = 0\,(\mu > 0)$ has no global nontrivial solutions under certain conditions.

概要　For integral equations with infinite delay, we obtain some results on the asymptotic behavior of solutions under sufficiently small nonlinear perturbations, which correspond to Perron-type theorems for functional differential equations.

10　内藤敏機 (電　通　大*)♯　非線形振動周期解とその逐次近似 ····· 15
宮崎倫子 (静岡大工)
申　正善 (法　政　大)
Dohan Kim (Seoul Nat. Univ.)

Toshiki Naito ♯ (Univ. of Electro-Comm.*)　Periodic solutions and its successive approximations in nonlinear oscillations
Rinko Miyazaki (Shizuoka Univ.)
Jong Son Shin (Hosei Univ.)
Dohan Kim (Seoul Nat. Univ.)

概要　We consider the periodic ordinary differential system $x' = A(t)x + \epsilon f(t, x, \epsilon)$, where $t, \epsilon \in \mathbb{R}, x, f(t, x, \epsilon) \in \mathbb{C}^d$, $A(t)$ is a continuous $d \times d$ matrix, $A(t)$ and $f(t, x, \epsilon)$ are periodic in t of period $\tau > 0$, and $f(t, x, \epsilon)$ is continuous in (t, x, ϵ) and continuously differetiable in x. A general representation on the existence of periodic solutions $x(t, \epsilon)$ of period τ for small $|\epsilon|$ together with the successive approximations is given from the viewpoint of Fredholm operators, the bifurcation equation and the implicit function theorem under the condition that $x' = A(t)x$ has nontrivial periodic solutions of period τ.

14:15〜16:30

11　田中　敏 (岡山理大理)♯　A note on the symmetry-breaking and Morse index for positive solutions of one-dimensional Hénon type equations ····· 15

Satoshi Tanaka (Okayama Univ. of Sci.)♯　A note on the symmetry-breaking and Morse index for positive solutions of one-dimensional Hénon type equations

概要　The two-point boundary value problem for one-dimensional Hénon type equations is considered. There always exists a positive even solution. The problem has also the positive least energy solution. It is known that the Morse index of the least energy solution equals 1. Therefore, if we prove that the Morse index of positive even solutions is greater than or equal to 2, then the positive least energy solution is non-even, and hence symmetry-breaking phenomena occur. On the other hand, it is shown that if every positive solution is nondegenerate and its Morse index equals 1, then the positive solution is unique and even. In this talk, existence and nonexistence of positive non-even solutions are studied.

12　谷川智幸 (熊本大教育)♯　進みと遅れの変数を含む 2 階半分線形関数微分方程式の一般化された正則変動関数解の存在について ····· 15

Tomoyuki Tanigawa (Kumamoto Univ.)♯　On the existence of generalized regularly varying solutions of second order half-linear functional differential equations

概要　The sharp sufficient conditions of the existence of generalized regularly varying solutions (in the sense of Karamata) of a class of functional differential equations are established.

概要　The equation considered in this talk is $x''+h(t)x'|x'|+\omega^2\sin x=0$, where $h(t)$ is continuous and nonnegative for $t\geq 0$ and ω is a positive real number. This may be regarded as an equation of motion of an underwater pendulum. The damping force is proportional to the square of the velocity. The purpose of this talk is to report necessary and sufficient conditions on the time-varying coefficient $h(t)$ for the origin to be asymptotically stable. The phase plane analysis concerning the positive orbits of an equivalent planar system to the above-mentioned equation is used to obtain the main results. In addition, solutions of the system are compared with a particular solution of the first-order nonlinear differential equation $u'+h(t)u|u|+1=0$.

概要　We consider the Neumann boundary value problem of $u''+\lambda(-u+u^p)=0$ in $(-1,1)$ with $u'(\pm 1)=0$, where $p>1$ is a real number and λ is a control parameter. We provide a theorem giving a complete bifurcation diagram of interior single-peak solutions. To prove this theorem we show the monotonicity of the period function for $u''-u+u^p=0$.

概要　We consider the bifurcation problem related to sine-Gordon equation. We show that the asymptotic behavior of bifurcation curve $\lambda(\xi)$ as $\xi\to\infty$ is effected by the oscillation property of the nonlinear term. We also give the asymptotic expansion formula for $\lambda(\xi)$ as $\xi\to 0$.

概要　We investigate global bifurcation structure of stationary solutions for cubic nonlinear equations with nonlocal constraint which appears as a shadow-system of a reaction-diffusion model for cell polarization by Y. Mori, A. Jilkine and L. Edelstein-Keshet in SIAM J. Appl. Math (2011). Some mathematical local bifurcation results are obtained by Kuto and Tsujikawa (Nonlinearity (2013) and Proc. 9th AIMS Conf.). We propose a new method to represent the bifurcation sheets which determine the global bifurcation structure.

17　竹 内 慎 吾 (芝浦工大システム理工)　♯ 一般化ヤコビ楕円関数系に関する基底の問題 ····· 15

Shingo Takeuchi (Shibaura Inst. of Tech.)　♯ Basis problems of generalized Jacobian elliptic functions

概要　We define a generalization of Jacobian elliptic function $\mathrm{sn}(x,k)$. The generalized function $\mathrm{sn}_{pq}(x,k)$ coincides with the classical Jacobian elliptic function $\mathrm{sn}(x,k)$ if $p=q=2$ and the generalized trigonometric function $\sin_{pq} x$ if $k=0$. The main topic of this talk is the basis property of the generalized Jacobian elliptic functions. We will obtain a theorem, which improves the results of Craven in 1971 and Edmunds et al. in 2012. In particular, as a corollary of the theorem, we will show that the classical Jacobian elliptic functions is a basis for any Lebesgue spaces if $0 \le k \le 0.99$.

18　宇 佐 美 広 介 (岐 阜 大 工)　逆爆発時間問題 ····· 15
上 村　豊 (東京海洋大海洋)

Hiroyuki Usami (Gifu Univ.)　Inverse blow-up time problem
Yutaka Kamimura (Tokyo Univ. of Marine Sci. and Tech.)

概要　We consider an inverse problem to determine a nonlinearity of a nonlinear equation from a blow-up time of solutions of the equation. We show that this inverse problem is locally well-posed near a tyipical superlinearity.

16:45〜17:45　特別講演

千 葉 逸 人 (九 大 I M I)♯　重み付き射影空間におけるパンルヴェ方程式

Hayato Chiba (Kyushu Univ.)♯　The Painlevé equations on weighted projective spaces

概要　The Painlevé equations are second order ordinary differential equations with the Painlevé property; the only movable singularities are poles. In this talk, the Painlevé equations are regarded as three dimensional vector fields on weighted projective spaces, which are obtained by projective compactification of C^3 in some weighted manner. The vector field has a few fixed points at infinity, which determine the asymptotic behavior of solutions of the Painlevé equation. Furthermore, it is shown that the cellular decomposition of the weighted projective space gives a new expression of the initial value space of the Painlevé equation.

9月25日(水)　第II会場

9:00〜12:00

19　廣 島 文 生 (九 大 数 理)♯　ラプラシアンの Bernstein 関数で定義されるシュレディンガー作用素の Lieb–Thirring bound ····· 15

Fumio Hiroshima (Kyushu Univ.)♯　Lieb–Thirring bound for Schrödinger operator with a Bernstein function of Laplacian

概要　We derive a Lieb–Thirring type bound for Schrödinger operator with a Bernstein function of Laplacian, which is a generalization of the standard Lieb–Thirring bound.

概要　We introduce the Riesz mean of eigenvalues of Schrödinger operators in Euclidean spaces. In particular, we investigate the upper bound for the sum of all bounded state energy, then estimate the sharp coefficient in Lieb–Thirring inequalities. It is conjectured by Lieb and Thirring that the optimal coefficient for three or higher dimensional spaces is equal to the value obtained from the semiclassical approximation. Then, we propose the new approach which may improve the best possible coefficient according to the Rumin–Solovej method.

概要　In this talk, we consider the Schrödinger operators with a periodic potential and the δ-δ-δ type vertex conditions on a quantume graph and discuss its spectrum. We demonstrate that the spectrum has the band structure. Moreover, we give the asymptotics of the band edges.

概要　We give a necessary and sufficient condition for a homogeneous partial differential equation in two variables to be reduced to a homogeneous ordinary one under a certain change of variables. It is described by means of the commutator with a first order partial differential operator which characterizes a homogeneity. Moreover we obtain the explicit representation of the reduced ordinary differential equation. This result is a generalization of such a reduction which had been applied to singular Cauchy problems in our previous works.

概要　The Möbius energy was introduced by O'Hara in 1991 as an energy of knots. It is well-known that the energy has the Möbius invariance. In this talk, a decomposition theorem of the Möbius energy is shown. The energy is decomposed into three terms, each of which has the Möbius invariance. The first term of decomposition characterizes the natural domain $H^{1,\infty} \cap H^{\frac{3}{2}}$ of the energy. Since the decomposition does not include terms described by the distance on curves, it enables us to calculate the variational formula easily. The absolute integrability of energy density and variational formula on $H^{1,\infty} \cap H^{\frac{3}{2}}$ is derived by using the decomposition.

24　内 免 大 輔 (阪 市 大 理)♯　Sobolev の臨界指数を持つ Kirchhoff 型方程式の正値解の存在について ····· 15

Daisuke Naimen (Osaka City Univ.)♯　Positive solutions of Kirchhoff type elliptic equations involving a critical Sobolev exponent

概要　We study a Kirchhoff type elliptic equations involving a critical Sobolev exponent. Our goal is proving the existence of a positive solution of our problem. The nonlocal coefficient which characterizes the Kirchhoff type equations, causes some difficulties in proving the existence. The main argument lies in ensuring the PS condition for the associated functional.

25　内 免 大 輔 (阪 市 大 理)♯　優線形項と劣線形項を持つ楕円型方程式の 2 種類の解の列の存在について
梶 木 屋 龍 治 (佐 賀 大 理 工) ····· 15

Daisuke Naimen (Osaka City Univ.)♯　Two sequences of solutions for indefinite superlinear-sublinear elliptic equations with nonlinear boundary conditions
Ryuji Kajikiya　(Saga Univ.)

概要　In this talk, we investigate a semilinear elliptic equation with a nonlinear Neumann boundary condition. In particular we show the existence of two sequences of solutions for our problem. To this aim, we introduce a local superlinear-sublinear condition for our nonlinear terms. This is some generalization of the convex-concave nonlinearities. Our method is based on the variational method.

26　田 中 視 英 子 (東 京 理 大 理)*　Generalized eigenvalue of nonhomogeneous elliptic operators ····· 15
D. Motreanu　(Univ. de Perpignan)

Mieko Tanaka (Tokyo Univ. of Sci.)*　Generalized eigenvalue of nonhomogeneous elliptic operators
Dumitru Motreanu
(Univ. de Perpignan)

概要　We prove the existence of $\lambda \in \mathbb{R}$ for which the equation $-\mathrm{div}(a(x,|\nabla u|)\nabla u) = \lambda |u|^{p-2}u$ in a bounded domain Ω under the Dirichlet boundary condition, has a non-trivial solution. As a special case, this equation coincides with the p-Laplace equation (that is, $a(x,t) = t^{p-2}$). In particular, it is shown that generally the spectrum of the operator $-\mathrm{div}(a(x,|\nabla u|)\nabla u)$ on $W_0^{1,p}(\Omega)$ is not discreet.

27　田 中 視 英 子 (東 京 理 大 理)*　Existence of the generalized Fučík spectrum for nonhomogeneous elliptic operators ····· 15

Mieko Tanaka (Tokyo Univ. of Sci.)*　Existence of the generalized Fučík spectrum for nonhomogeneous elliptic operators

概要　By variational methods and Morse theory, we prove the existence of uncountably many $(\alpha,\beta) \in \mathbb{R}^2$ for which the equation $-\mathrm{div}a(x,|\nabla u|)\nabla u = \alpha u_+^{p-1} - \beta u_-^{p-1}$ in Ω, has a sign changing solution under the Neumann boundary condition. As a special case, the above equation contains the p-Laplace equation. However, the function a is not supposed to be $(p-2)$-homogeneous in the second variable. In particular, it is shown that generally the Fučík spectrum of the operator $-\mathrm{div}a(x,|\nabla u|)\nabla u$ on $W_0^{1,p}(\Omega)$ contains some open unbounded subset of $\mathbb{R}^2$.

28　梶 木 屋 龍 治 (佐 賀 大 理 工)♯　Partially symmetric solutions of the generalized Hénon equation ····· 15

Ryuji Kajikiya　(Saga Univ.)♯　Partially symmetric solutions of the generalized Hénon equation

概要　We study the generalized Hénon equation in a symmetric domain. For two closed subgroups H and G of the orthogonal group such that $H \subset G$, we prove the existence of a positive solution which is H invariant but G non-invariant.

13:15〜14:15　特別講演

冨 田 直 人 (阪　大　理)♯　双線形フーリエマルチプライヤー作用素の有界性について

Naohito Tomita (Osaka Univ.)♯　On the boundedness of bilinear Fourier multiplier operators

概要　In this talk, we consider the boundedness of bilinear Fourier multiplier operators. Our aim is to find the regularity conditions for bilinear Fourier multipliers that are as small as possible to ensure the boundedness. In particular, the minimal conditions in terms of the Sobolev spaces of product type are given. We also discuss the boundedness of bilinear pseudo-differential operators.

9月26日(木)　　第Ⅱ会場

9:00〜12:00

29　柴 田 将 敬 (東 工 大 理 工)♯　The existence of a positive solution to semilinear elliptic equations with periodic potential ····· 15

佐 藤 洋 平
(東工大理工・阪市大数学研)

Masataka Shibata (Tokyo Tech)♯　The existence of a positive solution to semilinear elliptic equations with periodic potential

Yohei Sato
(Tokyo Tech / Osaka City Univ.)

概要　We talk about the existence of a positive solution to semilinear elliptic equations with periodic potential, in which the super-linear term does not satisfy the Ambrosetti–Rabinowitz growth condition or some kind of monotonicity condition for using the Nehari manifold.

30　小 坂 篤 志 (阪 府 大 工)♯　2次元測地球上における半線形楕円型方程式の分岐問題 ····· 15

Atsushi Kosaka (Osaka Pref. Univ.)♯　Bifurcation of solutions to semilinear elliptic problems on caps of $\mathbf{S}^2$

概要　In this talk, we consider the bifurcation problem of semilinear equations $\Delta u + \lambda u + u^p = 0$ defined on a geodesic ball in 2-dimensional sphere. We are interested in the bifurcation of non-trivial solutions from a trivial solution. For our purpose, we are required to investigate the multiplicity of eigenvalues of linear elliptic problems. In general, it seems difficult to investigate that. Thus we consider the case that 2-dimensional sphere is almost covered by a geodesic ball. In this case, by investigating zeros of the associated Legendre functions, we can prove that there exist bifurcation solutions.

概要 Blow-up solutions to the two-dimensional Gel'fand problem are studied. It is known that the location of the blow-up points of these solutions is related to a Hamiltonian function involving the Green function of the domain. We show that this implies an equivalence between the Morse indices of the solutions and the associated critical points of the Hamiltonian.

概要 We study the stationary problem of the Lotka–Volterra competition model with diffusion and advection. Sufficient conditions of the existence/nonexistence of nonconstant solutions are obtained by using the a priori estimates for solutions and the degree theory. Next we derive a limiting system as the diffusion and the advection terms tend to infinity, which characterizes nonconstant solutions in case when the activity of one of competitors is sufficiently large.

概要 We are interested in the structure of the positive radial solutions of a supercritical Neumann problem in a unit ball. We show that this problem has infinitely many singular solutions and that nonconstant regular solutions consist of infinitely many smooth curves. It is shown that each curve blows up and that each curve has infinitely many turning points under a certain condition.

概要 We study the asymptotic behavior of least energy solutions to a 2D nonlinear Neumann problem when the nonlinear exponent p gets large. Following the arguments of X. Ren and J. C. Wei, we show that the least energy solutions remain bounded uniformly in p, and it develops one peak on the boundary, the location of which is controlled by the Green function associated to the linear problem.

35　梶木屋龍治 (佐賀大理工)♯　劣線形放物型方程式の定常解の安定性について ····· 15
赤木剛朗 (神戸大システム情報)

Ryuji Kajikiya (Saga Univ.)♯　Stability of stationary solutions for a sublinear parabolic equation
Goro Akagi (Kobe Univ.)

概要　We study the stability analysis of stationary solutions of the Cauchy–Dirichlet problem for a sublinear parabolic equation. We prove that sign-changing solutions with high energy are not asymptotically stable and the unique positive stationary solution is exponentially stable.

36　五十嵐威文 (日大理工)*　Life span of solutions for a quasilinear parabolic equation with initial data having positive limit inferior at infinity ····· 15

Takefumi Igarashi (Nihon Univ.)*　Life span of solutions for a quasilinear parabolic equation with initial data having positive limit inferior at infinity

概要　We present a new upper bound of the life span of positive solutions of a quasilinear parabolic equation for the initial data having positive limit inferior at space infinity. The upper bound is expressed by the data in limit inferior, not in every direction, but around a specific direction.

37　高橋　仁 (東工大理工)♯　Removability of time-dependent singularities in the heat equation ···· 10
柳田英二 (東工大理工)

Jin Takahashi (Tokyo Tech)♯　Removability of time-dependent singularities in the heat equation
Eiji Yanagida (Tokyo Tech)

概要　In this talk, we consider solutions of the linear heat equation with time-dependent singularities. It is shown that if a singularity is weaker than the order of the fundamental solution of the Laplace equation, then it is removable. We also consider the removability of higher dimensional singular sets. An example of a non-removable singularity is given, which implies the optimality of the condition for removability.

38　髙坂良史 (室蘭工大工)♯　FitzHugh–Nagumo 型反応拡散系の特異極限問題の進行スポット解 ···· 10
Yan-Yu Chen (Tamkang Univ.)
二宮広和 (明大総合数理)

Yoshihito Kohsaka (Muroran Inst. of Tech.)♯　Traveling spots of singular limit problems of FitzHugh–Nagumo type equations
Yan-Yu Chen (Tamkang Univ.)
Hirokazu Ninomiya (Meiji Univ.)

概要　Localized patterns are often observed in the nature. In this talk, we consider traveling spots observed in two-dimensional excitable media. First, we introduce the singular limit problem of the FitzHugh–Nagumo type equations. Then we explain the existence of the traveling spot including the front and the back.

39　谷口雅治 (岡山大自然)♯　$(N-2)$ 次元曲面の与える Allen–Cahn 方程式の N 次元進行波解 ····· 15

Masaharu Taniguchi (Okayama Univ.)♯　An N-dimensional traveling front solution in the Allen–Cahn equation associated with an $(N-2)$-dimensional surface

概要　We study the Allen–Cahn equation in the N-dimensional Euclidean space. Let D be a compact and convex domain in $(N-1)$-dimensional Euclidean space and its boundary S is of class C^2 and the principal curvatures are positive at every point. Then we prove that there exists a unique N-dimensional traveling front solution in the Allen–Cahn equation associated with S.

14:15〜16:30

概要　In this talk we consider the mean curvature flow with external force term. In 1978, Brakke proved the existence of weak solutions defined by using geometric measure theory, for the mean curvature flow. The weak solution is called Brakke's mean curvature flow. In 1993, Ilmanen proved the existence of Brakke's mean curvature flow by the use of phase field method. We study Brakke's mean curvature flow with external force term and phase field method for the problem. Moreover we study the Allen–Cahn equation which approximates the mean curvature flow with external force term.

概要　We investigate the large-time behavior of the value functions of the optimal control problems on the n-dimensional torus which appear in the dynamic programming for the system whose states are governed by random changes. From the point of view of the study on partial differential equations, it is equivalent to consider viscosity solutions of quasi-monotone weakly coupled systems of Hamilton–Jacobi equations. We establish a convergence result to asymptotic solutions as time goes to infinity under rather general assumptions by using dynamical properties of value functions.

概要　We introduce a new machinery to study the large time behavior for general classes of Hamilton–Jacobi type equations, which include degenerate parabolic equations and weakly coupled systems. We establish the convergence results by using the nonlinear adjoint method and identifying new long time averaging effects. These methods are robust and can easily be adapted to study the large time behavior of related problems.

概要　The Cauchy problem for the drift-diffusion equation with the fractional Laplacian is considered. This fractional dissipation describes the anomalous diffusion. Indeed it is well-known that the spatial-decay of solutions to the Cauchy problem is not governed by the initial-data. This property makes it difficult to derive the large-time behavior of solutions. The goal is to derive the difference between solutions and their asymptotic expansion. Since the dissipative effect is anomalous, some coefficients on the asymptotic expansion seem to diverge. The renormalization with space-time variables avoids this crux.

概要　We consider the Cauchy problems for the drift-diffusion system of bipolar type to study the ill-posedness by showing that the continuous dependence on initial data does not hold generally in the scaling invariant Besov spaces. The scaling invariant Besov spaces are $\dot{B}^{-2+\frac{n}{p}}_{p,\sigma}(\mathbb{R}^n)$ with $1 \le p, \sigma \le \infty$ and we show the optimality of the case $p = 2n$ to obtain the well-posedness and the ill-posedness for the drift-diffusion system of bipolar type. On the other hand, the optimal case is $p = \infty$ for the drift-diffusion system of monopolar type and we compare with two types.

概要　In this talk we consider the Cauchy problem for a parabolic-elliptic system in $\mathbb{R}^2$ modeling chemotaxis as well as self-attracting particles, and show that in the critical mass case the fine dynamics of the model is ascertained in terms of the ω-limit sets. Moreover, a general class of nonnegative initial data is constructed for which the associated solutions exhibit a complex oscillatory behavior.

46　石田祥子 (東京理大理)♯　Global-in-time bounded solutions to degenerate Keller–Segel systems with chemotaxis sensitivity ····· 15
Xinru Cao
(Univ. Paderborn・Dalian Univ. of Tech.)

Sachiko Ishida (Tokyo Univ. of Sci.)♯　Global-in-time bounded solutions to degenerate Keller–Segel systems with chemotaxis sensitivity
Xinru Cao
(Univ. Paderborn/Dalian Univ. of Tech.)

概要　In this talk we deal with the system which describes the movement of the swimming bacteria and its positive chemotaxis, for example, bacteria with upward oxygentaxis living in thin fluid layers near solid-air-water (like Escherichia col). More specifically, we consider the quasilinear degenerate Keller–Segel systems with chemotaxis sensitivity. The purpose of this talk is to discuss the existence of global bounded solutions.

47　藤江健太郎 (東京理大理)♯　シグナル依存型感応性関数をもつ Keller–Segel 系の時間大域解の存在及び解の有界性 ····· 15
M. Winkler　(Univ. Paderborn)
横田智巳 (東京理大理)

Kentarou Fujie (Tokyo Univ. of Sci.)♯　Global existence and boundedness of solutions to Keller–Segel systems with signal-dependent sensitivity
Michael Winkler (Univ. Paderborn)
Tomomi Yokota (Tokyo Univ. of Sci.)

概要　This talk deals with the parabolic-elliptic Keller–Segel system (KS) with chemotactic sensitivity function. The global existence and L^∞-boundedness of classical solutions to (KS) are established when (KS) has a generalized chemotactic sensitivity function $\chi(v)$. The result improves Biler (1999) in which the global existence without L^∞-boundedness is shown in the special case $\chi(v) = \frac{\chi_0}{v}$. The key lies in lower bounds for v.

48　溝口紀子 (東京学大教育)♯　Boundedness of global solutions in the two-dimensional parabolic Keller–Segel system ····· 15
M. Winkler　(Univ. of Paderborn)

Noriko Mizoguchi ♯　Boundedness of global solutions in the two-dimensional parabolic Keller–Segel system
(Tokyo Gakugei Univ.)
Michael Winkler (Univ. of Paderborn)

概要　We consider the parabolic-parabolic Keller–Segel system in the two dimension. Let (u, v) be a solution of the system starting at (u_0, v_0) with $\|u_0\|_{L_1} > 8\pi$. We show that (u, v) exists globally in time, then it is uniformly bounded and converges to a stationary solution. Based on this result, we give a criterion for blowup using energy which seems to be optimal.

16:45〜17:45　特別講演

町原秀二 (埼玉大教育)♯　空間 1 次元 2 次の非線形項をもつ Dirac 方程式系の初期値問題について

Shuji Machihara (Saitama Univ.)♯　On the Cauchy problems for the system of Dirac equations with quadratic nonlinearities in 1d

概要　We will consider the Cauchy problem for the quadratic nonlinear Dirac equations, Dirac-Klein-Gordon equation and Chern-Simons-Dirac equation in spatial one dimension. We discuss the well-posed results and ill-posed results for those problems. We determine the range of indices of Sobolev spaces which the solutions of the problems belong to. We give some a priori estimates to have the time global well-posed results.

9月27日(金)　第II会場

9:00〜12:00

49 杉山裕介 (東京理大理)♯ Remark on global solvability for some 1-D quasilinear wave equation ····· 10

Yusuke Sugiyama (Tokyo Univ. of Sci.)♯ Remark on global solvability for some 1-D quasilinear wave equation

概要　We consider global solvability for the the Cauchy problem of the quasilinear wave equation: $\partial_t^2 u = \partial_x(c(u)^2\partial_x u)$ under the assumption that $c(u(0,x)) \geq \delta$ for some $\delta > 0$.

50 若杉勇太 (阪大理)* 時間-空間変数に依存する摩擦項を持つ半線形波動方程式の解の爆発について ····· 10

Yuta Wakasugi (Osaka Univ.)* Blow-up of solutions to the semilinear wave equation with damping depending on time and space variables

概要　We give a blow-up result for the one-dimensional semilinear wave equation with damping depending on both time and space variables. We show that if the damping term can be regarded as perturbation, then small data blow-up holds for any power of nonlinearity.

51 M. Rammaha* (Univ. of Nebraska–Lincoln)
高村博之 (公立はこだて未来大)
上坂洋司 (日大理工)
若狭恭平 (北大理)
Blow-up of solutions to semilinear wave equations with non-zero initial data ····· 10

Mohammad Rammaha* (Univ. of Nebraska–Lincoln)
Hiroyuki Takamura (Future Univ.-Hakodate)
Hiroshi Uesaka (Nihon Univ.)
Kyouhei Wakasa (Hokkaido Univ.)
Blow-up of solutions to semilinear wave equations with non-zero initial data

概要　In this talk, we consider the initial value problem for semilinear wave equations with non-compactly supported data. With the initial data of zero initial position, the solution blows up for any power nonlinearity. This was first shown by Asakura (1986) under the assumption that the spatial decay is weak at infinity. On the other hand, Takamura & Uesaka & Wakasa (2010) have obtained the blow up result for non-zero initial position by making use of "time-derivative reduction". Our aim in this talk is to show the blow up result when both the initial position and the initial velocity do not identically vanish.

概要　We consider the well-posedness of the Cauchy problem for the fourth order Schrödinger equation in the periodic setting when initial data is given in the Sobolev space H^s. This equation is one of the Schödinger hierarchies. The direct iteration method does not work for any $s \in \mathbb{R}$ because two derivatives are included in the resonant parts. To overcome this difficulty, we use the algebraic structure of the nonlinear terms. Strong nonlinear interactions are canceled by symmetry of the nonlinear terms and we obtain the unconditional well-posedness for $s \geq 1$. This result is optimal in some sense.

概要　We consider the Cauchy problem for the cubic NLS on the torus $\mathbb{T}^d$. For $d = 1$, Guo–Kwon–Oh (preprint, arXiv:1103.5271) improved Bourgain's L^2 well-posedness (1993), proving unconditional uniqueness in $H^{1/6}$, i.e., the uniqueness of solutions holds in $C([0,T];H^{1/6})$ without intersecting with any auxiliary space such as Bourgain's $X^{s,b}$ spaces. They achieved this by implementing an infinite iteration scheme for the Poincaré–Dulac normal form reductions. Our goal is to extend this result to the case $d \geq 2$. The main difficulty in higher dimensional settings is that the structure of the resonances is much more complicated than that in 1d. We employ the estimate on the number of integer points on a circle as the crucial tool for the key multilinear estimates.

概要　We consider L^2 subcritical nonlinear Schrödinger equation with an intilal data belonging to a scale-invariant homogeneous weighted L^2 space. We give a sharp criterion for scattering by showing that there exists a spatial solution which does not scatter for positive time and whose initial data attains minimal value of the weighted L^2 norm in all nonscattering solutions. In previous report, a very similar results was shown for the case where the power of nonlinearity is bigger than a so-called Strauss expontent. We remove this restriction by making use of some tools of harmonic analysis and real analysis.

概要　We consider the Cauchy problem for the Chern–Simons–Dirac system in spatial one dimension. As an available result, Bournaveas, Candy, and Machihara proved that the local in time well-posedness of this Cauchy problem in $H^s(\mathbb{R}) \times H^r(\mathbb{R})$ with $-1/2 < r \leq s \leq r+1$. So in this talk, we prove ill-posedness for almost all exponent pairs (s, r) outside of the well-posedness region. The proof based on the fact that the solution is explicitly written for specific initial data and the argument of Iwabuchi and Ogawa. In the remaining exponent pairs, we show the flow map is not twice differentiable at zero.

概要　We study the well-posedness of the Cauchy problem for systems of semirelativistic equations with quadratic nonlinearity. The problem is shown to be locally well-posed in H^s for any $s \geq 0$. In addition, under some constraints of coupling constants, the Cauchy problem is shown to be globally well-posed. The local well-posedness is obtained by a contraction argument with Bourgain method. The global well-posedness is shown by the L^2 conservatoin law and the persistence of regularity. We also obtained new bilinear estimates on Bourgain norms and auxiliary norms for semirelativistic propagators.

概要　In this talk, we consider the Cauchy problem of a system of quadratic derivative nonlinear Schrödinger equations (NLS-sys for short). A derivative loss arising from the nonlinear terms makes the problem difficult. For instance, it is known that the single quadratic derivative nonlinear Schrödinger equation is ill-posed in any Sobolev space H^s due to the derivative loss. We prove that if the coefficients of Laplacian in NLS-sys satisfy some conditions, then we can recover the derivative loss and get the well-posedness of NLS-sys. In particular, we prove the well-posedness of NLS-sys at the scaling critical regularity by using the U^2, V^2 type Bourgain spaces.

概要　We discuss decay estimates and Strichartz estimates for dispersive equations with non-homogeneous symbols on modulation spaces $M^s_{p,q}$ to obtain the global well-posedness of the Cauchy problems for nonlinear dispersive equations. As a result, we have a generalization of the result by Wang which treated the Cauchy problems for the Scrödinger equations with a nonlinearity of wider class on modulation spaces $M^s_{p,q}$.

概要　We prove global existence of analytic solutions to the Cauchy problem for a system of nonlinear Schrödinger equations with quadratic interaction in space dimension $n \geq 3$ under the mass resonance condition.

概要　We consider the one dimensional nonlinear Schrödinger equation

$$iu_t + \frac{1}{2}u_{xx} = u^{p+1}, (t,x) \in \mathbf{R}^2$$

with a fractional order nonlinearity with exponent $p > 2$. Our purpose in this talk is to construct the scattering operators.

14:15〜16:30

概要　We study the asymptotic behavior of perturbations around shock waves to the Hamer model system of a radiating gas. Here we assume that the initial data contains finite number of discontinuities and the shock can be stronger than previous studies. We obtain the global solution for small initial perturbations and jump quantities, and observe that every discontinuity approach the center of mass of the initial data without colliding and that the solution converges uniformly to the corresponding traveling wave.

62 隠居良行 (九大数理)♯ Existence and stability of time-periodic solution of the compressible
津田和幸 (九大数理) Navier–Stokes equation ····· 15

Yoshiyuki Kagei (Kyushu Univ.)♯ Existence and stability of time-periodic solution of the compressible
Kazuyuki Tsuda (Kyushu Univ.) Navier–Stokes equation

概要 We consider the compressible Navier–Stokes equation on the whole space under a time-periodic external force. We show that there exists a time peridoc solution if the external force is sufficiently small and satisfies a symmetric condition. Furthermore, we prove that the time-periodic solution is stable under sufficiently small perturbations in some Sobolev space. The decay rate of the perturbation is also established.

63 前川泰則 (東北大理)♯ Remark on the Helmholtz decomposition in domains above Lipschitz
三浦英之 (阪大理) graphs ····· 15

Yasunori Maekawa (Tohoku Univ.)♯ Remark on the Helmholtz decomposition in domains above Lipschitz
Hideyuki Miura (Osaka Univ.) graphs

概要 We consider the Helmholtz decomposition in a domain whose boundary is given as a Lipschitz graph. For such a domain it is well known that the Helmholtz decomposition is not always valid in standard L^p spaces except for $p = 2$. In this talk we will show that certain anisotropic Lebesgue spaces still admit the Helmholtz decomposition.

64 H. Abels (Univ. of Regensburg)♯ Existence of weak solutions for a diffuse interface model of non-Newtonian
L. Diening (LMU Munich) two-phase flows ····· 15
寺澤祐高 (東大数理)

Helmut Abels (Univ. of Regensburg)♯ Existence of weak solutions for a diffuse interface model of non-Newtonian
Lars Diening (LMU Munich) two-phase flows
Yutaka Terasawa (Univ. of Tokyo)

概要 We consider a phase field model for the flow of two partly miscible incompressible, viscous fluids of non-Newtonian (power law) type. In the model it is assumed that the densities of the fluids are equal. We prove existence of weak solutions for general initial data and arbitrarily large times with the aid of a parabolic Lipschitz truncation method, which preserves solenoidal velocity fields and was recently developed by Breit, Diening, and Schwarzacher.

65 J. Prüss (Univ. Halle)* 相転移を伴う有界領域内非圧縮性 2 相流の解の安定性 —表面張力が変数
清水扇丈 (静岡大理) の場合— ····· 15
G. Simonett (Univ. Vanderbilt)
M. Wilke (Univ. Halle)

Jan Prüss (Univ. Halle)* Stability of equilibria for incompressible two-phase flows with phase
Senjo Shimizu (Shizuoka Univ.) transitions —The case of variable surface tension—
Gieri Simonett (Univ. Vanderbilt)
Mathias Wilke (Univ. Halle)

概要 A basic model for incompressible two-phase flows with phase transitions consistent with thermodynamics in a bounded domain in the case of variable surface tension is considered. The negative total entropy of the problem serves as a Ljapunov functional and hence we know that the equilibria are zero velocity, constant temperature, a finite number of nonintersecting balls of equal size. We prove that an equilibrium is stable if and only if the phases are connected, otherwise it is unstable.

概要　In this talk, we would like to consider some decay property of solution operators for the Stokes equations with surface tension in the half space which arises from a free boundary problem for the Navier–Stokes equations. We divide the solution operators into three parts which are the low, high and middle frequency part in the Fourier space. Crucial part is the analysis of the low frequency part because the roots of Lopatinski determinant converge on the origin, but the polynomial decay of the solution operator can be proved thanks to the $N-1$ dimensions heat kernel. We, on the other hand, can show the exponential stability of the solution operators in the middle and high frequency part.

概要　We consider the initial boundary value problem of the Stokes equations for the compressible viscous fluid flow with slip boundary condition in a bounded domain. In order to consider a global in time unique existence theorem for a nonlinear problem with some initial data close to a constant state in a bounded domain, the exponential stability of solutions to the Stokes equations is required. In this talk, we prove the exponential stability employing the sectorial $\mathcal{R}$-boundedness of the Stokes operator and a homotopic argument.

概要　We talk about the $\mathcal{R}$-bounded solution operators for the model problem of the Stokes equations with free boundary condition without surface tension in the half space, which is obtained by the linearization of the Lagrangean description of the free boundary problem for the compressible viscous fluid flow. This problem was studied by Secchi and Valli in the L_2 framework and by Tani in the Hölder spaces. Our purpose is to study the same problem in the L_q framework. For this purpose, the generation of analytic semigroup and maximal regularity result play an essential role and our main result concerning the $\mathcal{R}$-bounded solution operators automatically imply them.

概要　We talk about the existence of $\mathcal{R}$-bounded solution operators for the compressible-incompressible two phase problem in the half space, which is the linearized problem of the Lagrangean description of the evolution of compressible and incomplressible viscous fluid flow separated by an interface. To treat the nonlinear problem, the generation of analytic semigroup and maximal regularity for the linearized problem play an essential role and our main theorem automatically implies them by the definition of $\mathcal{R}$-boundedness and the Weis operator valued Fourier multiplier theorem.

16:45〜17:45　特別講演

概要　This talk is concerned with the asymptotic behavior of (possibly sign-changing) solutions of the Cauchy-Dirichlet problem for the fast diffusion equation. It is well known that every solution of the problem vanishes in finite time at a common power rate, and moreover, asymptotic profiles of such vanishing solutions can be characterized as nontrivial solutions of some semilinear elliptic equation. This talk particularly addresses the stability analysis for asymptotic profiles of vanishing solutions. We first formulate the notions of stability and instability of (possibly sign-changing) asymptotic profiles, and then, we present some stability criteria by investigating fast diffusion flows on an implicit surface in an energy space. Furthermore, we also discuss an annular domain case, which does not fall within the criteria, by developing some perturbation method for radially symmetric functions.

実　函　数　論

9月24日(火)　　第Ⅲ会場

9:00〜12:05

1　高　阪　史　明 (大　分　大　工)♯　二変数関数の鞍点と非線形写像の不動点 …… 15
Fumiaki Kohsaka (Oita Univ.)♯　Saddle points of two variable functions and fixed points of nonlinear mappings

概要　The aim of this talk is to apply fixed point and convergence theorems for firmly nonexpansive type mappings to the problem of finding saddle points of two variable functions.

2　田 中 亮 太 朗 (新 潟 大 自 然)♯　有限次元ノルム空間における正規直交基底について …… 10
斎　藤　吉　助 (新　潟　大　理)
Ryotaro Tanaka (Niigata Univ.)♯　Orthonormal bases for finite dimensional normed linear spaces
Kichi-Suke Saito (Niigata Univ.)

概要　In this talk, we consider orthonormal bases for finite dimensional normed linear spaces which are related to Birkhoff orthogonality. The relationship between orthonormal bases and a structure of finite dimensional normed linear spaces is given.

3　田 中 亮 太 朗 (新 潟 大 自 然)♯　有限次元空間のノルム構造について …… 15
斎　藤　吉　助 (新　潟　大　理)
Ryotaro Tanaka (Niigata Univ.)♯　The norm structure of finite dimensional spaces
Kichi-Suke Saito (Niigata Univ.)

概要　In this talk, we consider regular norms on $\mathbb{R}^n$. It is shown that the class of regular norms is a natural generalization of generalized Day–James type norms. Furthermore, using certain convex functions, some characterizations of regular norms are given.

4　木　村　泰　紀 (東　邦　大　理)♯　誤差を含んだ収縮射影法による近似点列の収束性 …… 15
Yasunori Kimura (Toho Univ.)♯　Convergence of approximate sequences generated by the shrinking projection method with errors

概要　In this talk, we investigate approximate sequences to a fixed point of a mapping generated by the shrinking projection method with errors. We show that the sequence still has a nice property even if we do not suppose any summability condition for the error terms.

5　厚　芝　幸　子 (山梨大教育人間)♯　Attractive point and convergence theorems for families of nonlinear mappings …… 15
Sachiko Atsushiba (Univ. of Yamanashi)♯　Attractive point and convergence theorems for families of nonlinear mappings

概要　In this talk, we study the common attractive points of a family of nonlinear mappings. We also prove convergence theorems without convexity for the families of nonexpansive mappings by iterations. Using these results, we obtain new and well-known convergence theorems.

概要 We shall discuss a new geometric constant $C_{s,t}(X)$ of a Banach space X, $1 < s \leq \infty, -\infty \leq t < \infty$.

概要 The aim of our talk is to give the Schwartz kernel theorem for the tempered distributions on the Heisenberg group by means of the heat kernel method on the Heisenberg group. The heat kernel method, introduced by T. Matsuzawa, is the method to characterize the generalized functions on the Euclidean space by the initial value of the solutions of the heat equation. On the Heisenberg group, J. Kim and M. W. Wong showed the heat kernel method for the tempered distributions. We apply the heat kernel method for the tempered distributions on the Heisenberg group to the proof of the Schwartz kernel theorem for the tempered distributions on the Heisenberg group.

概要 In this talk, we establish the Hardy type inequality on the critical Sobolev–Lorentz–Zygmund space, which generalizes the critical Sobolev–Lorentz space and the critical Sobolev space. Our purpose is to prove the Hardy type inequalities on the critical Sobolev–Lorentz–Zygmund space involving double logarithmic weight-functions by giving the necessary and sufficient conditions with which these inequalities hold or not.

概要 Let α and β be functions in $L^\infty(\mathbb{T})$, where $\mathbb{T}$ is the unit circle. Let P denote the orthogonal projection from $L^2(\mathbb{T})$ onto the Hardy space $H^2(\mathbb{T})$, and $Q = I - P$, where I is the identity operator on $L^2(\mathbb{T})$. This paper is concerned with the singular integral operators $S_{\alpha,\beta}$ on $L^2(\mathbb{T})$ of the form $S_{\alpha,\beta}f = \alpha Pf + \beta Qf$, for $f \in L^2(\mathbb{T})$. In this paper, we study the normality of $S_{\alpha,\beta}$ which is related to the Brown–Halmos theorem for the normal Toeplitz operator on $H^2(\mathbb{T})$.

概要　In this paper, we consider the regularity for non-additive measures. We prove that the non-additive measures which satisfy Egoroff's theorem and has psuedmetric generating property implies Radon property (strong regularity) on a complete or locally compact, separable metric space.

概要　Let X be a locally compact space. Let $C_{00}(X)$ denote the space of all continuous functions on X with compact support. In this talk, firstly we will give an improvement of the Choquet integral representation of a functional J defined only on the positive cone $C_{00}^{+}(X)$. This has been done using the Greco theorem, which is the most general Daniell–Stone type integral representation theorem for functionals on function spaces. Next, we will introduce the notion of the asymptotic translatability of a functional J and reveal that this simple notion is equivalent to the Choquet integral representability of J defined on the whole space $C_{00}(X)$ with respect to a nonadditive measure on X with appropriate regularity.

14:20〜16:15

概要　We introduce generalized Campanato spaces $\mathcal{L}_{p,\phi}$ on a probability space $(\Omega, \mathcal{F}, P)$, where $p \in [1, \infty)$ and $\phi : (0, 1] \to (0, \infty)$. If $p = 1$ and $\phi \equiv 1$, then $\mathcal{L}_{p,\phi} = \mathrm{BMO}$. We give a characterization of the set of all pointwise multipliers on $\mathcal{L}_{p,\phi}$.

概要　We show the boundedness of the maximal operator for martingales on generalized Lebesgue spaces with variable exponent.

概要　A metric sequence space $(\Lambda_p(f), d_p^f)$ is derived from a function $f(\neq 0) \in L_p$. $\Lambda_p(f)$ includes various interesting sequence spaces. But in general, $\Lambda_p(f)$ is not a linear space, nor is the explicit structure clear. In this talk, specifying the case to $p = 2$, we discuss the linearity and the characterization as a sequence space of $\Lambda_2(f)$ by defining the doubling dimension and the inner (resp. outer) approximation $\Lambda_2^0(f)$ (resp. $\Lambda_2^\varphi(f)$) of $\Lambda_2(f)$ which satisfy $\Lambda_2^0(f) \subset \Lambda_2(f) \subset \Lambda_2^\varphi(f) \subset \ell_2$. $\Lambda_2^0(f)$ is the maximum linear subspace of $\Lambda_2(f)$. We give a necessary and sufficient condition for $\Lambda_2^0(f) = \Lambda_2^\varphi(f)$, which means that $\Lambda_2(f)$ is a linear space, by the doubling dimension.

概要　In the talk, the speaker will explain that the modification made for the definition of Morrey spaces no longer works in the general metric measure spaces.

概要　In this talk, we will unify the results of boundedness for commutators of Calderón–Zygmund operators in L^p spaces, Morrey spaces and the central Morrey spaces. In order to do this, we will show the boundedness for them in B_σ-Morrey spaces.

概要　Let Ω be the set of unit vectors and w be a radial weight on the plane. We consider the weighted directional maximal operator defined by $M_{\Omega,w}f(x) := \sup_{x\in R\in\mathcal{B}_\Omega} \frac{1}{w(R)} \int_R |f(y)|w(y)\,dy$, where $\mathcal{B}_\Omega$ denotes the all rectangles on the plane whose longest side is parallel to some unit vector in Ω and $w(R)$ denotes $\int_R w$. In this paper we prove an almost-orthogonality principle for this maximal operator under certain conditions on the weight. The condition allows us to get weighted norm inequality $\|M_{\Omega,w}f\|_{L^2(w)} \le C \log N \|f\|_{L^2(w)}$, when $w(x) = |x|^a$, $a > 0$, and when Ω is the set of unit vectors on the plane with cardinality $N \gg 1$.

18 田中　仁 (東大数理)♯ A characterization of two-weight trace inequalities for positive dyadic operators in the upper triangle case ····· 15
Hitoshi Tanaka (Univ. of Tokyo)♯ A characterization of two-weight trace inequalities for positive dyadic operators in the upper triangle case

概要 Two-weight trace inequalities for positive dyadic operators are characterized in terms of discrete the Wolff potentials in the upper triangle case $1 < q < p < \infty$.

19 勘甚裕一 (金沢大自然)♯ 非負のフーリエ係数を持つ直交関数展開について ····· 15
Yuichi Kanjin (Kanazawa Univ.)♯ On orthogonal polynomial expansions with nonnegative Fourier coefficients

概要 We establish Wiener type theorems and Paley type theorems for Laguerre polynomial expansions and disk polynomial expansions with nonnegative coefficients.

16:30〜17:30　特別講演

森藤紳哉 (奈良女大理)* Microlocal Besov spaces and dominating mixed smoothness
Shinya Moritoh (Nara Women's Univ.)* Microlocal Besov spaces and dominating mixed smoothness

概要 We considered two-microlocal Besov spaces in 2004. In this talk, we define more general microlocal spaces in terms of wavelets and give their characterization by using dominating mixed smoothness.

9月25日(水)　第Ⅲ会場

9:00〜11:55

20 伊藤昭夫 (近畿大工)♯ 心肥大を記述する常微分方程式系に対する非負値時間大域解の時間無限大での漸近挙動 ····· 15
山本和彦 (近畿大工)
Akio Ito (Kinki Univ.)♯ Large-time behavior of non-negative time-global solutions to ODE system describing cardiac hypertrophy
Kazuhiko Yamamoto (Kinki Univ.)

概要 In this talk, we consider a system of nonlinear ODEs, which describes cardiac hypertrophy. And we investigate the large-time behavior of non-negative time-global solutions to our system. Actually, we show the existence of a global attractor for the dynamical system associated with our system. Moreover, we investigate the structure of the ω-limit set for each fixed initial datum.

21 熊崎耕太 (苫小牧工高専)♯ コンクリート中性化過程における二酸化炭素輸送モデルの解の時間大域的挙動について ····· 15
Kota Kumazaki (Tomakomai Nat. Coll. of Tech.)♯ Large time behavior of a solution for carbon dioxide transport model in concrete carbonation process

概要 From the civil engineering point of view, it is important to construct and analyze a mathematical model of concrete carbonation process. On this subject, we propose a mathematical model for carbon dioxide transport in the process, and showed the existence and uniquness of a global solution of the model. In this talk, we show that the solution converges to a solution of the steady state problem, and clarify the structure of the solution of the steady state problem considering two cases for boundary data.

概要　The existence of solutions for a class of abstract evolution equations generated by maximal monotone operators with non-local convex constraint is considered. Moreover, its application to nonlinear PDE is considered. This result is a generalization of the theory of Lagrange multiplier related to variational inequalities. Based on the concept of optimization problems, the theory of Lagrange multiplier has strong relevance to various minimizing problems for some cost functionals with constraint. The objective of this paper is to give an extension of the well-known theory to a more general setting, in order to apply to nonlinear parabolic partial differential inclusions.

概要　This talk is concerned with the system of nonlinear heat equations with constraints coupled with Navier–Stokes equations in two-dimensional domains. In 2012, Sobajima, Tsuzuki and Yokota proved the existence and uniqueness of solutions to the system with heat equations include diffusion term $\Delta\theta$, where θ represents the temperature. This paper gives the existence result in which Laplace operator Δ is replaced with p-Laplace operator Δ_p, where $p > 2$.

概要　This talk is concerned with the initial boundary value problem and the time periodic problem of a system which describes double-diffusive convection in some porous medium. The global solvability of these problems is already obtained for the homogeneous Dirichlet boundary condition.

The main purpose of this talk is to report that the global solvability of the system under the homogeneous Neumann boundary value condition also holds true. The methods of proofs rely on the theory of the non-monotone perturbations for subdifferential operators. However, the lack of the coercivity of the Laplacian with the Neumann boundary condition causes some difficulties in this procedure. Especially for the periodic problem, we need to introduce some approximation procedures for this system with two approximation parameters.

概要　In this talk, a parabolic type system derived as a gradient flow of an energy functional is considered. Regarding to this system, the existence of solutions starting from the energy-domain was already known. Based on the previous result, we here focus on the verifications of the smoothing effects and the energy-disspations, i.e. the key-properties as a parabolic type gradient flow. Furthermore, as an extended topic, we mention about the result concerned with the large-time behavior of solutions that dissipate the governing energy in time.

概要　In this talk, a coupled system of a parabolic type initial-boundary value problem and an elliptic-parabolic type one is considered under one-dimensional setting of the spatial domain. This system is based on a phase field model of grain boundary. The results of this talk are concerned with the existence of solutions with energy dissipation and the large time behavior of solutions.

概要　In this talk we consider optimal control problems for onedimensional phase field system with total variation functional as the interfacial energy. Our system consists of two parabolic PDEs: a heat equation and a singular diffusion equation of an order parameter. We prove the existence of an optimal control that minimizes the nonlinear and nonsmooth cost functional. Moreover, we show the necessary condition of the optimal pair by using the optimal control problem of the approximating system.

概要　The Cauchy problem for nonlinear Klein–Gordon equations is considered in de Sitter spacetime. The nonlinear terms are power type or exponential type. The local and global solutions are shown in the energy class.

概要　A weighted energy estimate with tangential derivatives on the light cone is applied for the Cauchy problem of semilinear wave equations in one space dimension.

概要　In this paper, we study the definition of Fourier transformation of L^2_{loc}-functions and its fundamental properties. These are the new results for the Fourier transformation of L^2_{loc}-functions. As its applications, we study the characterizations of the local Sobolev spaces using the methods of Fourier transformation.
Further, the Fourier transformations of L^2_{loc}-functions are very essential in order to study the theory of natural statistical physics.

概要　In this paper, we study what the impact force is. In the studies of the phenomena of potential barrier and the phenomena of potential well, the force acting on an electron is considered to be an impact force. The impact force is the force $-\delta(x)$ which acts on an electron only at the point $x = 0$ and its work is concentrated only at this point. This means that this force is just the impact force.

13:00〜13:15

概要　In this paper, we study the phenomena of infinitely deep potential well in the view point of the natural statistical physics.
Under the action of infinitely deep potential in the 1-dimensional space $\mathbf{R}$, an electron moves in the interval of finite length whose end points are the complete reflection walls on both sides. We prove that the motion of the physical system composed of such electrons is understood by virtue of the natural statistical physics for the periodic motion.

概要　In this paper, we study the motion of the system of free particles in the view point of the natural statistical physics.
Thereby, we obtain the new results on the specific heats of an ideal gas in the view point of atomism. In this case, we need the theory of Fourier transformation of L^2_{loc}-functions because the Schrödinger operator of the system of free particles has the continuous spectrum.

13:20〜14:20　特別講演

加 納 理 成 (高 知 大 教 育)♯ ある癌浸潤モデルの解の存在とその性質について

Risei Kano　(Kochi Univ.)♯ The existence of solutions for the tumor invasion models

概要　We discuss that the solvability for the tumor invasion models. This problem was proposed by Chaplain and Anderson which is equipped by the some dependence for the variables.

函　数　解　析　学

9月24日(火)　　第IV会場

9:30〜11:50

1　伊　藤　　宏 (愛 媛 大 理 工)* 遠方で発散するポテンシャルをもつ Dirac 作用素 ····· 15

Hiroshi Ito　(Ehime Univ.)* Dirac operators with potentials with diverging at infinty

概要　In this talk we consider a Dirac operator with a dilation analytic matrix-valued potential diverging at infinity. We first show that the spectrum of the operator coincides with the whole real line and that there is no singular continuous spectrum. Moereover, there is no resonance in the lower half-plane. We next consider the locations of resonances of the operator and show that there are some relationships of spctra and resoances between two Schrödinger operators and the Dirac operator as the nonrelativistic limit

2　鈴 木 章 斗 (信　州　大　工)* 周期的にペンダント頂点を付加した 1 次元格子上のラプラシアンのスペクトル解析 ····· 15

Akito Suzuki　(Shinshu Univ.)* Spectral analysis of the Laplacian on a covering graph obtained from the one dimensional lattice by adding pendant vertices

概要　We consider a covering graph that are obtained from the one dimensional lattice by adding pendant vertices. We show that the Laplacian on the graph has a spectral gap and establish a necessary and sufficient condition under which the Laplacian has an eigenvalue.

3　鈴 木 章 斗 (信　州　大　工)　ペンダント頂点を付加した格子上のラプラシアンの 超対称的側面 ····· 15

Akito Suzuki　(Shinshu Univ.)　Supersymmetric aspects of the Laplacian on the graph obtained from the lattice by adding pendant vertices

概要　We consider the graph obtained from the d dimensional lattice by adding pendant edges. We study the property of the ground state of the supersymmetric Hamiltonian defined from the Laplacian on such a graph and show the existence of the spectral gap.

4　佐 々 木 格 (信　州　大　理)♯ 非可換調和振動子の固有値の多重度と Jacobi 行列 ····· 10

Itaru Sasaki　(Shinshu Univ.)♯ Jacobi matrix and the multiplicity of eigenvalues of the non-commutative harmonic oscillator

概要　The non-commuatative harmonic oscillator is defined by the Hamiltonian

$$Q(\alpha,\beta) := \begin{pmatrix} \alpha & 0 \\ 0 & \beta \end{pmatrix} \otimes \left(-\frac{1}{2}\frac{d^2}{dx^2} + \frac{1}{2}x^2 \right) + \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \otimes \left(x\frac{d}{dx} + \frac{1}{2} \right),$$

where α, β are positive parameters such that $\alpha\beta > 1$. We study the multiplicity of eigenvalues of $Q(\alpha,\beta)$. It is shown that the multiplicity of the lowest eigenvalue is one for all values of α and β. Moreover, we show that $Q(\alpha,\beta)$ can be decomposed into four self-adjoint Jacobi matrices.

概要　We study a quantum system of charged particle interacting with a quantized radiation field. The Hamiltonian of the system is defined by

$$H^V := \sqrt{(\mathbf{p} - q\mathbf{A}(\mathbf{x}))^2 + m^2} - m + H_f + V(\mathbf{x})$$

which acts in the Hilbert space $\mathcal{H} = L^2(\mathbb{R}^3) \otimes \mathcal{F}$ where $\mathcal{F}$ is the Fock space over $L^2(\mathbb{R}^3 \times \{1, 2\})$. Let $E^V := \inf \sigma(H^V)$ be the ground state energy. The difference $E^0 - E^V$ is called a binding energy. We show that the binding energy is positive under natural condition on V. Moreover we discuss the binding energy of the many particle system.

概要　It is shown that the spin-boson model has a unique ground state by means of a functional integration. The Gibbs measure associated with the ground state is constructed and its applications are given.

概要　The functional integral representation of the semigroup generated by the so-claaed semi-relativistic Pauli–Fierz model H is constructed. It is shown that H is essential self-adjoint, and 1) spatial decay of bound states, 2) Gaussian domination of the ground state and 3) existence of a probability measure associated with the ground state are shown.

概要　The Nelson model is defined as a self-adjoint operator by introducing UV cutoff. It is shown that by functional integrations UV cutoff can be renormalized. This result is a functional integral version of [E. Nelson JMP 5 (1964) 1190–1197].

概要　Characterizations of the joint eigenspaces of invariant differential operators have been one of the central problems in harmonic analysis on symmetric spaces. Helgason (Advan. Math. (1970)) conjectured that any joint eigenfunction on symmetric spaces of noncompact type is expressed as the image of the Poisson transform of an analytic functional on the boundary, and this conjecture was proved by Kashiwara et al. (Ann. of Math. (1978)). For real and regular spectral parameter, we consider an image characterization for the Poisson transform of the L^2-functions on the boundary of symmetric spaces of noncompact type. Our approach is based on techniques in the scattering theory and harmonic analysis on symmetric spaces.

14:15〜15:15　特別講演

岩 崎 千 里 (兵庫県立大物質)* 退化した放物型方程式に対する基本解の表象による表現とその応用

Chisato Iwasaki (Univ. of Hyogo)* The symbol of the fundamental solution for the degenerate parabolic operators and its application

概要　We give the exact symbol the fundamental solution of degenerate parabolic operators as pseudo-differential operators. We apply this representation to two subjects. One is to study the heat kernel trace and the spectral function on a sub-Laprace operator $\Delta^{sub}_{L\backslash G}$ on a compact nilmanifold $L\backslash G$. Here G is an arbitrary nilpotent Lie group of step 2 and L is a lattice. We can show the spectral function has only one pole. The another one is to get the eigen function expansion of the heat kernel to the Fokker–Planck operator.

9月25日(水)　　第IV会場

9:30〜11:50

10 細 川 卓 也 (茨 城 大 工)* Differences of weighted composition operators from H^∞ to the Bloch space ····· 10
大 野 修 一 (日 本 工 大)

Takuya Hosokawa (Ibaraki Univ.)* Differences of weighted composition operators from H^∞ to the Bloch space
Shûichi Ohno (Nippon Inst. of Tech.)

概要　We consider the boundedness and compactness of the differences of two weighted composition operators acting from the Banach space of bounded analytic functions on the open unit disk to the Bloch space.

11 泉 池 耕 平 (山 口 大 教 育)♯ Operator inner functions for Rudin type invariant subspaces over the bidisk ····· 15

Kouhei Izuchi (Yamaguchi Univ.)♯ Operator inner functions for Rudin type invariant subspaces over the bidisk

概要　Let $\mathcal{M}$ be a Rudin type invariant subspace of the Hardy space over the bidisk. In this talk, an operator inner function for $\mathcal{M}$ is given. This is a generalization of Q in and Yang's work.

12 三 浦　　毅 (新 潟 大 理)♯ 関数環上の全射等距離写像 ····· 15

Takeshi Miura (Niigata Univ.)♯ On surjective isometries between function algebras

概要　Let S be a surjective isometry between function algebras on locally compact Hausdorff spaces. We prove that such an isometry induces a homeomorphism between Choquet boundaries, and give a representation of it by a weighted composition operators.

13 嶌 田 洸 一 (東 大 数 理) A classification of flows on AFD factors with faithful Connes–Takesaki modules ····· 15

Koichi Shimada (Univ. of Tokyo) A classification of flows on AFD factors with faithful Connes–Takesaki modules

概要　We classify flows on AFD factors with faithful Connes–Takesaki modules. This genelizes the classification of trace-scaling flows on the AFD II_∞ factor, which is closely related to the uniquness of the AFD III_1 factor. In order to do the classification, we show that flows on AFD factors with faithful Connes–Takesaki modules has the Rohlin property. This also gives a partial answer to a classification problem of the Rohlin property for flows.

概要　We generalize Ozawa's bi-exactness to discrete quantum groups and give a new sufficient condition for strong solidity, which implies the absence of Cartan subalgebras. As a corollary, we prove that II_1 factors of free quantum groups are strongly solid. We also consider similar conditions on non-Kac type quantum groups, namely, non finite von Neumann algebras.

概要　By combining Ocneanu's classification of all biunitary connetions between ADE Dynkin diagrams with Kawahigashi's quantum Galois correspondence for subfactors and previously obtained subequivalence among ADE paragroups, we show that all irreducible generalized intermediate subfactors of ADE subfactors are classified into (sub)equivalence classes.

概要　All intermediate subfactors of GHJ subfactors and those lattice structures were obtained by Xu. We show that Xu's result is also obtained by using Ocneanu's classification of all biunitary connetions between ADE Dynkin diagrams.

概要　We present a simple sufficient condition for vanishing of an obstruction in orbifold construction for subfactors. For example, our result can be applied to show the existence of subfactors with principal graph D_{2n}.

9月26日(木)　　第IV会場

9:30〜12:00

概要　The EPR paradox tells us quantum theory is incompatible with classic realistic theory. Indeed, Bell has shown that quantum correlations of independent bipartite systems have more possibility than the classical correlations. To study what the possibilities are, Tsirelson has introduced the set of quantum correlation matrices, but depending on the interpretation of independence, there are two plausible definitions of it. Tsirelson's problem asks whether these definitions are equivalent. It turned out that this problem in quantum information theory is in fact equivalent to Connes's embedding conjecture, one of the most important open problems in theory of operator algebras. I will talk some recent progress on Tsirelson's problem.

概要 In my master's thesis, I showed that if E is a Fell bundle over an amenable étale locally compact Hausdorff groupoid such that every fiber on the unit space is nuclear, then $C_r^*(E)$ is also nuclear. In order to show this, we introduce (minimal) tensor products of Fell bundles with fixed C^*-algebras.

概要 A C^*-algebra is said to have the LP property if the linear span of projections is dense in a given algebra. It is well known that the LP property of a C*-algebra A is inherited to the matrix tensor product $M_n(A)$ and the quotient $\pi(A)$ for any *-homomorphism π. But it is not stable under the hereditary subalgebras, fixed point algebras A^G by finite groups G, and crossed products $A \rtimes_\alpha G$. We present that given a simple unital C*-algebra A with the LP property if an action α of a finite group G to Aut(A) has the Rokhlin proeprty then A^G and $A \rtimes_\alpha G$ has the LP property.

概要 I discuss some properties for free group C*-algebras associated with ℓ_p.

概要 We shall introduce the Rohlin property for automorphisms of σ-unital stably projectionless C*-algebras. Let $\mathcal{W}_2$ be the Razak–Jacelon algebra (which is a certain simple nuclear stably projectionless C*-algebra having trivial K-groups and a unique tracial state). We shall show that every trace scaling automorphism of $\mathcal{W}_2 \otimes \mathbb{K}$ has the Rohlin property.

概要 M. Rørdam showed that two automorphisms in a Kirchberg algebra are approximately unitarily equivalent, if they have the same invariants in the KL-group. In that same period, E. Kirchberg obtained an abstract proof of this result based on Connes–Higson's E-theory. On the other hand, for stably finite cases H. Lin showed analogous results of Rørdam's theorem by using his condition of tracial rank zero. In the present work, we show an alternative proof of H. Lin's theorem in a similar way of Kirchberg's strategy.

概要　In this talk, I will talk about the Haagerup property and property (T) for C*-algebras, both of which have been recently introduced to the theory of C*-algebras. I studied on $*$-homomorphisms from a C*-algebra with property (T) to a C*-algebra with the Haagerup property. An application of Popa's theorem shows images of such $*$-homomorphisms must be residually finite dimensional. I also want to talk about the studies of such property for relative property (T) cases. I studied on the reduced group C*-algebras of the concrete examples of discrete groups with relative property (T).

概要　We introduce a family $\Gamma_\beta, 1 < \beta \in \mathbb{R}$ of infinite non-amenable discrete groups as an interpolation of the Higman–Thompson groups $V_n, 1 < n \in \mathbb{N}$ by using the topological full groups of the groupoids defined by β-expansions of real numbers. They are regarded as full groups of certain interpolated Cuntz algebras $\mathcal{O}_\beta, 1 < \beta \in \mathbb{R}$. The groups $\Gamma_\beta, 1 < \beta \in \mathbb{R}$ are realized as groups of piecewise linear functions on $[0, 1]$ if the β-expansion of 1 is finite or ultimately periodic. We classify the groups $\Gamma_\beta, 1 < \beta \in \mathbb{R}$ by the number theoretical property of β.

14:15〜15:45

概要　The cores of the C*-algebras associated from complex dynamical systems and self-similar maps have much information of the original dynamical system. In the previous talks, we have classified traces and ideals of the C*-algebras associated with self similar maps under some condition. In the present talk, we report the classification of discrete extreme trace of the core of the C*-algebras associated with the dynamical system given by rational functions on the Riemannian sphere. In the present situation, the analysis is more difficult because rational functions do not have global inverse branch in general, and branched points can appear in the backward orbits of branched points.

概要　We study transitive Hilbert representations of quivers. We show that the existance of infinite-dimensional transitive Hilbert representations of a quiver depends on the quiver's orientation.

28　戸 松 玲 治 (北　大　理)♯　コンパクト量子群 G_q の無限テンソル積型作用 ····· 15

Reiji Tomatsu (Hokkaido Univ.)♯　Product type actions of a compact quantum group G_q

概要　I will explain recent progress of study of product type actions of a compact quantum group G_q.

29　田 端　亮 (広 島 大 理)♯　Determinant-permanent 数直線上で generalized matrix functions がとりうる値について ····· 15

Ryo Tabata (Hiroshima Univ.)♯　On possible values of generalized matrix functions on the determinant-permanent number line

概要　Schur's Theorem (1917) and Lieb's Permanent Dominance Conjecture (1966) state that the determinant is the minimum and the permanent is the maximum among the normalized generalized matrix functions. In this research, we try to sharpen the Lieb's conjecture to determine the possible values of the generalized matrix functions in the determinant-permanent number line. In particular for the case of immanants, we conjecture that the maximum values are attained at Y_n (for most immanants) and $Y_3 \oplus I_{n-3}$ (for the character $(n-1,1)$). On the other hand, the matrices at which the generalized matrix functions attain the maximum for most of non-immanant case seems to be a chaos. When the subgroup is trivial, Pierce's conjecture (1987) implies that the maximum value is attained at Y_n.

30　菊 地 克 彦 (京　大　理)♯　ある Gelfand 対に対する球表現 ····· 15

Katsuhiko Kikuchi (Kyoto Univ.)♯　Spherical representations for certain Gelfand pairs

概要　Let G be a Lie group, K a compact subgroup of G. We say that (G,K) is a Gelfand pair if the Banach $*$-algebra $L^1(K\backslash G/K)$ of all K-biinvariant integrable functions on G are commutative. In this talk, we give a parametrization of all spherical representations of certain Gelfand pairs (G,K) neither of reductive nor of Heisenberg type. The group G is the semidirect product $G = L \ltimes N$ of a nilpotent Lie group and a compact Lie group L which includes K as a proper closed subgroup.

16:00〜17:00　特別講演

松 木 敏 彦 (龍 谷 大 文)♯　直交群の多重旗多様体の有限型軌道分解

Toshihiko Matsuki (Ryukoku Univ.)♯　Finite-type orbit decompositions of multiple flag varieties for orthogonal groups

概要　Let G be the split special orthogonal group of odd degree over an arbitrary field of characteristic not 2. Let $P_1, \ldots, P_k$ be parabolic subgroups of G. Then we can consider the multiple flag variety

$$\mathcal{M} = (G/P_1) \times \cdots \times (G/P_k)$$

with the diagonal G-action. In this talk, I will give a necessary condition for finiteness of the orbit decomposition. I hope the condition will be also sufficient for finiteness.

9月27日(金)　第IV会場

9:30〜12:00

31　藤井淳一 (大阪教育大)♯　2次正定値行列全体の hyperkähler 構造 ····· 10

Junichi Fujii (Osaka Kyoiku Univ.)♯　On hyperkähler structure for the 2 by 2 positive-definite matrices

概要　The manifold of the positive operators whose geodesic is an operator mean has been discussed. Recently Pálfia showed that the operator means corresponding to the Riemannian metrics are only 3 ones; the arithmetic, harmonic and geometric ones, except the cases that the dimension of the space is not less than 3. In this talk, we discuss the 2 dimensional case that has a hyperkähler structure.

32　中村　登 (富山高専)♯　2, 3 の関数の作用素単調性の証明 ····· 15
泉野佐一

Noboru Nakamura (Toyama Nat. Coll. of Tech.)♯　Proofs of operator monotonicity of some functions
Saich Izumino

概要　A real-valued function f on $(0,\infty)$ is *operator monotone*, if $f(A) \le f(B)$ for operators A and B such that $0 \le A \le B$. As a typical example, $t \mapsto t^p$ $(0 \le p \le 1)$ is an operator monotone function, which is well-known as Löwner–Heinz theorem.

Besenyei and Petz showed the following two functions, parameterized with p, $f_p(x) = \left(\frac{x^p-1}{p(x-1)}\right)^{\frac{1}{p-1}}$ for $-2 \le p \le 2$ and $g_p(x) = \left(\frac{1+x^p}{2}\right)^{\frac{1}{p}}$ for $-1 \le p \le 1$ are operator monotone in x, respectively. By the representation of $f_p(x)$ using the integral, $f_p(x) = \left(\int_0^1 (1-t+tx)^{p-1}dt\right)^{\frac{1}{p-1}}$, we give another way of showing operator monotonicity of $f_p(x)$. Operator monotonicity of $g_p(x)$ is simply induced from the use of a binomial expansion. Moreover, related to them, we give a simple proof of operator monotonicity of Petz–Hasegawa's function.

33　柳研二郎 (山口大理工)♯　一般化歪情報量に関する不確定性関係 ····· 15
古市　茂 (日大文理)
栗山　憲 (佛教大教育)

Kenjiro Yanagi (Yamaguchi Univ.)♯　Uncertainty relation of generalized skew information
Shigeru Furuichi (Nihon Univ.)
Ken Kuriyama (Bukkyo Univ.)

概要　We consider $f(x,y) = ((1+x^y)/2)^{1/y}$ as a function of y for $x > 0$. We prove that $f(x,y)$ is concave in $1/2 < y < 1$. By using the concavity of $f(x,y)$, we give uncertainty relation with generalized skew information.

34 亀井栄三郎 * An extension of Tsallis relative operator entropy ····· 15
伊佐浩史 (前橋工科大)
伊藤公智 (前橋工科大)
遠山宏明 (前橋工科大)
渡邉雅之 (前橋工科大)
Eizaburo Kamei * An extension of Tsallis relative operator entropy
Hiroshi Isa (Maebashi Inst. of Tech.)
Masatoshi Ito (Maebashi Inst. of Tech.)
Hiroaki Tohyama (Maebashi Inst. of Tech.)
Msayuki Watanabe (Maebashi Inst. of Tech.)

概要 We see the relations among relative operator entropy $S(A|B)$ and Tsallis relative operator entropy $T_r(A|B)$ and $S_r(A|B)$ which is a generalization of $S(A|B)$. We give an extension of Tsallis relative operator entropy $T_{t,r}(A|B)$ and an expanded relative operator entropy $S_{t,r}(A|B)$. Then we show relations between $T_{t,r}(A|B)$ and $S_{t,r}(A|B)$ which are similar to the relations between $T_r(A|B)$ and $S_r(A|B)$.

35 伊藤公智 (前橋工科大)♯ Generalizations of operator Shannon inequality based on Tsallis and Rényi relative entropies ····· 15
伊佐浩史 (前橋工科大)
亀井栄三郎
遠山宏明 (前橋工科大)
渡邉雅之 (前橋工科大)
Masatoshi Ito (Maebashi Inst. of Tech.)♯ Generalizations of operator Shannon inequality based on Tsallis and Rényi relative entropies
Hiroshi Isa (Maebashi Inst. of Tech.)
Eizaburo Kamei
Hiroaki Tohyama (Maebashi Inst. of Tech.)
Masayuki Watanabe (Maebashi Inst. of Tech.)

概要 Recently, we obtained inequalities among relative operator entropies of sequences, which is an extension of operator version of Shannon inequality (briefly, operator Shannon inequality) discussed by Furuta and Yanagi–Kuriyama–Furuichi. In this talk, we shall obtain two generalizations of these inequalities by considering generalizations of relative operator entropies of sequences.

36 伊藤公智 (前橋工科大)♯ Matrix inequalities including grand Furuta inequality via Karcher mean ····· 15
Masatoshi Ito (Maebashi Inst. of Tech.)♯ Matrix inequalities including grand Furuta inequality via Karcher mean

概要 Recently, we have shown a generalization of Furuta inequality via weighted Karcher mean (weighted Riemannian mean) of n-matrices. In this talk, we shall obtain a generalization of grand Furuta inequality as an extension of our previous result.

37 内山 充 (島根大総合理工)♯ A converse of Loewner–Heinz inequality ····· 15
Mitsuru Uchiyama (Shimane Univ.)♯ A converse of Loewner–Heinz inequality

概要 Let $f(t)$ be a non-constant operator monotone function in a neighborhood of $t = a$. Then $A \leqq B$ if and only if there is a sequence $\{t_n\}_{n=1}^{\infty}$ so that $t_n \downarrow 0$ and $f(a + t_n A) \leqq f(a + t_n B)$.

概要　We denote by $A\sigma B$ a operator mean of positive operators A and B. It is known that an operator mean associated with some operator monotone function f on $(0,\infty)$. Let X and Y be positive invertible operators. We show that the condition $(tA+X)\sigma Y \le (tB+X)\sigma Y$ holds for a sufficiently small $t>0$ is equivalent to $A \le B$ if and only if X is a scalar multiple of Y or the operator monotone function f has the form

$$f(t)=\frac{at+b}{ct+d}, \quad a,b,c,d\in\mathbb{R},\ ad-bc>0.$$

概要　Let $f(t)$ be an operator monotone function. Then $A \le B$ implies $f(A) \le f(B)$, but the converse implication is not true. Let $A\sharp B$ be the geometric mean of $A, B \ge 0$. If $A \le B$, then $B^{-1}\sharp A \le I$; the converse implication is not true either. We will introduce that if $f(\lambda B+I)^{-1}\sharp f(\lambda A+I) \le I$ for all sufficiently small $\lambda>0$, then $f(\lambda A+I) \le f(\lambda B+I)$ and $A \le B$. Moreover, we extend it to multi-variable matrices means.

14:15〜15:15　特別講演

概要　In this talk, from the viewpoint of so-called “reverse inequalities”, we shall consider noncommutative structure of three n variable operator geometric means, that is, the chaotic geometric mean, the Karcher geometric mean and the Ando–Li–Mathias geometric mean. Firstly, we outline the history of the Kantorovich inequality, and describes how the Kantorovich inequality has developed in the field of operator inequalities. Next, we compare three geometric means from the viewpoint of the Ando–Hiai type inequality, and consider norm inequalities and its reverse for three geometric means. Moreover, we investigate the reverse of the arithmetic-geometric mean inequality for three operator geometric means.

統　計　数　学

9月24日(火)　　第VIII会場

9:30〜12:00

概要　We construct leafwise non-degenerate diffusion processes on foliated spaces via SDE approach. As an application we state a central limit theorem for a class of additive functionals of the leafwise diffusion process starting at almost every point with respect to any harmonic measure.

概要　On a manifold having (forward) Ricci flow background, we discuss the existence of a coupled Brownian motion such that their $\mathcal{L}_0$-distance is a supermartingale. As a consequence, another proof of the monotonicity of $\mathcal{L}_0$-cost along backward heat flow than Lott (2009) is obtained. This is a joint work with Kazumasa Kuwada (Ochanomizu University).

概要　In this talk, we will establish a discrete-time version of Clark(–Ocone–Haussmann) formula, which can be seen as an asymptotic expansion in a weak sense. The formula is applied to the estimation of the error caused by the martingale representation. This is a joint work with Jirô Akahori (Ritsumeikan Univ.) and Kaori Okuma (Ritsumeikan Univ.).

概要 We prove that the solution of stochastic differential equations with deterministic diffusion coefficient admits a Hölder continuous density if the Fourier transform of the drift coefficient exists and it has a polynomial decay property. In this result, the order of the decay is an important factor to determine the order of Hölder continuity of the density.

概要 Dyson's Brownian motion model with the parameter $\beta = 2$, is realized as an h-transform of the absorbing Brownian motion in a Weyl chamber of type A. In this talk we give another representation of the model by means of complex Brownian motions with entire functions. We also give some generalization of the result.

概要 In this talk we discuss the strong Markov property of the determinantal processes with an infinite number of particles obtained by the appropriate scaling limit of non-colliding diffusion processes. For some interesting models, the strong Markov property is proved.

概要 We investigate the error between the solution to a stochastic differential equation driven by a fractional Brownian motion and the approximation by the Crank–Nicholson scheme associated to the equation. In this talk, we consider the error as stochastic processes and determine the convergence rate of the error and the limit distribution in the Skorohod topology. The limit distribution is expressed by the term of the solution to the equation and the Itô integral with respect to a standard Brownian motion independent of the driving process of the equation. The key ingredients in our proof are asymptotic behavior of weighted Hermite variations as stochastic processes.

8 小川重義 (立命館大理工)* 植村英明 (愛知教育大教育) Identification of a noncausal Itô process from the stochastic Fourier coefficients ····· 15

Shigeyoshi Ogawa (Ritsumeikan Univ.)* Hideaki Uemura (Aichi Univ. of Edu.) Identification of a noncausal Itô process from the stochastic Fourier coefficients

概要 Let X_t be a noncausal Itô process of Skorokhod type, that is: a stochastic process of the form $dX_t = b(t,\omega)dt + a(t,\omega)dW_t$ where $W.$ is the Brownian motion and the term $a(\cdot)dW_t$ is understood as Skorokhod integral. For such an Itô process X_t we consider the Fourier coefficient $\mathcal{F}_n(dX)$ of the differential dX_t by $\mathcal{F}_n(dX) = \int_0^1 \overline{e_n(t)}dX_t, e_n(t) = \exp(2\pi n\sqrt{-1}t)$ $(n \in \mathbf{Z})$ and we are concerned with the elementary question; whether we can identify the original process $X.$ by the complete set of the stochastic Fourier coefficients $\{\mathcal{F}_n(dX), n \in \mathbf{Z}\}$. We study this problem in a framework of noncausal calculus, as we did in the previous articles, and we give an affirmative answer with a concrete scheme for the reconstruction.

9 市原直幸 (広島大工)* The generalized principal eigenvalue for ergodic type HJB equations ·· 15

Naoyuki Ichihara (Hiroshima Univ.)* The generalized principal eigenvalue for ergodic type HJB equations

概要 We are concerned with the generalized principal eigenvalue for HJB equations arising in a class of stochastic ergodic control problems. We give a necessary and sufficient conditions so that the generalized principal eigenvalue of an HJB equation coincides with the optimal value of the corresponding optimal control problem.

14:15〜14:45

10 久保田直樹 (日大理工)♯ Rates of convergence in first passage percolation with a weaker condition than exponential tail assumptions ····· 15

Naoki Kubota (Nihon Univ.)♯ Rates of convergence in first passage percolation with a weaker condition than exponential tail assumptions

概要 We consider the first passage percolation with i.i.d. weights on edges of a cubic lattice. Under the assumptions that a weight is equal to zero with probability smaller than the critical probability of bond percolation in a cubic lattice, and has the α-th moment for some $\alpha > 1$, we investigate rates of convergence in first passage time.

11 日比野雄嗣 (佐賀大工)♯ 直積グラフの距離 k グラフに関する漸近的スペクトル分布 ····· 15

Yuji Hibino (Saga Univ.)♯ Asymptotic spectral distributions of distance-k graphs of direct product graphs

概要 We will show that the distance-k graph of the N-th direct power of any fixed graph approximate the k-th Hermite polynomial of a standard normal variable as $N \to \infty$.

15:00〜16:00 特別講演

中島誠 (筑波大数理物質)♯ Branching random walks in random environment

Makoto Nakashima (Univ. of Tsukuba)♯ Branching random walks in random environment

概要 We consider branching random walks in time-space random environment. Branching random walks are often regarded as the random measure process on $\mathbb{Z}^d$ or $\mathbb{R}^d$. When environment is constant, a lot of properties as random measure process are already studied. We will discuss the properties as random measure process for random environment case.

16:15〜17:15　特別講演

福 山 克 司 (神 戸 大 理)♯ 等比数列の一様分布論

Katusi Fukuyama (Kobe Univ.)♯ Uniform distribution theory for geometric progressions

概要　Metric discrepancy results for various sequences will be presented. One of the main target is the investigation of the class consisting of geometric progressions and its variations.

9月25日(水)　　第VIII会場

9:15〜11:50

12 高 橋 博 樹 (慶 大 理 工)* Prevalence of non-uniform hyperbolicity at the first bifurcation of the Hénon family ····· 20

Hiroki Takahashi (Keio Univ.)* Prevalence of non-uniform hyperbolicity at the first bifurcation of the Hénon family

概要　We consider strongly dissipative Hénon-like maps in the plane, around the first bifurcation parameter a^* at which the uniform hyperbolicity is destroyed by the formation of homoclinic or heteroclinic tangencies inside the limit set. In [Takahasi H.: Commun. Math. Phys. **312** 37–85 (2012)] it was proved that a^* is a full Lebesgue density point of the set of parameters for which the non wandering set of the corresponding map is transitive, and Lebesgue almost every initial point diverges to infinity under forward iteration. For these parameters, we show that all Lyapunov exponents of all invariant ergodic Borel probability measures are uniformly bounded away from zero, uniformly over all the parameters.

13 池 田 拓 哉 (阪 大 理)* 擬コンパクトな Perron–Frobenius 作用素をともなったある種の非特異変換に関する中心極限定理について ····· 15
盛 田 健 彦 (阪 大 理)

Takuya Ikeda (Osaka Univ.)* Central limit theorem for a class of nonsingular transformations with quasi-compact Perron–Frobenius operator
Takehiko Morita (Osaka Univ.)

概要　We consider a class of nonsingular transformations T on a probability space $(X, \mathcal{B}, m)$ satisfying the following two conditions. First, there exists a Banach algebra V with $1 \in V$ embedded continuously in $L^\infty(m)$ and dense in $L^1(m)$. Secondly, the so called Perron–Frobenius operator $\mathcal{L}_{T,m}$ of T restricted to V is quasi-compact and its iterations $\mathcal{L}_{T,m}^n$ are uniformly bounded on V. Then given a real valued element f in V we can show a central limit theorem of mixed type with nice convergence rate for the sum $\sum_{k=0}^{n-1} f \circ T^k$ as $n \to \infty$ provided that the limiting variance is nondegenerate.

14 森　　真 (日 大 文 理)♯ On the essential spectrum of Perron–Frobenius operator ····· 20

Makoto Mori (Nihon Univ.)♯ On the essential spectrum of Perron–Frobenius operator

概要　We consider piecewise linear and Markov transformations F with same slope β ($\beta > 1$) on an interval I. As is well-known, when we restrict the Perron–Frobenius operator P associated with F to the set of functions with bounded variation, the spectrum radius of P equals 1 and the essential spectrum radius equals β^{-1}. On the other hand, if F is Markov, the dynamical zeta function $\zeta(z)$ is a rational function. Thus, when we consider a suitable domain of P, there exists possibility that the essential spectrum radius become smaller. In this talk, we will study the cases when we restrict its domain to the set of piecewise continuous functions.

概要　Let $p_t(x,y)$ be the heat kernel associated with the canonical self-similar Dirichlet form on a generalized Sierpiński carpet and let d_s denote the spectral dimension of the Dirichlet space, so that $t^{d_s/2}p_t(x,x)$ is uniformly bounded from above and below by positive constants for $t \in (0,1]$. This talk presents two recent results of the author on asymptotic behavior of $p_t(x,x)$ as $t \downarrow 0$. The former result asserts that for a "generic" (in particular, almost every) point x of the fractal, $t^{d_s/2}p_t(x,x)$ *neither* varies regularly at 0 *nor* is asymptotically log-periodic, whereas the latter states a short time asymptotic expansion of the trace of the heat semigroup involving ONLY finitely many log-periodic functions and an exponentially decaying remainder.

概要　We define matrix-valued rigid functions, and extend some known results in the 1-dimensional case, connecting kernels of Toeplitz operators and completely nondeterministic (CND) stationary processes, to the multi-dimensional case.

概要　In information transmission over Gaussian channels, it is well known that the error probability can be substantially reduced by using feedback, namely, under the average power constraint, the error probability decreases more rapidly than the exponential of any order. We consider continuous-time white Gaussian channels with feedback. The aim is to prove a stronger result on the multiple-exponential decay of the error probability. More precisely, for any positive constant c, there exists a feedback coding scheme such that the error probability $P_e(T)$ at time T decreases more rapidly than the exponential of order cT as T tends to infinity.

概要　A numerical characteristic of large random numbers is studied. Let F be a distribution on the real numbers with infinite endpoint. X denotes a random variable with distribution F. Consider the transformation for a decimal number $d_1d_2d_3...d_n.d_{n+1}...$ in $[10^{n-1},10^n)$ to $0.d_2d_3...$ in $[0,1)$. We are interested in the distribution of transformed X for large X, which implies the behavior of the large random number except the first figure. It is shown that the distribution of transformed X converges as X becomes large for most distributions and the limit distribution depends on the tail behavior of F.

19　鈴 木　　聡 (島根大総合理工)♯　不確実性を持つ準凸計画問題に対する surrogate 双対定理について　···· 15
黒 岩 大 史 (島根大総合理工)

Satoshi Suzuki (Shimane Univ.)♯　Surrogate duality for quasiconvex programming with data uncertainty
Daishi Kuroiwa (Shimane Univ.)

概要　Robust optimization problems, which have uncertain data, are considered. We investigate surrogate duality theorem for robust quasiconvex optimization problems. We give necessary and sufficient constraint qualifications for surrogate duality, and show some examples at which such duality results are used effectively.

9月26日(木)　　第VIII会場

9:00〜12:00

20　藤 井 孝 之 (滋 賀 大 経 済)♯　ジャンプ型マルコフ過程のノンパラメトリック推定　····· 15

Takayuki Fujii　(Shiga Univ.)♯　Nonparametric estimation for jump Markov processes

概要　We consider nonparametric estimation problems for a class of jump Markov processes. First we introduce the local time related to the level crossings and construct the local time estimator for the stationary density, which is unbiased and uniformly consistent. Furthermore, we also investigate other estimation problems for the jump intensity and the conditional jump size distribution.

21　佃　　康 司 (総合研究大学院大)♯　変化点問題に対する ℓ^∞ および L_2 空間の Z-process 法　····· 20
西 山 陽 一
(統計数理研・総合研究大学院大)

Koji Tsukuda　♯　Z-process methods in ℓ^∞- and L_2-spaces for change point problems
(Grad. Univ. for Adv. Stud.)
Yoichi Nishiyama
(Inst. of Stat. Math./Grad. Univ. for Adv. Stud.)

概要　We propose some new test statistics for some parametric change point problems. For testing goodness-of-fit, there are three well-known tests, namely, Kolmogorov–Smirnov test, Crámer–von Mises test and Anderson–Darling test. We are interested in Anderson–Darling test because its power is known to be good. To treat Anderson–Darling type statistics, choosing L_2-space as the framework of weak convergence is natural. We apply this method to change point problems. In this talk, we will present a modification of the test statistic by Horváth and Parzen (1994) to Anderson–Darling type, derive its asymptotic distribution under null hypothesis and prove consistency of test under alternative hypothesis.

概要　We prove the local asymptotic mixed normality (LAMN) property for statistical models of nonsynchronously observed diffusion processes when the length of observation intervals go to 0. The problem of nonsynchronous observations appears when we estimate the covariance of security returns using high-frequency financial data. When the statistical model has the LAMN property, we obtain a lower bound of the asymptotic variance of estimation error for any estimator of the parameter. We also see that the quasi-maximum likelihood estimator and the Bayes type estimator proposed by Ogihara and Yoshida (2012) attain this bound and hence are asymptotically efficient.

概要　We consider the problem of testing for mean vector and simultaneous confidence intervals when the data have monotone pattern missing observation. The maximum likelihood estimators of the mean vector and the covariance matrix for the case of three-step monotone missing data are given based on the result of Jinadasa and Tracy (1992). Further the covariance matrix of the maximum likelihood estimator of mean vector are obtained and approximate upper percentiles of the Hotelling's T^2 type statistic are proposed. These upper percentiles are then used to obtain simultaneous confidence intervals for the equality of mean components and linear contrasts. Finally the accuracy of the approximation is investigated by Monte Carlo simulation.

概要　We deal with a one-sample location test in high-dimensional data. For high dimensional data, Hotelling's T^2-statistics is not always well conditioned in the viewpoint of power of a test. Consequently, due to loss of the power, some nonexact approaches are proposed, e.g., Dempster's test, Bai–Saranadasa's test, and so on. In this talk, we focus on the power of Hotelling's T^2 test and Dempster's test. We propose the asymptotically optimal linear combination test statistics of T^2-statistics with the Dempster's test statistics when their asymptotic power is equal. Optimality is meant with respect to maximization of the asymptotic power function. Our numerical results show that the new test have higher power than the both Dempster's test and Hotelling's test in most cases.

概要 We provide the cut-off point for high-dimensional discriminant rule based on conditional error rate and expected error rate. In high-dimensional data, we can not use Wald-Anderson's plug-in criterion. For this reason, we use the Euclidean distance discriminant rule (EDDR) provided by Saranadasa (1993). To determine the cut-off point, we derive the asymptotic distribution for the conditional error rate and the second order unbiased estimator of expected error rate under the high-dimensional settings.

概要 A common feature of high-dimensional data is that the data dimension is high, however, the sample size is relatively low. We call such a data HDLSS data. We consider a geometric representation of a Gaussian-type HDLSS data. We find a surprising geometric characteristic in the dual space of the HDLSS data when the mean is not zero. We give an estimator of the eigenvalue by using the noise-reduction methodology created by Yata and Aoshima (2012). We show that the estimator enjoys the consistency in a mild condition when the dimension is high. In addition, we provide an asymptotic distribution of the estimator for the largest eigenvalue. Finally, we apply the findings to constructing a confidence interval of the largest eigenvalue.

概要 In this talk, we consider the asymptotic normality for inference on high-dimensional mean vectors. We relax the conditions to verify the asymptotic normality of concerned statistic for high-dimensional settings. We verify the asymptotic normality under some mild conditions. With the help of the asymptotic normality, we show that concerned statistics can ensure consistency for inferences on multi-sample and high-dimensional mean vectors.

概要　In this talk, we apply an empirical likelihood approach to the problem of classifying a multivariate (not necessarily Gaussian) stationary process into one of two categories described by two hypotheses Π_1 and Π_2, which specify that $\{\boldsymbol{X}(t);\ t \in \mathbb{Z}\}$ has "pivotal quantities" $\boldsymbol{\eta}_1$ and $\boldsymbol{\eta}_2$ under Π_1 and Π_2, respectively. It is shown that the misclassification probabilities by the empirical likelihood classification criterion converge to 0 as sample size tends to infinity. We also discuss non-Gaussian robustness, and show that for scalar processes, the empirical likelihood statistic is always non-Gaussian robust. To confirm the theoretical results, simulation studies are given.

概要　In this talk, we introduce a new way to estimate the tail index. It is known that there is an asymptotic distribution for any self-normalized sum made from an independent and identically distributed distribution function which belongs to a domain of attraction of a stable law. We give a general and explicit formula for the moments of the asymptotic distribution of symmetric self-nomalized sums. The result shows that the finite order moments are polynomials of the tail index of the distribution function and then always finite. As an application, tail index can be estimated through our result by using moment estimators. The numerical results compared with Hill's estimator will also be presented.

14:30〜15:30　特別講演

概要　As an alternative to maximal inequalities based on the usual methods of "chaining" that have been developed in the study of random fields, a new stochastic maximal inequality is prepared for some purposes stated below by using the formula for integration by parts. The main aim of this work is to obtain some central limit theorems (CLTs) in the space of bounded functions equipped with the uniform metric for three kinds of sequences of separable random fields of locally square-integrable martingales. As special cases, some new results for i.i.d. random sequences, including a new Donsker class and a maximal inequality for empirical processes indexed by a class of functions, are presented. This kind of results have been known to be useful for semiparametric statistical inference as well as statistical machine learning. The talk will be finished with some other topics of independent interest including an infinite-dimensional version of the classical CLT, a sufficient condition for the existence of bounded continuous version of separable, centered Gaussian random fields, a sufficient condtion for the VC-dimension of given countable class of sets to be finite, and asymptotic representation of semiparametric Z-estimators that are adaptive in many cases and useful for deriving semiparametric AIC.

15:45〜16:45　特別講演

山 本 紘 司 (阪　大　医)♯ 正方分割表におけるモデリングとその応用

Kouji Yamamoto (Osaka Univ.)♯ Modelling for square contingency tables and its application

概要　For the analysis of square contingency tables with the same row and column classifications, many observations concentrate on (or near) the main diagonal cells of the table. Therefore, the independence between the row and column classifications rarely holds. So, for analyzing such tables, we are interested in symmetry or asymmetry between the row and column classifications, instead of the independence between them.

Many statisticians have proposed models on symmetry or asymmetry. In this talk, I focus on models for analyzing square contingency tables with ordered categories, based on the cumulative probabilities. Also I talk about model that may be appropriate, if it is reasonable to assume an underlying a specified distribution.

As an application, some examples are shown using models described above, including real data analysis and numerical simulations.

9月27日(金)　第Ⅷ会場

9:15〜12:00

概要　Conditional independence is a fundamental concept in statistics and applied in a variety of fields. In this talk, we deal with the implication problem of conditional independence statements, that is, testing whether a conditional independence statement is derived from a set of other conditional independence statements. In order to solve this problem, we propose a new algebraic methods. The method is based on an idea that the implication problem can be transformed into an easier problem by adding extra conditional independence statements to a given set of conditional independence statements.

概要　Bartlett-type adjustment is a higher-order asymptotic method for improving the chi-squared approximation to the null distributions of various test statistics, which ensures that the resulting test has size alpha up to the third-order. In this talk, we continue our recent works on the third-order average local power properties of several Bartlett-type adjusted tests. Our results are applicable in wide generality since they allow both the interest and nuisance parameters to be multi-dimensional, for which there is no assumption regarding the global parameter orthogonality. We discuss Stern's (1997) adjusted profile likelihood inference for handling nuisance parameters.

概要 In this talk we discuss theoretical properties of a smoothed Wilcoxon's signed rank test, which is based on a kernel smooting. We show that the smoothed Wilcoxon's signed rank test is equivalent to the Wilcoxon's signed rank test in the sense of Pitman efficiency, and its main term of the variance does not depend on the distribution of the population, under the null hypothesis. Though the smoothed Wilcoxon's signed rank test is not distribution-free, we can obtain an Edgeworth expansion which does not depend on the distribution of the population.

概要 For the square contingency tables with ordered categories, Saigusa et al. (2013) have proposed an extended palindromic symmetry model. We give the decomposition of symmetry using extended palindromic symmetry model.

概要 In this talk we discuss a lemma in linear algebra on the eigenvalues of a Hermitian matrix and present a new proof of Fisher's inequality on the number of blocks of a balanced incomplete block design.

概要 We propose two explicit constructions for Φ_p-optimal rotatable designs of degree 3 on the unit ball. The first one is a group-theoretic construction, which provides a systematic treatment of some related approaches that have been traditionally used in design of experiments. The second one is a combinatorial construction, which was originally studied by Victoir (2004) in the context of a certain numerical integration formula called a cubature formula. This construction is easy but very powerful, as well as will act as an intermediary between an optimal design and various combinatorial objects such as block designs and orthogonal arrays.

概要　The existence of an affine alpha-resolvable triangular design has been investigated by Kageyama (2007, 2008), who showed its non-existence for any alpha less than or equal to 10. In this talk, for a symmetric design the existence will be disproved completely.

概要　Some class of ℓ PAB(v,k,λ) have been constructed by direct and recursive methods in Matsubara et.al (2006, 2007, 2013). In particular, for ℓ PAB$(v,2,1)$, it has been shown that there are 3 PAB$(v,2,1)$ for any $v \geq 6$. However, the existence of ℓ PAB$(12,2,1)$ with $\ell \in \{4,5,6\}$ is not known in literature. The purpose of this talk is devoted to provide some construction of ℓ PACB$(v,2,1)$ and show some nonexistence of ℓ PACB$(v,2,1)$.

概要　We consider a nested row-column design with split units for a two-factor experiment. The whole plot treatments occur in a regular generalized Youden design and the subplot treatments occur in a proper block design. We consider a mixed linear model for the observations with a four-step randomization, i.e., the randomization of blocks, the randomization of the rows (or columns) within each block, the randomization of the columns (or rows) within each block and the randomization of the subplots within each whole plot. We give the stratum efficiency factors for such a nested row-column design with split units, which has the general balance property.

概要　We consider a fractional 3^m factorial design derived from a simple array (SA), which is a balanced array of full strength, where $m \geq 4$. In this situation, we give a necessary and sufficient condition for an SA to be a balanced fractional 3^m factorial design of resolution V. Such a design is characterized by the suffixes of the index of an SA.

概要 A conflict-avoiding code (CAC) of length m and weight w is defined as a collection C of w-subsets (called codewords) of $\mathbb{Z}_m = \{0, 1, \ldots, m-1\}$, the ring of residues modulo m, such that $\Delta(x) \cap \Delta(y) = \emptyset$ for any $x, y \in C$, where $\Delta(x) = \{j - i \pmod m : i, j \in x, i \neq j\}$. The class of all the CACs of length m and weight w is denoted by $\mathrm{CAC}(m, w)$. A code $C \in \mathrm{CAC}(m, w)$ is called an equi-difference code if every codeword $x \in C$ has the form $\{0, i, 2i, \ldots, (w-1)i\}$. In this talk, we will present several explicit series of odd m for equi-difference codes which have maximum code size in $\mathrm{CAC}(m, 3)$ by revisiting several properties of multiplicative order of a unit in $\mathbb{Z}_m \setminus \{0\}$ and cyclotomic polynomials.

応　用　数　学

9月24日(火)　　第VII会場

9:45〜12:00

1　松　岡　千　博 (愛　媛　大　理)♯　エノン写像のエントロピーの計算 …… 15
平　出　耕　一 (愛　媛　大　理)

Chihiro Matsuoka (Ehime Univ.)♯　Entropy estimation of the Hénon attractor
Koichi Hiraide (Ehime Univ.)

概要　The topological entropy of the Hénon attractor is estimated using a function that describes the stable and unstable manifolds of the Hénon map. This function provides an accurate estimate of the length of curves in the attractor. The estimation method presented here can be applied to cases in which the invariant set is not hyperbolic. From the result of the length calculation, we have estimated the topological entropy h as $h \sim 0.49703$ for the original parameters $a = 1.4$ and $b = 0.3$ adopted by Hénon.

2　野　口　健　太 (慶　大　理　工)♯　閉曲面上の偶三角形分割の monodromy の同値類 …… 15

Kenta Noguchi (Keio Univ.)♯　Congruence classes of the monodromy of even triangulations on surfaces

概要　An even triangulation on a closed surface is an embedded graph where every face is a triangle and the degree of every vertex is even. It is known that there is an invariant of even triangulations, called “monodromy”. In this talk, we count the number of congruence classes of the monodromy of even triangulations.

3　V. Borozan (Univ. Paris 11・Hungarian Acad. of Sci.)♯　Partitioning a graph into highly connected subgraphs …… 10
藤　田　慎　也 (前　橋　工　科　大)
古　谷　倫　貴 (東　京　理　大　理)
Y. Manoussakis (Univ. Paris 11)
Narayanan N (Indian Inst. Tech.)

Valentin Borozan (Univ. Paris 11/Hungarian Acad. of Sci.)♯　Partitioning a graph into highly connected subgraphs
Shinya Fujita (Maebashi Inst. of Tech.)
Michitaka Furuya (Tokyo Univ. of Sci.)
Yannis Manoussakis (Univ. Paris 11)
Narayanan N (Indian Inst. Tech.)

概要　We discuss partitioning a graph into highly connected subgraphs. Let G be a graph of order n. We prove that if the minimum degree of G is at least $\lceil\sqrt{n}\rceil$, then $V(G)$ can be partitioned into several parts $H_1, \ldots, H_l$ such that each H_i induces a 2-connected graph.

概要 We treat the vertex weighted complexity of a graph, and give a generalization of Northshield's theorem for the vertex weighted complexity of a graph. Furthermore, we present an explicit formula for the vertex weighted complexity of a regular covering graph of G in terms of that of G.

概要 We continue the study of the maximal value of break intervals for equitable round-robin tournaments with home-away assignments. By using the m-team conditions, we prove the uniqueness of the break interval sequence with maximal break interval $k+1$ for 2^{k+1} teams. Further, we show that the maximal value of break intervals for equitable round-robin tournaments with $2n$ $(2^k < n < 2^{k+1})$ teams is equal to or less than $k+1$.

概要 We study the application of the inverse ultradiscretization, a method for deriving partial differential equations from a given cellular automaton, to a two-dimensional nonlinear cellular automaton. It is shown that the obtained partial differential equation preserves self-organizing patterns of the cellular automaton.

概要 Walsh figure of merit WAFOM(P) is a quality measure of point sets P for quasi-Monte Carlo integration constructed by a digital net method. WAFOM(P) is bounded by the minimum Dick weight of $P^{\perp}$, where the Dick weight is a generalization of Hamming weight. In this talk, we give an explicit construction of point sets with large minimum Dick weight using Niederreiter–Xing sequences and Dick's interleaving construction. These point sets are also examples of low-WAFOM point sets.

概要 By the theorem of Vizing, it is known that every graph G has an edge-coloring with exactly $\Delta(G)$ or $\Delta(G)+1$ colors, where $\Delta(G)$ is the maximum degree of G. If G has an edge-coloring with $\Delta(G)$ colors, then G is called **Class 1**. For a graph G, the **core** of G is the subgraph of G induced by the vertices of degree $\Delta(G)$. The conjecture by Hilton and Zhao asserts that every graph G of even order is Class 1 if the core of G has maximum degree at most 2. In this talk, we show that it is true if G is a claw-free graph.

14:15〜16:30

概要 Multi-dimensional numerical integration is an essential problem in numerical analysis, and the Monte Carlo method is a first choice in high dimensional cases. However, its convergence rate is significantly slow, so that we often replace random numbers with quasi-random numbers, such as Sobol' and Niederreiter–Xing sequences, for acceleration. Recently, Matsumoto, Saito, and Matoba proposed the Walsh figure of merit (WAFOM), which is a fast computable criterion for quasi-Monte Carlo point sets. They also constructed low-WAFOM point sets based on M-sequences by using random search, but such point sets have a disadvantage that the sample sizes are not extensible. In this talk, we introduce a construction of low-WAFOM point sets with extensibility in terms of the digital construction scheme.

概要 We shall show that an antimatroid is supersolvable as a lattice if and only if the associated rooted circuit graph is acyclic. An antimatroid lattice has a natural edge labelling. It is proved that the natural edge labelling of an atimatroid is an S_n EL labelling if and only if the rooted circuit graph is acyclic. The existence of an S_n EL labelling for a finite graded lattice is known to be equivalent to the supersolvability of the lattice, from which our main result follows. We note that the family of the complements of the elements of an antimatrod is called a convex geometry, and it is particularly a closure system. A closure system gives rise to a closure operator, from which rooted circuits are determied.

概要　In the class of monotone etensive operators on a non-empty finite set, we present the characterizations of idempoence, the exchange property, and the anti-exchange property in terms of rooted circuits and rooted cocircuits. For instance, a monotone extensive operator is a closure operator if it it idempoent. Hence the combination of the idempotence and the exchange property implies that it is a matroid, which leads to a new set of axioms of matroid. The situation is the same for a convex geometry as a convex geomtry comes from the pair of the idempotence and the anti-exchange property. Thus new and old sets of axioms of convex geometry arise from our results.

概要　In this talk, we propose an algorithm for enumerating all the optimal cost vertex colorings of given trees without repetitions if the optimal cost vertex coloring is not unique. Moreover, we characterize trees which use an arbitrary number of colors for optimal cost vertex coloring.

概要　In graph theory, the decomposition problem of graphs is a very important topic. Various type of decompositions of many graphs can be seen in the literature of graph theory. This paper gives balanced (C_9, C_{14})-foil designs and related designs.

概要　In this talk we discuss a lemma in linear algebra on the eigenvalues of a Hermitian matrix and its application to the theory of graph decomposition and isometric embeddings of graphs.

概要　For a coloring c of a graph G, we shall define the Chromatic distance as $cd(c) := \min\{d(x,y)|c(x) = c(y), x \neq y\}$. And for a graph G, and an integer r, we shall define the chromatic distance of G with r colours as $cd(G,r) := \max\{cd(c)|c \text{ is a } r \text{ colouring of } G\}$. If c is a colouring of graph G with $cd(c) > d$, we say c is a (d-) dispersive (r-) colouring (of G). We shall consider the dispersive coloring polynomials of some graphs.

16:50〜17:50　特別講演

原 田 昌 晃 (山 形 大 理)♯　Self-dual code とその周辺

Masaaki Harada (Yamagata Univ.)♯　Self-dual codes and related topics

概要　Self-dual codes, which are an important class of codes for both theoretical and practical reasons, are studied from several viewpoints. For example, many relationships between self-dual codes and unimodular lattices are known. It is a fundamental problem to classify self-dual codes of modest lengths and determine the largest minimum weight among self-dual codes of that length. In my talk, the current state of knowledge about the fundamental problem is presented, including my recent progress. Some observations about relationships between self-dual codes and unimodular lattices are also given.

9月25日(水)　　第VII会場

9:45〜12:00

17　八 森 正 泰 (筑波大システム情報)♯　任意の制限がシェラブルである単体的複体とシェリングの拡張性 …… 15
柏 原 賢 二 (東大総合文化)

Masahiro Hachimori (Univ. of Tsukuba)♯　Simplicial complexes whose restrictions are all shellable, and extendability of shellings

Kenji Kashiwabara (Univ. of Tokyo)

概要　In this talk, we consider simplicial complexes whose restrictions are all shellable. Such simplicial complexes consist a generalized class of matroid complexes. One more property we discuss in this talk is extendable shellability, where, a simplicial complex is extendably shellable if every partial shelling can be extended to a full shelling. Formerly, Bjorner and Erikkson showed that rank 3 (= 2-dimensional) matroid complexes are extendably shellable. In this talk, we show that the 2-dimensional pure skeleton of a 2-dimensional simplicial complex whose restrictions are all shellalble is extendably shellable. This is a generalization of the result of Bjorner and Erikkson.

18　安 藤　　清 (電　通　大)♯　Contractible subgraphs in 5-connected graphs …… 15

Kiyoshi Ando (Univ. of Electro-Comm.)♯　Contractible subgraphs in 5-connected graphs

概要　Let G be a 5-connected graph. A subgraph H of G is said to be contractible if the graph G/H obtained from G by contracting H is still 5-connected. We show that if a 5-connected graph G with $|V()| \geq 13$ has a fragment A such that (1) $|A| = 2$ and (2) either A has a vertex of degree 6 or A has no edge, then G has a contractible subgraph H with $|E(H)| \leq 2$.

19 中本敦浩 (横浜国大環境情報)♯
小田芳彰 (慶大理工)
山下登茂紀 (近畿大理工)
渡辺守 (倉敷芸術科学大)
Balanced partitions on permutations and their application to a geometric problem ····· 15

Atsuhiro Nakamoto ♯ (Yokohama Nat. Univ.)
Yoshiaki Oda (Keio Univ.)
Tomoki Yamashita (Kinki Univ.)
Mamoru Watanabe (Kurashiki Univ. of Sci. and Arts)
Balanced partitions on permutations and their application to a geometric problem

概要 For a permutation of a set $1, 2, ..., n$, we consider some balanced partition of it. We also consider an application of the result on geometry.

20 藤本実 (精華科学研)♯
上原邦彦 (帝塚山大経営)
$2d$ 差素数導出アルゴリズムと Hardy–Littlewood 予想 ····· 15

Minoru Fujimoto (Seika Science Lab.)♯
Kunihiko Uehara (Tezukayama Univ.)
An algorithm for the pair of primes of difference $2d$ and Hardy–Littlewood conjecture

概要 Polignac's conjecture states that for every positive even natural number $2d$, there are infinitely many consecutive prime pairs p and p' such that $p' - p = 2d$. In the case of $d = 1$, we handle the twin primes. We will give a new and simple algorithm which is similar to the Eratosthenes' sieve to be born the the pair of primes of difference $2d$. We will discuss the Hardy–Littlewood conjecture and give an evaluation for the density of these primes.

21 藤本実 (精華科学研)♯
上原邦彦 (帝塚山大経営)
Sophie Germain 素数導出アルゴリズムと双子素数 ····· 15

Minoru Fujimoto (Seika Science Lab.)♯
Kunihiko Uehara (Tezukayama Univ.)
An algorithm for the Sophie Germain primes and the twin primes

概要 A prime number p is a Sophie Germain prime if $2p + 1$ is also prime. It is conjectured that there are infinitely many Sophie Germain primes, but this has not been proven. We give a new and simple algorithm which is similar to the Eratosthenes' sieve to get the Sophie Germain primes. Using this algorithm, we discuss the conjecture above and give an evaluation for the density of these primes.

22 松本直己 (横浜国大環境情報)♯
M. Kotrbčík (Comenius Univ.)
閉曲面に埋め込み可能なスナークの頂点数について ····· 15

Naoki Matsumoto ♯ (Yokohama Nat. Univ.)
Michal Kotrbčík (Comenius Univ.)
The order of snarks can be embedded in surfaces

概要 In this talk, we only deal with finite, undirected and simple graphs. A *snark* is a 3-regular, cyclically 4-edge-connected, the girth is at least 5 and has no 3-edge-coloring. There are many results and open problems for snarks. For example, there is a famous conjecture of snarks on orientable surfaces, called Grünbaum conjecture, which is very recently disproved by Kochol. For proving the conjecture, many researchers found many kinds of snarks. In this talk, we consider the order of snarks which can be embedded in fixed surfaces.

概要 We say an edge that joins two vertices of a cycle is a chord of the cycle if the edge is not an edge of the cycle. A cycle is doubly chorded cycle if there are at least two such chords. We show a sharp degree sum condition on the existence of k vertex-disjoint doubly chorded cycles in a graph of order at least 6k.

概要 Let G be a triangulation a surface, and an edge-coloring of G is called a Grünbaum coloring if each face of G receive three distinct colors on the boundary edges. A triangulation G is said to be Eulerian if each vertex has even degree. We prove that several types of Eulerian triangulations have Grünbaum coloring.

13:00〜14:00　特別講演

概要 We consider mathematical models of a pattern formation arising in processes described by a system a single reaction-diffusion equation coupled with an ordinary differential equation. This type of models exhibits the diffusion-driven instability, and it is expected that non-constant stationary solutions exist and some spatially inhomogeneous solutions converge toward them. We shall discuss the stability of inhomogeneous stationary solutions and a possible large time behaviour of solutions.

9月26日(木)　第VII会場

9:30〜10:20

概要 In this talk, we consider coloring of graphs under the assumption that some vertices are already colored. Let G be an r-colorable graph and let $P \subset V(G)$. Albertson (1998) proved that if every pair of vertices in P have distance at least four, then every $(r+1)$-coloring of $G[P]$ can be extended to an $(r+1)$-coloring of G, where $G[P]$ is the subgraph of G induced by P. In this talk, we allow P to have pairs of vertices of distance at most three, and investigate how the number of such pairs affects the number of colors we need to extend the coloring of $G[P]$.

概要　An edge joining two nonconsecutive vertices of a cycle is called a *chord*, and a cycle with a chord is called a *chorded cycle*. One can easily see that any graph with minimum degree at least 3 contains a chorded cycle. Corresponding to Corrádi and Hajnal's result, Finkel (2008) showed that any graph with at least $4k$ vertices and minimum degree at least $3k$ contains k vertex-disjoint chorded cycles. This minimum degree condition is sharp, because the complete bipartite graph $K_{3k-1,n-3k+1}$ does not contain k vertex-disjoint chorded cycles. In this talk, we consider vertex-disjoint chorded cycles of the same length, and give a minimum degree condition for a large graph to contain such chorded cycles.

概要　Yoshimasu Murase introduced the 2 dimensions recurrence formula of x*x in 1673. In 2009, we discovered Tuchikura–Horiguchi method which is an expansion of the Newton method by way of Yoshimasu Murase. We give continued fraction presentations of the powers of square root and cubic root by Tsuchikura–Horiguchi method (the first extension recurrence formula of Murase Yoshimasu–Newton's type).

10:30〜12:00　特別セッション「将棋とパズル」

概要　We give an overview of the construction of strong computer Shogi programs, especially focusing on the design of the evaluation function of the game board.

概要 Imaginary cubes are three dimensional objects which have square projections in three orthogonal ways just as a cube has. In this talk, we study imaginary cubes and present puzzles based on them. We show that there are 16 equivalence classes of minimal convex imaginary cubes, among whose representatives are a hexagonal bipyramid imaginary cube and a triangular antiprism imaginary cube. Our main puzzle is based on remarkable properties of these objects, in particular, the possibility of tiling 3D Euclidean space. We show how these objects are related to fractals, and present sculptures and coloring problems of them.

14:15〜17:45

概要 Bogdanov–Takens bifurcation (BT bifurcation) is observed in a shadow system of three component reaction-diffusion system around the triple degenerate point of 0:1:2 modes. We state that the normal form around the triple degenerate point of the RD system can be re-normalized into the normal form for BT bifurcation. The result is obtained by applying center manifold reduction and normal form transformation.

概要 In this talk, we deal with the Keller–Segel system with the logistic growth. This system exhibits two types of spatio-temporal oscillations in the distinct parameter regimes. We discuss why the two oscillations are observed in the Keller–Segel system with the logistic growth.

概要 An ordinary differential equation describing virus infection predicts a conserved quantity. We validated the quantity based on time-course of experimental data in virus infection.

概要 Annual or seasonal fluctuation of the incidence size has been observed for a variety of infectious diseases, for example, influenza, measles, rubella, mumps, chickenpox etc. In case when incidence sizes in past epidemic seasons were large, the people in the community would tend to increase the prevention level against the infectious disease. To consider the essential effect of such social factor on the potentiality of incidence size fluctuation, we construct and analyze a simple mathematical model of discrete dynamical system, which is derived from the final-size equation of Kermack–McKendrick SIR model. We show that such social factor could potentially or partially contribute to the driving force causing the annual or seasonal fluctuation of incidence size for some infectious diseases.

概要 We consider crystalline curvature flow with a driving force. This equation is a simple model of spiral crystal growth. We mainly discuss the motion of spiral-shaped curve with a moving tip and show global existence of the solutions.

概要 Consider a co-rotating pair of spiral steps provided by a pair of screw dislocations. Burton, Cabrera and Frank proposed the critical distance of a co-rotating screw dislocations which we can regard the pair as a single screw dislocation with two spiral steps. In this talk we present some numerical results to see that there is the gap between their critical distance and numerical results. Then, we give a new definition and more precise value of the critical distance with making a formula of the growth rate of a crystal surface by a co-rotating pair.

概要　This article describes some dynamic aspects on dynastic utility incorporating two-sided altruism with an OLG setting. We analyzed the special case where the weights of two-sided altruism are dynamically inconsistent. The Bellman equation for two-sided altruism proves to be reduced to one-sided dynamic problem, but the effective discount factor is different only in the current generation. We show that a contraction mapping result of value function cannot be achieved in general, and that there can locally exist an infinite number of self-consistent policy functions with distinct steady states (indeterminacy of self-consistent policy functions).

概要　For a dataset whose orbit is distributed densely in the phase space, a data analysis method in the framework of stochastic differential equations (SDEs) is considered. Using the relation between the solution and the coefficients of SDE, we attempt to evaluate the coefficients by the data in order to extract its dynamics. Here, we introduce the improved formula to estimate the SDE coefficients and the quantitative index of predictability of the orbit of the data, and finally we show the result obtained by the presented method.

概要　The microbial population is considered as a time factor of a degradation rate in a microbial depolymerization process. An inverse problem is solved to construct a molecular factor of a degradation rate. An initial value problem is solved to simulate the transition of the weight distribution and the microbial population.

概要 We consider the dynamics of a pulse solution (front-back pulse) arising in a bistable reaction-diffusion system in one space dimension. It is numerically found that the front-back pulse exhibits five kinds of behavior when it encounters a jump-type heterogeneity. Among them, we focus on a sliding motion of an oscillatory standing pulse solution. To analytically clarify its mechanism, the original PDE system is first reduced to a mixed ODE-PDE system and then center manifold reduction is applied to the reduced system.

概要 We consider an inverse problem of determining unknown coefficients for a time-dependent radiative transport equation on a one-dimensional spatial interval. The main result shows that the absorption coefficient and the effective scattering coefficient are uniquely determined by giving pulse-like inputs at the endpoints of the interval and observing the outputs. The inverse problem is analyzed by considering the structure of the solution to the direct problem with pulse-like inputs.

概要 We propose a crack propagation model on a spring-block system using an idea of phase field model for the damage of springs. We consider a discrete model of elastic body using a scalar or tensor-valued spring-block system, and study its properties in detail. Our fracture model is constructed on the spring-block system. It is described in a mathematically clear way and the unique existence and regularity of a solution are proved.

9月27日(金)　第VII会場

9:00〜12:00

概要　Particle methods have been developed as computation method for compressible or incompressible flow, and particularly used to understand massive phenomenon such as Tsunami. On the other hand, mathematical analysis such as truncation error and stability is not enough. We have investigated the truncation error, which is first step of mathematical justification, of approximated operators of SPH and MPS method that are main methods of particle methods.

概要　A pressure-stabilized characteristics finite element scheme for the Navier–Stokes equations is presented and its error estimates for the velocity and the pressure are proved. The scheme can deal with convection-dominated problems and leads to the symmetric coefficient matrix of the system of linear equations. A cheap P1/P1 finite element is employed and degrees of freedom are smaller than that of other elements. Therefore, the scheme is useful especially for three dimensional problems. Two and three dimensional numerical results are shown to recognize the theoretical convergence orders.

概要　The numerical asymptotic stability of the simplified order 2.0 weak Taylor scheme for stochastic differential equations is discussed. We study asymptotic stability of the simplified order 2.0 weak Taylor scheme with a random variable that matches the first five moments of the normal random variable. In this talk three types of the random variable will be treated.

概要　Through investigating conditions of nonlinear symmetrical differential equations with dihedral group and odd function, specifications for bifurcations are studied, namely one of these bifurcations is identified as a transcritical bifurcation.

概要 In this note we study higher order systems of linear difference equations where the associated characteristic matrix polynomial is self-inversive. We consider classes of equations with bounded solutions.

概要 I deal with the eigenvalue problem of Laplacian in a singularly perturbed domain. This domain is given by removing a thin tubular neighborhood of a submaniforld M, from the original fixed domain. I consider the asymptotic behavior of each eigenvalue of Laplacian (Dirichlet or other boundary condition), when the thinness (small) parameter goes to zero.

概要 In this talk, we consider multiple existence of traveling waves of a free boundary problem

概要 Consider the solution $u(x,t)$ of the heat equation with initial data u_0. The diffusive sign $S_D[u_0](x)$ is defined by the limit of sign of $u(x,t)$ as $t \to 0$. A sufficient condition for $x \in \mathbf{R}^d$ and u_0 such that $S_D[u_0](x)$ is well-defined is given. A few examples of u_0 violating and fulfilling this condition are given. It turns out that this diffusive sign is also related to variational problem whose energy is the Dirichlet energy with a fidelity term. If initial data is a difference of characteristic function of two disjoint sets, it turns out that the boundary of the set $S_D[u_0](x) = 1$ (or -1) is roughly an equi-distance hypersurface from A and B and this gives a separation of two data sets.

概要　This talk is concerned with nonlinear and linear discrete-time algorithms for cross-diffusion systems. The nonlinear scheme corresponds to backward differences in time. The linear algorithm is a very easy to implement scheme we proposed. The main purpose of this paper is to derive convergence rates of the discrete-time schemes. We obtain the same orders for both the nonlinear and the linear schemes. Moreover, these orders are optimal. We also establish uniqueness and regularity results of weak solutions of the cross-diffusion systems.

概要　The Courant–Friedrichs–Lewy condition (CFL condition) is one of the most well-known concepts in the analysis of finite difference schemes, and it is sometimes misunderstood as the criterion for stability of numerical solutions. In this study, we recall the original meaning of the CFL condition as a necessary condition for convergence. We show some numerical experiments to illustrate unstable numerical solutions under the CFL condition.

概要　In this talk, we study Turing patterns in prey-predator reaction-diffusion systems with dormancy of predators. In simple terms, the results show that dormancy of predators is not a generator but an enhancer of spatio-temporal patterns in prey-predator systems.

14:15〜16:45

51 榊原航也 (明大理工)♯ 桂田祐史 (明大理工)　数値等角写像に対する天野の方法の非星型領域への拡張, 特に双極子法に基づく手法 ····· 15

Koya Sakakibara (Meiji Univ.)♯ Masashi Katsurada (Meiji Univ.)　An extension of Amano's method for numerical conformal mappings to non-starlike domains and the method based on the dipole simulation method

概要　In this talk, we extend the numerical method for conformal mappings proposed by Amano based on the charge simulation method to non-starlike domains. Moreover we propose two numerical methods for conformal mappings. One is that we compute approximate values of h at the collocation points $\{z_j\}_{j=1}^N$ and approximate h by the charge simulation method, or approximate the conformal mapping f by the complex dipole simulation method. The other is to compute numerical conformal mappings based on the dipole simulation method which is one branch of the charge simulation method. In addition, we show results for our numerical experiments and exemplify the effectiveness of our proposing numerical methods.

52 柏原崇人 (東大数理)♯　ロバン境界条件のディリクレまたはノイマン境界条件への収束について ····· 15

Takahito Kashiwabara (Univ. of Tokyo)♯　On the convergence of Robin boundary condition to Dirichlet or Neumann ones

概要　The Robin boundary condition $\partial u/\partial n + \alpha u = 0$ for the Poisson equation formally agrees with the Dirichlet and Neumann conditions when $\alpha = +\infty$ and $\alpha = 0$ respectively. We prove that the solution subject to the Robin condition indeed converges to the one satisfying the Dirichlet and Neumann conditions in the arbitrary Sobolev space $H^m(\Omega)$, with the rates of convergence $O(1/\alpha)$ and $O(\alpha)$, when $\alpha \to +\infty$ and $\alpha \to 0$ respectively.

53 土屋拓也 (早大理工)♯　離散変分法による Einstein 方程式の数値スキームの構築 ····· 15

Takuya Tsuchiya (Waseda Univ.)♯　A new numerical scheme for Einstein equations with discrete variational derivative method

概要　We propose a new set of the discretized equations of the Einstein equations with the discrete variational derivative (DVD) method. Because of the complexity of the Einstein equations, it is difficult to compare the discretized equations by the DVD method with the one by the Crank–Nicolson scheme. Therefore we derive a set of the discretized Maxwell equations with the DVD method, and compare it with the set of the discretized equations by the Crank–Nicolson scheme.

54 高安亮紀 (早大理工)♯ 大石進一 (早大理工・JST CREST)　構成的陰関数の定理とその応用について ····· 15

Akitoshi Takayasu (Waseda Univ.)♯ Shin'ichi Oishi (Waseda Univ. / JST CREST)　The constructive implicit function theorem and its applications to continuation method

概要　In this talk, the implicit function theorem is considered. The classical implicit function theorem yields the existence and local uniqueness of solutions for parameterized nonlinear operator equations in Banach spaces. Nevertheless, the explicit range of solution existence is difficult to obtain directly. The constructive implicit function theorem assures the explicit bound by computer assistance. Furthermore, it applies to numerical continuation method.

概要　We will describe a numerical verification of solutions for infinite-dimensional functional equations based on residual form and Newton-like iteration. The method is based upon the existing verification method originally developed by the authors. Several computer-assisted proofs for differential equations, including nonlinear partial differential equations will be shown.

概要　The fictitious domain approach is useful to compute numerical solutions of PDEs defined in complex domains and time-dependent moving domains. In this paper, we study a simple fictitious domain method with L^2-penalty for elliptic and parabolic problems. A priori estimates and the error estimates for penalization problems are carefully investigated. Our methods can be applied not only to Finite Element Method (FEM) but to Finite Volume Method (FVM). For FEM, the $P1$-element approximation is considered and the error estimates are derived. Introducing an admissible mesh to the fictitious domain, we provide the approximating scheme for FVM and obtain its error estimates. Numerical experiments are performed to confirm the theoretical results.

概要　We propose a new time discretization scheme for a system of nonlinear Schrödinger equations which is a model of the interaction of a non-relativistic particles with different masses. Our scheme is composed of two (complex-valued) linear systems at each time step, and the solution is shown to converge at a second order rate. We report numerical example to confirm the theoretical results. Our idea can be applied to a large class of nonlinear PDEs.

概要　We propose a hybridized discontinuous Galerkin method with the $P_1 - P_0$ element. A weaker penalty term allows us to use the $P_1 - P_0$ element. Several numerical results are presented to verify the validity of our method.

Daisuke Koyama (Univ. of Electro-Comm.)♯
Fumio Kikuchi (Hitotsubashi Univ.)

Korn's inequality for a hybridized discontinuous Galerkin FEM with lifting operator

概要　We present a formulation of hybridized Discontinuous Galerkin Finite Element Method (DGFEM) with lifting operator for the plane stress problem. To validate the formulation, we establish Korn's inequality associated with the DGFEM.

17:00〜18:00　特別講演

Takaharu Yaguchi (Kobe Univ.)♯

Energy-preserving numerical methods based on the finite element exterior calculus for wave-type differential equations

概要　In this talk, we consider energy-preserving numerical methods for the following wave-type equations

$$u_{tt} - (\mathrm{d}\delta + \delta\mathrm{d})u = f$$

where u is a k–form and the operator $\mathrm{d}\delta + \delta\mathrm{d}$ is the Hodge Laplacian. Recently numerical methods that approximate differential forms have received much attention. Among them, the finite element exterior calculus (FEEC) is the most reliable framework, which is based on the finite element method. On the other hand, the above equation is a Hamiltonian system, and hence this equation has the remarkable properties such as the energy conservation law and the symplecticity. We show that the finite element exterior calculus and the energy-preserving integrators by the discrete gradient method can be combined to discretize the above equation.

トポロジー

9月24日(火)　第V会場

9:00〜12:00

1 八木　潤 (高知大理)♯ 5-membered ringed chains のなす配置空間の分類 ····· 15
Jun Yagi (Kochi Univ.)♯ The classification of configuration spaces of 5-membered ringed chains

概要 An n-membered ringed chain is defined by a closed n-chain whose bond lengths are 1 and bond angles are constant except for two successive bond angles without the restriction. So far it has been proven that the configuration space of 5-membered ringed chains with the standard bond angle is a circle. In this talk, we determine the configuration space of 5-membered ringed chains for any bond angle.

2 秋吉宏尚 (阪市大理)♯ 錐特異点を1点持つトーラスの錐双曲構造について ····· 10
Hirotaka Akiyoshi (Osaka City Univ.)♯ Cone hyperbolic structures on the torus with a single cone point

概要 A fundamental polygon for a cone hyperbolic structure on the torus with a single cone point is constructed. The construction is a variation of Jorgensen's theory on the Ford domains of once-punctured torus groups.

3 志摩亜希子 (東海大理)♯ Crossing を4つ含む 4-chart について ····· 15
永瀬輝男 (東海大⋆)
Akiko Shima (Tokai Univ.)♯ 4-charts with four crossings
Teruo Nagase (Tokai Univ.⋆)

概要 We show that there does not exist any 4-minimal 4-chart with four crossings which represents a disjoint union of spheres. That is if a 4-chart with four crossings represents a disjoint union of spheres, then we can reduce the number of white vertices by C-moves.

4 伊藤哲也 (京大数理研)♯ 絡み目群がアーベル群である曲面絡み目 ····· 10
中村伊南沙 (学習院大理)
Tetsuya Ito (Kyoto Univ.)♯ On surface links whose link groups are abelian
Inasa Nakamura (Gakushuin Univ.)

概要 It is known that the link group of a classical link L is abelian if and only if L is an unknot or a Hopf link, and the link type is determined from the linking number. In this talk, we show that the analog of this fact does not hold for surface links. We study surface links whose link groups are free abelian, and we construct various examples of such surface links with the same link group but with various double linking numbers and triple linking numbers. Here the double and triple linking numbers are link-homotopy invariants of surface links, defined as natural generalizations of the classical linking numbers.

概要　For an oriented surface link F in $\mathbb{R}^4$, we consider a satellite construction of a surface link, called a 2-dimensional braid over F, which is in the form of a covering over F. We introduce the notion of an m-chart on a surface diagram $\pi(F) \subset \mathbb{R}^3$ of F, which is a finite graph on $\pi(F)$ satisfying certain conditions and is an extended notion of an m-chart on a 2-disk presenting a surface braid. A 2-dimensional braid over F is presented by an m-chart on $\pi(F)$. It is known that two surface links are equivalent if and only if their surface diagrams are related by a finite sequence of ambient isotopies of $\mathbb{R}^3$ and local moves called Roseman moves. We show that Roseman moves for surface diagrams with m-charts can be well-defined.

概要　An increasing sequence of integers is said to be universal for links if every link has a projection to the sphere such that the number of edges of each complementary face of the projection comes from the given sequence. In this talk, we define universal sequences for spatial graphs and prove that the sequence (1,2,3,4,5) is universal for spatial graphs without vertices of odd degree.

概要　We discuss the region crossing change on spatial-graph diagrams.

概要　Let D be a link diagram. In 2010, A. Shimizu [Shi] et al. introduced a local move on D called region crossing change. Let $\mathcal{R}$ ($\mathcal{C}$ resp.) be the set of the regions (crossings resp.) of D. In [Ha], I introduced $\mathbf{Z}_2$-linear structures on $2^{\mathcal{R}}$ and $2^{\mathcal{C}}$, and showed that region crossing change on D induces a linear map φ:$2^{\mathcal{R}} \to 2^{\mathcal{C}}$. In this talk, I will describe the coset decomposition of $2^{\mathcal{C}}$ by Imφ for the case that D is a 3-component link diagram.

[Shi] A. Shimizu. *Region crossing change is an unknotting operation*, to appear in Journal of the Mathematical Society of Japan.

[Ha] M. Hashizume. *On the homomorphism induced by region crossing change*, to appear in JP Journal of Geometry and Topology.

概要　For each knot of five or less crossings, the set of all regular projections of it is determined by Taniyama. Here a regular projection has no over/under crossing information. In this talk we determine the set of all regular projections of 6_2 knot.

概要　A coherent band surgery is a local move on an oriented link, which is equivalent to a smoothing a crossing. The coherent band-Gordian distance between two links is the least number of coherent band surgeries needed to transform one into the other. We explain how we tabulate the coherent band-Gordian distances between two knots with up to seven crossings.

概要　An oriented knot is almost positive if it is not positive and has a knot diagram with exactly one negative crossing. In this talk, we show that the Rasmussen invariant, 4-genus and 3-genus of an almost positive knot are equal. Moreover, we determine the Rasmussen invariant of an almost postive knot in terms of its almost positive diagram. As corollaries, we prove that there is no homogeneous and almost positive knot, and there is no almost positive knot of 4-genus one.

概要　Any genus one two-bridge knot has a form of $C[2m, -2n]$ in Conway's notation. We examine when a cyclic branched cover over the knot is an L-space. When $mn < 0$, all cyclic branched covers are known to be L-spaces. When $mn > 0$, it is known that the d-fold cyclic branched cover is an L-space only for $d = 2, 3$. In this talk, we verify it for $d = 4$, and also discuss the left-orderability of its fundamental group.

概要　In this talk we will explain how to get a planar graph from a slice disk. The graph presents a singular set in a handle diagram of 4-ball. We will discuss a sufficient condition for the graph to come from a ribbon disk.

14:15〜16:00

14 斎藤敏夫 (上越教育大)♯ Meridional destabilizing number of knots ····· 10
Toshio Saito (Joetsu Univ. of Edu.)♯ Meridional destabilizing number of knots

概要 We define the meridional destabilizing number of a knot. This together with Heegaard genus (or tunnel number) gives a binary complexity of knots. We study its behavior under connected sum of tunnel number one knots.

15 市原一裕 (日大文理)♯ 任意に高いヘンペル距離の橋分解をもつ結び目 ····· 10
斎藤敏夫 (上越教育大)
Kazuhiro Ichihara (Nihon Univ.)♯ Knots with arbitrarily high distance bridge decompositions
Toshio Saito (Joetsu Univ. of Edu.)

概要 We show that for any given closed orientable 3-manifold M with a Heegaard surface of genus g, any positive integers b and n, there exists a knot K in M which admits a (g,b)-bridge splitting of distance greater than n with respect to the Heegaard surface except for $(g,b)=(0,1),(0,2)$.

16 岡崎真也 (阪市大数学研)♯ レンズ空間の橋種数と組紐種数について ····· 10
Shinya Okazaki (Osaka City Univ.)♯ Bridge genus and braid genus of lens space

概要 The bridge genus and the braid genus are invariants of a closed connected orientable 3-manifold M which are introduced by A. Kawauchi. The bridge genus (resp. the braid genus) of M is the minimal number of bridge(L) (resp. braid(L)) for any L such that M is obtained by the 0-surgery of the three sphere along a link L. In this talk, we calculate the bridge genus and braid genus for some lens spaces.

17 岡崎建太 (京大数理研)♯ On the E_6 state sum invariant of lens spaces ····· 10
Kenta Okazaki (Kyoto Univ.)♯ On the E_6 state sum invariant of lens spaces

概要 The state sum invariants, first introduced by Turaev and Viro, and generalized by Ocneanu, are the invariants of closed oriented 3-manifolds associated with their simplicial decompositions. The E_6 state sum invariant is the state sum invariant derived from the E_6 subfactor.
In this talk, we briefly review the definition of the state sum invariants, and calculate many of the E_6 state sum invariant of the lens spaces $L(p,q)$, which were originally calculated for $q=1,2,3$ by Suzuki and Wakui.

18 山口祥司 (秋田大教育文化)♯ The asymptotic behavior of the higher dimensional Reidemeister torsion for Seifert manifolds ····· 15
Yoshikazu Yamaguchi (Akita Univ.)♯ The asymptotic behavior of the higher dimensional Reidemeister torsion for Seifert manifolds

概要 For hyperbolic 3-manifolds of finite volume, we can derive the hyperbolic volumes from the asymptotic behavior of the higher dimensional Reidemeister torsion for the holonomy representations. For Seifert manifolds, we can also derive the Euler characteristics of the base orbifolds in the Seifert fibrations from the asymptotic behavior of the higher dimensional Reidemeister torsion. In this talk, we will see the asymptotic behavior of the higher dimensional Reidemeister torsion for Seifert manifolds via a surgery formula for asymptotics. We will also discuss the difference between the asymptotic behaviors for hyperbolic 3-manifolds and Seifert manifolds.

19　清 水 達 郎 (東 大 数 理)♯　ホモロジー 3 球面の Morse homotopy 不変量と Kontsevich–Kuperberg–Thurston 不変量 ····· 10

Tatsuro Shimizu (Univ. of Tokyo)♯　Morse homotopy invariant and the Kontsevich–Kuperberg–Thurston invariant of homology 3-spheres

概要　We prove the degree one part of the Kontsevich–Kuperberg–Thurston invariant coincides with the degree one part of Morse homotopy invariant. (These two invariants are topological invariants for oriented rational homology 3-sphres.)

20　丹 下 基 生 (筑波大数理物質)*　$-E_8$ を交差形式とする 4 次元多様体の境界となるホモロジー球面 ····· 10

Motoo Tange (Univ. of Tsukuba)*　Homology spheres bounded by 4-manifolds with intersection form $-E_8$

概要　We construct simply-connected, $-E_8$-manifolds whose boundaries are $\Sigma(2,3,12n+5)$, where $-E_8$-manifold is a 4-manifold with intersection form $-E_8$. These 4-manifolds can be embedded in E(1) and the complements are the Gompf's nuclei. The embedding gives a sphere class with square -29.

21　松 田 能 文 (京　大　理)*　回転数とモジュラー群の円周への作用 ····· 15

Yoshifumi Matsuda (Kyoto Univ.)*　Rotation number and actions of the modular group on the circle

概要　We charactrize the standard action of the modular group on the circle, which corresponds to a hyperbolization of the modular surface, among actions of the modular group on the circle in terms of rotation number.

16:20〜17:20　特別講演

渡 邉 忠 之 (島根大総合理工)♯　Morse 理論と 3 次元多様体のグラフ値不変量

Tadayuki Watanabe (Shimane Univ.)♯　Morse theory and graph-valued 3-manifold invariant

概要　In his article published in 1996, K. Fukaya constructed a 3-manifold invariant by using Morse homotopy theory. Roughly, his invariant is defined by considering several Morse functions on a 3-manifold and counting with weights the ways that the theta-graph can be immersed such that edges follow gradient lines. We generalize his construction to 3-valent graphs with arbitrary number of loops for integral homology 3-spheres. I will also discuss extension of our method to 3-manifolds with positive first Betti numbers.

9月25日(水)　教育学部2号館大講義室

10:50〜11:50　2013年度幾何学賞受賞特別講演 (幾何学分科会と合同)

山ノ井克俊 (東工大理工)♯ 有理型函数の導関数の値分布

Katsutoshi Yamanoi (Tokyo Tech)♯ Value distribution of derivatives of meromorphic functions

概要　We discuss about the following two problems in value distribution of derivatives of meromorphic functions in the plane:
Conjecture of Gol'dberg, middle 1980-s: For every transcendental meromorphic function in the plane, the frequency of distinct poles is governed by the frequency of zeros of the second derivative.
Conjecture of Mues, 1971: For every non-constant meromorphic function in the plane which has primitive, the summation of the defects $\delta(a)$ over all complex numbers a is not greater than 1.
Our discussion is based on two developments in Nevanlinna theory, which are interesting for their own sake. The first one is a generalization of the second main theorem (SMT) for small moving targets, which gives a complete answer to Nevanlinna's old question dating back to 1920s. The other is a solution to reversion problem of SMT.
We shall also discuss about the background of the theory and related topics.

13:15〜14:15　2013年度幾何学賞受賞特別講演 (幾何学分科会と合同)

河野俊丈 (東大数理)♯ Braids, quantum symmetry and hypergeometric integrals

Toshitake Kohno (Univ. of Tokyo)♯ Braids, quantum symmetry and hypergeometric integrals

概要　The idea of constructing representations of fundamental groups by the monodromy of logarithmic connections goes back to Poincaré and Lappo-Danilevsky. In 1970's a relationship between nilpotent completions of fundamental groups and iterated integrals was established by K. T. Chen. Subsequently, Aomoto described the unipotent monodromy of the fundamental group of the complement of a complex hypersurface by iterated integrals of logarithmic forms.
After reviewing these historical aspects, I will apply such technique to representations of braid groups. For braid groups there is an important flat connection called KZ connection. On the other hand, there is a topological way to construct representations of braid groups, namely homological representations. These representations of braid groups are defined as the action of the mapping class group of a punctured disk on the homology of an abelian covering of its configuration space. They were extensively studied by Krammer and Bigelow.
We show that specializations of the homological representationsof braid groups are equivalent to the monodromy of the KZ equation with values in the space of null vectors in the tensor product of Verma modules when the parameters are generic. Here the representations of the solutions of the KZ equation by hypergeometric integrals due to Schechtman, Varchenko and others play an important role. By this construction we recover quantum symmetry of the monodromy of KZ connection due to Drinfel'd and myself by means of the action of the quantum groups on twisted cycles. In the case of special parameters corresponding to conformal field theory, we show that KZ connection can be regarded as Gauss–Manin connection.
We also discuss the representations of mapping class groups appearing in the monodromy of conformal filed theory for Riemann surfaces. We explain a joint work with Funar concerning a description of the image and the kernel of the monodromy of conformal field theory and give some applications.

9月26日(木)　第V会場

9:00〜12:00

概要 In this talk, we consider topological types of pairs of σ-locally compact convex sets and the closures in Fréchet spaces. Let $\ell_2^f(\tau)$ be the linear span of the canonical orthonormal basis of the Hilbert space $\ell_2(\tau)$ of weight an infinite cardinal τ. We show that for every σ-locally compact convex set C in a Fréchet space such that the closure $\overline{C}$ is not locally compact, the pair $(\overline{C}, C)$ is homeomorphic to $(\ell_2(\tau), \ell_2^f(\tau))$ if C is strongly countable-dimensional, and $(\overline{C}, C)$ is homeomorphic to $(\ell_2(\tau) \times [0,1]^{\aleph_0}, \ell_2^f(\tau) \times [0,1]^{\aleph_0})$ if C contains an infinite-dimensional locally compact convex set. This result is a generalization of the separable version due to D. Curtis, T. Dobrowolski and J. Mogilski.

概要 A 0-dimensional system is constructed from a sequence of graph coverings. Mutual approximation of Cantor systems by topological conjugacies are determined by the construction from sequences of graph coverings. Approximation by conjugacies from a Cantor system to a chain transitive Cantor system is determined by their periodic properties. A sequence of coverings with the lifting property determines G_δ conjugacy class. The universal homeomorphism of the topological transitive Cantor system can be shown in this way. The space of chain recurrent Cantor systems also has the universal conjugacy class of homeomorphisms.

概要 We show that for a generic element in sufficiently small C^1-neighborhood of a C^1-diffeomorphism with basic set, the measure with maximum total exponent on the continuation of the basic set is unique, of zero entropy and fully supported on the continuation. To the contrary, if $r \geq 2$ then for a generic element in sufficiently small C^r-neighborhood of a C^r-diffeomorphism with basic set, any measure with maximum total exponent on the continuation of the basic set is not fully supported on the continuation. Moreover, we give some applications of these results.

概要 We study local and global deformation properties of spaces of uniform embeddings and groups of uniform homeomorphisms in metric manifolds endowed with the uniform topology. From the Edwards–Kirby local deformation theorem for embeddings of compact spaces and the Arzela–Ascoli theorem, we deduce a local deformation theorem in any metric covering spaces over compact manifolds and any metric manifolds with geometric group actions. We also obtain a global deformation theorem in any metric manifold with finitely many bi-Lipschitz Euclidean ends.

概要　Non-holomorphic Lefschetz fibrations have been discovered in several ways, however, all of such Lefschetz fibrations have been constructed as the fiber sum of two or more non-trivial Lefschetz fibrations. In this talk, we give new non-holomorphic Lefschetz fibrations, which cannot be decomposed as a non-trivial fiber sum.

概要　Motivated by Luo's presentation for the mapping class group of a compact oriented surface, we introduce a notion of decomposition of relations in the mapping class group. Moreover, we give explicit decompositions of the typical positive relations such as the hyperelliptic relation, the chain relation with general length and the Cadavid–Korkmaz relation.

概要　It is known that every finitely presented group is the fundamental group of the total space of a Lefschetz fibration. Amoros–Bogomolov–Katzarkov–Pantev and Korkmaz constructed Lefschetz fibrations whose fundamental group is a given finitely presented group. In addition, Korkmaz defined the *genus* $g(\Gamma)$ of a finitely presented group Γ to be the minimal genus of a Lefschetz fibration whose fundamental group is isomorphic to Γ. In this talk, I evaluate upper bounds for genera of some finitely presented groups.

概要　Johnson homomorphisms are important tools for understanding the structure of the mapping class group. We will discuss how to determine the rational image of Johnson homomorphisms up to degree 6 and report our explicit computational results.

概要　We prove that a completion of the Goldman–Turaev Lie bialgebra of any compact connected oriented surface S is canonically isomorphic to the Lie algebra of continuous derivations of a completion of the 'groupoid ring' of (a restriction of) the fundamental groupoid of the surface S annihilating the boundary loops. This isomorphism induces a geometric construction of the Johnson homomorphisms (of all degree) for any compact connected oriented surface S.

31 加藤　諒 (名大多元数理)♯ 特別な $E(n)$ 可逆スペクトラムの非存在性 ····· 10
川元祐奈 (高知大総合人間自然)
下村克己 (高知大理)

Ryo Kato (Nagoya Univ.)♯ The non-existence of a special $E(n)$-invertible spectra
Yuna Kawamoto (Kochi Univ.)
Katsumi Shimomura (Kochi Univ.)

概要　In this talk we define the notion of "special" invertible spectra in the Picard group of $E(n)$-local spectra, and we will prove that there is no special invertible spectra under some condition.

32 柏木智希 (高知大総合人間自然)♯ The 2-primary chromatic $H^1M^1_{n-1}$ ····· 10
加藤　諒 (名大多元数理)
下村克己 (高知大理)

Tomoki Kashiwagi (Kochi Univ.)♯ The 2-primary chromatic $H^1M^1_{n-1}$
Ryo Kato (Nagoya Univ.)
Katsumi Shimomura (Kochi Univ.)

概要　The Adams–Novikov spectral sequence is one of good instrument for investigating the stable homotopy groups of spheres. Then we want to know the E_2-terms of the spectral sequence, and the chromatic method by Miller–Ravenel–Wilson is a useful tool for it. The chromatic spectral sequence is a powerful tool in chromatic method, and we determined the structure of some chromatic E_1-terms at the prime 2.

14:15〜16:00

33 加藤　諒 (名大多元数理)♯ Generalized Bousfield lattices and generalized retract conjecture ····· 10
下村克己 (高知大理)
立原有太郎 (高知大総合人間自然)

Ryo Kato (Nagoya Univ.)♯ Generalized Bousfield lattices and generalized retract conjecture
Katsumi Shimomura (Kochi Univ.)
Yutaro Tatehara (Kochi Univ.)

概要　We redefine the notion of Bousfield lattice, and we determined the structure of typical examples of them. Also we showed that the generalized retract conjecture holds on our Bousfield lattices under some condition.

34 加藤　諒 (名大多元数理)♯ β 元の積について ····· 10
下村克己 (高知大理)

Ryo Kato (Nagoya Univ.)♯ On the products of β-elements
Katsumi Shimomura (Kochi Univ.)

概要　In the stable homotopy groups of spheres, the Greek letter elements are important things for v_n-periodicity. In this talk we notice the second Greek letter family, called beta elements, and we will give the triviality and non-triviality of two beta elements.

35　加　藤　　諒 (名大多元数理)♯　有限巡回群の分類空間の安定ホモトピー群とその代数的 K 理論への応用 ····· 10

Ryo Kato　(Nagoya Univ.)♯　The stable homotopy groups of the classifying space of a finite cyclic group and its applications to algebraic K-theory

概要　We will consider the stable homotopy groups of integers module a power of two, and the TR-groups of the sphere spectrum.

36　金　城　就　実 (信 州 大 理 工)♯　Dynkin 図形に付随した 3 次元球面の 4 次元空間へのはめ込みの構成と Smale 不変量 ····· 15

Shumi Kinjo　(Shinshu Univ.)♯　A construction of immersions of 3-sphere into 4-space associated with Dynkin diagrams and the Smale invariant

概要　In this talk, we construct immersions of 3-sphere into 4-space associated with Dynkin diagram type A. We also compute the Smale invariants of the immersions.

37　内　藤　貴　仁 (信　州　大　理)♯　String topology and a Frobenius algebra structure of the Yoneda algebra ····· 10

Takahito Naito (Shinshu Univ.)♯　String topology and a Frobenius algebra structure of the Yoneda algebra

概要　The homology of the based loop space of a simply connected Gorenstein space has a structure of Frobenius algebras as with the string operations. On the other hand, Smith has proved that the Yoneda algebra of a Gorenstein algebra with finite global dimension is Frobenius. In this talk, we show that the correspondence of the two Frobenius algebra structures via the Eilenberg–Moore isomorphism.

38　松 尾 健 太 郎 (信州大総合工)♯　ループ空間の同変有理コホモロジー ····· 10

Kentaro Matsuo (Shinshu Univ.)♯　The equivariant rational cohomology of the loop spaces

概要　We show that the equivariant rational cohomology of loop spaces is isomorphic to the torsion product. Moreover, we compute explicitly the one dimensional sphere equivariant rational cohomology of the space of the loops on the complex projective space.

39　堀　口　達　也 (阪　市　大　理)♯　$(n-k,k)$ シュプリンガー多様体の同変コホモロジー ····· 10
福 川 由 貴 子 (阪　市　大　理)

Tatsuya Horiguchi (Osaka City Univ.)♯　The equivariant cohomology ring of $(n-k,k)$ Springer variety
Yukiko Fukukawa (Osaka City Univ.)

概要　Given a nilpotent operator $N\colon \mathbb{C}^n \to \mathbb{C}^n$, the Springer variety $\mathcal{S}_N$ is defined the subvariety of a flag variety $Flags(\mathbb{C}^n)$. When N is a nilpotent matrix in a Jordan canonical form with weakly decreasing sizes $(\lambda_1, \cdots, \lambda_q)$ of Jordan blocks, $\mathcal{S}_N$ is called the $(\lambda_1, \cdots, \lambda_q)$ Springer variety. It admits an S^1-action induced from the natural T^n-action on $Flags(\mathbb{C}^n)$, where the S^1-subgroup of T^n is given by $\{(g^n, g^{n-1}, \cdots, g) \mid g \in \mathbb{C},\ |g| = 1\}$. We give an explicit description of the equivariant cohomology ring of $(n-k,k)$ Springer variety under some assumption.

概要　A toric manifold is a closed smooth algebraic variety with an effective algebraic action of complex torus having an open dense orbit. It is not known whether or not the cohomological rigidity problem with integer coefficient for toric manifolds is affirmative. But that problem with mod 2 coefficient for real toric manifolds, the set of real points in toric manifolds, is not affirmative, and a counterexample is known. On the other hand, there are several partial affirmative results. One of them is that cohomological rigidity problem with mod 2 coefficient for real Bott manifolds is affirmative. All real Bott manifolds are real toric manifolds. The main theorem in this talk is that the cohomological rigidity problem for the product of real toric manifolds of dimension less than or equal to two is affirmative.

概要　We consider the maps between classifying spaces of compact Lie groups of certain forms. If the restriction map on a classifying space is a weak epimorphism, then the restriction on the other is known to factor through the classifying spaces of the center of the compact Lie group. Suppose a group is a semi-simple subgroup of a given connected compact Lie group with same rank. Replacing the weak epimorphism by the inclusion, analogous results are obtained. We will show, however, that if the subgroup is not semi-simple, the corresponding result does not hold.

16:20〜17:20　特別講演

概要　In this talk we will give an overview of an open book foliation theory, which studies (contact) 3-manifolds in a topological and combinatorial way via the open book decomposition. This method can be regarded as a generalization of Birman–Menasco's braid foliation theory which treats the case S^3, and is also seen as a refinement of convex surface techniques. We will explain basic ideas, and show several applications. In particular, we will demonstrate how a simple invariant of mapping class group, called the fractional Dehn twist coefficient, is related to the topology and contact structure of 3-manifolds. This is a joint work with Keiko Kawamuro (Univ. Iowa)

無　限　可　積　分　系

9月24日(火)　　第IX会場

9:30〜12:00

1　神吉雅崇 (東大数理)♯　p 進数体を用いた有限体上の可積分系の構成 ····· 15
時弘哲治 (東大数理)
間田　潤 (日大生産工)

Masataka Kanki (Univ. of Tokyo)♯　Constructing the integrable systems over finite fields using the field of
Tetsuji Tokihiro (Univ. of Tokyo)　p-adic numbers
Jun Mada (Nihon Univ.)

概要　We discuss how to define the discrete integrable equations over the finite field. We define the integrable equations over the field of p-adic numbers and then project the obtained time evolution onto the finite field. A property which resembles the good reduction in the theory of arithmetic dynamical systems is shown to be an integrability detector. This property is shown to be an arithmetic analog of the singularity confinement method in the case of discrete Painlevé equations. We briefly explain how to apply our methods to the soliton systems.

2　上岡修平 (京大情報)♯　戸田分子の初期値問題の解の組合せ論的な表示 ····· 15

Shuhei Kamioka (Kyoto Univ.)♯　A combinatorial expression of the solution to an initial value problem of the Toda molecule

概要　A combinatorial expression is given to the solution to an initial value problem of the Toda molecule. The tau function of the discrete Toda molecule that solves the corresponding initial value problem is described by means of combinatorial objects including Schur polynomials and non-intersecting paths. Taking continuum limit of the tau function, we obtain an expression in terms of non-intersecting paths of the tau function of the Toda molecule that solves the initial value problem.

3　野邊厚 (千葉大教育)♯　周期箱玉系の幾何学的実現 ····· 15

Atsushi Nobe (Chiba Univ.)♯　A geometric realization of the periodic box-ball system

概要　An explicit formula concerning tropical curve intersections equivalent to the time evolution of the periodic box-ball system (pBBS) is presented. First, the time evolution of the periodic discrete Toda lattice (pdTL) is realized as a point addition on a hyperelliptic curve, then the point addition is translated into curve intersections. Next, it is shown that the curves which appear in the curve intersections are explicitly given by using the conserved quantities of the pdTL. Finally, the formulation is lifted to the framework of tropical geometry, and a tropical geometric realization of the pBBS is constructed via tropical curve intersections.

概要 Generating functions of BBS is defined and studied. When the number of balls is finite, we show that the generating function is a rational function. When there are infinitely many balls, we conjecture that the generating function is rational if and only if the BBS is semi-periodic. We prove the conjecture in some special case. We also study the generating function of the BBS with a limited cart, including semi-periodic cases.

概要 We introduce a ultradiscretization with parity variables of the q-difference Painlevé VI equations. We show that ultradiscrete limit of Riccati-type solutions of q-Painlevé VI satisfies the ultradiscrete Painlevé VI equations with the parity variables, which is valid by using the parity variables. We study some solutions of the ultradiscrete Riccati-type equations and those of ultradiscrete Painlevé VI equations.

概要 The Schlesinger system $\mathcal{H}_{3,2}$ is proposed by Tsuda. It is given as the monodromy preserving deformation of a Fuchsian system with a spectral type $21, 21, 21, 111, 111$. It is known that $\mathcal{H}_{3,2}$ admits a particular solution in terms of a hypergeometric function which is a generalization of ${}_{n+1}F_n$. In this talk, we present another particular solution of $\mathcal{H}_{3,2}$, which is given by a rigid system.

概要 For the continuous Painlevé equations, character varieties, which are cubic surfaces satisfied by monodromy invariants, play an important role to study nonlinear connection problems. We show a q-analogue of a character variety for the q-Painlevé VI equation found by Jimbo and Sakai. We show a weak Riemann-Hilbert correspondence for q-linear equations, in the sense of G. D. Birkoff.

概要　The four dimensional degenerate Painlevé type equations $NY^{A_4}((11))((11))$, 31, $IV^{Mat}((2))((2))$, 211 and $II^{Mat}(((2)))(((11)))$ are derived by H. Kawakami, A. Nakamura and H. Sakai as extensions of the fourth and the second Painlevé equations. In this talk, we show that we classified the symmetric solutions to these equations by using their invariance under the symmetric transformations with the weight of radical of unity and the symmetric solutions to NY^{A_4} are transfdormed each other by the Bäcklund transformations. We also show the calculation results of the linear monodromy $\{M_\infty, C, S_1, S_2, S_3, S_4, e^{2\pi i T_0}\}$ for the one of these solutions.

14:15〜16:20

概要　We show that the Lax form of affine Toda system [Kashaev–Reshetikhin(1997)] can be obtained as the image of universal R matrix of $U_q(\widehat{\mathfrak{sl}}_N)$ and generalize the construction in a non-autonomous way. After periodic reduction it can be recognized as a quantization of the isomonodromy deformation equation of Garnier type.

概要　The spin-1 analogue of the eight vertex model is considered on the basis of free field representations of vertex operators in the 2×2-fold fused SOS model and vertex-face transformation. The spontaneous polarization of the model is obtained in terms of one-fold integral formula. The result is compared with that of trigonometric model obtained by Idzumi.

概要　We provide an explicit Dynkin diagrammatic description of the c-vectors and the d-vectors (the denominator vectors) of any cluster algebra of finite type with principal coefficients and any initial exchange matrix. We use the surface realization of cluster algebras for types A_n and D_n, then we apply the folding method to D_{n+1} and A_{2n-1} to obtain types B_n and C_n. Exceptional types are done by direct inspection with the help of a computer algebra software.

概要　The sine-Gordon Y-systems and the reduced sine-Gordon Y-systems were introduced by Tateo in the 90's in the study of the integrable deformation of conformal field theory by the thermodynamic Bethe ansatz method. The periodicity property and the dilogarithm identities concerning these Y-systems were conjectured by Tateo, and only a part of them have been proved so far. We formulate these Y-systems by the polygon realization of cluster algebras of types A and D, and prove the conjectured periodicity and dilogarithm identities in full generality. As it turns out, there is a wonderful interplay among continued fractions, triangulations of polygons, cluster algebras, and Y-systems.

概要　For a finite-dimensional simple Lie algebra $\mathfrak{g}$, let $U_q^+(\mathfrak{g})$ be the positive part of the quantized universal enveloping algebra, and $A_q(\mathfrak{g})$ be the quantized algebra of functions. We show that the transition matrix of the PBW bases of $U_q^+(\mathfrak{g})$ coincides with the intertwiner between the irreducible $A_q(\mathfrak{g})$-modules labeled by two different reduced expressions of the longest element of the Weyl group of $\mathfrak{g}$. This generalizes the earlier result by Sergeev on A_2 related to the tetrahedron equation and endows a new representation theoretical interpretation with the recent solution to the 3D reflection equation for C_2.

概要　We introduce a new path crystal over a quantum affine algebra by using the semi-infinite (or generic) Bruhat order on the affine Weyl group (or equivalently the quantum Bruhat graph associated to the finite Weyl group). Our crystal is a slight modification of a Littelmann's Lakshmibai–Seshadri path crystal; in fact, these two crystals are "locally" isomorphic as crystals. We show that the new path crystal provides a combinatorial realization of the crystal bases of level-zero extremal weight modules over quantum affine algebras.

16:30〜17:30　特別講演

直 井 克 之 (東 大 I P M U)♯ An approach to the $X = M$ conjecture using modules over a current algebra

Katsuyuki Naoi (Univ. of Tokyo)♯ An approach to the $X = M$ conjecture using modules over a current algebra

概要　A one-dimensional sum is defined by a weighted sum on the highest weight elements of a tensor product of KR crystals. The $X = M$ conjecture asserts that each one-dimensional sum has an explicit formula called the fermionic formula. In this talk, after overviewing the previous works we give a proof to this conjecture in non-twisted and classical types (in type BC we need additional assumptions), using the representation theory of the current algebra $\mathfrak{g} \otimes \mathbb{C}[t]$ where $\mathfrak{g}$ is the simple Lie algebra of a given type. The key idea of the proof is to consider two graded $\mathfrak{g} \otimes \mathbb{C}[t]$-modules whose graded multiplicities coincide with a one-dimensional sum and a fermionic formula respectively. Then we obtain the result by showing that these modules are isomorphic.

9月25日(水)　　第IX会場

9:30〜12:00

15　森 田　　健 (阪 大 情 報)♯ A connection formula of a divergent bilateral basic hypergeometric function ····· 15

Takeshi Morita (Osaka Univ.)♯ A connection formula of a divergent bilateral basic hypergeometric function

概要　We show a connection formula of a divergent bilateral basic hypergeometric function. We introduce the q-Borel–Laplace transformations to obtain our connection formula. These transformations are powerful tools for the study of divergent basic hypergeometric series (i.e., unilateral series). But the application of these resummation method to bilateral series has not known well. In this talk, we apply these transformations to a bilateral series and give an example of the new connection formula.

16　伊 藤 雅 彦 (東京電機大未来)♯ q-Dixon–Anderson 積分 —多変数 Ramanujan ${}_1\psi_1$ 和公式— ····· 20

Masahiko Ito (Tokyo Denki Univ.)♯ The q-Dixon–Anderson integral —a multi-dimensional Ramanujan ${}_1\psi_1$ sum—

概要　I will talk about a multi-dimensional extension of Ramanujan's ${}_1\psi_1$ summation formula. This formula is motivated from the Dixon–Anderson integral, which is an iterated integral generalized from the beta function. I will explain how this formula is related with Milne–Gustafson's $U(n)$ type ${}_1\psi_1$ summation formula.

概要　I would like to talk about an extension of the q-Selberg integral as a bilateral series. I will explain a subtle difference between the situation under the exponent of the difference product in the integrand of q-Selberg integral being an integer and that under the exponent not being an integer. After that I will show a new product formula for the extended q-Selberg integral under the exponent being an arbitrary complex number. If we restrict this result on the exponent being an integer, then using analytic continuation, we can find that the result contains a formula studied by Askey and Evans in 1980's and 90's.

概要　By using new interpretation of dual Grothendieck polynomials, we found various types of determinantal formula such as Giambelli formula. We also proved finite sum Cauchy identity.

概要　We found a family of Schubert polymomials that can be expressible using a factorial Schur functions. There are corresponding to the vexillary permutations defined by Anserson-Fulton.

概要　A Lie theoretic interpretation is given for some formulas of Schur functions and Schur Q-functions. Two realizations of the basic representation of the Lie algebra $A_2^{(2)}$ are considered. Via the boson-fermion correspondence, simple relations of the vacuum expectation values of fermions turn out to be identities of Schur functions.

21　齋 藤 洋 介 (東 北 大 理)♯　楕円 Ding–Iohara 代数と楕円 Feigin–Odesskii 代数から現れる可換な作用素の族 ····· 20

Yosuke Saito　(Tohoku Univ.)♯　Commutative families arising from the elliptic Ding–Iohara algebra and the elliptic Feigin–Odesskii algebra

概要　In 2009, Feigin, Hashizume, Hoshino, Shiraishi, and Yanagida constructed two families of commuting operators which contain the Macdonald operator by using the Ding–Iohara algebra and the trigonometric Feigin–Odesskii algebra. In this talk, I will show that by using the elliptic Ding–Iohara algebra and the elliptic Feigin–Odesskii algebra, we can construct commutative families of the elliptic Macdonald operator.

13:00〜14:00　特別講演

土 屋 昭 博 (東 大 I P M U)*　Log 共形場理論と拡大 W-代数の表現論

Akihiro Tsuchiya (Univ. of Tokyo)*　Logarithmic conformal field theory and the representation theory of extended W-algebras

概要　Rescently logarithmic CFT are interested by many mathematicians an physicists. Logarithmic CFT contains log type function in the N point functions. In this talk, I will talk about some examples of vertex operator algebras (VOA) which we call extended W-algebras.