

✿ 日本数学会
2026年度秋季総合分科会

英 文 サ マ リ 集

2026年9月
於 神戸大学

2026 日 本 数 学 会

秋季総合分科会プログラム

期 日 2026 年 9 月 1 日 (火) ～ 9 月 4 日 (金)

会 場 神戸大学六甲台地区鶴甲第 1 キャンパス
神 戸 市 灘 区 鶴 甲 1-2-1

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一般社団法人 日 本 数 学 会

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	日本数学会賞授賞式 (出光佐三記念六甲台講堂) (14:45～15:15)								
	総 合 講 演 (") 日本数学会賞秋季賞受賞者 (15:30～16:30)								
3日 (木)	函数解析学 9:30～12:00 14:15～16:30	函数方程式論 9:15～12:00 14:15～16:30	幾 何 学 9:30～11:45 14:15～16:00	代 数 学 9:00～12:00 15:30～18:00	実函数論 9:30～11:45 14:15～15:25	統 計 数 学 9:20～12:00	トポロジー 9:30～12:00 15:40～17:10	数学基礎論 および歴史 9:00～10:30 14:15～17:30	応 用 数 学 9:30～12:00 14:15～16:15
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4日 (金)		函数方程式論 9:00～12:00 14:15～16:15	幾 何 学 9:30～11:45 14:15～16:15	代 数 学 9:00～12:00 15:30～18:00	実函数論 10:00～12:00 14:15～15:45	統 計 数 学 9:30～12:00		数学基礎論 および歴史 9:10～10:30 14:15～17:30	応 用 数 学 9:30～12:00 14:15～16:15
	企画特別講演 13:00～14:00								
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総 合 講 演

9月2日(水) 総合講演会場

2026年度日本数学会賞秋季賞受賞講演

日本数学会賞秋季賞受賞者 (15:30~16:30)

Autumn Prize Winner

塩 谷 隆 (東 北 大 理) 測度距離空間の coarse 幾何 (16:45~17:45)

Takashi Shioya (Tohoku Univ.) Coarse geometry of metric measure spaces

概要 In this talk, I will discuss joint work with Takayuki Okuda (Hiroshima University) on the coarse geometry of metric measure spaces. Using ideas from optimal transport theory, we introduce a notion of measured coarse equivalence and define a corresponding variant of the uniformly finite homology of Block and Weinberger, called measured Block–Weinberger homology. We prove that this homology is invariant under measured coarse equivalence and, under the local doubling condition, that the vanishing of its 0-th homology is equivalent to non-amenability. The proofs combine techniques from optimal transport theory and the disintegration of measures. Some examples will also be presented.

企 画 特 別 講 演

9月1日(火)

第Ⅲ会場

植 田 一 石 (東 大 数 理) 特異点の幾何学 (13:00~14:00)
 Kazushi Ueda (Univ. of Tokyo) Geometry of singularities

概要 Singularities are ubiquitous in mathematics, and their definitions and roles vary across different fields. In this talk, we will discuss the relationship between singularities and geometry centered on mirror symmetry, with a view toward differential equations, sheaves, and (infinity-)categories.

第Ⅳ会場

特別招待講演(台湾数学会)

Tzu-Yueh Wang (Academia Sinica) From entire curves to integral points (13:00~14:00)
 Tzu-Yueh Wang (Academia Sinica) From entire curves to integral points

概要 In this talk, I will discuss recent developments in GCD methods and filtration methods. I will describe GCD methods toward the Green–Griffiths–Lang conjecture for entire curves omitting $n+1$ hypersurfaces, and new filtration methods that allow hypersurfaces with non-empty intersections. The filtration methods yield applications to one-parameter families of unit equations, exponential Diophantine equations, digit problems, and the distribution of integral points. The results are based on joint work with Carlo Gasbarri, Ji Guo, Khoa D. Nguyen, Chia-Liang Sun, Aaron Levin, Min Ru, and Zheng Xiao.

第Ⅴ会場

中 西 敏 浩 アールフォールの生涯と数学 (13:00~14:00)
 (島根大*・阪公大数学研)
 Toshihiro Nakanishi Lars Ahlfors —to the summit of mathematics
 (Shimane Univ.* / Osaka Metro. Univ.)

概要 2026 marks the 30th anniversary of Lars Ahlfors—the Finnish-American mathematician who received one of the first Fields medals at the age of 29. Ahlfors had been a leading figure in complex analysis during the 20th century. He developed theories of Riemann surfaces, value distribution, conformal invariants, Kleinian groups, and quasiconformal mappings laying the ground work for Teichmüller space. Ahlfors was so talented that whatever he touched turned into a fashionable object to study. So, when Walter Hayman was asked by his graduate student for advice, he simply said ‘Watch Ahlfors!’. Ahlfors is also known for his book Complex Analysis considered as the standard text on the theory of functions of one complex variable. I tell about Ahlfors’ contribution to mathematics in order to complement the story of the life of Lars Ahlfors described in his biography by Olli Lehto recently translated to Japanese language.

9月3日(木)

第I会場

小 沢 登 高 (京 大 数 理 研) $\flat$ 一様無限遠従順性 (13:00~14:00)
 Narutaka Ozawa (Kyoto Univ.) Uniform amenability at infinity

概要 Amenability is arguably the most important notion in Analytic Group Theory. While it has numerous applications in various areas, many familiar groups, particularly those that contain non-cyclic free groups, are not amenable. The weaker notion, called exactness or amenability at infinity, was introduced in the late 1990s and has found very useful in Operator Algebra Theory and Geometric Topology. The class of exact groups is considerably wide and contains most of the familiar groups such as linear groups and (relatively) hyperbolic groups. We introduce the notion of uniform exactness, or uniform amenability at infinity, for discrete groups and conjecture that it holds for linear groups and (relatively) hyperbolic groups. As the first step, we prove it for free groups, their limit groups, and their cousins. This shows a novel strong convergence phenomenon that any convergent sequence of such groups in the space of marked groups converges strongly in the operator algebraic sense. In particular, convergence of the spectral radius formula is uniform over probability measures on such groups whose supports have a fixed cardinality.

第IV会場

斎 藤 毅 (東 大 数 理) エタール・コホモロジーをめぐる (13:00~14:00)
 Takeshi Saito (Univ. of Tokyo) Developments of etale cohomology, through its history

概要 Etale cohomology is a cohomology theory for schemes and was introduced by Grothendieck in 1960s aiming at solving the Weil conjectures, that is a geometric analogue of the Riemann Hypothesis. It does not only define the cohomology groups for varieties but also constructs various functors connecting the derived categories of sheaves on varieties, called the 6 operations. Some of its early developments including the functional equation of the L-functions, the Grothendieck–Ogg–Shafarevich formula can be traced in Grothendieck–Serre correspondence. The index formula generalizing the GOS formula to higher dimension came much later, through the analogy with micro local analysis. We recall some of the developments through its history.

9月4日(金)

第II会場

小 園 英 雄 $\flat$ Helmholtz–Weyl 分解と電磁流体力学方程式 (13:00~14:00)
 (早大理工・東北大MathCCS)
 Hideo Kozono Helmholtz–Weyl decomposition and magnetohydrodynamic
 (Waseda Univ./Tohoku Univ.) equations

概要 We first introduce the L^r -Helmholtz–Weyl decomposition in 3D bounded domains with smooth boundary, which means that every L^r -vector field is expressed by the direct sum of the harmonic part, the range of rotation of vector potentials and the range of gradient of scalar potentials. Simultaneously, we establish a unique harmonic representative of the second cohomology group. Next, we address its application to the magnetohydrodynamic (MHD) equations in 3D domains with arbitrary geometry. It will be clarified that the harmonic vector field gives a non-trivial equilibrium state of the MHD equations, and it is exponentially stable provided its L^1 -norm is sufficiently small. Finally, we discuss the stationary problem and existence of time-periodic solutions. This is based on joint works with K. Noda (Kyoto Univ.), S. Shimizu (Kyoto Univ.) and T. Yanagisawa (Waseda Univ.).

第VI会場

小池 祐太 (東大数理)	Denoising diffusion probabilistic models and the Föllmer process	(13:00~14:00)
Yuta Koike (Univ. of Tokyo)	Denoising diffusion probabilistic models and the Föllmer process	

概要 The Föllmer process is a Brownian motion conditioned to have a pre-specified distribution at time 1. This process can be interpreted as an “augmented” time-compressed version of the reverse stochastic differential equation (SDE) for denoising diffusion probabilistic models (DDPMs). While this fact has been indirectly used to analyze DDPM sampling errors via discretization of the reverse SDE, connections between direct discretization of the Föllmer process and the DDPM sampler have not yet been fully explored. In this talk, we aim to clarify this point while surveying relevant results from existing work.

数 学 基 礎 論 お よ び 歴 史

9月3日(木) 第VIII会場

9:00~10:30

- 1 脇 克 志 (山 形 大 理) 佐久間文庫デジタル化の進捗情報 15
Katsushi Waki (Yamagata Univ.) Progress report on the digitization of the Sakuma library

概要 This report details the progress of the digitization project for the “Sakuma Library” a collection of rare materials held by the Yamagata University Library, which began in fiscal year 2024.

- 2 平 田 浩 一 (松山大情報・愛媛大*) 阿部知翁の円鎖・円環問題について 15
Koichi Hirata On circle chain problems studied by Chiou Abe
(Matsuyama Univ./Ehime Univ.*)

概要 Chiou Abe’s circle chain problems are more complex version of Naonobu Anjima’s circle chain problems. The chain consists of k sub-circles chain sandwiched between two circles of main n circles chain. In this study, we will examine Abe’s circle chain problems from the perspective of inversive coordinates of circles.

- 3 田 中 紀 子 (奈良学園大人間教育) Methods of expressing factorization in different mathematical schools 15
Noriko Tanaka (Naragakuen Univ.) Methods of expressing factorization in different mathematical schools

概要 In the Seki school, factorization seems to have been practiced beginning with Ajima Naonobu (1732–1798). This suggests that Ajima was most likely the first person in Japan to carry out factorization. In the Saijo school, Aida Yasuaki (1747–1817) expressed procedures similar to factorization by substituting letters for parts of equations. In the Takuma school, Oka Yukitada (?–?) made use of the distinctive notation of the Takuma school to present many examples of complex factorization.

- 4 田 村 誠 睡虎地漢簡『算術』の概要 15
(大阪産大全学教育機構)
Makoto Tamura (Osaka Sangyo Univ.) Overview of the Shuihudi bamboo slips “Suanshu” of the Han Dynasty

概要 The Shuihudi bamboo slips “Suanshu” of Han Dyanasty were unearthed in late 2006, and we inspected some of them in December 2009 ([2]). In 2014, at the international conference on the Beida Qinjian, we learned that a draft report on “SuanShu” had already been completed. The report, which had remained unpublished for a long time, but was eventually published in December 2025 ([1]). In this talk, we will introduce an overview of this “Suanshu”.

- 5 真 島 秀 行 (お茶の水女大*) 吉田光由著『塵劫記』の刊行について 15
Hideyuki Majima (Ochanomizu Univ.*) On the publications of Jinkouki edited by Yoshida Mitsuyoshi

概要 We discuss on articles and books about Jinkouki edited by Yoshida Mitsuyoshi in Edo era.

6 小 川 束 『大成算経』の方程について —その概念と計算法 15

(四日市大関孝和数学研)

森 本 光 生 (上 智 大*)

田 中 紀 子 (奈良学園大人間教育)

Tsukane Ogawa (Yokkaichi Univ.)

Mitsuo Morimoto (Sophia Univ.*)

Noriko Tanaka (Naragakuen Univ.)

On the equation problems in the *Taisei Sankei* —The concept and calculation method

概要 The equation problems in the *Taisei Sankei* are sometimes lumped together with the elimination method in today's linear algebra, but when examined in detail, this is not necessarily the case. This presentation describes three points. (1) The numbers given in the problem are arranged in a rectangular form, and the equivalent of the modern “sweep-out algorithm” is applied, but only until a single linear representation is obtained, without forcing the diagonal elements to all 1's. (2) The equal signs do not align because the numbers in the question appear in that order. (3) For integer division, some calculations were actually performed using an abacus.

10:40~11:40 特別講演

三 浦 伸 夫 (神 戸 大*)

誰がピュタゴラスの定理と名付けたか? —『原論』から読み解く近代西洋数学の展開

Nobuo Miura (Kobe Univ.*)

Who named the Pythagorean Theorem?: Tracing the development of early modern western mathematics through Euclid's Elements

概要 This lecture addresses the question of how and when the so-called Pythagorean Theorem acquired its now-familiar name. The Pythagorean Theorem is arguably the most widely known theorem in mathematics. It appears with a formal proof in Proposition 47 of Book I of Euclid's Elements, and from antiquity to the present it has been applied across a wide range of mathematical domains. Yet, despite its present ubiquity, the theorem was not referred to by this name in antiquity, nor for many centuries thereafter. This raises a fundamental historical question: who first named it the “Pythagorean Theorem”? Although it is difficult to provide a definitive answer, it is possible to identify candidate texts in which the designation may first have appeared. The lecture begins by surveying scholarly views concerning the discovery of the theorem and its association with Pythagoras. It then examines how the theorem was described and referred to in different historical contexts, including ancient Greek mathematics, the medieval Arabic tradition, the medieval Latin West, and the early modern period. Particular attention is given to the role of Euclid's Elements, not only as the source in which the theorem is classically formulated, but also as a central text in the transmission and transformation of mathematical knowledge. The lecture further argues that the naming of the theorem as the “Pythagorean Theorem” emerges only in the seventeenth century. This development is considered in relation to broader intellectual changes of the period, especially the growing tendency to attach personal names to theorems and laws. Finally, the lecture explores the conditions under which this designation became stabilized and widely accepted, tracing the historical processes through which it has been transmitted into modern mathematical discourse.

11:45~12:00 歴史部門懇談会

14:15~17:30

7 藤 田 雅 人 (海 保 大) 有限個の次元関数を持つ順序極小構造 15

Masato Fujita

(Japan Coast Guard Acad.)

O-minimal structures possessing finitely many dimension functions

概要 If an o-minimal structure has finitely many dimension functions possessing the van den Dries property, the number of these dimension functions is $2^m - 1$ for some positive integer m .

- 8 大 倉 昂 貴 (筑波大数理物質) Distality in ordered abelian groups 15
 Koki Okura (Univ. of Tsukuba) Distality in ordered abelian groups

概要 Let G be an ordered abelian group. Aschenbrenner, Chernikov, Gehret, and Ziegler showed that if G has finite spines, then it is distal if and only if for any prime p , G/pG is finite. In this talk, we generalize this result by omitting the assumption of finite spines. For a prime p , we define a ‘valuation’ $\mathfrak{s}_p$ on G . It induces counterparts of value groups and residue fields, called spines and ribs. Our result states that G is distal if and only if for any prime p , the sizes of ribs with respect to $\mathfrak{s}_p$ are uniformly bounded.

- 9 坪 井 明 人 (筑 波 大*) A property of algebraic independence in small theories 10
 Akito Tsuboi (Univ. of Tsukuba*) A property of algebraic independence in small theories

概要 In stable theories, independence is defined via forking, and the notion of weight is built from this independence relation. In particular, in superstable theories every type has finite weight. This finiteness plays a central role in Lachlan’s theorem that superstable Ehrenfeucht theories do not exist. In this talk, we show that an analogous phenomenon concerning weight can be obtained under the much weaker assumption of smallness, without appealing to the stability-theoretic framework.

- 10 池 田 宏 一 郎 (法 政 大 経 営) 無限個の生成元をもつジェネリック構造 15
 Koichiro Ikeda (Hosei Univ.) Generic structures with infinitely many generators

概要 In this talk, we want to explain the following problem: Is there a saturated generic structure M satisfying that $Th(M)$ is strictly stable and not ω -categorical?

- 11 竹 内 耕 太 (筑波大数理物質) Colorings and the number of independent strict orders 15
 坪 井 明 人 (筑 波 大*)
 Kota Takeuchi (Univ. of Tsukuba) Colorings and the number of independent strict orders
 Akito Tsuboi (Univ. of Tsukuba*)

概要 Coloring problems for infinite structures have long been studied in combinatorics. For example, let M be the random graph, respectively $(\mathbb{Q}, <)$. Then, it is well known that for every finite coloring of the vertices of M , there exists a monochromatic substructure $M_0 \subset M$ such that $M_0 \cong M$. On the other hand, for finite colorings of the edges of M , respectively of the two-element subsets of M , one cannot in general find a monochromatic substructure isomorphic to M .

Akito Tsuboi (2024) proved that, for the random graph, the nonexistence of a monochromatic isomorphic substructure is equivalent to the existence of unbounded independent strict orders: for any substructure $N \subset M$ with $N \cong M$, there is $M_0 \subset N$ with $M_0 \cong M$ such that $\kappa_{\text{srd}}(\text{Th}(M_0, f_c)) = \infty$. In this talk, we show that an analogous result also holds for $(\mathbb{Q}, <)$.

- 12 井 野 海 (法 政 大) Differential-algebraic comparisons between Eisenstein series and the modular j -function 15
 Kai Ino (Hosei Univ.) Differential-algebraic comparisons between Eisenstein series and the modular j -function

概要 This talk explains a differential-algebraic comparison between the Ramanujan system for the Eisenstein series E_2, E_4, E_6 and the Schwarzian differential equation of the modular j -function. In a differentially closed field of characteristic zero, the classical formula for j yields explicit differential-rational transformations between the corresponding non-degenerate loci. Combining this comparison with the theorem of Freitag and Scanlon on the strong minimality of this Schwarzian equation, we prove strong minimality of the non-degenerate Ramanujan locus and deduce that the generic type represented by the tuple E_2, E_4, E_6 has Lascar U -rank one.

- 13 桔 梗 宏 孝 (神戸大システム情報) Hrushovski の構成法と SOP3, TP1, TP2 について 15
 Hirotaka Kikyo (Kobe Univ.) On Hrushovski's construction and SOP3, TP1 and TP2

概要 We constructed structures with a theory having SOP3 by Hrushovski construction. But if you change parameters then it seems that you will get structures with a simple theory. In SOP3 cases, we will discuss about TP1, TP2 and some properties implied by NTP2.

- 14 中 浦 鯉 太 郎 (東 大 数 理) Generalized dp-ranks and their properties 15
 Koitaro Nakaura (Univ. of Tokyo) Generalized dp-ranks and their properties

概要 In model theory, various ranks are essential tools for investigating theories, such as the dp-rank in NIP theories. Originating from Shelah's ict -patterns, the dp-rank has been widely investigated, and its properties such as sub-additivity are well known. Recently, the sub-additivity of burden has been proved under dependent dividing by establishing its equivalence to the "NIP dp-rank." Inspired by this approach, this talk introduces "generalized dp-ranks" by considering classes of formulas other than NIP. We investigate their properties, including sub-additivity, aiming to find a universal framework to systematically prove the additivity of various model-theoretic ranks.

- 15 薄 葉 季 路 (早 大 理 工) 1 次元多様体と選択公理 15
 Toshimichi Usuba (Waseda Univ.) 1-manifolds and the axiom of choice

概要 A Hausdorff space X is (topological) n -manifold if every point of X has a neighborhood which is homeomorphic to $\mathbb{R}^n$. It is known that there are exactly four connected 1-manifolds; the real line $\mathbb{R}$, the circle S^1 , the long line $\mathbb{L}$, and the long ray $\mathbb{L}_+$. In this talk, under the absence of the Axiom of Choice, there can be a connected 1-manifold which is not homeomorphic to $\mathbb{R}$, S^1 , $\mathbb{L}$, and $\mathbb{L}_+$.

- 16 山 添 隆 志 (神戸大システム情報) Cardinal invariants of quotient Boolean algebras associated with ideals 15
 Takashi Yamazoe (Kobe Univ.) Cardinal invariants of quotient Boolean algebras associated with ideals

概要 Several classical cardinal invariants of the continuum can be formulated as invariants of the Boolean algebra $\mathcal{P}(\omega)/\text{Fin}$, where Fin denotes the set of all finite subsets of ω . In this talk, we study analogous cardinal invariants for quotient Boolean algebras of the form $\mathcal{P}(X)/\mathcal{I}$, where $\mathcal{I}$ is an ideal on a countable set X . We discuss how these invariants reflect combinatorial properties of the ideal $\mathcal{I}$ for several ideals, including the eventually different ideal $\mathcal{ED}$, its variant $\mathcal{ED}_{\text{fin}}$, and the random ideal $\mathcal{R}$.

- 17 野 呂 秀 貴 (神戸大システム情報) A dichotomy for local weak constant evasion numbers 15
 Hidetaka Noro (Kobe Univ.) A dichotomy for local weak constant evasion numbers

概要 The classical evasion number $\mathfrak{e}$ and the constant evasion numbers $\mathfrak{e}_2^{\text{const}}(k)$ are cardinal characteristics related to prediction. In previous work, the speaker introduced the local weak constant evasion numbers. These form an infinite family of cardinal characteristics between $\mathfrak{e}$ and $\mathfrak{non}(\mathcal{E})$. In this talk, we further generalize them by introducing parameterized local weak constant evasion numbers $\overline{\mathfrak{e}}_2^b$, where $b \in {}^\omega\omega$ is a sequence of natural numbers.

Our main result establishes a dichotomy for these invariants. For every $b \in {}^\omega\omega$, either $\mathfrak{cov}(\mathcal{N}) \leq \overline{\mathfrak{e}}_2^b$ or $\overline{\mathfrak{e}}_2^b \leq \mathfrak{non}(\mathcal{E})$. Moreover, which side of the dichotomy holds is determined by the convergence or divergence of the series $\sum_n 2^{-b(n)}$.

- 18 渕野 昌 (神戸大システム情報) Multiverse reflected down to the set-theoretic genealogy 15
 Sakaé Fuchino (Kobe Univ.) Multiverse reflected down to the set-theoretic genealogy

概要 In modern set theory, models of set-theory are constructed starting from a universe (of set theory) in which “we live.” The standpoint to consider the totality of these models of set theory as the ultimate objects is called Set-theoretic Multiverse. Even if we want to consider a set-generic version of the multiverse in which we only consider the universes constructed by set forcing extensions and reverse operation thereof, we come up to the problem that, strictly speaking, the generic extensions of the initial universe do not exist since the initial universe V is already the class of all sets. The reverse operation of taking grounds of V is real in the sense that they are uniformly definable by parameters deciding them. In this talk, we show that under one of the extremely strong generic large cardinal axioms the (undefinable) multiverse is reflected down to a set of grounds which is definable in ZFC.

9月4日(金) 第VIII会場

9:10~10:30

- 19 只木孝太郎 (中部大工) Confirming points and Direct PoT 15
 Kohtaro Tadaki (Chubu Univ.) Confirming points and Direct PoT

概要 In our former works, based on the toolkit of algorithmic randomness, we presented an operational refinement of the Born rule, called the principle of typicality, for specifying the property of the results of quantum measurements in an operational way. The Wigner’s friend paradox is a Gedankenexperiment regarding when and where the reduction of the state vector occurs in a chain of the measurements by several observers. In our former work, we extended the framework of the principle of typicality so that it can be applicable to the situation, such as the Wigner’s friend paradox, where apparatuses perform measurements over other apparatuses. In this talk, we propose an improvement of this framework, named Direct PoT, which is still more simple and therefore seems more plausible.

- 20 宮部賢志 (明大理工) 万能性はランダムな資源を必要とする 15
 Kenshi Miyabe (Meiji Univ.) Universality requires random resources

概要 In algorithmic randomness, universality play a fundamental role in characterizing ML-randomness. This talk focuses on a phenomenon in which the total resources naturally associated with universal detectors are themselves random. We prove that the initial capital of a universal c.e. martingale, the integral of a universal integral test, and the minimal description weight of a weakly universal prefix-free machine are all left-c.e. ML-random reals. In particular, the halting probability of such a weakly universal machine is also ML-random. These results can be viewed as natural extensions of the result that the measures of the components of a universal ML-test are left-c.e. ML-random reals.

- 21 G. Wilken (沖縄科学技術大) Direct generalization of Goodstein’s theorem 15
 Gunnar Wilken Direct generalization of Goodstein’s theorem
 (Okinawa Inst. of Sci. and Tech. Grad. Univ.)

概要 We present a most direct method to generalize Goodstein’s theorem (Goodstein 1944) and Cichon’s independence proof (Cichon 1983). This is demonstrated by a Goodstein principle independent of the fragment $\Pi_1^1\text{-CA}_0$ of second order number theory. The method is centered around the concept of quotient of a set of ordinals, which allows for a 1-1 correspondence between (unique) ordinal notations and natural numbers and builds on my work on fundamental sequences (Wilken 2026).

- 22 黒田 覚 (群馬県立女大文) Bounded reverse mathematics of Pfaffian and matchings 15
 Satoru Kuroda Bounded reverse mathematics of Pfaffian and matchings
 (Gunma Pref. Women's Univ.)

概要 We formalize Pfaffian in weak arithmetic theory and prove its basic properties. As applications, two algorithms for computing perfect matchings are formalized and their correctness are proved in some weak systems. Our work improves previously known bounds on the provability of matching algorithms due to Le and Cook.

- 23 菊池 誠 (神戸大システム情報) 算術の超準モデル上での計算可能関数 15
 倉橋 太志 (神戸大システム情報)
 Makoto Kikuchi (Kobe Univ.) Computable functions on nonstandard models of arithmetic
 Taishi Kurahashi (Kobe Univ.)

概要 We discuss some aspects of computable functions on nonstandard models of arithmetic.

10:40~11:40 特別講演

鈴木 悠大 (小山工高専) ω モデルと第二不完全性定理・反映原理

Yudai Suzuki Second incompleteness theorem and reflection principles via ω -models
 (Oyama Nat. Coll. of Tech.)

概要 In the study of provability, one approach is to understand provability through provability predicates. For example, Gödel's second incompleteness theorem and reflection principles can be seen as kinds of this approach.

It is known that truth in ω -models behaves like provability. In this talk, we introduce some recent results on ω -model versions of the second incompleteness theorem and reflection principles. We also show some applications of these theorems to computability theory, especially to the separations of computability theoretic degrees.

This talk includes joint work with Keita Yokoyama, and joint work with Keita Yokoyama and Juan P. Aguilera.

11:45~12:00 数学基礎論および歴史分科会総会

14:15~17:30

- 24 熊坂 翼 (神戸大システム情報) Abstract provability structure における不動点 15
 倉橋 太志 (神戸大システム情報)
 Tsubasa Kumasaka (Kobe Univ.) Fixed points in abstract provability structures
 Taishi Kurahashi (Kobe Univ.)

概要 Beklemishev & Shamkanov introduced Abstract Provability Structures (APS) to study Gödel's second incompleteness theorem (G2). An APS is a preordered set with two operators $\Box$ and $\Box$, representing provability and refutability, which enables an abstract and general analysis of G2. We extend their work by studying the fixed points of finite compositions of $\Box$ and $\Box$. In particular, we show that every operation in which $\Box$ occurs exactly twice has an explicitly given fixed point, and that for operations containing a single $\Box$, the existence and uniqueness of fixed points form a hierarchy.

- 25 上 島 晟 宏 (神戸大システム情報) 比較不能な定理集合を持つ算術の超準モデルについて 15
 Akihiro Ueshima (Kobe Univ.) On non-standard models of arithmetic with incomparable sets of theorems

概要 The incompleteness theorems imply the existence of non-standard models of Peano Arithmetic (PA) that contain non-standard proofs of standard sentences that are actually unprovable in PA. [Kikuchi and Kurahashi 2016] investigates how such non-standard proofs exist within these non-standard models. In this study, we extend the work of [Kikuchi and Kurahashi 2016] by focusing on models understood as forks of incomparable models.

- 26 倉 橋 太 志 (神戸大システム情報) 第 1 不完全性定理と外延性 15
 A. Visser (Utrecht Univ.)
 Taishi Kurahashi (Kobe Univ.) The first incompleteness theorem and extensionality
 Albert Visser (Utrecht Univ.)

概要 We discuss the first incompleteness theorem from the viewpoint of extensionality. We study how independent sentences can be effectively constructed for extensions of Peano Arithmetic. We compare several forms of effective finite essential incompleteness and examine whether such constructions can depend only on the extension of a theory.

- 27 小 暮 晏 佳 (神戸大システム情報) 様相述語論理における有限クリプキモデルとその算術への埋め込み 15
 倉 橋 太 志 (神戸大システム情報)
 Haruka Kogure (Kobe Univ.) Finite Kripke models and provability interpretations in quantified modal logic
 Taishi Kurahashi (Kobe Univ.)

概要 In this paper, we investigate arithmetical completeness with respect to finite Kripke models of quantified modal logic. We adapt the finite model embedding techniques of Artemov and Japaridze to two settings involving finite Kripke models. First, for conversely well-founded finite Kripke models of quantified modal logic, we construct a Σ_2 provability predicate together with an arithmetical interpretation that embeds the model into arithmetic. Second, for finite constant domain Kripke models of quantified modal logic, we construct a Σ_1 provability predicate satisfying $\mathbf{D2}^U$ and an arithmetical interpretation yielding such an embedding.

- 28 L. Pacheco (東京科学大情報理工) A non-wellfounded proof system for the constructive μ -calculus 15
 Leonardo Pacheco (Sci. Tokyo) A non-wellfounded proof system for the constructive μ -calculus

概要 We study a variant of the modal μ -calculus based on the constructive modal logic CK. We define game semantics for the constructive μ -calculus and prove its equivalence to the birelational Kripke semantics. We then use the game semantics to prove the soundness and completeness of a fully-labeled non-wellfounded proof system for it.

- 29 モンタキュートヨアフ Hybrid logic with empty names 15
 (国立情報学研)
 西 村 祐 輝 (東京科学大情報理工)
 L. Pacheco (東京科学大情報理工)
 Yoav Montacute Hybrid logic with empty names
 (Nat. Inst. of Informatics)
 Yuki Nishimura (Sci. Tokyo)
 Leonardo Pacheco (Sci. Tokyo)

概要 We study a hybrid logic $\mathbf{Ke}(@)$ with *empty names*, that is, where nominals may fail to refer. We define a Hilbert-style axiomatization for $\mathbf{Ke}(@)$ and prove its soundness and strong completeness. We also study the relation between $\mathbf{Ke}(@)$ and the standard hybrid logic $\mathbf{K}(@)$.

- 30 モンタキュートヨアフ (国立情報学研) Halo semantics for modal logic 15
 Yoav Montacute (Nat. Inst. of Informatics) Halo semantics for modal logic

概要 In nonstandard analysis the halo of a point in a topological space is the intersection of the nonstandard extensions of all its open neighbourhoods. We define a parametric family of modal operators from the halo by varying which elements of the nonstandard extension are admitted as witnesses, and identify four canonical instances. Two recover well-known modalities: the topological closure and the Cantor derivative. A third reduces to Kripke semantics over the specialisation preorder. The fourth, purely nonstandard instance admits only nonstandard witnesses. The Transfer Principle forces it to coincide with the omega-accumulation point operator, a classical topological notion not previously studied in modal logic. Unlike the Cantor derivative, the omega-accumulation operator maps arbitrary sets to closed sets without any separation axiom, yielding an omega-Cantor-Bendixson decomposition on all topological spaces. Axiom 4 holds universally, again without separation conditions. We prove that K4 is the complete logic over infinite spaces, and GL over infinite omega-scattered spaces.

- 31 富永浩平 (神戸大システム情報) Complexity of the pure logic of necessitation 15
 Kohei Tominaga (Kobe Univ.) Complexity of the pure logic of necessitation

概要 We focus on *necessitation*, the inference rule $\frac{\varphi}{\Box\varphi}$, and analyze its effect on the computational complexity of satisfiability problems for modal logics.

In this presentation, we show that the satisfiability problems for consistent extensions of N by closed formulas, NR, and ND are NP-complete. we also show that the satisfiability problems for closed fragments of consistent extensions of N by closed formulas are NP-complete, while closed fragments of NR and ND are in P.

- 32 野口真柊 (神戸大システム情報) とても弱い下位直観主義論理について 15
 倉橋太志 (神戸大システム情報)
 Mashu Noguchi (Kobe Univ.) Very weak subintuitionistic logics
 Taishi Kurahashi (Kobe Univ.)

概要 We introduce a new propositional logic, called very weak subintuitionistic logic **VF**, by adapting the relational semantics of Fitting, Marek, and Truszczyński for the pure logic of necessitation **N** to the propositional setting. We prove that **VF** and its closed negative extensions are sound and complete with respect to this semantics, and that they have the disjunction property and the finite frame property. We also prove that **VF** is strictly weaker than the weak subintuitionistic logic **WF** of Shirmohammadzadeh Maleki and de Jongh. Finally, we study modal companions of **VF** and its closed negative extensions via Corsi's modified Gödel translation.

- 33 佐藤雄太 (神戸大システム情報) IML でも CML でもない直観主義様相論理について 15
 Yuta Sato (Kobe Univ.) On modal logics in an intuitionistic setting that are neither IMLs nor CMLs

概要 We first introduce two different families of modal logics in an intuitionistic setting, Intuitionistic Modal Logics (IMLs) and Constructive Modal Logics (CMLs), and discuss why they part company with each other, what motivates their study, and how they compare with each other. We then take a deeper look at the logics that do not fit to the IML and CML traditions, including the logic **FIK** recently introduced by Balbiani et al. Finally, we introduce a new logic **KI**, whose semantics may appear natural from a point of view of classical modal logic, then we show that **KI** is neither a CML nor an IML, very similarly to **FIK**.

- 34 鈴木 信行 (静岡大 理) 中間述語論理における冠頭標準形定理の変種についての注意 15
 Nobu-Yuki Suzuki (Shizuoka Univ.) A remark on variants of the prenex normal form theorem in intermediate
 predicate logics

概要 The prenex normal form theorem (PNFT) is a well-known metatheorem on classical predicate logic. It is said to characteristically express the behavior of quantifiers in classical predicate logic. Following earlier work, we consider different forms in which PNFT may hold. We introduce a notion of PNFT of type n , which distinguishes “degrees” of validity of PNFT. We then construct, for every $n \geq 1$, uncountably many intermediate predicate logics enjoying the PNFT of type n . All of these logics have the same propositional fragment as intuitionistic logic.

- 35 山田 瑛嗣 (東京科学大情報理工) Classifying truth patterns in iterated announcements 15
 Eiji Yamada (Sci. Tokyo) Classifying truth patterns in iterated announcements

概要 Dynamic epistemic logic is the logical study of information flow, knowledge acquisition, and belief revision. Publicly announcing to a group of agents that a formula holds, called a public announcement, is one of the major topics in the field. It is known that there are formulas that change their truth values when announced repeatedly. For a finite or infinite sequence σ of 0s and 1s, we say that a formula is σ -valid if its truth pattern under iterated announcements is always σ whenever the initial truth value matches the first digit of σ . In this talk, we classify all possible notions of σ -validity.

代 数 学

9月1日(火) 第IV会場

9:00~12:00

- 1 土谷昭善(東邦大理) 最大次元をもつ Gorenstein 単体の分類 13
 Akiyoshi Tsuchiya (Toho Univ.) Classification of Gorenstein simplices of maximal dimension

概要 Lattice polytopes whose Ehrhart rings are Gorenstein form an important class in Ehrhart theory, toric geometry, and commutative algebra. In this talk, we discuss Gorenstein lattice simplices of maximal possible dimension for a fixed degree. A theorem of Di Rocco, Haase, Nill, and Paffenholz implies that if a d -dimensional Gorenstein simplex is not a lattice pyramid and has degree s , then $d \leq 2s - 1$. We classify the extremal case $d = 2s - 1$ in terms of even binary self-complementary codes. As an application, we obtain the classification of Gorenstein simplices of degrees 3 and 4, including the fact that there are exactly 6 such simplices in dimension 5 and degree 3, and exactly 19 such simplices in dimension 7 and degree 4, up to isomorphism.

- 2 土谷昭善(東邦大理) 特別な h^* 多項式をもつ Gorenstein 単体の分類と個数 13
 Akiyoshi Tsuchiya (Toho Univ.) Classification and counting of Gorenstein simplices with a special h^* -polynomial

概要 We discuss Gorenstein lattice simplices with h^* -polynomial $1 + t^k + t^{2k} + \dots + t^{(v-1)k}$. This class generalizes the form that appears in the classification of Gorenstein simplices of prime normalized volume. Hibi, Tsuchiya, and Yoshida classified the case where v is a product of two primes and conjectured that, for general v , the number of equivalence classes depends only on the divisor lattice of v . We prove this conjecture by giving a classification in terms of strict divisor chains and associated combinatorial data, and obtain an explicit counting formula.

- 3 松下光虹(東大数理) ルート系に付随するトーリック環について 13
 Koji Matsushita (Univ. of Tokyo) On toric rings associated with root systems

概要 In this talk, we consider toric rings associated with signed posets, which are combinatorial objects arising from root systems. These rings can be regarded as a generalization of Hibi rings. We discuss our results on the divisor class groups of these rings and on a characterization of when they are Gorenstein. If time permits, we will also explain a characterization of their conic divisorial ideals.

- 4 毛 利 健 太 (関西学院大理) Unconditional 格子多面体に付随するトーリック環の環論的性質 13
 本 村 諒 (東 邦 大 理)
 大 杉 英 史 (関西学院大理)
 土 谷 昭 善 (東 邦 大 理)
 Kenta Mori (Kwansei Gakuin Univ.) Toric rings of unconditional lattice polytopes
 Ryo Motomura (Toho Univ.)
 Hidefumi Ohsugi
 (Kwansei Gakuin Univ.)
 Akiyoshi Tsuchiya (Toho Univ.)

概要 Unconditional polytopes are convex polytopes that are symmetric with respect to all coordinate hyperplanes and arise naturally from anti-blocking polytopes by reflection. We investigate algebraic relations between an anti-blocking lattice polytope and its associated unconditional lattice polytope. We prove that the toric ring of an anti-blocking lattice polytope is normal if and only if the toric ring of the associated unconditional lattice polytope is normal. We also show that the toric ideal of an anti-blocking lattice polytope is generated by quadratic binomials if and only if the same holds for the associated unconditional lattice polytope. As an application, we obtain a graph-theoretic characterization of quadratic generation of symmetric stable set ideals.

- 5 宮 崎 充 弘 (阪公大数学研) Canonical trace radical property of some Stanley–Reisner rings 13
 Mitsuhiro Miyazaki Canonical trace radical property of some Stanley–Reisner rings
 (Osaka Metro. Univ.)

概要 In this talk, we show criteria of canonical trace radical (CTR) property of some Stanley–Reisner rings. Let $\mathbb{K}$ be a field and Δ a simplicial complex. First, we show that if Δ is doubly Cohen–Macaulay over $\mathbb{K}$, then the Stanley–Reisner ring $\mathbb{K}[\Delta]$ is CTR. Next we consider low dimensional case. First, we show that if $\dim \Delta = 0$, then $\mathbb{K}[\Delta]$ is CTR. Next, we consider the case where $\dim \Delta = 1$. We consider Δ as a graph and show the following: $\mathbb{K}[\Delta]$ is CTR if and only if a vertices with degree 3 or more and 2 or more are adjacent, then the edge between them is a part of a certain cycle.

- 6 工 藤 桃 成 (福岡工大情報工) A new criterion for Moreno-Sociás’ conjecture 13
 横 山 和 弘 (立 教 大*)
 Momonari Kudo A new criterion for Moreno-Sociás’ conjecture
 (Fukuoka Inst. of Tech.)
 Kazuhiro Yokoyama (Rikkyo Univ.*)

概要 We establish a new criterion for Moreno-Sociás’ conjecture for a fixed tuple $(n; d_1, \dots, d_m)$. Fröberg’s conjecture is known to admit three equivalent formulations in terms of generic properties, existence of a single sequence, and generic sequences. We prove that an analogous equivalence also holds for Moreno-Sociás’ conjecture. The key step is to show that the coincidence of Hilbert series, obtained from the known equivalence for Fröberg’s conjecture, forces the reduced Gröbner bases of a specialized sequence and the corresponding generic sequence to have the same leading monomials. As an application, the verification of Moreno-Sociás’ conjecture is reduced to constructing a single sequence with the desired properties. We also obtain a similar criterion for a variant concerning ideals whose quotient rings have Krull dimension one.

- 7 堀 内 淳 (日 本 工 大) Demazure-type construction for certain graded rings 13
 Jun Horiuchi (Nippon Inst. of Tech.) Demazure-type construction for certain graded rings

概要 We discuss Demazure-type construction of certain graded rings. Our purpose is to develop the construction for seminormal graded rings under certain conditions.

- 8 高橋 晃生 (早大教育) Defining ideals of some numerical semigroup rings with arithmetic pseudo-Frobenius numbers 13
- Kou Takahashi (Waseda Univ.) Defining ideals of some numerical semigroup rings with arithmetic pseudo-Frobenius numbers

概要 In this talk, we discuss defining ideals of numerical semigroup rings whose pseudo-Frobenius numbers form an arithmetic progression. We focus on a conjecture stating that the defining ideal is generated by the 2-minors of a certain matrix if and only if the pseudo-Frobenius numbers form an arithmetic progression of length $n - 1$, where n denotes the embedding dimension. We explain a proof of this conjecture when the embedding dimension is sufficiently large. We also describe the structure of pseudo-Frobenius numbers and present explicit forms of the corresponding defining ideal

- 9 菅原 明広 (山形大理工) Existence of a far-flung Gorenstein numerical semigroup attaining the Herzog–Kumashiro–Stamate bound 13
- Akihiro Sugawara (Yamagata Univ.) Existence of a far-flung Gorenstein numerical semigroup attaining the Herzog–Kumashiro–Stamate bound

概要 We solve a question posed by Herzog, Kumashiro and Stamate regarding the upper bound for the multiplicity of a far-flung Gorenstein numerical semigroup.

- 10 吉田 健一 (日大文理) Nearly Gorenstein Rees algebras over two-dimensional regular local rings 13
- 遠藤 直樹 (明大政治経済) 13
- Ken-ichi Yoshida (Nihon Univ.) Nearly Gorenstein Rees algebras over two-dimensional regular local rings
- Naoki Endo (Meiji Univ.)

概要 In this talk, we give a complete characterization of nearly Gorenstein Rees algebras over two-dimensional regular local rings. Moreover, we discuss several related topics.

- 11 前田 恭佑 (日大総合基礎) Classification on nearly Gorenstein rational surface singularities with multiplicity 4 13
- Kyosuke Maeda (Nihon Univ.) Classification on nearly Gorenstein rational surface singularities with multiplicity 4

概要 It is well known that a Gorenstein rational singularity is a rational double point. Previously, the speaker announced a classification of nearly Gorenstein rational triple points and a criterion for nearly Gorenstein rational singularities. Using these results, we classified rational surface singularities with multiplicity 4 which are nearly Gorenstein rings.

- 12 三船 裕輝 (名大多元数理) 有界複体の level の下限 13
- Yuki Mifune (Nagoya Univ.) Lower bounds for levels of bounded complexes

概要 The notion of level in a triangulated category, introduced by Avramov, Buchweitz, Iyengar, and Miller, measures the number of mapping cones needed to build a given object out of a specified full subcategory. In this talk, we discuss levels of bounded complexes with respect to resolving subcategories. In the classical case, Altmann, Grifo, Montano, Sanders, and Vu studied levels with respect to projective modules and the New Intersection Theorem for level. Awadalla and Marley studied Gorenstein projective analogues of lower bounds for such levels. The main topic of this talk is to establish lower bounds for levels in terms of resolution dimensions. This recovers results of Awadalla and Marley, and extends them to levels with respect to several other resolving subcategories.

14:15~15:15 特別講演

埴原 紀宏 (九大数理) 特異圏のカラビ・ヤウ構造と傾理論

Norihiro Hanihara (Kyushu Univ.) Calabi–Yau structures and tilting theory for singularity categories

概要 In Cohen–Macaulay representation theory, Calabi–Yau triangulated categories arise as the stable category of Cohen–Macaulay modules over certain Gorenstein rings such as commutative rings, (truncated) preprojective algebras, and so on. The stable category is also equivalent to the singularity category in the sense of Buchweitz and Orlov. In the talk, we discuss a lift of the Calabi–Yau property of a triangulated category to its differential graded enhancement, which is called a Calabi–Yau structure. We will explain a systematic construction of Calabi–Yau structures on enhanced singularity categories, and its application to tilting theory.

15:30~18:00

13 神田 遼 (阪公大理) Bicompletions of abelian categories with dimension functions 13

Ryo Kanda (Osaka Metro. Univ.) Bicompletions of abelian categories with dimension functions

概要 We develop cocompletion and completion procedures for small abelian categories equipped with dimension functions. The cocompletion process with respect to the dimension function is defined as a combination of Ind-completion and Serre quotient, and we show that it satisfies a certain universal property. For a split abelian category satisfying a certain condition, we prove that the cocompletion of the completion coincides with the completion of the cocompletion.

14 大竹 優也 (東大数理) Auslander の grade 条件と syzygy 圏 13

Yuya Otake (Univ. of Tokyo) Auslander grade condition and syzygy category

概要 Auslander–Bridger, Evans–Griffith, and Auslander–Reiten established deep connections between categories of higher syzygies and torsionfreeness. Auslander’s grade conditions play a central role in this relationship. In this talk, we relate Auslander’s grade conditions to Serre’s conditions. As an application, under suitable finiteness assumptions on homological dimensions, we recover several recent results asserting that higher torsionfreeness follows from Serre’s conditions.

15 木村 雄太 (広島工大工) 可換ネーター環上の道代数の傾加群と Schur ルート 13

Yuta Kimura (Hiroshima Inst. of Tech.) Schur roots and tilting modules of path algebras over commutative rings

概要 For a field k and a finite acyclic quiver Q , support tilting kQ -modules are known to be in bijection with the clusters of the cluster algebra $\mathcal{A}_Q$ of Q . In this talk, we extend this correspondence from fields to arbitrary ring indecomposable commutative Noetherian rings. More precisely, for such a ring R , 2-term silting complexes over RQ , up to additive equivalence, are shown to correspond bijectively to the clusters of $\mathcal{A}_Q$. As an application, when Q is Dynkin, torsion classes in $\text{mod } RQ$ are classified by order-preserving maps from $\text{Spec } R$ to the poset of clusters.

16 井上 翔太 (東京理大理) 準三角双代数の組紐付きコホモロジーの組紐付き森田不変性 13

板場 綾子 (東京理大教養教育)

Shota Inoue (Tokyo Univ. of Sci.) Braided Morita invariance of the braided cohomology of quasi-triangular bialgebras
Ayako Itaba (Tokyo Univ. of Sci.)

概要 The symmetric cohomology was introduced for groups by Staic, and was generalized to cocommutative Hopf algebras by Shiba, Sanada, and Itaba. In this research, we further generalize this notion and define the braided cochain complex and the braided cohomology of braided coalgebras in linear monoidal categories, using monoidal functors from the augmented braided category. As an application, we prove that the braided cochain complex of quasi-triangular bialgebras is a braided Morita invariant. We also provide an example by dealing with the Sweedler Hopf algebra, which is both non-cocommutative and finite-dimensional.

- 17 望 月 直 央 (名大多元数理) 切断微分次数付き代数上の拡大加群圏について 13
 Nao Mochizuki (Nagoya Univ.) On extended module categories over truncated DG-algebras

概要 Recent developments, such as silting theory and derived Morita theory, show that derived categories of connective DG-algebras arise naturally in the representation theory of algebras. Motivated by this perspective, d -truncated connective DG-algebras and their associated d -extended module categories were introduced as higher-dimensional generalizations of algebras and their module categories. In this talk, I will discuss Auslander–Reiten theory for extended module categories over truncated DG-algebras and its connection with higher cluster tilting theory.

- 18 Haigang Hu (Univ. of Sci. and Tech. of China) Classification of noncommutative central conics 13
 毛 利 出 (静岡大理)
 伍 文 超 (静岡大自然)
 Haigang Hu (Univ. of Sci. and Tech. of China) Classification of noncommutative central conics
 Izuru Mori (Shizuoka Univ.)
 Wenchao Wu (Shizuoka Univ.)

概要 Classification of noncommutative quadric hypersurfaces is one of the major projects in noncommutative algebraic geometry. In recent years, we are dedicated to complete the classification of noncommutative central conics. To achieve this goal, we and other authors develop some theories to study and classify some classes of noncommutative quadric hypersurfaces in a series of papers. In this paper, we completely classify noncommutative central conics by developing a general theory of homogenization and dehomogenization for noncommutative algebras. We show that there are bijections among the following sets of objects: the set of isomorphism classes of 4 dimensional Frobenius algebras, the set of isomorphism classes of noncommutative affine pencils of conics, and the set of isomorphism classes of noncommutative central conics.

- 19 高 島 佑 太 (都立大理) Classification of objects in the singularity categories of rational double points in arbitrary characteristics 13
 Yuta Takashima (Tokyo Metro. Univ.) Classification of objects in the singularity categories of rational double points in arbitrary characteristics

概要 The singularity categories of rational double points are known to be Krull–Schmidt categories. In characteristic zero, the indecomposable objects in these categories have been completely classified, relying on the fact that rational double points are quotient singularities by finite subgroups of the special linear group of degree two. On the other hand, in positive characteristics, since rational double points are not necessarily quotient singularities, how to describe the indecomposable objects in their singularity categories has yet to be investigated thoroughly. In this talk, I will explain a method to determine the indecomposable objects corresponding to the vertices of the Auslander–Reiten quiver of the singularity category for a rational double point defined over an algebraically closed field of arbitrary characteristic.

- 20 仁 村 州 (名大多元数理) Some surface geometry via quiver moduli and Bridgeland moduli 13
 Shu Nimura (Nagoya Univ.) Some surface geometry via quiver moduli and Bridgeland moduli

概要 Different moduli problems often capture different aspects of the geometry of algebraic varieties. In this talk, I discuss a class of surfaces arising from dihedral reflection groups and explain how their birational geometry can be described in terms of Bridgeland moduli spaces on a natural root stack associated with the maximal resolution. The resulting wall-and-chamber structure describes the MMP of the maximal resolution and is shown, via the derived McKay correspondence, to intersect the region arising from King stability for representations of a noncommutative algebra. As an application, we obtain a new proof of Ishii's conjecture for dihedral reflection groups and place the relation between quiver moduli and surface geometry in the framework of Bridgeland stability. This talk is based on arXiv:2605.22474.

- 21 松 原 祐 貴 On a certain tamely ramified geometric Langlands correspondence . . . 13
 (Univ. of Southern Denmark)
 Yuki Matsubara On a certain tamely ramified geometric Langlands correspondence
 (Univ. of Southern Denmark)

概要 The geometric Langlands correspondence (GLC) is a geometric analogue of the Langlands conjecture in number theory, relating algebraic geometry, representation theory, and many other areas. Dima Arinkin's 2001 result established the GLC for the case $G = SL_2$ on the complex projective line P^1 with four fixed regular singularities. When one attempts to extend this to five or more singularities, it turns out to be more natural to decompose the correspondence into a Radon transform-type correspondence and a GLC-like correspondence. In this talk, I will explain the calculations of cohomology that support the proof of this GLC-like correspondence in the P^1 with five fixed regular singularities case.

- 22 根 本 卓 弥 (早 大 理 工) Rank two special Ulrich bundles on the Fano threefold of degree 10 with
 Picard number 2 13
 Takuya Nemoto (Waseda Univ.) Rank two special Ulrich bundles on the Fano threefold of degree 10 with
 Picard number 2

概要 We construct rank 2 special Ulrich bundles on the Fano threefold of degree 10 with Picard number 2, namely the blow-up of $\mathbb{P}^3$ along a general smooth complete intersection of two cubic surfaces.

9月2日(水) 第IV会場

9:00~12:00

- 23 岩見智宏(九工大工) (c_2, c_3) - or c_3 -sectional genera analogues based on certain triple covers of irregular three-folds 13

Tomohiro Iwami (Kyushu Inst. of Tech.) (c_2, c_3) - or c_3 -sectional genera analogues based on certain triple covers of irregular three-folds

概要 Based on S. Mori's proof of the existence of 3-dimensional flips for an extremal neighborhood $(X, C) \subset \mathbb{C}^4$ of irreducible reducible exrrimal curve C with type k1A, k2A by using "2-game" between $l(P), q(P) (P \in D \in |-K_X|)$ related to extension of $S^2(\text{gr}_C^1 \Omega_X^1)$ under abundance property ([S.Mori 1988]), the author had studied 1)–2) as follows ([the auhor, 2018–2026]): 1) 3-dimensional Miyaoka–Yau type inequality $(\text{MY})_{3, c_3}$ with $c_3 := c_3(X)$ for such a (X, C) , and 2) similar such an inequality $(\text{MY})_{3, c_3, S^2}$ for $(\text{MY})_{3, c_3}$ under extension of $S^2(\text{gr}_{C_s}^1 \Omega_X^1)$ in (X, C_s) with reducible $C =: C_s$, regarding to followings i)–iii): for such a C_s , i) Higgs sheaves $(\mathcal{E}, \theta_s)$ associated to such 2-game under the cofibered products $({}^2_1 \square_0^1)_\#$ of C_s , ii) for infinitesimals $\Delta_{(i)}$ ($i \in [1, 2]$) of (tri-)diagonals $\Delta_{(1)}$ (or, $\Delta_{(2)}$) in $({}^2_1 \square_0^1)_\#$, differential operators $\mathcal{D}_{(1)} := \mathcal{D}\text{iff}_{(1)}$ ($i = 1$ case) (or, $\mathcal{D}_{(2)} := \mathcal{D}\text{iff}_{(2)}$ ($i = 2$ case)) as corresponding to $\mathcal{E}$ in i), and iii) for topologicality associated to valuative extensions of $(\underline{\nu}, \underline{P})$, homological equivalence deformations for $c_1^3, c_1 c_2$ with $c_i = c_i(X)$ in $(\text{MY})_{3, c_3, S^2}$ by CH_0 as Chow cycle complexes via $\Delta_{(i)}$ ([S.Bloch–V.Srinivas 1983]) and via Hodge module (M, K, F, V) for $\mathcal{D}_{(i)}$ with weights $w_\bullet (\bullet \in \{\underline{\nu}, \underline{P}\})$ from $(\underline{\nu}, \underline{P})$ under related triple cover ([R.Miranda 1985]). In this talk, the author reports mainly followings A) and B): A) to formulate (c_2, c_3) - (or, c_3 -)sectional genera analogues by (rapidity related to) $\kappa_\nu(D) = \kappa_\sigma(D)$ ([N.Nakayama 2004]) under limit of θ_s as such 2-game or extension of $S^2(\text{gr}_{C_s}^1 \Omega_X^1)$ for c_1 -sectional genera in the case of pseudo-effective divisor as in the tautological divisor ([Y.Miyaoka 1977]), and B) to give automorphisms of movable cone $\text{Mov}(X)$ for (X, C_s) following to A) by degenerations of the complexes K in (M, K, F, V) associated to homological equivalence deformations with $w_\bullet$ as "characters" of related 2-groups.

- 24 高橋優太(中大理工) On varieties with Ulrich exterior power of tangent bundles 13
渡邊 究(中大理工)

Yuta Takahashi (Chuo Univ.) On varieties with Ulrich exterior power of tangent bundles
Kiwamu Watanabe (Chuo Univ.)

概要 In this talk, we study polarized smooth projective varieties (X, H) for which an exterior power $\bigwedge^r T_X$ of the tangent bundle is an H -Ulrich bundle. Our main result gives a complete classification in the case of Picard number one. More precisely, if X is a smooth projective variety of dimension $n \geq 2$ with $\rho(X) = 1$ and $\bigwedge^r T_X$ is H -Ulrich for some $0 < r < n$, then $(X, H) \simeq (\mathbb{P}^2, \mathcal{O}_{\mathbb{P}^2}(2))$.

- 25 北川夏芽(名大多元数理) Rational curves on del Pezzo varieties in positive characteristic 13
Natsume Kitagawa (Nagoya Univ.) Rational curves on del Pezzo varieties in positive characteristic

概要 The study of rational curves on Fano varieties in positive characteristic presents several difficulties. One such difficulty is the existence of inseparable maps, which may yield pathological components of the moduli spaces of rational curves. In this talk, we discuss how to overcome this difficulty, and describe some results on the structure of moduli spaces of rational curves on certain del Pezzo varieties in positive characteristic.

- 26 加藤 裕基 (久留米工高専) Algebraic cobordism via spans 13
 Yuki Kato (Kurume Nat. Coll. of Tech.) Algebraic cobordism via spans

概要 We formulate algebraic cobordism as the universal oriented cohomology theory on an ∞ -category of spans. After recalling the axioms on line bundles and admissible morphisms, we state the universal property of the resulting cobordism spectrum. We then apply the span formalism to perfectoid v -stacks and state the tilting invariance

$$\mathrm{MGL}_{\mathrm{perf}}(R) \simeq \mathrm{MGL}_{\mathrm{perf}}(R^b)$$

for a perfectoid algebra R and its tilt R^b .

- 27 松原=許宰榮 (東北大情報) 主 matroid 行列式 13
 S. Telen (MPI MiS)
 Saiei-Jaeyeong Matsubara-Heo Principal matroid determinant
 (Tohoku Univ.)
 Simon Telen (MPI MiS)

概要 In the late 20th century, Gel'fand, Kapranov, and Zelevinsky (GKZ) developed a modern theory of discriminants and resultants. Central to their theory is a polynomial called the principal A-determinant. This polynomial led to the discovery of the secondary polytope and is one of the origins of combinatorial algebraic geometry. Topologically, its zero locus coincides with the Euler discriminant locus of toric hypersurfaces with a fixed monomial support. In this talk, we introduce the principal matroid determinant for a realizable matroid and report an analog to the GKZ theory. In our framework, reciprocal linear spaces replace toric varieties, while matroids and their flats replace the roles of convex polytopes and their faces.

- 28 松原=許宰榮 (東北大情報) 射影超曲面の族の極限混合 Hodge 構造の周期 13
 朝倉 政典 (北大理)
 Saiei-Jaeyeong Matsubara-Heo Periods of limiting mixed hodge structures of projective hypersurfaces
 (Tohoku Univ.)
 Masanori Asakura (Hokkaido Univ.)

概要 For a generic one-parameter degeneration of projective hypersurfaces, we show that the periods of the limiting mixed Hodge structure are generated by certain special values of logarithm, Gamma and Dirichlet L-functions. Our proof is based on the analytic continuation of solutions to the GKZ system.

- 29 永野 中行 (金沢大自然) 複素鏡映群と関係する K3 曲面族の周期と超平面配置で極を持つ保型形式について 13
 Atsuhira Nagano (Kanazawa Univ.) Periods of K3 surfaces associated with a complex reflection group and meromorphic modular forms with poles in a hyperplane arrangement

概要 The speaker will introduce a family of lattice polarized K3 surfaces. The period mapping for the family enables us to identify a five dimensional weighted projective space and the Looijenga compactification, that is defined by a hyperplane arrangement, of a bounded symmetric domain. The deformation parameters of the family of K3 surfaces are closely related with invariants of the complex reflection group of exceptional type with the maximal rank.

- 30 大橋 亮 (東大情報理工) Superspecial plane quintic curves and Gaussian hypergeometric series 13
- Ryo Ohashi (Univ. of Tokyo) Superspecial plane quintic curves and Gaussian hypergeometric series

概要 In this talk, we study plane quintic curves with cyclic automorphism groups of orders 8 and 10. These curves are represented by one-parameter families, and their superspeciality can be characterized explicitly in terms of truncated Gaussian hypergeometric series. Using this characterization, we determine the exact number of isomorphism classes of superspecial plane quintic curves with automorphism groups of order 10. We also develop an efficient algorithm for enumerating such curves with automorphism groups of order 8, and present computational results for characteristics between 13 and 10000.

- 31 中野 竜之介 (北大 理) 超幾何級数 $F(\frac{1}{6}, \frac{1}{2}, 1; x)$ で表されるある種の極限定理の代数幾何学的側面
松本 圭司 (北大 理) 13
- Ryunosuke Nakano (Hokkaido Univ.) Algebro-geometric aspects of a certain limit theorem expressed by the
Keiji Matsumoto (Hokkaido Univ.) hypergeometric series $F(\frac{1}{6}, \frac{1}{2}, 1; x)$

概要 The algebro-geometric prototype is Gauss's arithmetic-geometric mean, whose common limit is expressed by the hypergeometric series $F(\frac{1}{2}, \frac{1}{2}, 1; x)$; Jacobi's period formula relates the periods, theta constants and hypergeometric series of the Legendre family of elliptic curves. We develop this framework (periods, Jacobi-type formula, isogeny) for the case where $F(x) = F(\frac{1}{6}, \frac{1}{2}, 1; x)$ arises as a period. From the genus-three curve $C(x): w^6 = z^5(z - x)(z - 1)^3$, we form an elliptic curve E_λ as a quotient by an involution and realize $F(x)$ as its normalized period. We establish an analogue of Jacobi's formula, and prove that iterating the pair of maps M_1, M_2 arising from the degree-two isogeny gives a common limit $M(a_0, b_0) = a_0 / F(\frac{1}{6}, \frac{1}{2}, 1; 1 - (b_0/a_0)^3)^2$.

- 32 辻 栄 周 平 (北教大 旭川) 非結晶的ルート系 H_2, H_3, H_4 の特性準多項式 10
黒田 匡 迪 (日本文理大工)
- Shuhei Tsujie (Hokkaido Univ. of Edu.) The characteristic quasi-polynomials of non-crystallographic root sys-
Masamichi Kuroda tems H_2, H_3 , and H_4
(Nippon Bunri Univ.)

概要 The characteristic quasi-polynomial of a hyperplane arrangement over the ring of integers was introduced by Kamiya, Takemura, and Terao as a generalization of the characteristic polynomial. In particular, characteristic quasi-polynomials associated with crystallographic root systems are known to possess several remarkable properties. Characteristic quasi-polynomials can also be defined for hyperplane arrangements over the ring of integers of an algebraic number field. In this talk, we report on the relationship between the characteristic quasi-polynomials of the non-crystallographic root systems H_2, H_3 , and H_4 , and those of the crystallographic root systems A_4, D_6 , and E_8 .

- 33 八木雪野 (阪大理) 超平面配置のフィルター付き Varchenko–Gelfand 代数と有向マトロイド
吉永正彦 (阪大理) 13
Yukino Yagi (Univ. of Osaka) Filtered Varchenko–Gelfand algebras of hyperplane arrangements and
Masahiko Yoshinaga (Univ. of Osaka) oriented matroids

概要 The Varchenko–Gelfand (VG) algebra is defined as the algebra of $\mathbb{R}$ -valued functions on the chambers of a real hyperplane arrangement. This algebra has a natural filtration by the degree with respect to Heaviside functions, giving rise to the associated graded VG algebra. While the graded algebra is isomorphic to the Orlik–Solomon algebra when the coefficient ring $\mathbb{R}$ is an integral domain of characteristic 2, we investigate VG algebras over coefficient rings of characteristic different from 2. Specifically, we study to what extent VG algebras determine the underlying oriented matroid structures. Our main result shows that for arrangements generic in codimension 2, the oriented matroid can be recovered from both the filtered and graded VG algebras.

13:00～14:00 特別講演

- 高橋篤史 (阪大理) ミラー対称性と導来圏の完全例外列
Atsushi Takahashi (Univ. of Osaka) Mirror symmetry and full exceptional collections in derived categories

概要 A Frobenius manifold is a complex manifold whose tangent sheaf carries a Frobenius algebra structure satisfying certain flatness conditions. In mirror symmetry, Frobenius manifolds arising from Gromov–Witten theory are expected to be isomorphic to those arising from deformation theory. This notion originates in Kyoji Saito’s theory of primitive forms and was later axiomatized by Dubrovin in the context of two-dimensional topological field theories. Derived categories also admit several realizations, for instance via coherent sheaves on algebraic varieties and Lagrangian Floer theory. Kontsevich’s homological mirror symmetry predicts equivalences between such categories. Moreover, full exceptional collections are expected to reflect monodromy phenomena, as illustrated by Dubrovin’s conjecture relating the monodromy data of semisimple Frobenius structures to their numerical data. Bridgeland showed that the space of stability conditions on a triangulated category has a natural complex manifold structure, and physical intuition suggests that it should carry a Frobenius structure. A central problem is to understand this space in terms of the above categorical data. We expect semiorthogonal decompositions of a derived category to provide an important clue; in particular, “good” ones should induce a stratification of the space of stability conditions. As a first step, we study full exceptional collections, expected to correspond to maximal-dimensional strata, and examine the relevant compatibility properties. This talk surveys our recent results from this perspective.

9月3日(木) 第IV会場

9:00～12:00

- 34 野方雄斗 (弘前大理工) Cyclotomic numbers of order $q-1$ over $\mathbb{F}_{q^r}$ 13
工藤隼己 (弘前大理工)
Yuto Nogata (Hirosaki Univ.) Cyclotomic numbers of order $q-1$ over $\mathbb{F}_{q^r}$
Hayaki Kudo (Hirosaki Univ.)

概要 Let $q = p^n$, $r \in \mathbb{Z}_{\geq 2}$, $e = q-1$, and $k = \frac{q^r-1}{e}$. In this talk, we discuss the cyclotomic numbers $(a, b)_{q-1}$ over $\mathbb{F}_{q^r}$. We prove that $(a, b)_{q-1} \leq \lceil \frac{k}{2} \rceil$ for all $0 \leq a, b \leq q-2$ except when $q=2$ and $r \geq 3$. We also give sharper bounds for prime values of r , especially for $r=2$ and $r=3$.

- 35 別宮 耕一 (弘前大理工) Codes generated by matrices whose co-ranks are cyclotomic numbers
 葛西 雄介 (弘前大理工) 13
 工藤 隼己 (弘前大理工)
 野方 雄斗 (弘前大理工)

Koichi Betsumiya (Hirosaki Univ.) Codes generated by matrices whose co-ranks are cyclotomic numbers
 Yusuke Kasai (Hirosaki Univ.)
 Hayaki Kudo (Hirosaki Univ.)
 Yuto Nogata (Hirosaki Univ.)

概要 Cyclotomic numbers $(a, b)_e$ are deeply related to the separation of $\mathbb{F}_q$ by cyclotomic cosets. We consider linear codes $C_{(a,b)}$ generated by the matrix $C^{(a,b)}$ whose corank is a cyclotomic number. We classify the structure of $C_{(a,b)}$ depending on the parameter a . In particular, we have $(a, b)_e \leq \frac{k}{2}$ for $a = \frac{e}{2}$.

- 36 鳴海 柊星 (弘前大理工) 連続する k 乗数の間における k -full 数の分布について 13
 立谷 洋平 (弘前大理工)

Shusei Narumi (Hirosaki Univ.) On the number of k -full integers between successive k -th powers
 Yohei Tachiya (Hirosaki Univ.)

概要 Let $k \geq 2$ be an integer. In this talk, we will investigate the distribution of k -full integers between three successive k -th powers. More precisely, for any integers $\ell, m \geq 0$, we establish the explicit asymptotic density for the set of integers n such that the intervals $(n^k, (n+1)^k)$ and $((n+1)^k, (n+2)^k)$ contain exactly ℓ and m k -full integers, respectively. As an application, we present that there are infinitely many triples of consecutive perfect k -th powers in the sequence of k -full integers.

- 37 北島 雅也 (名大多元数理) Erdélyi–Kober 型分数階微積分による星芒型 p -Bessel 関数の次数階層構造 13

Masaya Kitajima (Nagoya Univ.) Hierarchy structures of orders of astroid-type p -Bessel functions via Erdélyi–Kober fractional calculus

概要 We study the lattice point problem for generalized circles $|x_1|^p + |x_2|^p = r^p$, called p -circles (Lamé curves), in the cuspidal range $0 < p < 1$. Our focus is the lattice point error term $P_p(r)$ and its optimal exponent α_p . Unlike the classical case $p = 2$, which is closely related to Hardy's identity and Bessel functions, the cuspidal case remains poorly understood. Restricting to the countable family with $(2/p) \in \mathbb{N}$, called astroid-type p -circle, we introduce generalized p -Bessel functions associated with distorted angular components. In previous work, we derived a Hardy-type identity giving an explicit oscillatory representation of P_p . In this talk, we show that these generalized p -Bessel functions possess a hierarchical structure generated by Erdélyi–Kober-type fractional integral and differential operators. This yields order-shift formulas and suggests the effectiveness of fractional analytic methods for cuspidal lattice point problems.

- 38 D. Duverney 2 次多項式によって生成される Mahler 型無限積の超越性について 10
 (Baggio School for Engineering)
 黒沢 健 (東京理大理)

Daniel Duverney Transcendence of Mahler-type infinite products generated by second-degree polynomials
 (Baggio School for Engineering)
 Takeshi Kurosawa (Tokyo Univ. of Sci.)

概要 We study the transcendence of the Mahler-type infinite products generated by second-degree polynomials.

- 39 岩田 英人 (群馬工高専) On a relation to the Riemann hypothesis and an analytic part for the divisor function 13
 Hideto Iwata On a relation to the Riemann hypothesis and an analytic part for the divisor function
 (Gunma Nat. Coll. of Tech.)

概要 Let $\varphi(n)$ denote the Euler totient function. We study the analytic part associated with the summatory function of $\sigma_1(n)$ and obtain explicit bounds under the Riemann Hypothesis. In particular, we establish an upper bound of order $x^{\delta'} \exp\left(\frac{\log x}{\log \log x}\right)$, where $\delta' = \max\{1/2, \delta\}$.

- 40 寺田 怜央 (九大 J G M I) Asymptotic estimates of sums of Bege's generalized Möbius functions 13
 Reo Terada (Kyushu Univ.) Asymptotic estimates of sums of Bege's generalized Möbius functions

概要 In 1970, T. M. Apostol introduced a generalization of the Möbius function. In 2001, A. Bege further generalized this function. Since then, several researchers have studied the partial sums of these functions. In this talk, we present improved estimates for the partial sums of Bege's generalized Möbius functions.

- 41 坂井 遥 On a theorem of Turán II 13
 南出 真 (山口大理)
 谷川 好男
 Haruka Sakai On a theorem of Turán II
 Makoto Minamide (Yamaguchi Univ.)
 Yoshio Tanigawa

概要 Denote by $\omega_z(n)$ the number of distinct prime divisors $p \leq z$ of the natural number n . Using an idea by Granville and Soundararajan we investigate $\sum_{n \leq x} (\omega_z(n) - \log \log z)^k$. Fix an integer $k \geq 2$. For sufficiently large x and $z \geq e^e$ with the restriction $z \leq x^{1/k}$, we show a precise asymptotic formula for the sum.

- 42 遠藤 健太 (鈴鹿工高専) Euler-Zagier 型の多重ゼータ関数の臨界線上の値の稠密性について 13
 Kenta Endo (Suzuka Nat. Coll. of Tech.) Denseness results for the Euler-Zagier type multiple zeta-functions with identical arguments on the critical line

概要 We consider the value-distribution of the Euler-Zagier type multiple zeta-functions with identical arguments on the critical line. Mishou showed the set of the values of the Euler-Zagier double sum with identical arguments on the critical line is dense in the complex plane under the Riemann Hypothesis. In this talk, we generalize Mishou's result to the r -fold Euler-Zagier multiple zeta-functions with identical arguments for $r \geq 4$.

- 43 宮川 貴史 (尾道市大経済情報) Barnes 多重ゼータ関数の Laurent 級数展開 13
 Takashi Miyagawa Laurent series expansions for the Barnes multiple zeta function
 (Onomichi City Univ.)

概要 We study Laurent series expansions of the Barnes multiple zeta function

$$\zeta_r(s, a; w_1, \dots, w_r) = \sum_{m_1, \dots, m_r \geq 0} (a + m_1 w_1 + \dots + m_r w_r)^{-s}.$$

Explicit formulas are obtained for the constant term and higher Laurent coefficients at $s = r$. We also determine the corresponding coefficients at the remaining poles $s = r - j$ ($1 \leq j \leq r - 1$), expressing them in terms of polygamma functions and their higher derivatives.

- 44 花 木 ひ か り (東 北 大 理) Schur 多重ゼータ関数の Littlewood–Richardson 規則 13
 Hikari Hanaki (Tohoku Univ.) The Littlewood–Richardson rule for Schur multiple zeta functions

概要 The Schur multiple zeta functions introduced by Nakasuji–Phuksuwan–Yamasaki are defined as sums over semi-standard Young tableaux, which is analogous to the tableau representation of classical Schur functions. While the product of Schur functions expands as a linear combination of Schur functions, the product of Schur multiple zeta functions is known to expand into a similar form by taking the summation over all variable permutations (i.e., under the action of symmetric group S_n , where n is the number of variables). In this talk, we introduce refined formulas by restricting the group action on the sum, from S_n to its subgroup S_m that fixes the remaining $n - m$ variables. Furthermore, we present an extension of this restriction to the alternating group A_m for certain special cases.

- 45 范 谷 瑜 (名 大 多 元 数 理) p 進多重 L 関数の特殊値に対する明示的な公式 13
 Ku-Yu Fan (Nagoya Univ.) An explicit formula for the special values of the p -adic multiple L -functions

概要 In this talk, I will discuss an explicit formula for the special values of the p -adic multiple L -functions introduced by Furusho, Komori, Matsumoto, and Tsumura. I will begin by recalling a formula of Furusho and Jarossay, which expresses these special values as infinite sums of cyclotomic multiple harmonic values whose coefficients are cyclotomic multiple Bernoulli numbers. The main result of this talk gives a more explicit form of this expression by describing these coefficients in terms of special values of generalized Euler–Zagier–Lerch type complex multiple zeta functions. To obtain this result, I will recall twisted multiple Bernoulli numbers, which are precisely such special values, and then explain an explicit formula expressing cyclotomic multiple Bernoulli numbers in terms of twisted multiple Bernoulli numbers. I will conclude by writing out the resulting formula explicitly in low-depth cases.

12:00~12:30 代数学分科会総会

14:15~15:15 特別講演

甲 斐 亘 (東 北 大 理) 数体の素元の線形パターン, および Hilbert 第 10 問題との関わり

Wataru Kai (Tohoku Univ.) Linear patterns of prime elements in number fields and their connection to Hilbert’s Tenth Problem

概要 Let K be a number field and $\mathcal{O}_K$ its integers. I will discuss when a given set of finitely many polynomials of degree 1 with $\mathcal{O}_K$ -coefficients can take simultaneous prime values in $\mathcal{O}_K$. This builds upon my former joint work with Mimura, Munemasa, Seki and Yoshino, and extends work of Green–Tao–Ziegler for the case $K = \mathbb{Q}$.

I will also mention how the main result was used independently by Koymans–Pagano, Alpöge–Bhargava–Ho–Shnidman and Zywinia to draw an even more negative answer to Hilbert’s Tenth Problem (on determining solvability of Diophantine equations, original negative answer in 1970) via constructions of elliptic curves and abelian varieties of specified ranks.

15:30~18:00

- 46 佐 々 木 荘 介 (早 大 理 工) 実二次体の $\mathbb{Z}_2$ -拡大における岩澤 λ -不変量について 13
 Sosuke Sasaki (Waseda Univ.) On the Iwasawa λ -invariant of $\mathbb{Z}_2$ -extensions of real quadratic fields

概要 Let $k = \mathbb{Q}(\sqrt{m})$ be a real quadratic field. We developed a new algorithm and verified that the Iwasawa invariant $\lambda_2(k)$ vanishes for $m < 10^6$. This talk is based on joint work with K. Komatsu, T. Fukuda, and N. Kumakawa.

- 47 藤井 俊 (島根大教育) On capitulations and pseudo-null submodules in certain $\mathbb{Z}_p^d$ -extensions 13

Satoshi Fujii (Shimane Univ.) On capitulations and pseudo-null submodules in certain $\mathbb{Z}_p^d$ -extensions

概要 Let p be a prime number and $k/\mathbb{Q}$ a finite extension. Let K/k be a $\mathbb{Z}_p$ -extension. A result of Ozaki shows that the maximal finite submodule of unramified Iwasawa modules and capitulations in K/k are closely related. In this talk, we extend Ozaki's result to certain $\mathbb{Z}_p^d$ -extensions.

- 48 佐々木悠真 (徳島大創成) ある虚 2 次体の円分 $\mathbb{Z}_2$ 拡大の中間体における 2 類体塔 13
Haruma Sasaki (Tokushima Univ.) The 2-class field tower over intermediate fields of the cyclotomic $\mathbb{Z}_2$ -extensions of certain imaginary quadratic fields

概要 For the cyclotomic $\mathbb{Z}_2$ -extension k_∞ of an imaginary quadratic field k , we consider whether the Galois group $G(k_\infty) = \text{Gal}(\mathcal{L}(k_\infty)/k_\infty)$ of the maximal unramified pro-2-extension over k_∞ is metabelian or not. To investigate whether examples of metabelian type exist, we study the 2-class field towers of intermediate fields k_n in k_∞/k . In this work, we exhibit certain imaginary quadratic fields k for which $G(k_1)$ are metabelian and have cyclic commutator subgroups.

- 49 水澤 靖 (立教大理) 4つの分岐奇素数をもつ実 2 次体の $\mathbb{Z}_2$ 拡大について 10
齊藤 唯人 (立教大理)
Yasushi Mizusawa (Rikkyo Univ.) On $\mathbb{Z}_2$ -extensions of real quadratic fields with four odd ramified prime
Yuito Saito (Rikkyo Univ.) numbers

概要 In this talk, we study the Iwasawa λ -invariant of the cyclotomic $\mathbb{Z}_2$ -extension of a real quadratic field $\mathbb{Q}(\sqrt{p_1 p_2 p_3 p_4})$, where p_1, p_2, p_3 and p_4 are distinct odd prime numbers satisfying certain arithmetic conditions. Greenberg's conjecture asserts that the Iwasawa λ - and μ -invariants vanish for the cyclotomic $\mathbb{Z}_l$ -extension of any totally real number field and any prime number l . While several infinite families of real quadratic fields satisfying the conjecture for $l = 2$ are known, their discriminants have at most three odd prime factors. We present a new infinite family of real quadratic fields with exactly four odd prime factors satisfying Greenberg's conjecture for $l = 2$.

- 50 岡野 恵司 (都留文大教養) On the triviality of the unramified Iwasawa modules of the maximal multiple $\mathbb{Z}_p$ -extensions 13
Keiji Okano (Tsuru Univ.) On the triviality of the unramified Iwasawa modules of the maximal multiple $\mathbb{Z}_p$ -extensions

概要 For a number field k and an odd prime number p , we consider the maximal multiple $\mathbb{Z}_p$ -extension $\tilde{k}$ of k and the unramified Iwasawa module $X(\tilde{k})$, which is the Galois group of the maximal unramified abelian p -extension of $\tilde{k}$. In this talk, we classify the CM-fields k in which p splits completely and for which $X(\tilde{k}) = 0$.

- 51 水澤 靖 (立教大理) 岩澤加群の自明性と代数体のまつわり数 10
岡野 恵司 (都留文大教養)
Yasushi Mizusawa (Rikkyo Univ.) Trivial Iwasawa modules and arithmetic linking numbers
Keiji Okano (Tsuru Univ.)

概要 In this talk, we give a computable criterion of the triviality of the unramified Iwasawa module over the maximal multiple $\mathbb{Z}_p$ -extension of a CM-field satisfying some basic assumptions. The criterion is a generalization of Gold's theorem on imaginary quadratic fields, and is based on the Koch type presentation of a pro- p Galois group with restricted ramification, which is analogous to the Milnor presentation of a link group from a viewpoint of arithmetic topology.

- 52 時 實 真 宙 (阪 大 理) Stark–Heegner 点と Richaud–Degert 型実 2 次体の類数 1 問題 13
 Mahiro Tokizane (Univ. of Osaka) Stark–Heegner points and the class number one problem for real quadratic fields of Richaud–Degert type

概要 Gauss conjectured that there are infinitely many real quadratic fields with class number 1. This problem remains one of the most important unsolved problems. On the other hand, it is known that there are only finitely many real quadratic fields of the so-called Richaud–Degert (R-D) type with class number 1 (Mollin–Williams). Recently, Caeiro and Darmon discovered a new approach using Stark–Heegner points, which are real quadratic analogues of Heegner points. In this talk, we generalize their method. Assuming the rationality of Stark–Heegner points and other conditions, we show that we can completely determine those of class number 1 among $(\mathbb{Q}(\sqrt{(an)^2 \pm 2a}))$, which is a special case of R-D type real quadratic fields.

- 53 片 岡 武 典 (東 京 理 大 理) Construction of graph coverings with prescribed Iwasawa invariants . . . 13
 Takenori Kataoka (Tokyo Univ. of Sci.) Construction of graph coverings with prescribed Iwasawa invariants

概要 A fundamental result in Iwasawa theory for graphs is an analogue of Iwasawa’s class number formula. The first main result of this talk is that every pair of non-negative integers can be realized as the Iwasawa λ - and μ -invariants of a $\mathbb{Z}_p$ -covering of graphs. The second extends this to multiple $\mathbb{Z}_p$ -coverings.

- 54 柳 田 有 貴 子 (東 北 大 理) Counting cycles in isogeny graphs via the trace of Hecke operators . . . 13
 Yukiko Yanagida (Tohoku Univ.) Counting cycles in isogeny graphs via the trace of Hecke operators

概要 Estimating the number of cycles in finite graphs is important for understanding graph structures and for potential applications to cryptography. In this talk, we focus on supersingular isogeny graphs. For distinct primes $p \neq l$, we consider the isogeny graph $G_1(p, l)$ and study estimates for the number of its cycles. We first review bounds depending on p , and then present our main theorem, which is independent of p in certain cases.

To estimate the number of cycles, we use the Ihara zeta function associated with graphs and the trace formula for Hecke operators. We explain the relationship between the Ihara zeta function and the number of cycles, and discuss connections with estimates arising from trace formulas for Hecke operators.

- 55 余 錦 波 (名 大 多 元 数 理) Schur–MacMahon q -series 13
 H. Bachmann (名 大 多 元 数 理)
 Jinbo Yu (Nagoya Univ.) Schur–MacMahon q -series
 Henrik Bachmann (Nagoya Univ.)

概要 Quasimodular forms appear in multiple areas of mathematics, including number theory, enumerative geometry, and combinatorics. However, finding a $\mathbb{Z}$ -spanning set for the space of quasimodular forms with integer coefficients remains an open problem. In this talk, we introduce the Schur–MacMahon q -series, which are mixed weight quasimodular forms. We prove that this family spans the ring of quasimodular forms over $\mathbb{Q}$. Furthermore, we conjecture that it forms a $\mathbb{Z}$ -spanning set for the space of integer coefficient quasimodular forms. As evidence, we prove that the space spanned by this family over $\mathbb{Z}$ is closed under the derivation $q \frac{d}{dq}$.

9月4日(金) 第IV会場

9:00~12:00

- 56 越 知 直 紀 (名大多元数理) Minimum obstruction modulus of primitive, positive definite integral binary quadratic forms 13

Naoki Ochi (Nagoya Univ.) Minimum obstruction modulus of primitive, positive definite integral binary quadratic forms

概要 Let $Q(x, y)$ be a positive definite integral binary quadratic form. It is known that there exist integers k, m such that $Q(x, y)$ cannot represent m modulo k . This congruence condition is called a “local obstruction.” In this talk, we define the “minimum obstruction modulus of $Q(x, y)$ ” and present an explicit formula for it in the case of primitive, positive definite integral binary quadratic forms.

- 57 吉 崎 彪 雅 (東京理大理工) Periodic continued fractions along the $\mathbb{Z}_2$ -extension over $\mathbb{Q}$ 13
金 村 佳 範
(NTT データ数理システム)

Hyuga Yoshizaki (Tokyo Univ. of Sci.) Periodic continued fractions along the $\mathbb{Z}_2$ -extension over $\mathbb{Q}$
Yoshinori Kanamura
(NTT DATA Math. Systems Inc.)

概要 For each non-negative integer N and positive integer ℓ , a periodic continued fraction (PCF) of the form $[a_1, \dots, a_N, \overline{a_{N+1}, \dots, a_{N+\ell}}]$ is called (N, ℓ) -type. In 2021, Brock–Elkies–Jordan generalized the theory of PCFs over $\mathbb{Z}$ to the ring of integers in a number field. In particular, they considered the case where the number field is an intermediate field of the $\mathbb{Z}_2$ -extension over $\mathbb{Q}$ and asked whether an (N, ℓ) -type PCF for X_n exists. In this talk, we answer their question for types $(1, 2)$ and $(0, 3)$.

- 58 行 田 康 晃 マルコフ–ラグランジュスペクトラムの離散部分の一般化 13
(名大高等研・名大多元数理)

Yasuaki Gyoda (Nagoya Univ.) A generalization of the discrete part of the Markov–Lagrange spectrum

概要 This talk studies a generalization of the discrete part of the Markov–Lagrange spectrum. Classically, Markov numbers arise as positive integer solutions of the Markov equation $x^2 + y^2 + z^2 = 3xyz$ and are closely related to the discrete Markov–Lagrange spectrum.

We consider the generalized Markov equation $x^2 + y^2 + z^2 + k_1yz + k_2zx + k_3xy = (3 + k_1 + k_2 + k_3)xyz$, where $k_1, k_2, k_3 \geq 0$, and study the generalized Markov numbers appearing in its positive integer solutions. The main result shows that these numbers naturally produce elements of the Markov–Lagrange spectrum. More precisely, if n is a (k_1, k_2, k_3) -generalized Markov number appearing in position i , then $\sqrt{((3 + k_1 + k_2 + k_3)n - k_i)^2 - 4}/n$ is realized as the Lagrange constant of a quadratic irrational number.

- 59 鶴 田 有 斗 (東 北 大 理) ある $\mathbb{Q}$ 上のアーベル多様体に付随する Galois 表現の Frobenius トレー
スの有限超越性について 13

Yuto Tsuruta (Tohoku Univ.) On the finite transcendence of Frobenius traces for abelian varieties over $\mathbb{Q}$

概要 Rosen introduced the ring of finite algebraic numbers $\mathcal{P}_{\mathcal{A}}^0$ as a subset of $\mathcal{A} = \prod \mathbb{F}_p / \bigoplus \mathbb{F}_p$. In this talk, we show that the sequence of Frobenius traces for any elliptic curve over $\mathbb{Q}$ is finite transcendental by using the Sato–Tate conjecture. In addition, we prove a similar result for principally polarized abelian varieties over $\mathbb{Q}$ whose associated ℓ -adic Galois representations are surjective.

- 60 島田 佑一 (都立産業技術高専) A remark on modular Galois deformations 13
 Yuichi Shimada A remark on modular Galois deformations
 (Tokyo Metro. Coll. of Ind. Tech.)

概要 In this talk we consider deformations of Galois representations associated to Hilbert modular forms. In particular, we discuss the structure of the deformation ring of infinite level obtained by Taylor–Wiles–Kisin patching. We then give a condition for when it is formally smooth over O , where O is the ring of integers of a finite extension of $\mathbb{Q}_l$.

- 61 武内 竜馬 (東京科学大理) A criterion for log regularity via log Frobenius–Witt differentials 13
 Ryoma Takeuchi (Sci. Tokyo) A criterion for log regularity via log Frobenius–Witt differentials

概要 Frobenius–Witt differentials, introduced by T. Saito in 2022, play an important role in the theory of characteristic cycles in mixed characteristic. In particular, Saito proved that, for a regular Noetherian scheme X over $\mathbb{Z}_{(p)}$ satisfying a certain finiteness condition, the sheaf $F\Omega_X$ of Frobenius–Witt differentials of X is a locally free $\mathcal{O}_{X_{\mathbb{F}_p}}$ -module of “correct” rank. In this talk, the speaker will introduce “log” Frobenius–Witt differentials and give a “log analogue” of the above result.

- 62 市川 遼 (東北大理) Torsion packet envelope のディオファントス問題への応用 13
 Ryo Ichikawa (Tohoku Univ.) Applications of torsion packet envelopes to Diophantine problems

概要 The Coleman–Chabauty method, introduced by Coleman (1985), is well known as a way to explicitly determine the rational points of an algebraic curve. Based on Coleman’s p -adic integration, this method provides an upper bound for the number of rational points of an algebraic curve under certain conditions. The speaker has introduced a new concept, called the Torsion Packet Envelope, as a method for determining the rational points of algebraic curves. In this talk, we will present this method together with some of its applications to Diophantine problems.

- 63 戸次 鵬人 (佐賀大理工) Catalan 定数と Apéry 定数のある積分表示について 13
 Hohto Bekki (Saga Univ.) On integral representations of Catalan’s constant and Apéry’s constant

概要 The Beilinson conjectures predict that (the transcendental part of) special values of L -functions of motives are described by their regulators. Motivated by the work of Otsubo, who gave explicit computations of the regulators of Fermat curves, we aim to find some explicit formulas for the regulators of higher-dimensional Fermat hypersurfaces. In this talk, I would like to report on some curious integral representations of Catalan’s constant and Apéry’s constant that we observed in the course of this project. This talk is based on joint work in progress with Lambert A’Campo, Steven Charlton, Aleksander Horawa, Finnley Paoletta, Constantin Torp, and Antonia Zerbs.

- 64 ツァンシンイー (お茶の水女大基幹) Skew braces with a trivial automorphism group 13
 Sin Yi Tsang (Ochanomizu Univ.) Skew braces with a trivial automorphism group

概要 For a group G , it is known that $\text{Aut}(G) = 1$ if and only if $|G| = 1, 2$. For a skew brace A , it is natural to ask whether $\text{Aut}(A) = 1$ if and only if $|A| = 1, 2$. This turns out to be false—using GAP, we found that there are skew braces A of order 24 and 54 for which $\text{Aut}(A) = 1$. A classification of the skew braces A with $\text{Aut}(A) = 1$ seems to be difficult. In this talk, we present our new result, which states that for each odd prime p , there is a skew brace A of order $2p^3$ such that $\text{Aut}(A) = 1$. We will discuss the construction and some future problems.

- 65 Xichuan Tan (筑波大数理物質) Log chiral de Rham complex and A_n -singular surfaces 13
 Xichuan Tan (Univ. of Tsukuba) Log chiral de Rham complex and A_n -singular surfaces

概要 We present a construction of the chiral de Rham complex over an algebraic surface with at most rational singularities of A_n -type. An explicit formula for the character of the chiral structure sheaf is also provided.

- 66 山内 博 (東京女大現代教養) 格子頂点代数の実形の分類 13
 林 正 洪 (中華民国中央研究院)
 Hiroshi Yamauchi Classification of real forms of lattice vertex algebras
 (Tokyo Woman's Christian Univ.)
 Ching Hung Lam (Academia Sinica)

概要 We classify real forms of lattice vertex algebras. This talk is based on joint work with Ching Hung Lam.

- 67 田邊 顕一 朗 (東京都市大共通教育) ハイゼンベルグ頂点作用素代数の固定部分代数の既約弱加群について .. 13
 Kenichiro Tanabe (Tokyo City Univ.) On irreducible weak modules for the fixed-point subalgebra of the Heisenberg vertex operator algebra

概要 We give a new series of irreducible weak modules for the fixed-point subalgebra of the Heisenberg vertex operator algebra.

14:15~15:15 特別講演

渡 邊 英 也 (立 教 大 理) 量子座標余代数と両側 ι 結晶

Hideya Watanabe (Rikkyo Univ.) Quantum coordinate coalgebras and bi- ι -crystals

概要 A quantum symmetric pair, which is a quantization of a symmetric space G/K , consists of a quantized enveloping algebra U_q of the Lie algebra of G and its coideal subalgebra U^i . The coideal subalgebra U^i is a quantization of the Lie algebra of K , and is referred to as an ι -quantum group. Quantum symmetric pairs can be thought of as generalizations of quantum groups (= quantized enveloping algebras). Many important results involving quantum groups, such as universal R-matrices, canonical bases, and crystal bases, have been extended to quantum symmetric pairs. It is well-known that the Hopf dual A_q of U_q is a quantization of the coordinate ring of the affine variety G . The quantum coordinate algebra A_q has the (dual) canonical basis and the crystal basis with a bi-crystal structure. When G is of type A , the bi-crystal is related to classical combinatorics such as Robinson–Schensted–Knuth correspondence. The aim of this talk is to extend this construction to quantum symmetric pairs and see what kind of combinatorics would arise as bi- ι -crystals.

15:30~18:00

- 68 椎 塚 奎 太 郎 (近畿大総合理工) 亜群の crossed Burnside 環について 13
 Keitaro Shiizuka (Kindai Univ.) Crossed Burnside rings for groupoids

概要 Groupoids generalize groups and arise in many areas of mathematics. We introduce crossed Burnside rings of finite groupoids. For a finite groupoid $\mathcal{G}$ and a $\mathcal{G}$ -monoid S , the crossed Burnside ring is defined as the Grothendieck ring of the slice category $\text{Set}^{\mathcal{G}}/S$. For the conjugation action, it contains the ordinary Burnside ring of $\mathcal{G}$ as a subring. We also describe a relation between Burnside rings with the Hadamard product and action groupoids. Finally, we prove that the crossed Burnside ring of a finite groupoid decomposes as a direct product of the crossed Burnside rings of the isotropy groups of its connected components.

- 69 小田 文 仁 (近畿大理工) Deflation map and the sum of inverses of the element orders in finite groups 10
 Fumihito Oda (Kindai Univ.) Deflation map and the sum of inverses of the element orders in finite groups

概要 Let G be a finite group and let K be a field of characteristic 0. Let $KB(G)$ be the Burnside ring of G over K . We construct an element $\sigma^G \in KB(G)$, which gives a rational number $m(G)$ that is the sum of the inverses of the element orders in G , by using the deflation morphism $\text{Def}_{G/G}^G$.

- 70 百野 巧 真 (関西大理工) Finiteness of specializations of the q -deformed modular group at roots of unity 13
 任 鑫 (阪公大数学研)
 柳 川 浩 二 (関西大システム理工)
 Takuma Byakuno (Kansai Univ.) Finiteness of specializations of the q -deformed modular group at roots of unity
 Xin Ren (Osaka Metro. Univ.)
 Kohji Yanagawa (Kansai Univ.)

概要 To define the q -deformed rational numbers, Morier-Genoud and Ovsienko introduced the subgroup G_q of $GL(2, \mathbb{Z}[q^{\pm 1}])$ for which $G_q/Z(G_q)$ is isomorphic to the modular group. Let ζ_n be a primitive n -th root of unity. We show that the specialization of G_q at $q = \zeta_n$ is finite if and only if $n = 2, 3, 4, 5$, while the case $n = 6$ is still “mild”. When $n = 3, 4$ (resp. $n = 5$), the specialization is closely related to the binary tetrahedral group (resp. binary icosahedral group). We also give an application to the normalized Jones polynomials of rational links.

- 71 谷 中 勝 哉 (筑波大数理物質) Lie algebras of Suzuki and Ree groups over twisted rings 13
 Masaya Yanaka (Univ. of Tsukuba) Lie algebras of Suzuki and Ree groups over twisted rings

概要 Among the finite groups of Lie type, Suzuki and Ree groups are most mysterious because they are not rational points of algebraic groups. However, Naert showed in his dissertation that they are given by groups over twisted rings. We define Lie algebras over twisted rings and compute the Lie algebras of Suzuki and Ree groups. We give an explicit description of the Cartan subalgebras and root spaces.

- 72 奥 山 真 吾 (香川高専) 対称群 S_n ($n \leq 5$) の m -thick 既約表現の決定 13
 面 田 康 裕 (明石工高専)
 中 本 和 典 (山梨大医)
 Shingo Okuyama On the m -thickness of the irreducible representations of S_n for $n \leq 5$
 (Nat. Inst. of Tech., Kagawa Coll.)
 Yasuhiro Omoda
 (Nat. Inst. of Tech., Akashi Coll.)
 Kazunori Nakamoto
 (Univ. of Yamanashi)

概要 The concept of m -thickness in irreducible representations of groups, introduced by two of the present authors, offers a new perspective on the classification of irreducible representations. In this talk, we determine the m -thickness of all the irreducible representations of S_n ($n \leq 5$) over a field of characteristic 0.

- 73 面田 康裕 (明石工高専) On m -thick representations of simple Lie groups 13
 中本 和典 (山梨大医)
 Yasuhiro Omoda On m -thick representations of simple Lie groups
 (Nat. Inst. of Tech., Akashi Coll.)
 Kazunori Nakamoto
 (Univ. of Yamanashi)

概要 We present a method to study the m -thickness of finite-dimensional irreducible representations of complex connected simple Lie groups via the structure of their weight posets. As a result, we proved the conjecture that m -thickness implies $(m-1)$ -thickness for any WMF irreducible representation.

- 74 L. Speyer (沖縄科学技術大) A small counterexample to James's conjecture 13
 Liron Speyer A small counterexample to James's conjecture
 (Okinawa Inst. of Sci. and Tech. Grad. Univ.)

概要 James's conjecture predicted a strong characteristic-independence property for decomposition numbers of type A Hecke algebras in blocks whose weight is smaller than the characteristic of the coefficient field. We describe a new explicit counterexample to this conjecture. The counterexample occurs in surprisingly small rank and is found by the explicit computation of a Gram matrix for the relevant Specht module.

- 75 浅井 聡太 (東大数理) Bicom pact torsion classes and conjectures on brick infinite algebras ··· 13
 Sota Asai (Univ. of Tokyo) Bicom pact torsion classes and conjectures on brick infinite algebras

概要 In the module category $\text{mod } A$ of a finite dimensional algebra A , a torsion class $\mathcal{T}$ is said to be compact if it is generated by a single module. This and the dual condition define the notion of bicom pact torsion classes. I conjecture that a torsion class is bicom pact if and only if it is functorially finite, and prove it for hereditary algebras and also for semistable torsion classes. This gives that Demonet Conjecture implies Enomoto Conjecture, both of which are important conjectures on brick infiniteness.

- 76 八尋 耕平 (京大高等研) 2×3 パーシステンス加群の表現空間の既約成分 13
 平岡 裕章 (京大高等研)
 Kohei Yahiro (Kyoto Univ.) Irreducible components for 2×3 commutative ladder persistence
 Yasuaki Hiraoka (Kyoto Univ.)

概要 We describe the set of irreducible components of representation varieties of 2×3 persistence modules and describe the Kashiwara operators.

- 77 藤野 秀司 (東京理大理) 単純加群を加群のシフトに送る両側傾複体の構成 13
 小境 雄太 (東京理大理)
 Shuji Fujino (Tokyo Univ. of Sci.) Construction of two-sided tilting complexes sending simples to shifts of
 Yuta Kozakai (Tokyo Univ. of Sci.) modules

概要 Two-sided tilting complexes are complexes of bimodules whose derived tensor functors induce derived equivalences between algebras. In 1991, Rickard showed that if there exists a one-sided tilting complex of A -modules whose endomorphism algebra is B , then there exists a two-sided tilting complex of A - B -bimodules. However, it is sometimes not easy to explicitly construct a two-sided tilting complex from a given one-sided tilting complex based on his proof.

In this talk, for a finite-dimensional symmetric algebra over an algebraically closed field, we explicitly construct a two-sided tilting complex corresponding to a one-sided tilting complex that sends simple modules to shifts of indecomposable modules. This construction generalizes the construction of two-sided tilting complexes over generalized Brauer tree algebras by Fujino, Kozakai, and Takamura in 2025.

幾 何 学

9月1日(火) 第Ⅲ会場

9:30~12:00

- 1 木村泰紀(東邦大理) 球面・双曲三角形の新しいオイラー線について 10
 佐藤健治(玉川大工)
 Yasunori Kimura (Toho Univ.) A new Euler geodesic of a spherical or hyperbolic triangle
 Kenzi Satô (Tamagawa Univ.)

概要 The circumcenter, barycenter, and orthocenter of a planar triangle lie on a straight line. For a spherical or hyperbolic triangle, the barycenter and orthocenter split into multiple points. It is already known that the circumcenter, one of barycenters, and one of orthocenters of a spherical or hyperbolic triangle lie on a geodesic. The authors proved that the circumcenter, another barycenter, and another orthocenter of a spherical or hyperbolic triangle lie on another geodesic.

- 2 松田康雄 サイクロイド曲線の曲率円 15
 Yasuo Matsuda On the curvature circles of the cycloid curves

概要 This study demonstrates a method for constructing the curvature circles of the cycloid curves.

- 3 前田陽一(東海大理) 二葉双曲面を用いた実特殊線形変換群 $SL(2, \mathbb{R})$ の3次元モデルと, 群構造の可視化 10
 Yoichi Maeda (Tokai Univ.) A three-dimensional model of $SL(2, \mathbb{R})$ with hyperboloid of two sheets, and the visualization of its group structure

概要 In this talk, we consider a mapping from $SL(2, \mathbb{R})$ to three-dimensional Minkowski space. With this model, we can visualize its group structure. For two elements A, B in $SL(2, \mathbb{R})$, there are four points corresponding to A, B, AB , and BA in the Minkowski space. The purpose of this study is to visualize the non-commutativity of the groups. The difference between AB and BA becomes clear with the Minkowski cross product of two vectors. In this model, it can also be seen that subgroups like the set formed by lower triangular matrices are given as certain Euclidean planes passing through the origin.

- 4 亀山敦(岐阜大工) 多角形共通基本領域を持つ平面格子 15
 Atsushi Kameyama (Gifu Univ.) Polygonal common fundamental domains for lattices in the plane

概要 A lattice is a rank 2 discrete subgroup of the group of translations acting on the plane. When two lattices act on the plane, a subset of the plane that serves as a fundamental domain for both lattices is called a common fundamental domain. In this talk, we investigate conditions under which there exists a common fundamental domain that is a polygon.

- 5 古郷優平(北大理) Finite-gap solutions of the Pohlmeier–Lund–Regge equation and the associated curve evolution 15

Yuhei Kogo (Hokkaido Univ.) Finite-gap solutions of the Pohlmeier–Lund–Regge equation and the associated curve evolution

概要 This talk studies finite-gap solutions of the Pohlmeier–Lund–Regge (PLR) equation and their associated curve evolutions. The Lund–Regge evolution describes a space curve satisfying $\gamma_{st} = \gamma_s \times \gamma_t$, and a Hasimoto-type variable built from curvature and torsion reduces this geometry to a complex PLR equation. Using spectral data on a hyperelliptic curve, we construct Baker–Akhiezer functions and obtain a theta-function formula for finite-gap PLR solutions. Substituting the corresponding $SU(2)$ -valued Lax solution into the Sym formula reconstructs a family of space curves in $\mathbb{R}^3$. We also give necessary and sufficient conditions for the reconstructed curve to be closed in the spatial direction or periodic in time, expressed through Abelian integrals. This provides a PLR analogue of the Calini–Ivey closure theory for vortex filaments.

- 6 守屋克洋(兵庫県立大理) 指数2の4次元擬ユークリッド空間における極小時間的曲面の表現公式 10

Katsuhiro Moriya (Univ. of Hyogo) A representation formula for minimal timelike surfaces in the four-dimensional pseudo-Euclidean space of index two

概要 This talk presents a representation formula for minimal timelike surfaces in the four-dimensional pseudo-Euclidean space $\mathbb{E}_2^4$, based on the author's recent work. Classical Weierstrass-type representations for such surfaces involve integration as an essential step. In contrast, the new formula provides a direct parametrization without any integration. By a result of Chen, every minimal timelike surface can be locally expressed as the sum of two null curves, reducing the problem to the description of null curves in $\mathbb{E}_2^4$. We show that every null curve can be represented explicitly in terms of four real-valued functions and their derivatives.

- 7 宮岡礼子(東北大理)^b Chern予想の部分解決(Dupin超曲面の場合) 10

Reiko Miyaoka (Tohoku Univ.) Chern's conjecture in the Dupin case

概要 Chern's conjecture states that a closed minimal hypersurface in the Euclidean sphere is isoparametric if it has constant scalar curvature. When the number g of distinct principal curvatures exceeds three, few satisfactory results are known, and additional assumptions seem necessary. Here, we impose the Dupin condition, which is far weaker than the isoparametric one, and obtain: A closed proper Dupin hypersurface with constant mean curvature is isoparametric if (i) $g=3$, (ii) $g=4$ and it has constant scalar curvature, or (iii) $g=4$ and it has constant Lie curvature, and (iv) $g=6$ and it has constant Lie curvatures. These cover all non-trivial cases for closed proper Dupin hypersurfaces. The argument relies on advanced tools from Lie sphere geometry and combines topological and geometric methods.

- 8 岸田陸玖(東京科学大情報理工) 3次元 isotropic 空間の零平均曲率曲面の新しい枠組みについて 15

Riku Kishida (Sci. Tokyo) A new framework of zero mean curvature surfaces in the isotropic 3-space

概要 The isotropic 3-space $\mathbb{I}^3$ is the 3-dimensional real vector space with the degenerate inner product of signature $(0++)$. For a space-like surface in $\mathbb{I}^3$, the mean curvature function can be defined in a natural way. A space-like surface whose mean curvature function vanishes everywhere is called a zero mean curvature surface. A zero mean curvature surface in $\mathbb{I}^3$ admits Weierstrass-type representation formulas. In this talk, we introduce a class of zero mean curvature surfaces with singularities in $\mathbb{I}^3$, which we call ZMC-faces. As an application of ZMC-faces, we show that several Osserman-type inequalities can be obtained under certain assumptions on both completeness and finiteness of the total curvature. We also present some examples which attain the equality in these inequalities.

- 9 勝田 宗平 (名大多元数理) 平面ネットワークを用いた藤本予想の証明 15
 Shuhei Katsuta (Nagoya Univ.) A proof of the Fujimoto conjecture via planar networks

概要 In 1990, H. Fujimoto proved that the nondegenerate Gauss map of a complete minimal surface in $\mathbb{R}^m$ can omit at most $\frac{m(m+1)}{2}$ hyperplanes in general position in the complex projective space $\mathbb{P}^{m-1}$. He also showed that this bound is optimal for all odd integers m and for even integers $4 \leq m \leq 16$, and conjectured that the same is true for all even integers $m \geq 4$. Recently, we proved this conjecture. In this talk, we will present an outline of the proof. A key ingredient is a planar network arising from the theory of totally positive matrices.

14:15~16:45

- 10 須貝 遥 (東京理大創域理工) 5次元負曲率等質リーマン多様体の分類 15
 Haruka Sugai (Tokyo Univ. of Sci.) Classification of five-dimensional homogeneous manifolds of negative curvature

概要 Every homogeneous manifold of negative curvature is known to be isometric to a Lie group with a left invariant metric. We define an SNC-algebra to be a Lie algebra which admits an inner product of strictly negative curvature. In the speaker's joint paper in 2022, we classified SNC-algebras in dimension four. In this presentation, we explain the classification of SNC-algebras in dimension five.

- 11 古賀 勇 (九州国際大現代ビジネス) 球面からグラスマン多様体への同変調和写像の剛性 15
 高橋 正郎 (久留米工高専)
 長友 康行 (明大理工)
 Isami Koga (Kyushu Int. Univ.) Rigidity of equivariant harmonic maps from the sphere into the Grassmannians
 Masaro Takahashi (Kurume Nat. Coll. of Tech.)
 Yasuyuki Nagatomo (Meiji Univ.)

概要 In this talk, we would like to introduce the rigidity results for G -equivariant harmonic maps of the sphere S^m into real or complex Grassmannians of low rank for $G = \mathrm{SO}(m+1)$, $\mathrm{Spin}(m+1)$, G_2 (when $m=6$) and $\mathrm{Spin}(7)$ (when $m=7$).

- 12 塚田 龍聖 (広島大先進理工) 実半単純対称対の split Dynkin index について 15
 Ryusei Tsukada (Hiroshima Univ.) Split Dynkin indices for real semisimple symmetric pairs

概要 For a Lie algebra homomorphism between real semisimple Lie algebras, the Split Dynkin index, introduced by Okuda (RIMS Kokyuroku, 2022), is a non-negative integer matrix that encodes combinatorial information on the restricted root systems. This talk presents results on the computation of Split Dynkin indices for Lie algebra homomorphisms arising from real semisimple symmetric pairs.

- 13 田中 真紀子 (東京理大創域理工) 有向ラグランジュ・グラスマン多様体の幾何学 15
 田崎 博之 (都立大理・筑波大数理物質)
 Makiko Sumi Tanaka (Tokyo Univ. of Sci.) Geometry of oriented Lagrangian Grassmann manifolds
 Hiroyuki Tasaki (Tokyo Metro. Univ./Univ. of Tsukuba)

概要 We explicitly describe all polars, centrioles and maximal antipodal sets of oriented Lagrangian Grassmann manifolds.

- 14 長 屋 拓 暁 (広島大先進理工) 可解群の作用の固有性判定について 15
 Hiroaki Nagaya (Hiroshima Univ.) A properness criterion for group actions of solvable groups

概要 In the theory of discontinuous groups, it is important to determine whether a group action is proper. In particular, many researchers have studied the following setting: let G be a locally compact Hausdorff group, H, L closed subgroups of G , and consider the natural L -action on the homogeneous space G/H . In this setting, the properness of this action can be approached from the viewpoint of coarse geometry. Coarse geometry is systematically developed by Roe. This geometry provides a framework for studying boundedness and asymptotic behavior. From this perspective, in this talk, we give a properness criterion for the natural L -action on G/H in the case where G is solvable.

- 15 宮 地 宗 人 (広島大先進理工) A geometric interpretation of generalized Hurwitz–Radon numbers defined by Kannaka–Tojo 15
 Muneto Miyaji (Hiroshima Univ.) A geometric interpretation of generalized Hurwitz–Radon numbers defined by Kannaka–Tojo

概要 The Hurwitz–Radon number is a classical invariant related to the composition problem of quadratic forms and to the existence of linearly independent vector fields on spheres. Recently, Kannaka and Tojo introduced generalized Hurwitz–Radon numbers associated with a real reductive Lie algebra and its representation. In this talk, we focus on one of these invariants, denoted by $\rho^{(2)}$, and give a geometric interpretation in terms of fundamental vector fields induced by Lie group actions. Given a Lie group G , a subspace of its Lie algebra $\mathfrak{g}$, and a G -manifold M , we define a numerical invariant measuring the maximum number of pointwise linearly independent fundamental vector fields. We show that, in a special setting, this invariant coincides with $\rho^{(2)}$.

- 16 長 谷 川 和 志 (金沢大人間社会) Quaternionic complex manifolds and fixed-point sets of S^1 -actions ... 15
 Kazuyuki Hasegawa (Kanazawa Univ.) Quaternionic complex manifolds and fixed-point sets of S^1 -actions

概要 We study fixed-point sets of S^1 -actions and compatible complex structures on quaternionic manifolds. If the first Chern class of a fixed-point component is nontrivial, then there is no hypercomplex structure on the quaternionic manifold containing the prescribed compatible complex structure induced from a twistor function on that component. Furthermore, we determine the connected components of fixed-point sets arising from quaternionic S^1 -actions on the quaternionic projective space. As a consequence, we generalize Pontecorvo's example.

- 17 青 木 侑 省 (函 館 工 高 専) η 全臍的実超曲面上の Legendre 軌道の共役値と焦値 10
 Yusei Aoki Conjugate and focal values along Legendre trajectories on totally η -umbilic real hypersurface
 (Hakodate Nat. Coll. of Tech.)

概要 We study variations of Legendre trajectories for Sasakian magnetic fields associated with contact metric structures on totally η -umbilic real hypersurfaces in a non-flat complex space form. We calculated conjugate and focal values along Legendre trajectories.

9月2日(水) 第Ⅲ会場

10:00~10:15 2026年度日本数学会幾何学賞授賞式

10:20~11:20 2026年度日本数学会幾何学賞受賞特別講演 (トポロジー分科会と合同)

馬場伸平 (阪大理) Riemann 面上の複素射影構造と曲面群の表現

Shinpei Baba (Univ. of Osaka) Complex projective structures on a Riemann surface and representations of the surface group

概要 Complex projective structures on a surface provide a rich interplay between Riemann surface structures, hyperbolic geometry, and representations of its fundamental group into $PSL(2, C)$. In particular, their holonomy representations are not necessarily discrete, and projective structures provide geometric meaning to such general representations. In this talk, we discuss various relations between complex projective structures and their holonomy representations.

13:00~14:00 2026年度日本数学会幾何学賞受賞特別講演 (トポロジー分科会と合同)

安井弘一 (阪大情報) 4次元多様体のエキゾチック微分構造と種数関数

Kouichi Yasui (Univ. of Osaka) Exotic smooth structures on 4-manifolds and genus functions

概要 A central problem in 4-dimensional topology asks whether a given smooth 4-manifold admits an exotic smooth structure (i.e., another smooth 4-manifold homeomorphic but not diffeomorphic to the given one), and if so, whether it admits infinitely many pairwise non-diffeomorphic exotic smooth structures. To approach this problem, various methods for constructing and distinguishing exotic smooth structures have been developed over the past four decades. In this talk, I will survey some of these methods, focusing on the roles of handlebodies, corks, and genus functions. I will also discuss closely related topics such as exotically knotted submanifolds in 4-manifolds.

9月3日(木) 第Ⅲ会場

9:30~11:45

18 塩原裕介 (信州大総合医理工) Towards Riemannian diffeology 15

Yusuke Shiobara (Shinshu Univ.) Towards Riemannian diffeology

概要 Diffeology provides a natural generalization of differential geometry, yet its Riemannian theory remains underdeveloped. We introduce a framework for Riemannian diffeology based on Blohmann's tangent functor and the metric framework of Iglesias-Zemmour. A weak Riemannian metric on a diffeological space is defined as a smooth symmetric positive 2-tensor on an appropriate tangent object. This yields the category of weak Riemannian diffeological spaces and isometries, containing Riemannian manifolds modeled on locally convex spaces. We show that the induced pseudodistance is a genuine distance under a natural separation condition. Examples include diffeological adjunction spaces and mapping spaces $(C^\infty(M, N))$. Moreover, the metric is compatible with loop concatenation on free loop spaces, suggesting connections to string topology. This talk is based on joint work with Katsuhiko Kuribayashi and Keiichi Sakai.

- 19 中野 椋太 (早大理工) Trace-class vacuum Einstein equations on ℓ^2 -manifolds and spherical rigidity 15

Ryota Nakano (Waseda Univ.) Trace-class vacuum Einstein equations on ℓ^2 -manifolds and spherical rigidity

概要 This talk presents a framework for formulating the vacuum Einstein field equations on infinite-dimensional Lorentzian manifolds modeled on the Hilbert space ℓ^2 . In infinite dimensions, the usual contractions defining the Ricci tensor and scalar curvature may diverge. To address this problem, we impose a trace-class condition on curvature operators, which makes the Ricci tensor, scalar curvature, and Einstein tensor well defined. Within this framework, we construct basic trace-class vacuum solutions, including an ℓ^2 -analogue of the Minkowski metric and infinite-dimensional Kasner metrics. We then prove a rigidity theorem for spherically symmetric solutions: every spherically symmetric trace-class vacuum metric is flat. Thus, unlike the finite-dimensional Schwarzschild-Tangherlini family, no nontrivial spherically symmetric black-hole-type vacuum solution exists in this trace-class infinite-dimensional setting.

- 20 Rongkai Zhang (阪大理) Rigidity of the Borell–Brascamp–Lieb inequality 10
Rongkai Zhang (Univ. of Osaka) Rigidity of the Borell–Brascamp–Lieb inequality

概要 The Borell–Brascamp–Lieb inequality is an integral inequality concerned with the L1-norm of two functions and that of the t-interpolation of them. I will discuss some aspects of the inequality on weighted Riemannian manifolds satisfying the curvature dimension condition. Specifically, I will present a theorem on the rigidity of curvature and measure for this inequality. I will also discuss connections with the Brunn–Minkowski inequality and its rigidity, and conclude with a few further questions related.

- 21 久保田 景 (阪大理) ローレンツハウスドルフ測度と余面積不等式 15
Hikaru Kubota (Univ. of Osaka) Lorentz Hausdorff measure and coarea inequality

概要 Recently, synthetic Lorentzian geometry has emerged as an active area of research, developed in the same spirit as synthetic Riemannian geometry which includes the theories of (R)CD and Alexandrov spaces. A Lorentzian pre-length space (LpLS) is a metric space endowed with an additional Lorentzian distance. In synthetic Lorentzian geometry, LpLSs play roles analogous to those of metric spaces in the Riemannian setting. In particular, they generalize smooth spacetimes and naturally arise as limits of sequences of spacetimes. Furthermore, many geometric notions, especially curvature bounds, admit formulations parallel to those in metric geometry. In this talk, I will introduce the notion of Lorentzian Hausdorff measure and present a coarea-type inequality for this measure. If time permits, I will also discuss some related local structural properties of LpLS.

- 22 深谷 友宏 (都立大理) The Tits boundary of coarsely convex spaces 15
佐藤 一慶 (都立大理)

Tomohiro Fukaya (Tokyo Metro. Univ.) The Tits boundary of coarsely convex spaces
Ikkei Sato (Tokyo Metro. Univ.)

概要 The Tits boundary is a boundary at infinity that describes the large-scale distribution of curvature in a CAT(0) space. It is defined using the angle structure intrinsic to CAT(0) spaces, and its structure and its relationship to the geometry of the underlying space have been extensively studied in connection with various topics, including rank rigidity and relative hyperbolicity. In joint work with Tomohiro Fukaya, the speaker constructed the Tits boundary for coarsely convex spaces, a broad class of non-positively curved spaces that includes CAT(0) spaces. In this talk, we outline its definition and discuss geometric properties of coarsely convex spaces that follow from the structure of their Tits boundaries.

- 23 濱 中 翔 太 (筑波大数理物質) 重み付き ADM 質量と重み付き山辺流 15
 Shota Hamanaka (Univ. of Tsukuba) Weighted ADM mass and weighted Yamabe flow

概要 I'll discuss weighted Yamabe flow on asymptotically flat smooth metric measure spaces and its interaction with the weighted ADM mass. I'll first show that the asymptotically flat structure is preserved along the flow. In the range of the dimensional parameter $m > 2 - n$, $m \neq 0$, I'll show that the weighted ADM mass is constant and that the weighted Einstein–Hilbert functional is non-increasing under a certain assumption. Under another weaker assumption, I'll show instead that the weighted ADM mass is monotone non-increasing along the flow.

- 24 前 田 瞬 (千葉大教育) 完備勾配山辺ソリトンの回転対称性と分類 15
 Shun Maeta (Chiba Univ.) Rotational symmetry and classification of complete gradient Yamabe solitons

概要 In this talk, we classify two- and three-dimensional nontrivial, nonflat, complete gradient Yamabe solitons. In particular, we show that any three-dimensional nontrivial, nonflat, complete shrinking gradient Yamabe soliton is rotationally symmetric. In higher dimensions, we also show that any nontrivial complete shrinking gradient Yamabe soliton whose scalar curvature is bounded below by the soliton constant everywhere and is strictly greater than the constant at some point is rotationally symmetric. This assumption is optimal. Furthermore, a complete classification of nontrivial complete expanding gradient Yamabe solitons with bounded scalar curvature is provided.

14:15~16:00

- 25 船 野 敬 (東北大情報) 凸領域上のラプラシアン固有値の分布に関する考察 10
 Kei Funano (Tohoku Univ.) A study of the distribution of eigenvalues of the Laplacian on convex domains

概要 I will explain my study of the Distribution of Eigenvalues of the Laplacian on Convex Domains.

- 26 藤 井 萌 (名大多元数理) Steklov 第 1 固有値最大化と写像の境界分散最大化 15
 Moe Fujii (Nagoya Univ.) Steklov first-eigenvalue maximization and maximization of the variance of maps on the boundary

概要 In this talk, I will define weighted Steklov eigenvalue problem with Bakry–Émery Laplacian and maximization problem of its first eigenvalue for all Riemannian metric under some condition. I will also talk about maximization problem of the variance of maps, which is a dual of maximization problem of the first eigenvalue. I will especially explain the relationship between two maximizing problem (weak duality) and some examples.

- 27 成 田 知 将 (米子工高専) コンパクト多様体上のラプラシアン固有値汎関数の第二変分公式 15
 Kazumasa Narita (Yonago Nat. Coll. of Tech.) Second variation formula for the Laplace eigenvalue functional on closed manifolds

概要 For a closed Riemannian manifold (M, g) of dimension n , let $\lambda_1(g)$ be the first positive eigenvalue of the Laplace–Beltrami operator Δ_g and $\text{Vol}(M, g)$ the volume of (M, g) . Considering the scale-invariant quantity $\lambda_k(g)\text{Vol}(M, g)^{2/n}$ as a functional over all the metrics in a fixed conformal class, we derive a second variation formula for the functional. As a corollary, we prove that if the canonical flat metric on a torus is such that the multiplicity of λ_1 is two, then the flat metric is not a maximal point of the functional in its conformal class. This is a higher dimensional extension of Karpukhin's very recent work.

- 28 中 村 友 哉 Koszul–Vinberg 構造と Poisson 構造の対応および Jacobi–Koszul–Vinberg
(工学院大学学習支援センター) 構造と Jacobi 構造の対応 15
木 村 直 記 (東京理大理)

Tomoya Nakamura (Kogakuin Univ.) Correspondence of Koszul–Vinberg structures with Poisson structures,
Naoki Kimura (Tokyo Univ. of Sci.) and of Jacobi–Koszul–Vinberg structures with Jacobi structures

概要 It is known that Koszul–Vinberg structures on an affine manifold correspond with Poisson structures on the total space of its tangent bundle. In this talk, we show that Koszul–Vinberg structures on a left-symmetric algebroid correspond with Poisson structures on its prolongation. Moreover, we show that Jacobi–Koszul–Vinberg structures on a Jacobi-left-symmetric algebroid correspond with Jacobi structures on its prolongation.

- 29 中 村 友 哉 Koszul–Vinberg–Nijenhuis 構造と Poisson–Nijenhuis 構造の対応および
(工学院大学学習支援センター) 整合的 Koszul–Vinberg 対と整合的 Poisson 対の対応 15
木 村 直 記 (東京理大理)

Tomoya Nakamura (Kogakuin Univ.) Correspondence of Koszul–Vinberg–Nijenhuis structures with Poisson–
Naoki Kimura (Tokyo Univ. of Sci.) Nijenhuis structures, and of compatible Koszul–Vinberg pairs with compatible Poisson pairs

概要 We prove that Koszul–Vinberg structures on a left-symmetric algebroid correspond with Poisson structures on its prolongation. In this talk, we show that Koszul–Vinberg–Nijenhuis structures on a left-symmetric algebroid correspond with Poisson–Nijenhuis structures on its prolongation. Moreover, we show that compatible Koszul–Vinberg pairs on a left-symmetric algebroid correspond with compatible Poisson pairs on its prolongation.

- 30 木 村 直 記 (東京理大理) $\mathbb{R}^n$ 上の Jacobi–Koszul–Vinberg 構造, Koszul–Vinberg 構造, Jacobi 構
中 村 友 哉 造, Poisson 構造の例とその特性葉層 10
(工学院大学学習支援センター)

Naoki Kimura (Tokyo Univ. of Sci.) Examples of Jacobi–Koszul–Vinberg structures, Koszul–Vinberg struc-
Tomoya Nakamura (Kogakuin Univ.) tures, Jacobi structures, and Poisson structures on $\mathbb{R}^n$ and their char-
acteristic foliations

概要 We present a two-parameter family of Jacobi–Koszul–Vinberg structures on $\mathbb{R}^2$. We also give Koszul–Vinberg structures on $\mathbb{R}^3$ and Jacobi structures on $\mathbb{R}^5$ which are obtained from the Jacobi–Koszul–Vinberg structures on $\mathbb{R}^2$. In addition, we provide Poisson structures on $\mathbb{R}^6$ which are obtained from both of the Koszul–Vinberg structures on $\mathbb{R}^3$ and the Jacobi structures on $\mathbb{R}^5$. Furthermore, we consider their characteristic foliations.

16:15～17:15 特別講演

藤 岡 禎 司 (福岡大理) Busemann 幾何学の最近の進展
Tadashi Fujioka (Fukuoka Univ.) Recent developments in Busemann geometry

概要 Busemann spaces are metric spaces with non-positive curvature in the sense that the distance function is convex along every pair of geodesics. They generalize the well-known CAT(0) spaces, which are defined by triangle comparison. The main difference of these two is whether or not they include Banach spaces and Finsler manifolds. In this talk, I will discuss recent developments in the geometry of Busemann spaces, building upon the geometry of CAT(0) spaces.

9月4日(金) 第Ⅲ会場

9:30~11:45

- 31 周 小 舟 (立命館大理工) Quandle presentations of surface knots in 4-manifolds and bridge numbers 15

Xiaozhou Zhou (Ritsumeikan Univ.) Quandle presentations of surface knots in 4-manifolds and bridge numbers

概要 The fundamental quandle is an invariant for distinguishing surface knots, yet computable presentations have traditionally been limited to surfaces embedded in the 4-sphere. Building on the framework of banded unlink diagrams introduced by Hughes, Kim, and Miller, we give a Wirtinger type presentation of the fundamental quandle of surface links in arbitrary 4-manifolds. As applications, we extend the work of Sato and Tanaka to show that for any $b \geq 4$ and $m \geq 0$, there exist infinitely many pairwise non-local surface knots with bridge number b in $\mathbb{C}P^2 \# m \overline{\mathbb{C}P^2}$, and we distinguish infinite families of surface knots with isomorphic knot groups, extending results of Tanaka and Taniguchi.

- 32 L. H. S. Gomes (阪 大 理) On the classification of transverse Calabi–Yau Vaisman manifolds 15

Lucas Henrique Silveira Gomes On the classification of transverse Calabi–Yau Vaisman manifolds (Univ. of Osaka)

概要 Vaisman manifolds form a class of non-Kähler manifolds endowed with a natural transversely Kähler foliation. This structure allows one to define transverse analogues of the usual Chern classes on complex manifolds. In this talk, we show that the vanishing of the first basic Chern class for Vaisman manifolds with large enough first Betti number forces the manifold to be diffeomorphic to a Kodaira–Thurston manifold. Moreover, the complex structure is left-invariant, the foliation is regular, and the manifold is a fiber bundle over its Albanese torus.

- 33 陣 内 智 史 (阪 大 理) ネフかつ巨大類における Bogomolov–Gieseker 不等式の等号成立条件 .. 15

Satoshi Jinnouchi (Univ. of Osaka) The equality condition of the Bogomolov–Gieseker inequality for nef and big classes

概要 The Bogomolov–Gieseker inequality is a Chern class inequality satisfied by slope stable vector bundles. When slope stability is defined with respect to a Kähler class, this result, including the characterization of the equality case, is classically well understood. In this talk, we first present an example in which the equality in the Bogomolov–Gieseker inequality is achieved for the first time with respect to a nef and big class. Next, we introduce a theorem that generalizes both the Bogomolov–Gieseker inequality and its equality condition to slope stable vector bundles with respect to nef and big classes. This theorem provides a unified framework that encompasses the example mentioned above.

- 34 宮 武 夏 雄 (東北大MathCCS) 完備調和計量の劣調和関数を用いた拡張の一意性の問題と楕円型方程式の弱劣解に対する強 Liouville 性 15

Natsuo Miyatake (Tohoku Univ.) On the uniqueness of complete solutions and strong Liouville property for weak subsolutions of elliptic equations

概要 Li and Mochizuki proved that, for any Riemann surface and any nonzero holomorphic r -differential q , there exists a unique harmonic metric on the associated cyclic Higgs bundle satisfying a certain asymptotic condition called completeness.

In this talk, I consider the problem of extending the Li–Mochizuki theorem to arbitrary semipositive singular Hermitian metrics, which are not necessarily induced by holomorphic r -differentials. In particular, I will explain a uniqueness theorem under the assumption that the corresponding Hermitian metrics are mutually bounded, together with a criterion showing that this assumption is automatically satisfied when the exponential of the weight function is continuous outside a compact subset. The proof is based on a Liouville-type theorem for weak subsolutions of elliptic equations.

- 35 波照間雄大 (早大理工) Distinguished bases and the braid group action for solutions of the tt^* -Toda equations 15

Yudai Hateruma (Waseda Univ.) Distinguished bases and the braid group action for solutions of the tt^* -Toda equations

概要 The topological-antitopological fusion (tt^*) equations were introduced by Cecotti and Vafa. In this talk, we study the braid group action on the Stokes matrices of the tt^* -Toda equations. We construct a bilinear form L on the solution space of a certain scalar o.d.e. associated with the tt^* -Toda equations. The Stokes matrices arising from the tt^* -Toda equations are then realized as matrix representations of L with respect to the canonical solutions. This construction allows us to introduce distinguished bases associated with the tt^* -Toda equations and to study their braid group orbits.

- 36 中西隼斗 (千葉大理) 複素射影平面の SYZ ミラーに対するラグランジュ多重切断とモースホモトピー 15

Yat-Hin Suen
(National Cheng Kung Univ.)

Hayato Nakanishi (Chiba Univ.) Multi-valued Morse homotopy for the SYZ mirror of the complex projective plane

Yat-Hin Suen
(National Cheng Kung Univ.)

概要 We propose a definition of the category $Mo^{\text{mult}}(P)$ of multi-valued Morse homotopy on P consisting of multi-valued functions associated to Lagrangian multi-sections. We then show that a full subcategory $Mo_{\mathcal{E}}^{\text{mult}}(P)$ of $Mo^{\text{mult}}(P)$ is A_{∞} -equivalent to a full subcategory $DG_{\mathcal{E}}^{\text{vect}}(\mathbb{CP}^2)$ of the category $DG^{\text{vect}}(\mathbb{CP}^2)$ consisting of holomorphic vector bundles over the complex projective plane $\mathbb{CP}^2$. As an application, we study the mirror description for global sections of the holomorphic tangent bundle over $\mathbb{CP}^2$.

- 37 秦泉寺雅夫 (岡山大自然) Geometrical proof of generalized mirror transformation for multi-point virtual strcutre constants of projective hypersurfaces 15

Masao Jinzenji (Okayama Univ.) Geometrical proof of generalized mirror transformation for multi-point virtual strcutre constants of projective hypersurfaces

概要 In this talk, we propose a geometric proof of the generalized mirror transformation for multi-point virtual structure constants of degree k hypersurfaces in CP^{N-1} .

14:15~16:15

- 38 馬場康太 (名大多元数理) 多重ゼータ値と Kontsevich グラフの対数型積分 15

Kota Baba (Nagoya Univ.) Multiple zeta values and logarithmic integrals of Kontsevich graphs

概要 Kontsevich graphs and their associated integrals were introduced by Kontsevich in 2003 in his construction of the deformation quantization of Poisson manifolds and his proof of the Formality Theorem. In this talk, we discuss the relationship between logarithmic integrals of Kontsevich graphs and multiple zeta values. In 2020, Banks–Panzer–Pym proved that logarithmic Kontsevich integrals can be expressed as integer linear combinations of normalized multiple zeta values. Moreover, they conjectured that every normalized multiple zeta value can be expressed as an integer linear combination of logarithmic Kontsevich integrals. Motivated by this conjecture, the speaker explicitly constructed integer linear combinations of Kontsevich graph integrals whose values are specific multiple zeta values. We explain the construction of the corresponding Kontsevich graphs and outline the proof of the main result.

- 39 米原修平 (米子工高専) Lie 垂代数の部分垂代数に対する Godbillon–Vey 類 15
 Shuhei Yonehara Godbillon–Vey classes of Lie subalgebroids
 (Yonago Nat. Coll. of Tech.)

概要 The Godbillon–Vey class is a secondary characteristic classes which is defined for regular foliations and have been studied extensively. On the other hand, extending the Godbillon–Vey class to singular foliations is difficult, and a complete result has not yet been obtained. In this paper, we address this problem by focusing on a geometric object called a Lie algebroid on a manifold. More precisely, we fix a Lie algebroid and relatively define the Godbillon–Vey class for its Lie subalgebroids, and study their properties. We also present several examples.

- 40 嘉陽海渡 (北大理) 連接接束における射影平坦性とアファインはめ込み 10
 Kaito Kayo (Hokkaido Univ.) Projective flatness of coherent tangent bundles and affine immersions

概要 An equiaffinite immersion induces a symmetric 2-form h and a Ricci-symmetric, torsion-free connection ∇ , where ∇h is totally symmetric. Conversely, Dillen, Nomizu, and Vranken showed that for a non-degenerate h , the existence of such an immersion is equivalent to the projective flatness of the dual connection ∇^* . To extend this result, we investigate the situation where h is degenerate. Previously, the author introduced quasi-Codazzi structures using coherent tangent bundles to allow for metric degeneracy. Since conventional projective flatness cannot be defined on vector bundles, this study extends this concept to coherent tangent bundles and generalizes their existence theorem.

- 41 山口夏穂里 (立命館大理工) Characterization of δ -almost sufficient statistics via KL divergence ... 15
 Kaori Yamaguchi (Ritsumeikan Univ.) Characterization of δ -almost sufficient statistics via KL divergence

概要 This talk shows how much information about a statistical model is lost when the model is coarse-grained by a statistic. We present a characterization of δ -almost sufficient statistics in terms of the Kullback–Leibler divergence and show that it is equivalent to the previous definition based on the Fisher metric. Furthermore, we calculate the Kullback–Leibler divergence in examples arising from repeated trials and quantitatively evaluate how well the resulting δ -almost sufficient statistics preserve information about the original model.

- 42 上野龍 (千歳科学技術大理工) 確率単体内の双全臍的部分多様体の分類 15
 Ryu Ueno Classification of doubly totally-umbilical submanifolds in the probability
 (Chitose Inst. of Sci. and Tech.) simplex

概要 We give a complete classification of doubly totally-umbilical submanifolds in the probability simplex. The probability simplex is one of the most standard statistical manifolds, and information geometry initiated by S. Amari and H. Nagaoka studies the statistical submanifold theory in the probability simplex. On the other hand, H. Furuhashi defined doubly totally-umbilical submanifolds in the geometry of statistical manifolds, inspired by totally-umbilical submanifolds of Riemannian geometry.

43	伊 師 英 之 (阪 公 大 理)	Invariant statistical connections on the multivariate centered Gaussian	
	小 林 彦 蔵 (広島大先進理工)	model and their moduli spaces	15
	奥 田 隆 幸 (広島大先進理工)		
	Hideyuki Ishi (Osaka Metro. Univ.)	Invariant statistical connections on the multivariate centered Gaussian	
	Hikoza Kobayashi (Hiroshima Univ.)	model and their moduli spaces	
	Takayuki Okuda (Hiroshima Univ.)		

概要 We study invariant statistical connections on the space $\mathcal{N}_0^n$ of zero-mean multivariate normal distributions (the multivariate centered Gaussian model) equipped with the Fisher metric g^F . We introduce moduli spaces of invariant statistical connections on homogeneous Riemannian manifolds via two natural equivalence relations arising from a categorical viewpoint, and apply this framework to $(\mathcal{N}_0^n, g^F)$. We explicitly determine the $GL(n, \mathbb{R})$ -invariant statistical connections, with particular emphasis on the dually flat case, and describe the corresponding moduli spaces. This talk is based on arXiv:2605.30300.

函数論

9月1日(火) 第V会場

9:30~11:10

- 1 牛 島 顕 (兵庫県立大国際商経) 超理想頂点のある双曲三角形が生成する三角群のディリクレ基本多角形
 中 西 敏 浩 (阪公大数学研) の決定 10
Akira Ushijima (Univ. of Hyogo) Determination of Dirichlet fundamental polygons for triangle groups
 Toshihiro Nakanishi generated by hyperbolic triangles with ultraideal vertices
 (Osaka Metro. Univ.)

概要 We study Dirichlet fundamental polygons for triangle groups generated by hyperbolic triangles whose vertices may include ultraideal vertices, that is, vertices lying beyond the circle at infinity in the projective disk model of the hyperbolic plane. Our result shows that a known description of Dirichlet fundamental polygons for ordinary hyperbolic triangles and for triangles with ideal vertices remains valid when some vertices are ultraideal. The proof uses an extension of Ceva's theorem for generalized hyperbolic triangles.

- 2 堀 口 俊 二 Newton–Mandelbrot set 15
 Shunji Horiguchi Newton–Mandelbrot set

概要 The Wasan (Japanese mathematics in the Edo period (1603–1868: national isolation)) of 1673 leads to the extension of Mandelbrot set, i.e., the Newton–Mandelbrot set. We use the Newton–Mandelbrot set to show that the complex plane continuously transforms the Mandelbrot set and the Multibrot set. This shows the originality of Japanese traditional mathematics (Wasan).

- 3 神 本 丈 (九大数理) Analytic continuation of local zeta functions to a slit complex plane · · 15
 水 野 宏 真 (九州産大理工)
 野 瀬 敏 洋 (福岡工大)
Joe Kamimoto (Kyushu Univ.) Analytic continuation of local zeta functions to a slit complex plane
Hiromichi Mizuno
 (Kyushu Sangyo Univ.)
 Toshihiro Nose (Fukuoka Inst. of Tech.)

概要 In this talk, we consider an analytic continuation of local zeta functions associated to general continuous functions in one dimensional case. We will provide a sufficient condition under which the one-dimensional local zeta function admits a holomorphic continuation to the complex plane cut along the negative real axis.

- 4 相 川 弘 明 (中部大理工) Everywhere divergence of tangential parabolic limits of Gauss–Weierstrass
 integrals 15
 Hiroaki Aikawa (Chubu Univ.) Everywhere divergence of tangential parabolic limits of Gauss–Weierstrass
 integrals

概要 We construct a bounded function whose Gauss–Weierstrass integral has a divergent tangential parabolic limit at every initial point. This shows the sharpness of the parabolic approach in the parabolic Fatou theorem. We compare the tangential parabolic approach and the non-nontangential parabolic approach of Nagel–Stein type.

- 5 堀田 一 敬 (山口大創成) スリット写像に関連する Loewner chain への埋め込み問題 15
 S. Schleißinger (Univ. of Würzburg)
 Ikkei Hotta (Yamaguchi Univ.) Problems related to conformal slit-mappings
 Sebastian Schleißinger
 (Univ. of Würzburg)

概要 Motivated by Loewner's classical theorem on slit mappings, this talk discusses several embedding problems for slit-type mappings.

- 6 松崎 克彦 (早大教育) Boundary characterizations of little Bloch and VMOA functions on the
 陶 菲 (早大教育) half-plane 15
 Katsuhiko Matsuzaki (Waseda Univ.) Boundary characterizations of little Bloch and VMOA functions on the
 Fei Tao (Waseda Univ.) half-plane

概要 We extend Pommerenke's characterizations of boundary curves by little Bloch and VMOA conditions from the unit disk to the upper half-plane. For a conformal mapping onto an unbounded quasidisk, we consider its boundary extension. In the non-compact setting on the half-plane, smallness on the boundary curve is not necessarily comparable with smallness of the parameter on the real line. To overcome this difficulty, we use relative versions of asymptotic conformality and asymptotic smoothness with respect to the parametrization by the boundary extension. Our theorems show that the disk results remain valid for the half-plane once the correct relative geometric notions are used. The relative formulation of curves is equivalent to the original one for the disk, so our results can be regarded as the generalization of Pommerenke's.

14:20~15:20 特別講演

- 平田 賢太郎 (広島大先進理工) 半線形楕円型方程式の解の特異点除去可能性と漸近挙動に関するポテンシャル解析
 Kentaro Hirata (Hiroshima Univ.) Potential analysis regarding removability of singularities and asymptotic behavior of solutions to semilinear elliptic equations

概要 This talk concerns the removable singularities and the asymptotic behavior of solutions to semilinear elliptic equations with power-type source or absorption terms. We will introduce previous researches on the removability of singularities on isolated points or compact smooth manifolds of dimension not greater than $N-3$, and then present my research results regarding the removability of singular sets of dimension at most $N-2$ that satisfy the Ahlfors regularity condition and the uniform Minkowski condition, as well as the existence of weighted nontangential limits (asymptotic behavior).

15:40~16:50

- 7 志賀 啓成 Thompson's groups and Teichmüller modular groups of generalized Cantor sets (Part I) 15
 (阪公大数研・東京科学大*)
 Hiroshige Shiga Thompson's groups and Teichmüller modular groups of generalized Cantor sets (Part I)
 (Osaka Metro. Univ./Sci. Tokyo*)

概要 Thompson's groups, which are denoted by F , T and V , were introduced by R. Thompson. It is known that they have a lot of interesting properties. In the first part of my talk, it is shown that Thompson's groups are algebraically related to subgroups of Teichmüller modular groups of Teichmüller spaces of generalized Cantor sets.

- 8 志賀啓成 (阪公大数学研・東京科学大*) Thompson's groups and Teichmüller modular groups of generalized Cantor set (Part II) 15
 Hiroshige Shiga (Osaka Metro. Univ./Sci. Tokyo*) Thompson's groups and Teichmüller modular groups of generalized Cantor set (Part II)

概要 In the second part of our talk, it is established that Thompson's groups are realized as subgroups of Teichmüller modular groups of generalized Cantor sets. Moreover, in this sense, we show that Thompson's groups F, T act properly discontinuously on the Teichmüller spaces, but the group V does not.

- 9 四之宮佳彦 (静岡大教育) On curve graphs of hyperelliptic translation surfaces 15
 Yoshihiko Shinomiya (Shizuoka Univ.) On curve graphs of hyperelliptic translation surfaces

概要 The curve graph of a translation surface is a graph whose vertices are homotopy classes of regular closed geodesics. Two vertices are joined by an edge if the corresponding geodesics are disjoint. In general, this graph is not connected. In this talk, we introduce an extension of the curve graph that is connected. We show that the extended curve graphs of hyperelliptic translation surfaces share many of the same properties as the classical curve graphs of surfaces. We also give a characterization of hyperelliptic Veech surfaces in terms of their extended curve graphs.

- 10 大野玄道 (京大人間環境) Uniform perfectness of the limit sets of conformal tree iterated function systems 15
 Hiromichi Ono (Kyoto Univ.) Uniform perfectness of the limit sets of conformal tree iterated function systems

概要 A compact subset C of the complex plane is said to be uniformly perfect if there exists a constant $M \geq 1$ such that any annulus A which separates C has the module smaller than M . It was shown by R. Stankewitz that the limit set of a conformal iterated function system on the plane is uniformly perfect except for the obvious exceptions. In this talk, we consider tree iterated function systems which are the generalizations of iterated function systems, and show that the limit set of a such system is uniformly perfect if for any map ϕ in the system, the absolute value of the derivative of ϕ is uniformly bounded from below.

9月2日(水) 第V会場

9:30~11:10

- 11 濱田英隆 (九州産大*) Bohr-Rogosinski radius in complex Banach spaces 15
 本田竜広 (専修大商) M. Kohr (Babeş-Bolyai Univ.)
 Hidetaka Hamada (Kyushu Sangyo Univ.*) Bohr-Rogosinski radius in complex Banach spaces
 Tatsuhiro Honda (Senshu Univ.) Mirela Kohr (Babeş-Bolyai Univ.)

概要 In this talk, we investigate the Bohr-Rogosinski radius for holomorphic mappings on the unit ball of a complex Banach space with values in a higher dimensional complex Banach space.

- 12 綾 野 孝 則 (阪公大数学研) 双楯円的な種数 2 の超楯円曲線に付随するアーベル関数の退化極限 15
 Takanori Ayano (Osaka Metro. Univ.) Degenerate limit of the abelian functions associated with a bielliptic
 hyperelliptic curve of genus 2

概要 Solutions of differential equations in terms of elementary functions can be obtained by the degeneration of solutions in terms of the theta, sigma, and abelian functions. Bernatska and Leykin studied the degeneration of the hyperelliptic sigma function using the theory of the heat equation. Bernatska, Enolski, and Nakayashiki studied it using Sato theory. A curve is called bielliptic if it admits a morphism of degree 2 to an elliptic curve. In our previous work, we described the abelian functions associated with a bielliptic hyperelliptic curve of genus 2 in terms of elliptic functions. In this talk, by using this formula, we will calculate the degenerate limit of the abelian functions associated with the bielliptic hyperelliptic curve of genus 2.

- 13 高 橋 正 (羽衣国際大現代社会) 平面 6 次曲線に関する数式处理的考察 15
 Tadashi Takahashi A computer algebraic study on plane sextic curves
 (Hagoromo Univ. of Int. Stud.)

概要 In the previous presentation, we demonstrated a computer algebraic method for deriving Yoshihara's defining equation. In this presentation, we report example of double cover of cubic curve in plane sextic curves and we report able to capture the characteristics Yoshihara's defining equation using calculating the Puiseux series.

- 14 足 立 真 訓 (静岡大理) ファイバー束の中間的擬凸性 15
 Seungjae Lee
 (Kyungpook National Univ.)
 Aeryeong Seo
 (Kyungpook National Univ.)
 Masanori Adachi (Shizuoka Univ.) Intermediate pseudoconvexity of fiber bundles
 Seungjae Lee
 (Kyungpook National Univ.)
 Aeryeong Seo
 (Kyungpook National Univ.)

概要 We investigate the pseudoconvexity of locally trivial holomorphic ball bundles over compact Riemann surfaces of genus ≥ 2 , as well as the intermediate pseudoconvexity of their complements in the associated projective space bundles. We prove that any such ball bundle is 1-convex, while its complement is n -convex, where n denotes the dimension of the ball fiber, provided that the bundle admits a harmonic section with a regular point.

- 15 小 池 貴 之 (筑波大数理物質) Formal principle for line bundles on neighborhoods of an analytic subset
 of a compact Kähler manifold 15
 Takayuki Koike (Univ. of Tsukuba) Formal principle for line bundles on neighborhoods of an analytic subset
 of a compact Kähler manifold

概要 We investigate the formal principle for holomorphic line bundles on neighborhoods of an analytic subset of a complex manifold mainly in the case where it can be realized as an open subset of a compact Kähler manifold. Our approach identifies the obstruction as a global analytic class supported on a neighborhood of Y , and relates its vanishing to the solvability of a $\partial\bar{\partial}$ -problem on neighborhoods of Y . As a consequence we obtain cohomological criteria ensuring the formal principle. We also construct a holomorphic family of compact Kähler surfaces containing a curve with topologically trivial normal bundle in which the formal principle holds for almost every fiber but fails for uncountably many fibers, exhibiting an instability phenomenon in families.

- 16 大 沢 健 夫 (名大多元数理)b On complete Kähler Riemann domains 15
 Takeo Ohsawa (Nagoya Univ.) On complete Kähler Riemann domains

概要 As an application of an extension theorem for holomorphic functions on complete Kähler manifolds, it will be proved that a complete Kähler Riemann domain over $\mathbb{C}^n$ satisfying a kind of boundary condition is holomorphically convex. A well-known result by Diederich and Pflug follows from this as a corollary.

13:00~14:00 特別講演

厚 地 淳 (慶 大 理 工) ケーラー多様体上の拡散過程と正則写像の値分布 —伊藤解析の視点から—

Atsushi Atsuji (Keio Univ.) Diffusion processes on Kähler manifolds and the value distribution of holomorphic maps —From the perspective of Itô calculus—

概要 Any non-constant holomorphic function on the complex plane sends a complex Brownian motion to a time-changed complex Brownian motion. This property is called conformal invariance of Brownian motion. This leads us to a natural idea to study properties of holomorphic functions using Brownian motion, and Itô calculus (stochastic calculus) which is a systematic method for analysis of stochastic processes initiated by Kiyoshi Itô. This conformal invariance property holds not only for complex Brownian motion on the complex plane but also for Brownian motion on Kähler manifolds that is a diffusion process whose generator is the complex Laplacian defined from Kähler metric. In this talk we are discussing some extension of classical value distribution theory of holomorphic functions, especially Nevanlinna theory, using stochastic calculus on Kähler manifolds. Our idea seems applicable for a wider class of functions and domains of functions, like discrete spaces. We will talk about some application of our methods from stochastic calculus to function theoretic objects on discrete spaces if time allows.

函数方程式論

9月1日(火) 第II会場

9:00~12:00

- 1 松原=許宰榮 (東北大情報) Matroid 超幾何系 10
 S. Telen (MPI MiS)
 Saiei-Jaeyeong Matsubara-Heo Matroid hypergeometric systems
 (Tohoku Univ.)
 Simon Telen (MPI MiS)

概要 In the late 20th century, Gel'fand, Kapranov, and Zelevinsky (GKZ) developed the modern theory of discriminants and resultants. Central to their theory is the principal A-determinant. We discovered its matroid analog, the principal matroid determinant, for realizable matroids. Although these topics are pure algebraic geometry, GKZ theory originated in the study of the singular locus of a holonomic system (GKZ hypergeometric system). In GKZ's words, "a hypergeometric system is a quantization of a discriminant". Accordingly, we introduce the matroid hypergeometric system as a holonomic system quantizing the principal matroid determinant. Despite its natural definition and integral representations, its analytic properties are yet to be investigated. We welcome any insights at this Functional Equations session.

- 2 齋藤保久 (島根大理工) 遅延型 Lotka–Volterra 系における遅延配置と大域安定性 10
 Yasuhisa Saito (Shimane Univ.) Delay placement and global stability in delayed Lotka–Volterra systems

概要 This talk studies the effect of delay placement on delay-independent global stability in delayed Lotka–Volterra systems. For a symmetric predator-prey system with four discrete delays, a necessary and sufficient condition for global asymptotic stability of the positive equilibrium is presented. This condition differs from the corresponding sharp condition for a two-delay system, revealing a delay-placement discrepancy. We also discuss competitive and cooperative systems. Our analysis suggests that such a discrepancy may disappear over a large parameter region. These results indicate that the influence of delay placement on global stability may depend strongly on the sign structure of species interactions.

- 3 谷川智幸 (阪公大理) 外力項付き半分線形微分方程式の振動解の存在と零点の存在区間 10
 宇佐美広介 (岐阜大工)
 J. Jaroš (Comenius Univ.)
 Tomoyuki Tanigawa Existence of oscillatory solutions and localization of zeros for forced
 (Osaka Metro. Univ.) half-linear differential equations
 Hiroyuki Usami (Gifu Univ.)
 Jaroslav Jaroš (Comenius Univ.)

概要 In this talk, we investigate the existence of oscillatory solutions of the forced second-order half-linear differential equation

$$(p(t)|x'|^{\alpha-1}x')' + q(t)|x|^{\alpha-1}x = f(t), \quad t \geq a.$$

Our main objective is to clarify, by means of the generalized Prüfer transformation, how the forcing term influences the oscillatory behavior of solutions.

- 4 宇佐美 広介 (岐阜大*) 外力項付き半分線形常微分方程式の初期値問題の局所解の多重性 10
谷川 智幸 (阪公大理)
 Hiroyuki Usami (Gifu Univ.*) Multiplicities of local solutions of IVP's to forced half-linear ordinary
 Tomoyuki Tanigawa differential equations
 (Osaka Metro. Univ.)

概要 We consider initial value problems of nonhomogeneous quasilinear ordinary differential equations including half-linear equations. We give necessary conditions and sufficient conditions for such problems to have multiple local solutions.

- 5 Wei Zheng (Heilongjiang Univ.) 2つの時間遅れをもつ非整数階微分方程式の安定集合 10
松永 秀章 (阪公大理)
 Wei Zheng (Heilongjiang Univ.) Stability sets for fractional differential equations with two delays
 Hideaki Matsunaga
 (Osaka Metro. Univ.)

概要 In this talk we are concerned with a linear fractional-order differential equation with two delayed terms. By applying the D-decomposition method to the characteristic equation, we present a stability region as a necessary and sufficient condition for the asymptotic stability of the zero solution.

- 6 石橋 和葵 (島根大総理工) PD制御型微分演算子をもつ線形微分方程式系の Wintner 型漸近定理 .. 10
 Kazuki Ishibashi (Shimane Univ.) Wintner-type asymptotic behavior for linear differential systems with a
 proportional derivative controller

概要 In this talk, the asymptotic behavior of linear differential systems incorporating a proportional derivative-type (PD) differential operator is investigated. Building on the classical asymptotic convergence property of Wintner, a generalized Wintner-type asymptotic result for such systems is established. The proposed framework encompasses a wide class of time-varying coefficient matrices and extends classical asymptotic theory to equations governed by a PD operator. An illustrative example is also presented to demonstrate the applicability of the proposed theorem.

- 7 西口 純矢 Structural origin of the Hale bilinear form: From the viewpoint of the
 (摂南大理工・東北大 AIMR) Green and Lagrange identities 10
 Junya Nishiguchi Structural Origin of the Hale Bilinear Form: From the Viewpoint of
 (Setsunan Univ./Tohoku Univ.) the Green and Lagrange Identities

概要 In the theory of linear retarded functional differential equations (RFDEs), the classical bilinear form proposed by J. Hale has long suffered from foundational ambiguities due to its historically *ad hoc* introduction. In this talk, we resolve these long-standing issues by establishing the Green and Lagrange identities associated with an autonomous linear RFDE. We derive a bilinear form B , which is none other than the celebrated Hale bilinear form, thereby clarifying its structural origin from the perspective of differential equations. Furthermore, by utilizing the recent definition of the M^p -space via the memory measure, we demonstrate that B uniquely extends to the product space $M^{*q} \times M^p$, and that the identities still hold in the mild sense.

- 8 山 岸 弘 幸 (産業技術高専) 4階楕円型偏微分方程式に対応するソボレフ不等式とソボレフ型不等式の
 渡 辺 宏 太 郎 (防 衛 大) 最良定数 10
 永 井 敦 (津田塾大学芸)
 Hiroyuki Yamagishi The best constants of the Sobolev and the Sobolev-type inequalities
 (Tokyo Metropolitan Coll. of Indus. Tech.) corresponding to forth order partial differential equation
 Kohtaro Watanabe
 (Nat. Defense Acad. of Japan)
 Atsushi Nagai (Tsuda Coll.)

概要 We consider fourth order linear partial differential equation in an N -dimensional Euclidean space ($N = 1, 2, 3$), which represents bending of a plate on an elastic foundation under a tension. The best constants of the Sobolev and the Sobolev-type inequalities are found by means of the Green function and the theory of reproducing kernel.

- 9 柴田 徹 太 郎 (広 島 大*) Asymptotic behavior of bifurcation curves of nonlocal logistic equation
 of population dynamics 10
 Tetsutaro Shibata (Hiroshima Univ.*) Asymptotic behavior of bifurcation curves of nonlocal logistic equation
 of population dynamics

概要 We consider the one-dimensional nonlocal Kirchhoff type bifurcation problem related to logistic equation of population dynamics. We deal with this equation from a view point of bifurcation problem. The purpose is to establish the precise asymptotic formulas for bifurcation curve $\lambda = \lambda(\alpha)$ as $\alpha \rightarrow \infty$ in L^2 -framework, where $\alpha := \|u_\lambda\|_2$. Usually, bifurcation problems are considered in L^∞ -framework. Therefore, our results here are new and significant.

- 10 梶 木 屋 龍 治 Sobolev–Poincaré 不等式の最良定数に対する評価 10
 (大阪電通大共通教育機構)
 田 中 視 英 子 (東 京 理 大 理)
 田 中 敏 (東 北 大 理)
 Ryuji Kajikiya Estimates of the best constant for the Sobolev–Poincaré inequality
 (Osaka Electro-Comm. Univ.)
 Mieko Tanaka (Tokyo Univ. of Sci.)
 Satoshi Tanaka (Tohoku Univ.)

概要 We study the best constant of the Sobolev–Poincaré inequality. The best constant $\lambda(p, q, \Omega)$ becomes the first eigenvalue of the differential equation related to the p -Laplace operator. We give the upper and lower estimates for $\lambda(p, q, \Omega)$ in the subcritical case $1 < q < p^*$ when Ω is a bounded open set.

- 11 梶 木 屋 龍 治 Partially symmetric solutions of the Hénon equation in unbounded do-
 (大阪電通大共通教育機構) mains 10
 Ryuji Kajikiya Partially symmetric solutions of the Hénon equation in unbounded do-
 (Osaka Electro-Comm. Univ.) mains

概要 We study the Hénon equation in unbounded domains Ω . Let G be a closed subgroup of the orthogonal group. The domain Ω is called G invariant if $g(\Omega) = \Omega$ for any $g \in G$. A solution u is called G invariant if $u(gx) = u(x)$ for $g \in G$ and $x \in \Omega$. Let H and G be two closed subgroups of the orthogonal group such that $H \subsetneq G$. For a G invariant unbounded domain Ω , we prove the existence of a positive solution which is H invariant but no G invariant.

- 12 木下智晴 (早大理工) On the existence of vector solutions to nonlinear Schrödinger equations
 佐藤洋平 (埼玉大理工) with weak three wave interaction 10
Tomoharu Kinoshita (Waseda Univ.) On the existence of vector solutions to nonlinear Schrödinger equations
Yohei Sato (Saitama Univ.) with weak three wave interaction

概要 In this talk, I would like to talk about the nonlinear Schrödinger equations with three wave interaction. For large interaction, Pomponio (2010) showed that there exists a ground state which is a vector solution. On the other hand, for small interaction the existence of vector solutions is not even known. The purpose of this talk is to establish the existence and the multiplicity of vector solutions of the system for small three wave interaction. This talk is based on joint work with Yohei Sato (Saitama University).

- 13 Xiaojun Chang (東北師範大) L^2 -supercritical case の3波相互作用をもつ非線形シュレディンガー方程
 長田祐輝 (東京理大理) 式系に対する正規化解 10
 佐藤洋平 (埼玉大理工)
Xiaojun Chang Normalized solutions for the nonlinear Schrödinger system with three
 (Northeast Normal Univ.) wave interaction for the L^2 -supercritical case
Yuki Osada (Tokyo Univ. of Sci.)
Yohei Sato (Saitama Univ.)

概要 We consider the existence of L^2 -normalized solutions for a nonlinear Schrödinger system with three wave interaction. This system consists of three components of unknown functions. We consider spatial dimensions $2 \leq N \leq 5$, and we take the nonlinearities to be of power type $|u_i|^{p_i-2}u_i$, where the exponents satisfy $2 < p_i < 2^*$ for $i = 1, 2, 3$. Here $2^* = \frac{2N}{N-2}$ if $N \geq 3$, $2^* = \infty$ if $N = 2$. In this talk, by classifying the nonlinearities $|u_i|^{p_i-2}u_i$ as L^2 -subcritical or L^2 -supercritical, we prove the existence of a local minimal positive solution or mountain pass positive solution for small or large $\alpha > 0$.

- 14 Yu Su Characterization of ground state solutions for Schrödinger–Poisson sys-
 (Anhui Univ. of Sci. and Tech.) tem with critical strength of interaction 10
 渡辺達也 (京都産大理)
Yu Su (Anhui Univ. of Sci. and Tech.) Characterization of ground state solutions for Schrödinger–Poisson sys-
Tatsuya Watanabe tem with critical strength of interaction
 (Kyoto Sangyo Univ.)

概要 In this talk, we give a complete characterization of ground state solutions for the nonlinear Schrödinger–Poisson system with a critical strength of the interaction. Firstly, we prove the existence of an optimizer of the Gagliardo–Nirenberg–Coulomb–Sobolev inequality. Secondly, we give a full correspondence between an optimizer, an energy ground state solution and an action ground state solution. Finally, we obtain an explicit formula of the critical strength by using the optimizer and the best constant of the Gagliardo–Nirenberg–Coulomb inequality.

14:15~16:30

- 15 濱本直樹 (早大理工) 球体上のベクトル場に対する Hardy 定数 10
Naoki Hamamoto (Waseda Univ.) Hardy constant for vector fields on the ball

概要 In this talk we consider the best constant C_N in N -dimensional Hardy-type inequality for test vector fields u in the unit ball whose normal components satisfy Dirichlet boundary condition. Since this condition is not imposed on all the components of u , the best value of C_N turns out to be strictly less than the well-known value $\frac{(N-2)^2}{4}$ when $N \geq 4$.

- 16 片山 翔 (慶大理工) 半線形楕円型方程式の境界特異解の構成 10
 Weiwei Ao (武漢大)
 Juncheng Wei (香港中文大)
 Sho Katayama (Keio Univ.) Construction of boundary singular solutions to a semilinear elliptic
 Weiwei Ao (Wuhan Univ.) equation
 Juncheng Wei
 (Chinese Univ. of Hong Kong)

概要 We construct positive solutions to a semilinear elliptic equation $-\Delta u = u^p$ in a general bounded domain, with prescribed isolated boundary singularities, with the zero Dirichlet boundary condition away from the singular set. Such solutions were previously constructed when p is sufficiently close to $\frac{N+1}{N-1}$ from above, by del Pino, Musso, and Pacard (2007). Our result extends their result to the range $\left(\frac{N+1}{N-1}, \frac{N+2}{N-2}\right)$ apart from a discrete set of exceptional exponents. A main ingredient is to construct a fast-decay boundary singular solution to the equation $-\Delta u = u^p$ on the half-space and to obtain its nondegeneracy via a global analytic bifurcation theory.

- 17 熊谷 健太 (東大数理) 球領域上における半線型楕円型方程式の分岐構造 10
 Kenta Kumagai (Univ. of Tokyo) Bifurcation structure of semilinear elliptic equations in a ball

概要 The bifurcation structure of a supercritical elliptic equation is completely clarified by Joseph and Lundgren (1972/73) for power nonlinearities and the exponential nonlinearity in a ball. For these nonlinearities, the bifurcation curve has infinitely many turning points when the growth rate of nonlinearity is smaller than Joseph–Lundgren critical, while the bifurcation curve has no turning point when the growth rate is greater than or equal to Joseph–Lundgren critical. In this talk, we give a new type of nonlinearity such that the growth rate is greater than or equal to Joseph–Lundgren critical, while the bifurcation curve has infinitely many turning points. This result shows that the bifurcation structure is not determined solely by the growth rate of the nonlinearity. In fact, we find a general criterion which determines the bifurcation structure.

- 18 鈴木 貴 (阪大 M M D S) 点渦系 Onsager 理論 —緩和時間での階層循環 5
 Takashi Suzuki (Osaka Univ.) Onsager theory of point vortices —recursive hierarchy in relaxation time

概要 We investigate the relaxation dynamics of point vortices described by the Euler–Smoluchowski–Poisson equation. Our study reveals a quantization mechanism for collapse masses and demonstrates that the Hamiltonian of the point vortex system governs the dynamics of sub-collapses, both in finite-time and infinite-time blowup scenarios.

- 19 宮本 怜里 (東京理大創域理工) Existence and nonexistence of global-in-time solutions to semilinear heat
 equations with potentials and spatial weights 10
 Reiri Miyamoto (Tokyo Univ. of Sci.) Existence and nonexistence of global-in-time solutions to semilinear heat
 equations with potentials and spatial weights

概要 In this talk, we investigate the existence and nonexistence of global-in-time positive solutions to the Cauchy problem for semilinear heat equations with radially symmetric potentials and spatial weights. We assume that the associated Schrödinger operator L is nonnegative in $L^2(\mathbb{R}^N)$. Under suitable assumptions on the radially symmetric positive harmonic function for the operator L , we establish Fujita-type criteria for the existence and nonexistence of global-in-time solutions to this problem. The present paper extends the previous work in the one-dimensional case to arbitrary dimensions.

- 20 鈴木 将 満 (明大研究・知財) Local existence and nonexistence for fractional semilinear parabolic systems with singular initial data 10
- Masamitsu Suzuki (Meiji Univ.) Local existence and nonexistence for fractional semilinear parabolic systems with singular initial data

概要 We study the fractional semilinear parabolic system

$$\begin{cases} \partial_t^\alpha u + (-\Delta)^{\frac{\theta_1}{2}} u = |v|^{\frac{\theta_2}{N}} v & \text{in } \mathbb{R}^N \times (0, T), \\ \partial_t^\alpha v + (-\Delta)^{\frac{\theta_2}{2}} v = |u|^{\frac{\theta_1}{N}} u & \text{in } \mathbb{R}^N \times (0, T), \\ u(x, 0) = u_0(x), v(x, 0) = v_0(x) & \text{in } \mathbb{R}^N, \end{cases}$$

where $0 < \alpha \leq 1$, $0 < \theta_1, \theta_2 \leq 2$, $N \geq 1$ and $T > 0$. When $0 < \alpha < 1$, the fractional derivative ∂_t^α is meant in a generalized Caputo sense. We mainly consider the case where u_0 and v_0 have a singularity. We obtain integrability conditions on (u_0, v_0) which explicitly determine local in time existence/nonexistence of a solution.

- 21 山内 雄介 (広島工大情報) Weighted gap conditions for minimal-time blow-up in semilinear heat equations 10
- Yusuke Yamauchi Weighted gap conditions for minimal-time blow-up in semilinear heat equations
(Hiroshima Inst. of Tech.)

概要 We study nonnegative classical solutions to the Cauchy problem for the semilinear heat equation with power nonlinearity. We establish three results concerning the initial data: a sufficient condition for minimal-time blow-up, a necessary condition for non-minimal-time blow-up, and a sufficient condition for non-minimal-time blow-up. To formulate these conditions, we introduce two quantities associated with a ball: a weighted average of the solution using the normalized first Dirichlet eigenfunction, and a weighted gap between the supremum of the solution and this average.

- 22 比佐 幸太郎 (福岡大理) Infinite time blow-up and slow decay for the six dimensional energy-critical heat equation with self-similarly decaying initial data 10
- 高橋 仁 (東京科学大情報理工) E. Zhanpeisov (東北大理)
- Kotaro Hisa (Fukuoka Univ.) Infinite time blow-up and slow decay for the six dimensional energy-critical heat equation with self-similarly decaying initial data
- Jin Takahashi (Sci. Tokyo) Erbol Zhanpeisov (Tohoku Univ.)

概要 We consider the six dimensional energy-critical semilinear heat equation with self-similarly decaying initial data. Our main result shows the existence of sign-changing solutions that exhibit infinite-time blow-up and nonnegative solutions that decay strictly more slowly than the self-similar rate. Moreover, the blow-up and decay rates are not uniquely determined by the decay rate of the initial data, but exhibit a certain flexibility depending on the construction. The proof is based on gluing suitably rescaled bubbles to forward self-similar solutions.

- 23 比佐 幸太郎 (福岡大理) Non-uniqueness of positive solutions for supercritical semilinear heat equations without scale invariance 10
- 宮本 安人 (東大数理)
- Kotaro Hisa (Fukuoka Univ.) Non-uniqueness of positive solutions for supercritical semilinear heat equations without scale invariance
- Yasuhito Miyamoto (Univ. of Tokyo)

概要 We establish nonuniqueness of solutions for Cauchy problems of semilinear heat equations with a wide class of nonlinearities. We assume that the growth rate of the nonlinearity is less than the Joseph-Lundgren exponent for $N > 10$ and it satisfies certain assumptions guaranteeing the existence of a positive radial singular stationary solution u^* . We prove that the problem with initial value u^* has at least two positive solutions, namely u^* and $u(t)$ which satisfies $u \in L_{loc}^\infty(0, t_0; L^\infty(\mathbb{R}^N))$ for some $t_0 > 0$.

- 24 曾 我 悠 利 (東 北 大 理) ある走化性方程式の優臨界における解挙動の分類 10
 Yuri Soga (Tohoku Univ.) A classification of behaviors of solutions to a chemotaxis system in supercritical dimensions

概要 We consider a chemotaxis system in the whole space with emphasis on supercritical dimensions. We establish a sharp threshold phenomenon separating global-in-time existence from finite time blow-up in terms of scaling-critical Morrey norms of the initial data. In particular, we prove the existence of singular stationary solutions and show that their Morrey norm values serve as the critical thresholds determining the long-time behavior of solutions.

- 25 曾 我 悠 利 (東 北 大 理) 非局所相互作用を伴う移流拡散方程式における解の漸近挙動 10
 G. Karch (Univ. of Wrocław)
 Yuri Soga (Tohoku Univ.) Asymptotic behaviors of solutions for aggregation-diffusion equations with nonlocal interaction
 Grzegorz Karch (Univ. of Wrocław)

概要 We consider the large-time behavior of aggregation-diffusion equations with nonlocal interaction. First, we assume regular interaction kernels and establish heat kernel asymptotics under weaker assumptions than those imposed by Carrillo, Gómez-Castro, Yao and Zeng (2023). Our proof is based on decay estimates and Duhamel's formula, and does not rely on their entropy method or the use of self-similar variables. We next discuss the critical logarithmic interaction. In this case, the interaction remains visible under the diffusive scaling, and the asymptotic profile is described by a nonlinear self-similar solution. We prove uniqueness of this self-similar solution for every prescribed mass and show convergence toward it after rescaling, based on the repulsive structure of the logarithmic interaction energy. This is a joint work with Grzegorz Karch (University of Wrocław).

17:00~18:00 特別講演

- 渡 辺 宏 太 郎 (防 衛 大) 円環および球上の等長変換の半線形楕円型方程式の正值解の形状評価への応用について
 Kotaro Watanabe Applications of isometries on annuli and spheres to the shape evaluation problem of positive solutions for semilinear elliptic equations
 (Nat. Defense Acad. of Japan)

概要 We define isometries on annuli and spheres and apply them to the shape evaluation problem of positive solutions for semilinear elliptic equations under the Dirichlet boundary condition, specifically focusing on their spherical symmetry and the location of their maximum points. For problems on spheres, we apply this approach to the existence of m-mode solutions. For problems on annuli, we utilize it to evaluate the location of the maximum points of positive solutions to the Henon equation. Furthermore, we attempt to apply these methods to the uniqueness theorems of positive radial solutions for certain types of semilinear elliptic equations under the Dirichlet condition.

9月2日(水) 第II会場

9:00~12:00

- 26 小 泉 祐 太 (早 大 理 工) Space-time analyticity for the parabolic-parabolic Keller–Segel–Navier–Stokes equations 10
 Yuta Koizumi (Waseda Univ.) Space-time analyticity for the parabolic-parabolic Keller–Segel–Navier–Stokes equations

概要 Consider the Cauchy problem of the Keller–Segel–Navier–Stokes equations of parabolic-parabolic type in the whole space with the initial data in scaling invariant homogeneous Besov spaces. We show that the mild solution to the system is analytic jointly in space and time variables. The corresponding error estimates are also established.

- 27 小 泉 祐 太 (早 大 理 工) Space-time analyticity for the parabolic-elliptic Keller–Segel–Navier–Stokes equations 5
- Yuta Koizumi (Waseda Univ.) Space-time analyticity for the parabolic-elliptic Keller–Segel–Navier–Stokes equations

概要 Consider the Cauchy problem of the Keller–Segel–Navier–Stokes equations of parabolic-elliptic type in the whole space with the initial data in scaling invariant homogeneous Besov spaces. We show that the mild solution to the system is analytic jointly in space and time variables. The corresponding error estimates are also established.

- 28 K. Baghaei (PIAIS) Boundedness in an indirect chemotaxis-consumption model with signal-dependent sensitivity 10
- 千代祐太郎 (東京理大理) 町野智迅 (東京理大理) 横田智巳 (東京理大理)
- Khadijeh Baghaei (PIAIS) Boundedness in an indirect chemotaxis-consumption model with signal-dependent sensitivity
- Yutaro Chiyo (Tokyo Univ. of Sci.) Chihaya Machino (Tokyo Univ. of Sci.) Tomomi Yokota (Tokyo Univ. of Sci.)

概要 This talk deals with global existence and boundedness in an indirect chemotaxis-consumption model with signal-dependent sensitivity. In previous works, global existence and boundedness were obtained in a higher-dimensional case. In this talk, we study a lower-dimensional case.

- 29 A. Columbu (Univ. of Cagliari) Finite-time blow-up in flux-limited chemotaxis systems with nonlinear signal production 10
- 小波津晶平 (東京理大理) M. Marras (Univ. of Cagliari)
- Alessandro Columbu (Univ. of Cagliari) Shohei Kohatsu (Tokyo Univ. of Sci.) Monica Marras (Univ. of Cagliari)

概要 We consider flux-limited chemotaxis systems with nonlinear signal production, and show that under suitable conditions on parameters, there exist initial data with the property that the corresponding classical solutions blow up in finite time. The proof is based on establishing monotonicity of solutions, and we have developed a proof method for monotonicity applicable even in the presence of nonlinear sensitivities.

- 30 細 野 竜 也 (阪公大数学研) Global existence at critical mass for the parabolic-parabolic Keller–Segel system on the plane 10
- Tatsuya Hosono (Osaka Metro. Univ.) Global existence at critical mass for the parabolic-parabolic Keller–Segel system on the plane

概要 We study the Cauchy problem for the two dimensional fully parabolic Keller–Segel system at the critical mass. Global-in-time existence at the critical mass is known under radial symmetry or additional moment assumptions on the initial data. In the absence of moment assumptions, classical energy-based approaches cease to be effective, and the problem becomes substantially more delicate at the critical threshold due to the degeneracy of the underlying energy structure. In this talk, we establish global-in-time existence for general initial data at the critical mass without imposing any symmetry or moment conditions.

- 31 和久井洋司 (福井大工) 移流拡散方程式の閾値定数定常解の安定性 10
 三宅庸仁 (九大数理)
 山田哲也 (福井工高専)
 Hiroshi Wakui (Univ. of Fukui) Stability of the critical constant steady state of a drift-diffusion equation
 Nobuhito Miyake (Kyushu Univ.)
 Tetsuya Yamada
 (Fukui Nat. Coll. of Tech.)

概要 In this paper, we prove the asymptotic stability of the critical constant steady state for a simplified parabolic-elliptic Keller–Segel system in n -dimensional Euclidian space, which admits a one-parameter family of constant steady states. Although the stability threshold for constant steady states is known, the critical case has remained open. We also show that the convergence rate in the critical case differs from the rates obtained for previously studied subcritical constant steady states.

- 32 仙葉 隆 (神奈川大工) Infinite time blow-up of solutions to the classical Keller–Segel system in
 内藤雄基 (広島大先進理工) higher dimensions 10
 Takasi Senba (Kanagawa Univ.) Infinite time blow-up of solutions to the classical Keller–Segel system in
 Yūki Naito (Hiroshima Univ.) higher dimensions

概要 We study the simplest parabolic-elliptic model of chemotaxis in $\mathbf{R}^N$, and show the optimal criteria for the existence of the infinite time blow-up of solutions with the initial data below the Chandrasekhar singular solution when $N \geq 10$. In particular, we exhibit the differences of the criteria between the cases $N \geq 11$ and $N = 10$.

- 33 村井杏伍 (東北大理) 重み付き Wasserstein 空間上の minimizing movement を用いた準線型
 Keller–Segel 方程式の解の構成 10
 Kyogo Murai (Tohoku Univ.) Existence of global weak solutions to quasilinear Keller–Segel systems
 by minimizing movement in the weighted Wasserstein metrics

概要 We prove global existence of weak solutions to quasilinear Keller–Segel systems with nonlinear mobility by the minimizing movement (JKO scheme) in the product space of the weighted Wasserstein space and L^2 space. In particular, we newly show global existence of weak solutions to the degenerate Keller–Segel system with nonlinear mobility in the critical case. While the minimizing movement for Keller–Segel systems with linear mobility are adapted in the product space of the Wasserstein space and L^2 space, due to the nonlinearity of mobility, we need to use the weighted Wasserstein space instead of the Wasserstein space.

- 34 山本征法 (群馬大理工) 移流拡散方程式の解に含まれる非線形プロファイル 10
 Masakazu Yamamoto (Gunma Univ.) Nonlinear profiles of solutions to the drift-diffusion equation

概要 In this talk, the initial-value problem of three-dimensional Debye–Hückel-type drift-diffusion equation is discussed. Particularly, large-time behavior of solutions are studied. In the preceding work, it was shown that charge-density converges asymptotically to the radially symmetric function. In this talk, it is reported that the unique nonlinear profile describing the electric field effect acts radially symmetrically.

- 35 梶原直人 (岐阜大工) Solutions to a one-dimensional combustion-type free boundary problem
 古川 賢 (富山大理) via maximal regularity 10
 儀我美一 (東大数理)
 Naoto Kajiwara (Gifu Univ.) Solutions to a one-dimensional combustion-type free boundary problem
 Ken Furukawa (Univ. of Toyama) via maximal regularity
 Yoshikazu Giga (Univ. of Tokyo)

概要 We study a one-dimensional free boundary problem arising in combustion theory, where the motion of the interface is governed by a prescribed Neumann boundary flux and a zero Dirichlet boundary condition. We treat both the half-line case and the bounded interval case. For both settings, we employ maximal L^p - L^q regularity as our main analytical tool. In the half-line case, the solutions need not decay at infinity, even though the spatial derivatives belong to $L^q(\mathbb{R}_+)$. To handle the evolution law of the free boundary, we introduce a derivative formulation that avoids second-order boundary traces. By combining maximal L^p - L^q regularity and Schauder estimates, we establish local- in-time existence, uniqueness, and regularity of solutions, as well as the evolution law of the free boundary.

- 36 古川 賢 (富山大理) 燃焼問題に由来する自由境界熱方程式の可解性 10
 梶原直人 (岐阜大工)
 儀我美一 (東大数理)
 Ken Furukawa (Univ. of Toyama) Solvability of the free boundary heat equation arising from the combustion problem
 Naoto Kajiwara (Gifu Univ.)
 Yoshikazu Giga (Univ. of Tokyo)

概要 In this talk, we discuss the local-in-time well-posedness of a free-boundary problem arising from a combustion theory. The problem is described by a linear inhomogeneous heat equation posed on the moving domain $(s(t), \infty)$, subject to a homogeneous Dirichlet boundary condition and an inhomogeneous Neumann boundary condition. Our main result establishes the existence and uniqueness of a positive classical solution. In particular, we show that the boundary function $s(t)$ is $\frac{1}{2}$ -Hölder continuous in time when the forcing term is singular of order $O(\frac{1}{\sqrt{t}})$. Furthermore, under suitable smoothness assumptions on the initial data and the forcing term, we prove that s enjoys higher regularity than $\frac{1}{2}$ -Hölder continuity.

- 37 市田 優 (明大理工) ある空間 1 次元反応拡散方程式の非有界進行波解の最小速度 10
 Yu Ichida (Meiji Univ.) Minimal speed of unbounded traveling wave solutions for a certain 1D reaction-diffusion equation

概要 In this talk, we give results on the unboundedness and explicit form of the minimal speed of traveling wave solutions for a one-dimensional spatial reaction-diffusion equation with an asymptotically linear reaction term and a saturation parameter. By applying a Poincaré-type compactification, we reveal the full dynamics (including infinity) of the two-dimensional system of ordinary differential equations satisfied by traveling wave solutions.

- 38 小池 開 (慶大経済) 1次元 Allen–Cahn 方程式の一樣可制御性 10
 V. Laheurte (Univ. Luxembourg)
 F. Sueur (Univ. Luxembourg)
Kai Koike (Keio Univ.) Uniform null-controllability of the one-dimensional Allen–Cahn equation
 Vincent Laheurte (Univ. Luxembourg) tion
 Franck Sueur (Univ. Luxembourg)

概要 Consider the Allen–Cahn equation $u_t = \varepsilon u_{xx} + (u - u^3)/\varepsilon$ with a parameter $\varepsilon > 0$ posed on the interval $[0, 1]$ with homogeneous Neumann boundary conditions. It is known that the equation possesses for each integer n , a unique (up to sign) steady solution $u_{n,\varepsilon}$ with n distinct zeros. Such solutions are called transition layers, and we study the uniform (with respect to ε) null-controllability of the Allen–Cahn equation linearized around them, with distributed controls of the form $\chi_\omega(x)h(t, x)$, where ω is a finite sum of non-empty open intervals and χ_ω is its indicator function. We show that if and only if the closure of ω contains all the zeros of $u_{n,\varepsilon}$, the system is uniformly null-controllable in finite time. This is a joint work with Vincent Laheurte (Université du Luxembourg) and Franck Sueur (Université du Luxembourg).

- 39 下條昌彦 (都立大理) Stability of traveling waves in non-cooperative systems with nonlocal
 A. Ducrot dispersal of general diffusivities 10
 (Univ. Le Havre Normandie)
 郭 忠勝 (淡江大)
Masahiko Shimojo Stability of traveling waves in non-cooperative systems with nonlocal
 (Tokyo Metro. Univ.) dispersal of general diffusivities
 Arnaud Ducrot
 (Univ. Le Havre Normandie)
 Jong-Shenq Guo (Tamkang Univ.)

概要 In this talk, we establish a stability theorem for traveling wave solutions to a class of non-cooperative reaction-diffusion systems with nonlocal dispersal and general diffusivities. The stability condition requires the initial perturbation to yield a bounded and integrable weighted relative entropy functional. Finally, we demonstrate the applicability of our main theorem by analyzing the stability of traveling waves in several non-cooperative ecological models.

- 40 伊藤 涼 (神奈川大理) 反応拡散方程式の大域存在しない非有界な進行波解 10
 二宮 広和 (明大総合数理)
Ryo Ito (Kanagawa Univ.) Non-global unbounded traveling wave solutions of reaction-diffusion equations
 Hirokazu Ninomiya (Meiji Univ.)

概要 We consider non-global unbounded traveling wave solutions of a one-dimensional reaction-diffusion equation. Previous studies have shown that, under a linear growth condition on the nonlinearity, there exists the minimal wave speed that separates the existence and nonexistence of traveling wave solution. In contrast, traveling wave solutions may fail to exist in the non-global setting. We extend this framework to the non-global case by allowing the minimal wave speed to take the value $+\infty$.

13:00~14:00 特別講演

- 原 田 潤 一 (秋田大教育文化) 空間 5 次元・6 次元エネルギー臨界藤田方程式の解の漸近挙動
 Junichi Harada (Akita Univ.) Asymptotic behavior of solutions to the energy critical Fujita equation
 in 5D and 6D

概要 In this talk, we report on our recent results regarding the asymptotic behavior of solutions to the following heat equation:

$$u_t = \Delta_x u + |u|^{p-1}u \quad (p = \frac{n+2}{n-2})$$

Our interest is to clarify the dynamics of solutions to this equation. Generally, in critical-type problems, the set of all stationary solutions plays a major role in determining the dynamics. In the last decade, there has been great progress in the analysis around the Aubin–Talenti solution, and it has been shown that various types of solutions exist. In this talk, we change our perspective slightly and study the movement of the center of mass of the solutions. We will present our results on this problem.

9月3日(木) 第Ⅱ会場

9:15~12:00

- 41 H. Danielle (Paris-Saclay Univ.) Convergence to a self-similar solutions for a two phase Stefan problem
 宮 本 安 人 (東 大 数 理) with zero latent heat 10
 中 島 主 恵 (東京海洋大海洋環境)
 Hilhorst Danielle (Paris-Saclay Univ.) Convergence to a self-similar solutions for a two phase Stefan problem
 Yasuhito Miyamoto (Univ. of Tokyo) with zero latent heat
 Kimie Nakashima
 (Tokyo Univ. of Marine Sci. and Tech.)

概要 We study a two-phase Stefan problem with zero latent heat on the half-line. This problem involves a discontinuous diffusion coefficient. We establish a well-posedness theory for weak solutions, including existence, uniqueness, and a comparison principle, for a broad class of initial data. A central part of the paper is the construction of an explicit stationary solution in self-similar variables, corresponding to a self-similar profile of the original problem. Our main result proves that this self-similar profile is globally asymptotically stable: for any admissible initial data, the corresponding solution converges to the profile in the L^1 -sense as time tends to infinity. This provides the first global convergence result in L^1 for the two-phase Stefan problem on the half-line.

- 42 廣 井 楓 也 (東 大 数 理) 交叉する 2 直線と一般の角度で接触する両端点を持つ開曲線に対する面
 積保存型曲率流 10
 Fuya Hiroi (Univ. of Tokyo) Area-preserving curvature flow for open curves with general contact
 angles on skew lines

概要 For each $m \in \mathbb{N} \cup \{0\}$, we consider the corresponding area-preserving curvature flow for open curves with general contact angles on skew lines. In the studies of moving boundary problems for geometric gradient flows, the right-angle condition ensures that the endpoints of open curves naturally remain on the boundary lines during the evolution. On the other hand, under general contact angle conditions, it is non-trivial whether the end points remain on the lines, and the solvability of the problem is no longer guaranteed. We construct global-in-time solutions and analyze their asymptotic behavior under such generalized boundary conditions.

- 43 三浦達哉 (京大理) Stability of flat-core pinned p -elasticae 10
 吉澤研介 (長崎大教育)
 Tatsuya Miura (Kyoto Univ.) Stability of flat-core pinned p -elasticae
 Kensuke Yoshizawa (Nagasaki Univ.)

概要 Euler's elastica is a critical point of the bending energy under the fixed-length constraint, and its L^p -counterpart is called p -elastica. In this talk, we consider p -elasticae under the pinned boundary condition and classify the stability of the so-called flat-core p -elasticae, which is the only remaining case. Consequently, we completely classify all pinned p -elasticae in terms of stability.

- 44 S. Ibrahim (Univ. of Victoria) Phase transition thresholds and chiral magnetic fields of general degree
 三浦達哉 (京大理) 10
 C. Román (UC Chile)
 清水一慶 (京大理)
 Slim Ibrahim (Univ. of Victoria) Phase transition thresholds and chiral magnetic fields of general degree
 Tatsuya Miura (Kyoto Univ.)
 Carlos Román (UC Chile)
 Ikkei Shimizu (Kyoto Univ.)

概要 We consider the variational problem for the Landau–Lifshitz energy with Dzyaloshinskii–Moriya interaction. We will report our recent result on the energy minimizing problem in general topological degree, which unveils a sort of phase transition phenomena mathematically.

- 45 茂木響太郎 (東京科学大理) 極小曲面の動的不安定性 10
 Kotaro Motegi (Sci. Tokyo) Dynamical instability of minimal surfaces

概要 We study the notion of dynamical stability of minimal surfaces, recently introduced by Stuvard and Tonegawa. It is formulated in terms of Brakke flows, which provide a weak formulation of mean curvature flow. We prove that a minimal surface is dynamically unstable if its scale-invariant L^2 -distance to a plane at a singular point is sufficiently small.

- 46 青木大地 (早大理工) 劣多項式的な強圧項を伴う完全非線型放物型方程式の内部 Hölder 評価 10
 Daichi Aoki (Waseda Univ.) Interior Hölder estimates for fully nonlinear parabolic equations with superlinear gradient terms of subpolynomial growth

概要 We consider the Hölder continuity of viscosity solutions to fully nonlinear parabolic equations whose gradient terms exhibit superlinear growth slower than any polynomial, referred to as subpolynomial growth. Previous studies have treated specific examples such as logarithmic growth. To handle arbitrary subpolynomial growth conditions, we introduce the notion of a polynomial envelope and combine it with the theory of slowly varying functions developed by Karamata in the 1930s. Based on this framework, we establish a Harnack-type estimate adapted to the growth rate of the gradient term, which leads to interior Hölder estimates for a broader class of equations than existing results.

- 47 青木大地 (早大理工) 強圧項を伴う完全非線型楕円型方程式の内在的弱 Harnack 不等式 10
 Daichi Aoki (Waseda Univ.) An intrinsic weak Harnack inequality for fully nonlinear elliptic equations with superlinear gradient terms

概要 We construct Harnack-type estimates for viscosity solutions of fully nonlinear elliptic equations with superlinear gradient terms. More precisely, we establish an intrinsic weak Harnack inequality, originally developed for degenerate and singular parabolic equations. The purpose of this study is to show that this intrinsic estimate remains effective in the elliptic setting when superlinear gradient terms are involved. As consequences, we derive a strong maximum principle and an interior Hölder estimate. In particular, the interior Hölder estimate obtained here is new in the superlinear setting.

- 48 海保敬柊 (東北大理) Double phase 型の増大度をもつ高階楕円型方程式の very weak solution に対する高次可積分性 10
 Yoshiki Kaiho (Tohoku Univ.) Higher integrability for very weak solutions of higher-order elliptic equations with double phase growth

概要 We study higher-order elliptic equations driven by a nonstandard-growth operator, commonly referred to as a double phase operator. For such elliptic equations, we establish a higher integrability result for very weak solutions, whose integrability is lower than standard weak solutions. This result gives a higher-order generalization of the recent work of Baasandorj, Byun, and Kim (Trans. Amer. Math. Soc., 2023). The proof relies on a higher-order Lipschitz truncation and Sobolev–Poincaré inequalities adapted to the double phase structure.

- 49 佐藤由菜 (東北大理) $p \rightarrow \infty$ による非発散形放物型 p -Laplace 方程式の粘性解の漸近挙動とその応用 10
 Yuina Sato (Tohoku Univ.) Asymptotic behavior of viscosity solutions to parabolic p -Laplace equations of nondivergence form as $p \rightarrow \infty$ and its applications

概要 This talk is concerned with the asymptotic behavior of viscosity solutions to nonlinear parabolic equations involving the p -Laplacian as p tends to infinity.

- 50 王曉文 (早大理工) p -Laplace 型作用素を含む退化楕円型 Bellman 方程式の粘性解の微分の Hölder 評価 10
 Xiaowen Wang (Waseda Univ.) Hölder estimates on the gradient of viscosity solutions of degenerate Bellman type equations involving p -Laplacian type operators

概要 We establish an interior $C^{1,\sigma}$ estimate for viscosity solutions to some degenerate Bellman type equations involving p -Laplacian type operators. We prove an equicontinuity estimate of rescaled solutions via doubling argument and weak Harnack inequality, and then apply improvement of flatness iteration to obtain the interior $C^{1,\sigma}$ estimate for some $\sigma \in (0, 1)$.

- 51 Qing Liu (沖縄科学技術大) Stability for Monge solutions of eikonal equations in metric spaces ... 10
M. B. P. Wiranata
 (沖縄科学技術大)

Qing Liu Stability for Monge solutions of eikonal equations in metric spaces
 (Okinawa Inst. of Sci. and Tech. Grad. Univ.)
Made Benny Prasetya Wiranata
 (Okinawa Inst. of Sci. and Tech. Grad. Univ.)

概要 In this talk, we will discuss the stability of Monge solutions for eikonal equations in metric spaces. A key difficulty is that the classical subslope is not generally preserved under uniform convergence. To address this issue, we develop an equivalent nonlocal formulation of subslope conditions on spheres. This approach complements existing methods based on metric viscosity solutions and enables us to directly establish stability results under uniform convergence and Gromov–Hausdorff perturbations of the domain and the metric, without test functions. By introducing the optical metric, the same strategy can be applied to inhomogeneous eikonal equations. In addition, these ideas lead to a Perron-type construction of Monge solutions on general complete length spaces.

- 52 森下 敬悟 (東北大理) 大半径での Dirichlet trapped mode 消失の計算機援用証明 10
 Keigo Morishita (Tohoku Univ.) A rigorous computational proof of large-radius non-existence of the Dirichlet trapped mode

概要 This talk studies localized waves in a two-dimensional channel containing a semicircular obstacle. The wave satisfies a Dirichlet condition on the channel walls and a Neumann condition on the obstacle boundary, and it decays along the channel. Such a non-radiating solution is called a Dirichlet trapped mode. We prove that no such mode exists below the cut-off frequency (i.e. the bottom of the essential spectrum) when the obstacle radius is sufficiently large. The proof combines variational analysis with certified interval-arithmetic computations using Arb.

- 53 津原 駿 (阪大基礎工) Well-posedness for NLS with nonlinear interior and boundary interactions in the half-space 10
 Shun Tsuhara (Univ. of Osaka) Well-posedness for NLS with nonlinear interior and boundary interactions in the half-space

概要 We consider the initial-boundary value problem for the nonlinear Schrödinger equation with a nonlinear Neumann boundary condition in higher-dimensional half-spaces. While local well-posedness in L^2 has been established in two- and three-dimensional half-spaces, the L^2 -theory in dimensions four and higher, as well as the corresponding H^1 -theory, has remained open. The main difficulty is that the standard representation formula breaks down when one takes derivatives in the normal direction. In this talk, we establish anisotropic boundary Strichartz estimates in higher dimensions and apply them to prove local well-posedness in both L^2 and H^1 .

14:15~16:30

- 54 道工 勇 (埼玉大*) 連続マルチンゲールにより駆動される確率非線形シュレディンガー方程式
 橋本 隼也 (京大理) 式の L^2 解の指数関数的減衰 10
 町原 秀二 (埼玉大理工)

Isamu Dôku (Saitama Univ.*) Exponential decay of L^2 -solutions to stochastic nonlinear Schrödinger equations driven by continuous martingales
 Shunya Hashimoto (Kyoto Univ.)
 Shuji Machihara (Saitama Univ.)

概要 We discuss the global well-posedness and asymptotic behavior of L^2 -solutions to stochastic nonlinear Schrödinger equations with multiplicative noise driven by continuous square integrable martingales with density. Our approach relies on a rescaling transformation that converts the stochastic system into a random nonlinear Schrödinger equation with a potential acting as a damping term.

- 55 深谷 法良 (滋賀県大工) Instability theory of stationary solutions for nonlinear Schrödinger equations 10
 林 雅行 (京大人間環境) tions 10
 Noriyoshi Fukaya (Univ. of Shiga Pref.) Instability theory of stationary solutions for nonlinear Schrödinger equations
 Masayuki Hayashi (Kyoto Univ.) tions

概要 We consider the instability of stationary solutions to nonlinear Schrödinger equations with double-power nonlinearities. These equations admit both standing waves with positive frequency decaying exponentially at spatial infinity and stationary solutions decaying polynomially. In this talk, we prove the instability of positive, radial, and decreasing stationary solutions under a zero-frequency analogue of the Grillakis–Shatah–Strauss instability criterion.

- 56 駒田 洸一 (早大理工) 質量劣臨界一般化ブシネス方程式に対する基底状態未満の解の散乱について 10
 Koichi Komada (Waseda Univ.) Scattering below the ground state for the mass-subcritical generalized Boussinesq equation

概要 We consider the generalized Boussinesq equation in high dimensions. Chen–Shao (2026) proved the scattering of radial solutions below the ground state in the mass-subcritical case. In the proof, they divide solutions below the ground state into two invariant sets, and use the fact that the virial functional is always positive within one of these sets. However, there is a partial error in the proof of the fact. We show that there exists an exponent such that the virial functional is always positive within the invariant set when the power of nonlinearity is greater than or equal to that exponent. On the other hand, the virial functional can be negative within the invariant set when the power of nonlinearity is less than that exponent.

- 57 川本 昌紀 (岡山大異分野基礎研) Strauss 冪未満の非線形シュレディンガー方程式の時間大域解及びその散
 眞崎 聡 (北大理) 乱について 10
 宮崎 隼人 (香川大教育) 乱について 10
 Masaki Kawamoto (Okayama Univ.) Global-in-time solutions and scattering for nonlinear Schrödinger equations with nonlinearities below the Strauss exponent
 Satoshi Masaki (Hokkaido Univ.) tions with nonlinearities below the Strauss exponent
 Hayato Miyazaki (Kagawa Univ.)

概要 For nonlinear Schrödinger equations with power-type nonlinearities, the existence and scattering of solutions are established by the general theory developed by Tosio Kato when the exponent of the nonlinearity is above the Strauss exponent. On the other hand, when the exponent is at or below the Strauss exponent, no comparable general theory is available, and finite-time blow-up of solutions with small initial data is known under certain special conditions. In this talk, we show that, one can establish global-in-time existence and scattering even below the Strauss exponent, provided that the nonlinearity satisfies suitable conditions.

- 58 片山 聡一郎 (阪大理) Global existence and the asymptotic behavior for systems of derivative
 眞崎 聡 (北大理) NLS equations under the bounded weak null gauge condition 10
 Soichiro Katayama (Univ. of Osaka) Global existence and the asymptotic behavior for systems of derivative
 Satoshi Masaki (Hokkaido Univ.) NLS equations under the bounded weak null gauge condition

概要 We study a class of nonlinear Schrödinger systems, which are mathematical models used to describe wave phenomena in physics. For critical nonlinear interactions involving derivatives, solutions may develop complicated long-time behavior, and understanding whether they remain stable is a fundamental problem. We introduce a new condition that is significantly weaker than previously known assumptions while still guaranteeing the global existence of small solutions. Under this condition, we also determine the asymptotic behavior of solutions and show that it is governed by a related ordinary differential equation. Our result provides a unified framework that covers several previously studied models and extends earlier theories on long-time dynamics.

- 59 山崎 陽平 (山口大 理) 2次元 Fermi–Pasta–Ulam 格子上的線状進行波の線形安定性 10
 Yohei Yamazaki (Yamaguchi Univ.) Linear stability of line solitary waves in two dimensional Fermi–Pasta–Ulam lattices

概要 We consider two dimensional Fermi–Pasta–Ulam lattices equation. Friesecke and Pego proved the existence of asymptotically stable solitary waves in one dimensional Fermi–Pasta–Ulam lattices. We regard the one dimensional solitary waves as line solitary waves in two dimensional Fermi–Pasta–Ulam lattices. In this talk, we show the linear stability of the line solitary waves in two dimensional Fermi–Pasta–Ulam lattices.

- 60 浜野 大 (京大 理) クライン・ゴルドン・シュレディンガー方程式系の不安定性について .. 10
 菊池 弘明 (津田塾大学 芸)
 富岡 健太
 (津田塾大数学・計算機研)

Masaru Hamano (Kyoto Univ.) Instability of the Klein–Gordon–Schrödinger system
 Hiroaki Kikuchi (Tsuda Coll.)
 Kenta Tomioka (Tsuda Coll.)

概要 We consider the Klein–Gordon–Schrödinger system in 4D. We obtain results about a minimization problem and instability of standing waves of the Klein–Gordon–Schrödinger system. These results are based on joint work with Masaru Hamano (Kyoto University) and Hiroaki Kikuchi (Tsuda University).

- 61 小野寺 栄治 (高知大 理工) Local well-posedness for a fourth-order nonlinear dispersive system on the 1D torus 10
 Eiji Onodera (Kochi Univ.) Local well-posedness for a fourth-order nonlinear dispersive system on the 1D torus

概要 We study local well-posedness for a class of fourth-order nonlinear dispersive systems on the one-dimensional torus. The main difficulty arises from the loss of derivatives in the nonlinear terms. Under relaxed structural conditions, we construct modified energies via gauge-type transformations to eliminate the derivative loss and establish local well-posedness in high-regularity Sobolev spaces.

- 62 佐藤 拓也 (愛媛大 理) Large-data L^2 -decay for attractive-dissipative nonlinear Schrödinger equations without the strong dissipative condition 10
 北直泰 (熊本大 先端)
 宮崎 隼人 (香川大 教育)
 Takuya Sato (Ehime Univ.) Large-data L^2 -decay for attractive-dissipative nonlinear Schrödinger equations without the strong dissipative condition
 Naoyasu Kita (Kumamoto Univ.)
 Hayato Miyazaki (Kagawa Univ.)

概要 We prove a large-data L^2 -decay estimate for nonlinear dissipative Schrödinger equations with attractive-dissipative power nonlinearity. The main difficulty is the lack of sign definiteness of the standard energy when $\Re \lambda < 0$, which prevents the usual energy argument from directly yielding a uniform gradient bound.

We introduce an augmented energy, obtained by adding a suitable multiple of the decreasing L^2 -norm to the standard energy. This produces an additional dissipative term and gives a direct uniform-in-time H^1 bound without the iteration argument used in previous works. Consequently, for arbitrary initial data in the weighted energy space $\Sigma = H^1 \cap \mathcal{FH}^1$, we obtain the decay rate previously known under the strong dissipative condition throughout the sharp decay range $1 < p \leq 1 + 2/d$.

- 63 近 藤 俊 希 (広島大先進理工) 二次微分型分数階非線形 Schrödinger 方程式のノルムインフレーション
岡 本 葵 (広島大先進理工) 10
Toshiki Kondo (Hiroshima Univ.) Norm inflation for quadratic derivative fractional nonlinear Schrödinger
Mamoru Okamoto (Hiroshima Univ.) equations

概要 We consider the Cauchy problem for quadratic derivative fractional nonlinear Schrödinger equations. We determine the sharp exponents of the fractional derivatives for which the Cauchy problem is well-posed in the Sobolev space.

- 64 波 多 間 備 (阪 大 理) Optimal well-posedness of the cubic NLS system on the 1D torus 10
A. Rout
(Politecnico di Milano)
Sonae Hadama (Univ. of Osaka) Optimal well-posedness of the cubic NLS system on the 1D torus
Andrew Rout (Politecnico di Milano)

概要 The cubic nonlinear Schrödinger equation on the one-dimensional torus is globally well-posed in L^2 . In this talk, we discuss an analogue of this result for an infinite system. This system can be formulated as an operator equation with self-adjoint initial data in the Schatten class $\mathfrak{S}^p$. We will first explain that the system is globally well-posed for $p = 1$ and ill-posed for $p > 1$. We will then show that a suitable renormalisation improves this threshold. More precisely, the renormalised system is globally well-posed for $p \leq 2$ and ill-posed for $p > 2$. This is joint work with Andrew Rout (Politecnico di Milano).

17:00~18:00 特別講演

竹 田 寛 志 (福 岡 大 理) 弾性波の長時間挙動

Hiroshi Takeda (Fukuoka Univ.) Asymptotic behavior of elastic waves for large time

概要 In this talk, we consider the Cauchy problem for linear elastic wave equations. We prove the precise long-time behavior of solutions according to the regularity of the initial data. In particular, we obtain estimates that exhibit the interaction among the components as a system.

9月4日(金) 第Ⅱ会場

9:00~12:00

- 65 川 下 美 潮 (広島大先進理工) 空洞と介在物を含む媒質についての波動方程式による逆問題における指
川 下 和 日 子 (広島大先進理工) 示関数の漸近挙動について 10
Mishio Kawashita (Hiroshima Univ.) Asymptotic behavior of the indicator function in an inverse problem for
Wakako Kawashita (Hiroshima Univ.) the wave equation in media with cavities and inclusions

概要 In this presentation, we consider the inverse problem of the wave equation for a medium containing cavities and inclusions as scatterers using the enclosure method. The position information of the scatterers obtained from the indicator function is the shortest distance from the observation site, and the information regarding the type of scatterers is a positive or negative sign. In this study, by using asymptotic solutions and examining the leading terms of the asymptotic expansion of the indicator function in detail, we clarified the relationship between the position, shape, and type of the scatterers and the leading terms of the indicator function.

- 66 川下 美潮 (広島大先進理工) 修正漸近解による active sonar 型逆問題の解析 10
 川下 和日子 (広島大先進理工)
 Mishio Kawashita (Hiroshima Univ.) Analysis for inverse problems for active sonar type using modified asymptotic solutions
 Wakako Kawashita (Hiroshima Univ.)

概要 In inverse problems, waves are frequently used to obtain information about the interior of structures, such as cavities. Mathematically, such problems are formulated as initial and boundary value problems of the wave equation. The incident waves are emanated from a domain $B \subset D$ and reflected waves are measured in the same region B . Active sonar is a typical example for such inverse problems. To analyze these problems, asymptotic solutions provide a good approximation for the true reflected waves. One of the big problems for asymptotic solutions is to require much regularities. In this talk, we introduce *modified asymptotic solutions* to reduce this issue, and show how we can improve regularities for the boundaries of the cavities.

- 67 片山 聡一郎 (阪大理工) Lifespan of small solutions to semilinear hyperbolic systems in one space dimension 10
 若狭 恭平 (室蘭工大工)
 Soichiro Katayama (Univ. of Osaka) Lifespan of small solutions to semilinear hyperbolic systems in one space dimension
 Kyouhei Wakasa
 (Muroran Inst. of Tech.)

概要 We consider the Cauchy problem for systems of semilinear hyperbolic equations of first order with multiple propagation speeds. We obtain a sufficient condition for the global existence of C^1 -solutions with small initial data, and also the almost optimal lifespan of C^1 -solutions under weaker conditions than this sufficient condition. Application to systems of semilinear wave equations in one space dimension with multiple propagation speeds is discussed, and we obtain the almost optimal lifespan estimate under some condition weaker than the null condition.

- 68 片山 聡一郎 (阪大理工) 空間 1 次元重み付き半線形波動方程式の解の減衰評価について 10
 西井 良徳 (阪大理工)
 若狭 恭平 (室蘭工大工)
 Soichiro Katayama (Univ. of Osaka) A note on the decay estimates for weighted semilinear wave equations
 Yoshinori Nishii (Univ. of Osaka) in one space dimension
 Kyouhei Wakasa
 (Muroran Inst. of Tech.)

概要 We consider decay estimates for semilinear wave equations with weighted nonlinear terms in one space dimension. In particular, we focus on pointwise estimates and the decay and non-decay properties of the energy, where the weights depend on time and space. We discuss how the weights affect the decay properties of solutions.

- 69 片山 聡一郎 (阪大理工) Global existence and the asymptotic behavior for systems of semilinear wave equations under the bounded weak null condition 10
 眞崎 聡 (北大理工)
 Soichiro Katayama (Univ. of Osaka) Global existence and the asymptotic behavior for systems of semilinear wave equations under the bounded weak null condition
 Satoshi Masaki (Hokkaido Univ.)

概要 We consider the Cauchy problem for systems of semilinear wave equations. We are interested in the critical cases: The case of quadratic nonlinearity in three space dimensions, and the case of cubic nonlinearity in two space dimensions. A well-known sufficient condition of small data global existence for these critical cases is the null condition. We would like to obtain the small data global existence and the asymptotic behavior of global solutions under a weaker condition than the null condition. Our condition is closely connected to the weak null condition of Lindblad–Rodnianski.

- 70 廣澤史彦 (山口大理) 弱消散型波動方程式のエネルギー減衰評価と消散係数の滑らかさについて 10

Fumihiko Hirose (Yamaguchi Univ.) On the smoothness and oscillation of coefficients in for energy decay estimates of weak dissipative wave equations

概要 In proving the energy decay estimates for initial value problems of weakly extinct wave equations, the smoothness and oscillation of the dissipative coefficient are important factors. In this talk, will introduce a result showing that the energy decay estimate holds under weaker assumptions regarding the smoothness of the coefficient than before, made possible by the introduction of a new method.

- 71 山ノ井太朗 (東京理大理) Limit of the lifespan of classical solutions to 1D quasilinear wave equations 10
杉山裕介 (東京理大理) tions

Taro Yamanoi (Tokyo Univ. of Sci.) Limit of the lifespan of classical solutions to 1D quasilinear wave equations
Yusuke Sugiyama (Tokyo Univ. of Sci.) tions

概要 In this talk, we consider the initial value problem for the 1D quasilinear wave equation with small initial data. We determine the asymptotic behavior of the lifespan of classical solutions as the parameter characterizing the smallness of the initial data tends to 0. Furthermore, we successfully removed the assumption of strong decay at spatial infinity on the initial data, which was imposed in previous studies

- 72 岡島駿太 2つの弱い消散項をもつ Timoshenko 方程式系の解の減衰特性 10

(東京海洋大海洋科学技術)

森直文

(東京海洋大海洋資源環境)

Shunta Okajima Decay property for the Timoshenko system with two types of weak damping
(Tokyo Univ. of Marine Sci. and Tech.)

Naofumi Mori

(Tokyo Univ. of Marine Sci. and Tech.)

概要 We consider the dissipative structure and decay properties of the Timoshenko system in the whole space when weak damping terms are introduced into both the displacement and rotational equations. Although the system does not satisfy the Kawashima condition, we uncover a new stabilization mechanism arising from the interaction of the two damping terms. By employing the Fourier energy method, we establish sharp point-wise estimates of the Fourier transform and derive optimal time-decay rates of solutions in L^2 -based norms. A feature of our result is that the combined damping eliminates the regularity-loss phenomenon, while a fourth-order degeneracy appears in the low-frequency region. This behavior differs essentially from previously studied single-damping models and provides a new example of effective dissipation beyond the classical Kawashima framework.

- 73 上田好寛 (神戸大海事) Scalar viscous conservation law with time-shift coupled nonlinearity .. 10
Shih-Hsien Yu (Academia Sinica)

Yoshihiro Ueda (Kobe Univ.) Scalar viscous conservation law with time-shift coupled nonlinearity
Shih-Hsien Yu (Academia Sinica)

概要 We investigate the scalar viscous conservation law characterized by a time-delayed nonlinearity. For a sufficiently small time delay, we prove the existence of traveling wave solutions corresponding to arbitrary inviscid Burgers' shock profiles. Furthermore, we establish the nonlinear asymptotic stability of these traveling waves and determine their pointwise decay rates in the space-time domain. By exploiting the specific structure of the Green's function for the Burgers' equation linearized around the stationary profile, we derive an effective integral representation of the solution. This explicit Green's function enables us to capture the cancellation of effects induced by the time shift. Consequently, this integral representation yields a constructive method for obtaining exponentially sharp pointwise estimates.

- 74 澁谷光祐 (東北大理) Nonlinear effects on the asymptotic expansion of the Burgers equation
 山本征法 (群馬大理工) with the half Laplacian 10
Kosuke Shibuya (Tohoku Univ.) Nonlinear effects on the asymptotic expansion of the Burgers equation
Masakazu Yamamoto (Gunma Univ.) with the half Laplacian

概要 In this talk, the initial value problem of the Burgers equation with the half Laplacian is concerned. This problem is critical from the viewpoint of well-posedness and has been extensively studied. On the other hand, it is subcritical in terms of the large-time behavior of solutions. Previous studies have shown that the solution converges to the Poisson kernel as time goes to infinity. However, since the derivative order of the equation are balanced, the equation has a first-order hyperbolic structure as well as a parabolic structure and is expected to have a dissipative structure. The main result of this talk clarifies that the diffusive wave emerges in the asymptotic expansion and the diffusive wave is explicitly described, and that asymptotic profiles from the nonlinear terms are uniquely determined by the scaling. In addition, the main result also reveal that the logarithmic shifting term appears in the expansion.

- 75 黄裕淙 (東京科学大情報理工) Asymptotic stability for the outflow problem of viscous, heat-conductive,
 西畑伸也 (東京科学大情報理工) ideal polytropic gas 10
 松村昭孝 (阪大*)
Yucong Huang (Sci. Tokyo) Asymptotic stability for the outflow problem of viscous, heat-conductive,
Shinya Nishibata (Sci. Tokyo) ideal polytropic gas
Akitaka Matsumura (Osaka Univ.*)

概要 The spherically symmetric motion of the viscous, heat-conducting, ideal polytropic gas is described by the spherically symmetric compressible full Navier–Stokes equations. The existence of a unique stationary solution for the corresponding outflow problem is obtained by I. Hashimoto and A. Matsumura. In the current presentation, we study the decay property of this stationary solution and we also show that it is time-asymptotically stable for small spherically symmetric initial perturbations.

- 76 飯田祥樹 (京大理) Critical regularity approach to the two-dimensional compressible viscous
 渡邊圭市 (諏訪東京理大工) surface wave equations 10
Yoshiki Iida (Kyoto Univ.) Critical regularity approach to the two-dimensional compressible viscous
Keiichi Watanabe (Suwa Univ. of Sci.) surface wave equations

概要 Consider the motion of a barotropic compressible viscous fluid in a two-dimensional strip-like domain bounded above by a free boundary and below by a rigid bottom. The density and velocity of the fluid are governed by the two-dimensional compressible Navier–Stokes equations subject to mixed boundary conditions, where the effects of gravity and surface tension are not taken into account. In this talk, in a critical regularity framework, we prove the global well-posedness of the problem near the trivial equilibrium state for small initial data. No compatibility conditions are imposed on the initial data. Furthermore, the corresponding solution converges exponentially to the equilibrium as time tends to infinity. Our approach is based on maximal L_1 -regularity for the linearized problem.

- 77 相 木 雅 次 (東京理大創域理工) 円形渦糸の摂動に対する形状安定性について 10
 檜 垣 充 朗 (神戸大理)
Masashi Aiki (Tokyo Univ. of Sci.) Stability of the shape for circular vortex filaments under non-symmetric
Mitsuo Higaki (Kobe Univ.) perturbations

概要 We establish the nonlinear orbital stability of circular vortex filaments governed by the Localized Induction Equation (LIE) under non-symmetric perturbations, within the framework of [Tani-Nishiyama, 1997]. While the circular filaments are known to be Lyapunov unstable due to linear growth of the translational mode, we prove that their shape remains globally stable modulo spatial translations and rotations about the symmetry axis. The crucial ingredient is a geometric stability lemma derived from the conservation of vector fluid impulse, which constrains the low-frequency modulations that are not covered by the relative energy. Finally, we relate the fluid impulse to an isoperimetric inequality, yielding a geometric constraint for closed filaments.

- 78 相 木 雅 次 (東京理大創域理工) 円形渦糸から分岐するリアプノフ不安定な運動 10
 檜 垣 充 朗 (神戸大理)
Masashi Aiki (Tokyo Univ. of Sci.) Lyapunov unstable motion bifurcating from a circular vortex filament
Mitsuo Higaki (Kobe Univ.)

概要 This paper investigates the dynamics of closed vortex filaments governed by the Localized Induction Equation. Recently, Aiki and Higaki (2026) established the nonlinear orbital stability of circular vortex filaments, while identifying Lyapunov instability due to the growth of translation modes. Motivated by this result, we prove the existence of a family of closed solutions, which we call axial screw motions, that bifurcate from a circular filament. These solutions remain uniformly close to the orbit of the circle, but drift secularly away from the reference motion because their translation speed along the symmetry axis differs from that of the circular filament. In particular, they provide explicit non-trivial perturbations that satisfy orbital-stability estimates while failing Lyapunov stability.

14:15~16:15

- 79 吉 澤 寛 彰 (東大数理) 粘性 β 平面方程式の時間大域的適切性と解の時間減衰評価 10
Tomoaki Yoshizawa (Univ. of Tokyo) Global well-posedness and temporal decay estimates for the viscous β -
 plane equations

概要 We consider the Cauchy problem of the viscous β -plane equations. We first establish the global well-posedness of the system for the initial data sufficiently small compared to the Rossby parameter. We also reveal that under some additional assumptions, the solution decays as fast as the corresponding linear solution and asymptotically behaves like a constant multiple of the integral kernel of the linearized equation. In particular, the decay rate of the solution is faster than expected from the flow of the heat equation.

- 80 藤 村 瞳 威 (東京理大創域理工) 時間依存する消散項をもつ一次元 p -system の解の漸近挙動について ... 10
 側 島 基 宏 (東京理大創域理工)
Toi Fujimura (Tokyo Univ. of Sci.) Asymptotic behavior of solutions to the one-dimensional p -system with
Motohiro Sobajima time-dependent damping
 (Tokyo Univ. of Sci.)

概要 We consider asymptotic behavior of solutions to the Cauchy problem for the one-dimensional p -system with time-dependent damping under a diffusive condition. By introducing auxiliary functions adapted to the damping coefficient $b(t)$, we extract the diffusive structure of the system without differentiating $b(t)$. Under a low-regularity assumption on $b(t)$, we prove global-in-time existence and derive convergence rates toward an asymptotic profile by energy estimates.

- 81 岡崎 大輝 (東北大理) 劣臨界表面準地衡方程式に対する時間連続性を仮定しない解の一意性 .. 10
Taiki Okazaki (Tohoku Univ.) Uniqueness of the sub-critical SQG without time-continuity assumption

概要 We consider the uniqueness of the solution of the dissipative surface quasi-geostrophic equation, without assuming time-continuity and smallness of the solutions. We show that the uniqueness holds in the scale-critical Lebesgue spaces. The proof is based on the energy method, inspired by the approach introduced by Lions and Masmoudi (2001) in the study of uniqueness for the Navier–Stokes equations. A key ingredient of the argument is the justification of the energy inequality via the smoothing effect of the fractional heat semigroup together with an iteration scheme based on the structure of the integral equation.

- 82 須部 絢斗 (早大理工) Well-posedness of the MHD-Boussinesq equations in scaling invariant Besov spaces via maximal Lorentz regularity 10
Kento Sube (Waseda Univ.) Well-posedness of the MHD-Boussinesq equations in scaling invariant Besov spaces via maximal Lorentz regularity

概要 We consider the incompressible MHD-Boussinesq system in the whole space $\mathbb{R}^3$. We establish the existence and uniqueness of local strong solutions for arbitrary initial data and external forces in scaling invariant Besov spaces. Our method relies on the maximal Lorentz regularity theorem for the linearized equations, which enables us to handle the full nonlinear system within the framework of Lorentz–Besov spaces. Furthermore, we prove that these local solutions can be extended globally in time provided that the initial data and external forces are sufficiently small in the scaling invariant norms.

- 83 谷口 至良 (早大理工) A Liouville-type theorem for the stationary MHD equations in three space dimensions 10
Shiro Taniguchi (Waseda Univ.) A Liouville-type theorem for the stationary MHD equations in three space dimensions

概要 We consider the stationary MHD equations in $\mathbb{R}^3$. The aim of this talk is to prove a Liouville-type theorem for the MHD system. We emphasize that the assumptions on the magnetic field can be relaxed compared with those on the velocity field. The key ingredient of the proof is to establish an a priori estimate for the Dirichlet integral in terms of the vorticity and the current density. Furthermore, our theorem covers the result for the Navier–Stokes equations established by Kozono–Terasawa–Wakasugi (2017, J. Funct. Anal.).

- 84 青木 基記 (東京理大創域理工) 領域上における磁気流体方程式の弱解のエネルギー並びにクロスヘリシティの保存条件について 10
Motofumi Aoki (Tokyo Univ. of Sci.) On a sufficient condition for conservation laws of 3D MHD equations in a bounded domain

概要 In this talk, we consider a sufficient condition for weak solutions of the ideal magneto-hydrodynamic (MHD) equations in a bounded domain to satisfy the conservation laws for energy and cross-helicity. In 1997, Caffisch, Klapper, and Steele proved the conservation laws for energy and cross-helicity in the whole space when weak solutions possess regularity higher than $1/3$. Kang and Lee (2007) studied the critical case, proving the conservation laws in the whole space with $1/3$ fractional derivative. For the case of bounded domains, Wang and Zuo (2020) proved the conservation laws under a condition corresponding to that of Caffisch, Klapper, and Steele, by additionally assuming a certain boundedness near the boundary. We show the conservation laws for energy and cross-helicity under a condition corresponding to that of Kang and Lee, by utilizing the Hodge–Stokes operator.

- 85 任 登 輝 (早 大 理 工) L^∞ bounds under Lorentz integrability conditions on external forces for the 2D Navier–Stokes system 10
 Denghui Ren (Waseda Univ.) L^∞ bounds under Lorentz integrability conditions on external forces for the 2D Navier–Stokes system

概要 In this paper, we study the two-dimensional incompressible Navier–Stokes system with external force under homogeneous Dirichlet boundary conditions in a smooth bounded domain. Based on the results of Takeuchi and Winkler, we investigate the uniform L^∞ bounds of solutions with Lebesgue spaces replaced by Lorentz spaces which enable us to obtain more precise information on the scaling critical norm.

- 86 武 内 太 貴 (九 大 I M I) Decay rates of global solutions to the Navier–Stokes system in homogeneous Besov spaces 10
 Taiki Takeuchi (Kyushu Univ.) Decay rates of global solutions to the Navier–Stokes system in homogeneous Besov spaces

概要 The incompressible Navier–Stokes system on the whole space is considered. By assuming that the small initial data belong to the scaling invariant homogeneous Besov spaces and satisfy an additional condition, we obtain the decay rates of the corresponding global solutions. In particular, we characterize the condition of the initial data for the logarithmic decay. Our decay rate improves up to a certain rate, which is expected to be the maximal decay rate under our conditions.

- 87 藤 井 幹 大 (名古屋市大理) 臨界 Besov 空間における Navier–Stokes 方程式の解の非一意性 10
 Mikihiro Fujii (Nagoya City Univ.) Non-uniqueness for the Navier–Stokes equations in scaling Besov spaces

概要 It is known that uniqueness of mild solutions to the incompressible Navier–Stokes equations holds in the critical class $C([0, T]; L^n(\mathbb{R}^n))$ for $n \geq 3$. In this talk, we prove that this result is sharp in the sense that uniqueness fails if $L^n(\mathbb{R}^n)$ is replaced by some scaling critical spaces that are even slightly larger. We achieve this through a complete classification for every pair (p, q) of whether uniqueness of mild solutions in the critical Besov class $C([0, T]; \dot{B}_{p,q}^{n/p-1}(\mathbb{R}^n))$ holds or not. Our non-uniqueness mechanism produces infinitely many global solutions emanating even from zero initial state, whose large-time asymptotics are governed by non-trivial stationary flows. To the best of our knowledge, such non-unique solutions provide the first examples of non-dissipative unforced Navier–Stokes flow with critical regularity.

- 88 L. Brandolese (Univ. Lyon 1) Linear and nonlinear interaction of the incompressible dissipative Navier–
 岡 部 考 宏 (横浜国大国際社会) Stokes flow 10
 柳 澤 卓 (早 大 理 工)
 Lorenzo Brandolese (Univ. Lyon 1) Linear and nonlinear interaction of the incompressible dissipative Navier–
 Takahiro Okabe (Yokohama Nat. Univ.) Stokes flow
 Taku Yanagisawa (Waseda Univ.)

概要 We consider the asymptotic behavior of solutions to the incompressible Navier–Stokes equations. We constructed rapidly decaying solutions for certain initial data that do not necessarily possess symmetry. Moreover, we observe that linear and nonlinear interaction may occur in our situation.

16:30～17:30 特別講演

津田和幸 (九州産大理工)	An approach to a moving boundary problem for the Navier–Stokes equations in weighted function spaces
Kazuyuki Tsuda (Kyushu Sangyo Univ.)	An approach to a moving boundary problem for the Navier–Stokes equations in weighted function spaces

概要 In this talk, we consider the Navier–Stokes equations in exterior domains in $\mathbb{R}^n$, $n \geq 3$, with a periodically in time moving boundary and external force. For this case we prove the existence of a locally unique mild time periodic solution in weighted function spaces with radially symmetric Muckenhoupt weights.

This type of problem was classically studied by Morimoto (1971) and Miyakawa and Teramoto (1982), after global weak solutions was shown by Fujita and Sauer (1968), and has subsequently been investigated by several authors. We briefly review previous results on fixed or periodically moving boundaries.

To solve our problem, a Muckenhoupt weight approach works well. Indeed, the solutions split into a stationary part controlled by potential theoretic estimates and a purely oscillatory part constructed as mild solution via analytic semigroup theory in weighted spaces. To deal with perturbation terms of even second order—coming from a coordinate transform and the moving boundary—a maximal L^1 type regularity estimate will be used in weighted Lorentz spaces. To control the convective term an H^∞ -calculus in weighted spaces of the Stokes operator, its BIP property and embedding estimates of fractional powers are exploited.

実 函 数 論

9月3日(木) 第V会場

9:30~11:45

- 1 波多野修也 (阪大情報) 減少再配列に対する平均振動の局所的な評価 15
 Naoya Hatano (Univ. of Osaka) Local-type estimate for the mean oscillation of rearrangements

概要 An estimate for the mean oscillation, defined as the difference between the decreasing rearrangement and its maximal rearrangement, was established by Alvino, Trombetti, and Lions in 1989. In this study, we obtain a local version of their result by restricting the functions to an arbitrary cube. Moreover, as a corollary, we obtain a local-type Sobolev inequality in the framework of Lorentz spaces.

- 2 宮本孝志 (大阪教育大数学教育) オーリッチ空間に値をとる非強可測関数の r -積分可能性について 15
 北廣男 (鹿児島大*)
 尾形尚子 (神戸大)
 Takashi Miyamoto (Osaka Kyoiku Univ.) On the r -integrability of non-strongly measurable functions taking values in Orlicz spaces
 Hiroo Kita (Kagoshima Univ.*)
 Naoko Ogata (Kobe Univ.)

概要 In a presentation given at the 58th Joint Symposium on Real Function Theory and Functional Analysis (Ito Campus, Kyushu University, 2019), we explained the construction of a function defined on the interval $[0,1]$ and taking values in the Orlicz space $L^\Phi(\mathbb{R}^n)$. This function is neither strongly measurable, strongly continuous, nor weakly continuous. How can such a function be integrated? In this talk, inspired by the concept of ranked spaces, we introduce the r -integral and demonstrate that r -integration is indeed possible.

- 3 川澄亮太 (群馬大数理データ科学教育研究センター) Hausdorff 容量に基づく Orlicz 空間および弱 Orlicz 空間上の一般化分数べき極大作用素の有界性 15
 Ryota Kawasumi (Gunma Univ.) The boundedness of generalized fractional maximal operators on Orlicz and weak Orlicz spaces with respect to Hausdorff capacity

概要 We consider the boundedness of the generalized fractional maximal operator $\mathcal{M}_\rho$ on Orlicz and weak Orlicz spaces with respect to Hausdorff content. Hausdorff content is a set function defined similarly to an outer measure and enables the quantitative measurement of non-integer-dimensional objects. Orlicz and weak Orlicz spaces generalize the classical Lebesgue and weak Lebesgue spaces, respectively, and are defined in terms of Young functions. To establish our main result, we use a modular inequality derived by Deringoz et al. (2018), which serves as a powerful tool for analyzing the boundedness of operators on these spaces. Our result generalizes the results of Adams (1998) and Kawasumi, Nakai, and Shi (2023) concerning the boundedness of the fractional maximal operator $\mathcal{M}_\alpha$.

- 4 齋藤洋樹 (日大理工) Diagonal trace inequalities in Choquet–Lorentz spaces 15
 Hiroki Saito (Nihon Univ.) Diagonal trace inequalities in Choquet–Lorentz spaces

概要 We characterize diagonal trace inequalities in Choquet–Lorentz spaces by an isoperimetric inequality. We further show that the corresponding trace inequalities in Choquet spaces are equivalent to an isocapacitary inequality.

- 5 貞末 岳 (大阪教育大数学教育) Gagliardo–Nirenberg inequality for generalized fractional integrals on
 中井 英一 (茨城大理) martingale Musielak–Orlicz and Musielak–Orlicz Hardy spaces 15
 山口 哲志 (一橋大経済)
 Gaku Sadasue (Osaka Kyoiku Univ.) Gagliardo–Nirenberg inequality for generalized fractional integrals on
 Eiichi Nakai (Ibaraki Univ.) martingale Musielak–Orlicz and Musielak–Orlicz Hardy spaces
 Satoshi Yamaguchi (Hitotsubashi Univ.)

概要 By Mizuta et al, (2012), the classical Gagliardo–Nirenberg inequality for the fractional integral operators was extended to Musielak–Orlicz spaces. In this talk, we give an extension of Gagliardo–Nirenberg inequality for the fractional integral operators in the framework of martingale theory.

- 6 富澤 佑季乃 (新潟工大工) Busemann 空間における三角不等式の精密化とその拡張 15
 Yukino Tomizawa A refinement of the triangle inequality in Busemann spaces and its ex-
 (Niigata Inst. of Tech.) tensions

概要 The refinement of the triangle inequality for two vectors in Banach spaces can be generalized to geodesics in Busemann spaces. Moreover, extension formulas for this refinement involving three or more vectors exist in Banach spaces. In this talk, we consider whether such extensions can be generalized to Busemann spaces.

- 7 福田 亮治 (大分大理工) Shilkret 関数空間 $\mathcal{L}^1(Sh)$ の一様構造 15
 本田 あおい (神戸大理)
 岡崎 悦明
 Ryoji Fukuda (Oita Univ.) Uniform structure of Shilkret function space $\mathcal{L}^1(Sh)$
 Aoi Honda (Kobe Univ.)
 Yoshiaki Okazaki

概要 We consider a non-additive measure and non-additive integral due to Shilkret. Uniform structure of Shilkret function space $\mathcal{L}^1(Sh)$ is discussed. We give a necessary and sufficient condition which ensures $\mathcal{L}^1(Sh)$ is a topological vector space.

- 8 河邊 淳 (信州大工) 連続型 Sugeno 積分表示定理の抽象形 15
 Jun Kawabe (Shinshu Univ.) Continuous Sugeno integral representation theorems in an abstract set-
 ting

概要 The purpose of this talk is to present abstract Sugeno integral representation theorems whose representing measures are simultaneously inner and outer continuous on suitable collections of sets, including open, closed, compact, and measurable sets. Such theorems, which we call continuous Sugeno integral representation theorems, will be developed in a framework sufficiently general to cover a wide range of applications.

14:15~15:25

- 9 井波 虎太郎 (SUSTech) Strichartz estimates for quasi-periodic functions: An arithmetic per-
 spective 15
 Kotaro Inami (SUSTech) Strichartz estimates for quasi-periodic functions: An arithmetic per-
 spective

概要 Besicovitch quasi-periodic functions are generalizations of periodic functions. We consider the Strichartz type estimate for the Schrödinger equation with quasi-periodic initial data. Unlike the Euclidean setting and the periodic setting, neither the dispersive estimate nor the Weyl-type bound is known. In 2025, Schippa overcame this difficulty and established Strichartz type estimates via the decoupling estimate. In this talk, we improve the Strichartz estimates on a long time interval by focusing on the arithmetic properties of frequencies.

- 10 陳 彦 含 (京 大 理) Weighted inequalities for variation operators associated with fractional Schrödinger semigroups 15

Yanhan Chen (Kyoto Univ.) Weighted inequalities for variation operators associated with fractional Schrödinger semigroups

概要 Let $\{e^{-tL^\alpha}\}_{t>0}$ be the fractional Schrödinger semigroup associated with $L = -\Delta + V$, where V is a non-negatvie potential belonging to the reverse Hölder class. In this work, we establish weighted boundedness properties of the variation operator related to $\{e^{-tL^\alpha}\}_{t>0}$, including weighted L^p-L^q quantitative inequalities and mixed weak-type inequalities, from which the weighted weak type $(1,1)$ inequality also follows as a special case.

- 11 大 西 勇 (広 島 大 理) A variational proof of the Ryu–Takayanagi formula in non-compact gauge theories from Lie-algebraic observable-dependent renormalization 15

Isamu Ohnishi (Hiroshima Univ.) A variational proof of the Ryu–Takayanagi formula in non-compact gauge theories from Lie-algebraic observable-dependent renormalization

概要 We present the first variational proof of the Ryu Takayanagi formula for holographic entanglement entropy in non compact gauge theories without the Einstein equations or background metric. Working in SL three R times SL three R Chern Simons theory we embed the modular Hamiltonian of a boundary region as a target observable in a dynamical Lie algebra with Lie algebraic observable dependent renormalization flow. This generates a Krylov tower whose invariance under the maximal Lie observable dependent symmetry subalgebra selects entanglement wedge preserving symmetries. We establish variational equivalence between the boundary modular flow and the normal variation of the bulk minimal surface in Iwasawa coordinates. Lions concentration compactness principle applied to minimizing sequences in the Sobolev space on the non compact manifold proves the existence of a minimizer satisfying the minimal surface equation. Thus the entanglement entropy equals the area of the minimizer divided by four Newtons constant plus an ultraviolet constant term as a theorem in the calculus of variations. The result extends to Sp two n R lattice gauge theories. This bridges operator algebraic renormalization with geometric variational calculus and opens a pathway toward non perturbative derivations of holographic dualities from gauge theory first principles.

- 12 大 西 勇 (広 島 大 理) The universal bridge theorem: Spectral-geometric norm-expectation correspondence in compressed LA-ODR algebras 15

Isamu Ohnishi (Hiroshima Univ.) The universal bridge theorem: Spectral-geometric norm-expectation correspondence in compressed LA-ODR algebras

概要 We prove a rigorous model independent Norm Expectation Correspondence in compressed Lie algebraic observable dependent renormalization algebras. The correspondence equates the Hilbert Schmidt norm of the projected temporal drift generator to the deviation from the synchronized stationary state up to a curvature controlled remainder. By integrating the Wedderburn decomposition of the output algebra, the spectral theory of primitive quantum dynamical semigroups with contractivity and spectral gap estimates, and the Riemannian geometry of the quantum statistical manifold equipped with the Hilbert Schmidt metric and Amari Nagaoka connections, we elevate the observed Bridge Relation to the Universal Bridge Theorem. The remainder vanishes exactly under quantum detailed balance or flat alpha one connection, conditions satisfied in all Time Twisted Universe LA ODR models. The theorem completes the algebraic geometric closure of the TTU LA ODR synthesis, furnishes explicit synchronization rates and curvature diagnostics for quantum networks trapped ions and superconducting circuits, and supplies the first rigorous algebraic pathway from observable dependent renormalization to a fully geometric theory of emergent spacetime. It unifies spectral theory information geometry and quantum control.

15:40~16:40 特別講演

富田 直人 (阪大 理) 双線形擬微分作用素の有界性について

Naohito Tomita (Univ. of Osaka) On the boundedness of bilinear pseudo-differential operators

概要 In this talk, we consider the boundedness of bilinear pseudo-differential operators. We first determine the optimal conditions on symbols that ensure boundedness on unweighted Lebesgue spaces. We then discuss more general symbol classes and weighted estimates for bilinear pseudo-differential operators.

9月4日(金) 第V会場

10:00~12:00

- 13 久保田 大輔 (千葉大融合理工) 時間依存係数を伴う非斉次擬放物型 KWC システムに対する時間無限大での漸近挙動 15
 鵜飼 直孝 (千葉大融合理工)
 白川 健 (千葉大教育)
 水野 大樹 (早稲田高)

Daisuke Kubota (Chiba Univ.) Large-time behavior for inhomogeneous pseudo-parabolic KWC systems
Naotaka Ukai (Chiba Univ.) with time-dependent coefficients

Ken Shirakawa (Chiba Univ.)

Daiki Mizuno

(Waseda Senior High School)

概要 In this study, we investigate the large-time behavior of solutions to an inhomogeneous pseudo-parabolic KWC system with time-dependent coefficients. Our system extends previous studies by incorporating an inhomogeneous term and time-dependent damping coefficients. Under suitable assumptions, we establish the existence and uniqueness of global-in-time solutions and characterize their asymptotic behavior as time tends to infinity. The asymptotic limits of the solutions are expected to be closely related to the corresponding steady-state system, which may admit non-smooth BV solutions. Our aim is to clarify the process by which smooth global-in-time solutions approach such non-smooth steady-state solutions. This study is expected to provide theoretical insight into the validity of the pseudo-parabolic KWC system as a model for grain-boundary motion.

- 14 鵜飼 直孝 (千葉大融合理工) 未知変数依存型非等方性を有する擬放物型偏微分方程式と 1-調和写像流
 白川 健 (千葉大教育) 型方程式による連立系 15
Naotaka Ukai (Chiba Univ.) A coupled system of a pseudo-parabolic PDE and a regularized 1-
 Ken Shirakawa (Chiba Univ.) harmonic map-type flow with unknown-dependent anisotropy

概要 In this talk, we study a relaxed coupled PDE system arising as the constrained gradient flow of an orientation-adaptive anisotropic energy motivated by color image denoising. A characteristic feature of the system is the incorporation of an anisotropic function $\gamma \in C^{1,1}(\mathbb{R}^{3 \times 2})$ and a rotation matrix $R \in C^\infty(\mathbb{R}; \mathbb{R}^{2 \times 2})$ into the energy functional. This structure enables automatic orientation adaptation, but it also gives rise to essential analytical difficulties in the study of the constrained problem. Under suitable assumptions on the anisotropic function γ , we prove the existence of solutions satisfying an energy dissipation inequality. The proof is based on a time-discretization scheme without range constraints and a limiting procedure recovering solutions to the constrained system.

- 15 垣内 花 (日本女大理) 時間依存する潜熱項を含む 2 相ステファン問題の自由境界の挙動 15
 愛木 豊彦 (日本女大理)
 Hana Kakiuchi (Japan Women's Univ.) Behavior of free boundaries to two-phase Stefan problems with time
 Toyohiko Aiki (Japan Women's Univ.) dependent latent heat term

概要 In this talk we consider a one-dimensional free boundary problem describing a bread baking process. For this problem, the domain is assumed to be occupied by the bread consisting of crumb, crust and the evaporation front, and the unknown functions are the position of the front, the temperature field, and the water mass distribution. Our previous work established that the crust region never vanishes by constructing stationary solutions and applying the comparison principle under the high regularity condition for initial data. Now, we aim to show that the crumb region vanishes, namely, bread is baked completely.

- 16 荒木 康太 (日大理工) 空間不均一な拡散を持つ非線形 Fokker-Planck 方程式の散逸関数の長時間挙動とその数値計算 15
 水野 将司 (日大理工)
 Kouta Araki (Nihon Univ.) Long-time behavior of the dissipation function for a nonlinear Fokker-
 Masashi Mizuno (Nihon Univ.) Planck model with inhomogeneous diffusion and numerical observation

概要 We consider the long-time behavior of the dissipation function of the free energy in a nonlinear Fokker-Planck model with inhomogeneous spatial diffusion, subjected to the natural boundary condition. The model is based on a continuity equation and the law of energy dissipation associated with the free energy. By assuming that the spatial derivative of the gradient of $\log d(x)$ is sufficiently small, we show the exponential decay of the dissipation function. We next numerically examine whether the gradient of $\log d(x)$ affects the decay rate of the dissipation function in the one-dimensional Fokker-Planck model.

- 17 中島 清 (東京理大理) Refined existence results for a porous medium type equation with Neu-
 横田 智巳 (東京理大理) mann boundary condition 15
 Kiyoshi Nakashima
 (Tokyo Univ. of Sci.) Refined existence results for a porous medium type equation with Neu-
 mann boundary condition
 Tomomi Yokota (Tokyo Univ. of Sci.)

概要 We consider a Cauchy-Neumann problem for a porous medium type equation. In this talk, we establish existence of weak solutions to the problem when the initial data belongs to $H^1(\Omega)^*$.

- 18 柴田 旺典 (東京理大理) Global existence and uniqueness of weak solutions to volume-filling
 chemotaxis systems with source terms 15
 Osuke Shibata (Tokyo Univ. of Sci.) Global existence and uniqueness of weak solutions to volume-filling
 chemotaxis systems with source terms

概要 We consider volume-filling chemotaxis systems with source terms. The purpose of this talk is to show global existence and uniqueness of weak solutions.

- 19 千代 祐太郎 (東京理大理) Global boundedness and large-time behavior in a viscous Burgers equa-
 原島 秀介 (東京理大理) tion with time delay 15
 横田 智巳 (東京理大理)
 Yutaro Chiyo (Tokyo Univ. of Sci.) Global boundedness and large-time behavior in a viscous Burgers equa-
 Shusuke Harashima tion with time delay
 (Tokyo Univ. of Sci.)
 Tomomi Yokota (Tokyo Univ. of Sci.)

概要 We consider a viscous Burgers equation with time delay. In this talk, we prove global existence, boundedness and large-time behavior.

14:15~15:45

- 20 小杉千春 (山口大理) 曲率を考慮した弾性閉曲線の伸縮運動を表現する初期値境界値問題の弱
愛木豊彦 (日本女大理) 解の存在 15
Chiharu Kosugi (Yamaguchi Univ.) Existence of weak solutions for the elastic curve model generated by the
Toyohiko Aiki (Japan Women's Univ.) free energy depending on the curvature

概要 We consider the initial and boundary value problem for the beam equation as a mathematical model for representing motions of the elastic curve. In our model, an unknown function from the interval $(0, 1)$ to the cartesian product $(0, T) \times (0, 1)$, where T is a positive constant, represents the position on the plane. We have already introduced the stress function having the singular point. In previous work, we have proved the solvability and obtained the lower bound of the strain. In this talk, we introduce the mathematical model by the free energy including the curvature. Thanks to the Galerkin method and the Aubin compact theorem, we can prove the existence of weak solutions.

- 21 赤川佳穂 (京都教育大) 塑性ひずみ依存制約をもつ弾塑性モデルの発展包含 15
松井一徳
(東京海洋大流通情報工)
Yoshiho Akagawa (Kyoto Univ. of Edu.) An evolution inclusion for an elasto-plastic model with a plastic-strain-
Kazunori Matsui dependent constraint
(Tokyo Univ. of Marine Sci. and Tech.)

概要 This paper discusses a quasi-variational inequality arising in an elasto-plastic model coupled with a Kelvin–Voigt-type equation of motion. From a physical perspective, it is natural that the admissible stress region depends on the unknown stress itself through the plastic strain. This model is designed to describe plastic deformation through translation of the convex constraint by a hardening operator, which differs from perfect plasticity models in that the constraint depends on the solution itself. To establish the existence of a solution, we recast the self-dependent inclusion as an equivalent evolution inclusion whose constraint depends only on the external state, reducing the problem to known results. The key point is a change of variables that absorbs the self-dependence into a transformed leading operator, whose positivity is guaranteed by the structural assumptions.

- 22 深尾武史 (龍谷大先端理工) Robin 境界条件を課した Cahn–Hilliard 方程式の透過度変数の漸近解析
P. Colli (Univ. di Pavia) について 15
Kei Fong Lam
(Hong Kong Baptist Univ.)
Takeshi Fukao (Ryukoku Univ.) Permeability parameter asymptotics in a Cahn–Hilliard equation with
Pierluigi Colli (Univ. di Pavia) Robin boundary conditions
Kei Fong Lam
(Hong Kong Baptist Univ.)

概要 We study a system in which the Cahn–Hilliard system is imposed in the bulk domain and the Allen–Cahn type boundary equation is prescribed, connected through a Robin type condition characterized by a permeability parameter. This setting is closely related to the theory of transmission problems, and the Robin type condition can be viewed as a remnant of a thin-boundary description, with the permeability parameter controlling the degree of coupling between the bulk and the boundary. The main objective is to perform a rigorous asymptotic analysis with respect to the permeability parameter.

- 23 大西 勇 (広島大理) A universal constraint for relaxation rates in infinite-dimensional quantum Markov semigroups: Gaussian systems and complete positivity beyond finite dimensions 15

Isamu Ohnishi (Hiroshima Univ.) A universal constraint for relaxation rates in infinite-dimensional quantum Markov semigroups: Gaussian systems and complete positivity beyond finite dimensions

概要 We prove that a universal upper bound on the maximal relaxation rate of finite dimensional quantum Markov generators extends rigorously to the full class of Gaussian quantum Markov semigroups on infinite dimensional bosonic Fock space with any number of modes. The original bound was established algebraically by applying the Bendixson Hirsch theorem in the KMS inner product induced by the invariant state and holds under conditional two positivity. The key step is to reduce the second moment dynamics of Gaussian states exactly to a classical Ornstein Uhlenbeck process on finite dimensional phase space. This reduction permits us to lift the same algebraic argument via the KMS inner product constructed from the invariant covariance matrix without truncation or ultraviolet cutoff. The resulting inequality states that the fastest relaxation rate is bounded above by the sum of all relaxation rates divided by an effective symplectic dimension given by the trace of the unique invariant covariance matrix solving the Lyapunov equation. The bound is saturated for the damped harmonic oscillator and remains valid under conditional two positivity alone. We discuss applications to Lie algebraic dynamical decoupling on the symplectic Lie algebra and to dynamical renormalization group flows for controlling individual relaxation channels and obtaining scaling forms in the thermodynamic limit. The result provides the first rigorous generalization of the finite dimensional relaxation rate constraint to unbounded operators on bosonic Fock space.

- 24 田中直樹 (静岡大理) 許容測地線族をもつ距離空間における消散作用素と軟解の存在定理 15
- Naoki Tanaka (Shizuoka Univ.) Mild solutions for dissipative operators in metric spaces with an admissible family of geodesics

概要 We develop a nonlinear dissipative operator theory in metric spaces equipped with admissible geodesic structures, including Hadamard spaces and spaces with conical, consistent, reversible geodesic bicomings. Using tangent cones, directional derivatives, and opposition maps, we formulate a metric analogue of Kobayashi's Banach space framework. Under appropriate convexity and subadditivity assumptions, mild solutions are characterized by a local Euler approximation condition and enjoy uniqueness and continuous dependence on initial data. The theory thus unifies Banach space results with metric-space settings governed by geodesic bicomings and CAT(0)-type convexity.

16:00~17:00 特別講演

田中 悠也 (関西学院大理) 増大・減衰項をもつ走化性方程式系の解挙動について

Yuya Tanaka (Kwansei Gakuin Univ.) Behavior of solutions to chemotaxis systems with growth and damping terms

概要 In this talk, we consider behavior of solutions to chemotaxis systems with growth and damping terms. We first review results on finite-time blow-up for chemotaxis systems with density-dependent sensitivity and logistic-type source. In particular, we discuss how the growth effect induced by density-dependent sensitivity competes with the damping effect of logistic-type source. We also present several related results. In the latter part of this talk, we focus on a result on boundedness and stability in a model for tuberculosis granuloma formation, which can be regarded as a type of chemotaxis systems. Although the model has a chemotaxis-consumption structure, the analysis of behavior of solutions is complicated by the presence of a growth term describing replication of bacteria. We explain how this growth effect can be controlled in order to derive boundedness of solutions and stability of equilibrium. We also discuss some recent progress of this problem.

函数解析学

9月1日(火) 第I会場

9:30~10:30

- 1 渡辺 秀司 (群馬大*・三条市大工) 一様な外部磁場のあるときの超伝導の BCS ギャップ方程式の作用素論的扱い (関数ポテンシャルの場合) 15
 Shuji Watanabe An operator-theoretical treatment of the BCS gap equation with a uniform external magnetic field and a function potential
 (Gunma Univ.* / Sanjo City Univ.)

概要 We obtained the BCS-Bogoliubov gap equation with a uniform external magnetic field under the restriction that the potential is a constant. In this talk, we remove the restriction and study the BCS-Bogoliubov gap equation with a function potential. From the viewpoint of operator theory, we show that there is a unique nonnegative solution (the gap function) to the BCS-Bogoliubov gap equation with a uniform external magnetic field and that there is also a unique magnetic field (the critical magnetic field). We point out several properties of the solution and the critical magnetic field such as smoothness with respect to both the temperature and the external magnetic field. On the basis of these results, we show that the transition from normal conductivity to superconductivity in a type I superconductor is of the first order. Moreover, we obtain the explicit expression for the entropy gap.

- 2 一ノ瀬 弥 (信州大理) 伝播子アプローチによる量子電磁力学の Feynman 経路積分に基づく定式化 15
 Wataru Ichinose (Shinshu Univ.) A formulation of the propagator approach to quantum electrodynamics via Feynman path integrals

概要 A formulation of quantum electrodynamics in terms of sums over histories i.e. Feynman path integrals is well known for the effectiveness of its intuitive picture. However, because of the ambiguity in how to compute the sums over histories, it has not been adopted as the standard theory of quantum electrodynamics. In the present paper, we show that the propagator approach to quantum electrodynamics developed by Feynman can be formulated in a mathematically rigorous manner on the basis of Feynman path integrals. As an application, results for Compton scattering and related processes are derived.

- 3 大森 祥輔 (法政大経済) Rigged Hilbert space formulation for a quasi-Hermitian operator in composite system II 15
 Shosuke Omori (Hosei Univ.) Rigged Hilbert space formulation for a quasi-Hermitian operator in composite system II

概要 This presentation focuses on a rigged Hilbert space (RHS) formulation that describes Dirac's bra-ket formalism for quasi-Hermitian quantum composite systems. Based on the RHS obtained as the tensor product of the RHSs with a positive-definite metric introduced in our previous presentation, we develop the bra-ket formalism. In particular, we formulate the spectral decomposition of quasi-Hermitian operators within this framework. We show that the resulting bra-ket descriptions are fully represented in the dual spaces and demonstrate how these dual spaces provide a suitable setting for addressing the problem of defining the adjoint of quasi-Hermitian operators in non-Hermitian composite systems.

- 4 在田 晋一 (東大数理) Algebraic radiation condition for the massless Dirac–Helmholtz equation
 伊藤 健一 (神戸大) tion 15
 Shinichi Arita (Univ. of Tokyo) Algebraic radiation condition for the massless Dirac–Helmholtz equation
 Kenichi Ito (Kobe Univ.) tion

概要 We discuss the uniqueness of a solution to the Helmholtz equation associated with the massless Dirac operator with long-range perturbations. In the Schrödinger case, it is well-known that a solution is generally not unique, but becomes so under Sommerfeld’s radiation condition. This condition selects the purely outgoing or incoming solution. In this talk, we present an algebraic version of such a condition for the Dirac case with a characterization of the solution in terms of the limiting resolvent. The proof depends on an elementary commutator method of Ito–Skibsted (2020), avoiding advanced functional analysis, pseudodifferential calculus, or even reduction to the Schrödinger equation. A first-order operator appears in the commutator, and bounding it is key, although it is unbounded.

14:20～15:30

- 5 佐々木 格 (信州大理) 外場付き Klein–Gordon 方程式の量子化に伴う正準交換関係の表現論 .. 15
 鈴木 章斗 (小松大生産システム)
 松澤 泰道 (信州大教育)
 Itaru Sasaki (Shinshu Univ.) Representation theory of canonical commutation relations arising from
 Akito Suzuki (Komatsu Univ.) the quantization of the Klein–Gordon equation with an external potential
 Yasumichi Matsuzawa (Shinshu Univ.) tion

概要 We investigate the Weyl representation of the canonical commutation relations for a model describing a quantized massive scalar field under the influence of an external potential. We determine whether the Weyl representation remains equivalent to or becomes inequivalent to the original one when the mass and/or potential are changed. This problem is reduced to the study of Schrödinger operators.

- 6 川本 昌紀 (岡山大異分野基礎研) 逆 2 乗ポテンシャルと時間依存した調和振動子をもったシュレディンガー作用素について 15
 石田 敦英 (東京理大教養教育)
 Masaki Kawamoto (Okayama Univ.) On Schrödinger operators with an inverse-square potential and a time-dependent harmonic oscillator
 Atsuhide Ishida (Tokyo Univ. of Sci.)

概要 In this talk, we will present results on the unique existence of the propagator, asymptotic completeness, and Strichartz estimates for a Hamiltonian with an inverse-square potential and a time-dependent harmonic oscillator. In particular, the strong singularity of the inverse-square potential prevents the direct application of existing theories for constructing the propagator. we will discuss the difficulties arising from this singularity and the methods used to overcome them.

- 7 伊藤 雅人 (立命館大理工) 楔形極小値をもつ二重井戸ポテンシャルに対する固有値の分裂の半古典解析 15
 Masato Ito (Ritsumeikan Univ.) Splitting of low-lying eigenvalues for a wedge-shaped symmetric double well

概要 We discuss the eigenvalue problem of the Schrödinger operator with a symmetric double well potential with the wedge-shaped bottom. The symmetric double well potential causes so-called eigenvalue splitting, that is the distance between the nearest eigenvalues is exponentially small as a semiclassical parameter tends to zero. We give the asymptotic expansion of the eigenvalue splitting for the two smallest eigenvalues with explicit leading term. In particular, we show that the polynomial order of the leading term except exponential decay factor is characterized by the shape of the bottom. The proof relies on Yafaev’s solutions, which provide the quantization conditions. The asymptotic expansions of the two eigenvalues are derived from these conditions.

- 8 河村 勇太 (立命館大理工) 非自己共役な連立擬微分方程式の解の半古典波面集合の伝播 15
 Yuta Kawamura (Ritsumeikan Univ.) Propagation of semiclassical wave front sets for non-self-adjoint matrix-valued pseudo-differential operators

概要 We study the propagation of semiclassical wavefront sets for solutions of systems of pseudo-differential equations with non-self-adjoint matrix-valued symbols. The propagation of singularities theorem of Duistermaat and Hörmander has a semiclassical analogue describing the propagation of semiclassical wavefront sets along Hamiltonian flows. We extend this theory to matrix-valued operators whose principal symbols satisfy a generalized microhyperbolicity condition and have nonnegative imaginary parts.

15:45~16:45 特別講演

- 藤家 雪朗 (立命館大理工) 量子共鳴の Weyl 則についての一注意
 Setsuro Fujiie (Ritsumeikan Univ.) A remark on the Weyl law of the quantum resonances

概要 The Weyl asymptotic formula for the eigenvalues of the Dirichlet Laplacian on a bounded domain has been refined and extended in various direction. A pioneering work by J. Sjöstrand in 1990 gives an upper bound in the semiclassical limit of the density of quantum resonances near a fixed real energy in terms of the dimension of the trapped set of the underlying classical mechanics. It was a question if it also gives a lower bound. In the talk, we will show a counterexample of a matrix Schrödinger operator, for which the density of quantum resonances is small while the dimension of the trapped set is high. This is a joint work with J.-F. Bony, T. Ramond and M. Zerzeri.

9月2日(水) 第I会場

10:00~10:30

- 9 谷口 健二 (青学大理工) 標準 Whittaker $(\mathfrak{g}, K)$ -加群の自己双対性 15
 Kenji Taniguchi Self-adjoint properties of the standard Whittaker $(\mathfrak{g}, K)$ -modules
 (Aoyama Gakuin Univ.)

概要 The structure of the standard Whittaker $(\mathfrak{g}, K)$ -module is examined in the case when the group in question is a real split reductive linear Lie group. This module is an injective object in the category of Harish-Chandra $(\mathfrak{g}, K)$ -modules which admit a fixed infinitesimal character. The global character of this module is determined. The main theorem of this presentation is that it has a self-adjoint property.

- 10 久保利久 (龍谷大経済) On the K -type decomposition of the kernel of Kable's Heisenberg operator 15
 Toshihisa Kubo (Ryukoku Univ.) On the K -type decomposition of the kernel of Kable's Heisenberg operator

概要 In 2012, Kable introduced a one-parameter family $\mathcal{D}_n(s)$ of $SL(n, \mathbb{R})$ -intertwining differential operators between parabolically induced representations for the pair $(SL(n, \mathbb{R}), P_{\text{Heis}})$. As such, the space $\text{Sol}(n; s)$ of smooth solutions to $\mathcal{D}_n(s)f = 0$ in the induced representation is a representation space of $SL(n, \mathbb{R})$. To date, the K -type decomposition of the space $\text{Sol}(n; s)_K$ of K -finite solutions have been determined only for $n = 3$. In this talk, we classify the K -type decomposition of $\text{Sol}(n; s)_K$ for $n \geq 4$ by realizing a certain Smith algebra as an algebra of differential operators.

10:45~11:45 特別講演

森田 陽 介 (九 大 数 理) 等質空間上の固有な作用の幾何学

Yosuke Morita (Kyushu Univ.) Geometry of proper actions on homogeneous spaces

概要 Let G/H be a homogeneous space and Γ be a discrete subgroup of G . If the Γ -action on G/H is proper and free, the quotient space becomes a manifold locally modelled on G/H and called a Clifford–Klein forms. When H is a noncompact closed subgroup of G (and thus, there is no G -invariant Riemannian metric on G/H), not every discrete subgroup of G acts properly on G/H , and there are many interesting phenomena which does not occur in the classical, Riemannian setting. In the last 40 years or so, the study of proper actions on non-Riemannian homogeneous spaces has been one of the fertile areas in mathematics to which various methods (Lie-theoretic, dynamical, homotopical, etc.) had been applied and produced partially overlapping but different results. In this talk, I will review important results and present some recent progress in this area.

13:00~14:00

- 11 A. Hafid (東 大 数 理) 非可換疎距離幾何について 15

Ayoub Hafid (Univ. of Tokyo) Notions of a noncommutative coarse metric geometry

概要 We look at how notions of coarse geometry can be ported to the noncommutative setting. In particular we introduce the setting of quantum metric spaces (in two different forms), and show how one can construct Roe algebras for these spaces. We show how a higher index taking value in the K-groups of a Roe algebra can be constructed for locally compact metric spaces under some mild conditions on the commutators of their elements, and introduce some examples where this could be applied.

- 12 宮 川 明 裕 (京 大 理) The spectra of polynomials in free random variables 15

Akihiro Miyagawa (Kyoto Univ.) The spectra of polynomials in free random variables

概要 This talk concerns the spectra of polynomials in free semicircular and circular random variables, which are not necessarily self-adjoint operators. We prove that every noncommutative rational function in free semicircular variables that is square-integrable is automatically a bounded operator. As a consequence, the usual spectrum coincides with the L^2 -spectrum for rational functions. Using this observation, we develop a method to determine spectra through L^2 -resolvent expansions and apply it to several classes of polynomials in free circular variables, including homogeneous, random-walk-type, and quadratic polynomials. The results provide explicit spectral descriptions and suggest connections with strong convergence phenomena in non-Hermitian random matrix theory.

- 13 藤 津 尚 仁 (阪 大 情 報)
- C^*
- 環における特異値関数 15

Naoto Fujitsu (Univ. of Osaka) Singular value functions for C^* -algebras

概要 We introduce *singular value functions* for C^* -algebras, generalizing the singular values of compact operators on Hilbert spaces. We also establish several fundamental properties of these singular value functions and present examples of singular value functions for certain classes of C^* -algebras.

- 14 伊 藤 久 優 雅 (名 大 多 元 数 理) NC functions over the nc Grassmannian 15

Hyuga Ito (Nagoya Univ.) NC functions over the nc Grassmannian

概要 We formulate Voiculescu's non-commutative Riemann sphere theory of fully matricial functions within the nc function theory of Kaliuzhnyi-Verbovetskyi and Vinnikov. We then extend this theory to Grassmannians and, more generally, to flag manifolds. We further introduce a Grassmannian generalization of Voiculescu's non-commutative resolvent and investigate the corresponding resolvent equation. Finally, we explain how the classical spectral theory of unbounded operators can be incorporated into this framework.

9月3日(木) 第I会場

9:30~12:00

- 15 伊藤 公智 (前橋工科大) On weighted means including the weighted power difference and Stolarsky means 15

Masatoshi Ito (Maebashi Inst. of Tech.) On weighted means including the weighted power difference and Stolarsky means

概要 Recently, we discussed the weighted power difference mean of two positive numbers or operators on a Hilbert space. In this talk, we generalize representing functions of operator means introduced in our former argument, and also we obtain results on generalizations of the weighted power difference and Stolarsky means.

- 16 首藤 大揮 (立命館大理工) Some inequalities for matrix means and positive linear maps 15
Hiroki Shudo (Ritsumeikan Univ.) Some inequalities for matrix means and positive linear maps

概要 We study data-processing type inequalities for the Bures–Wasserstein mean under unital positive linear maps and derive explicit reverse bounds under uniform spectral constraints. Moreover, we introduce a class of alternative quasi-means generated by two-sided functional calculus and obtain corresponding inequalities under unital positive maps.

- 17 瀬尾 祐貴 (大阪教育大教育) Estimation of bounds among three rescaled Rényi divergences 15
Yuki Seo (Osaka Kyoiku Univ.) Estimation of bounds among three rescaled Rényi divergences

概要 Takahashi and Fujiwara defined the rescaled sandwiched α -Rényi divergence. According to the idea due to Takahashi and Fujiwara, we consider the rescaled version of $\mathfrak{h}_\alpha$ -Rényi divergence due to Hiai. Also, similarly, we define the rescaled version of α -Rényi divergence due to Petz. In this talk, we estimate the bounds of the difference among three rescaled Rényi divergence in terms of the generalized Kantorovich constants.

- 18 山崎 丈明 (東洋大理工) On the Ando–Hiai property for spectral geometric means 15
瀬尾 祐貴 (大阪教育大教育)
和田 州平 (木更津工高専)
Takeaki Yamazaki (Toyo Univ.) On the Ando–Hiai property for spectral geometric means
Yuki Seo (Osaka Kyoiku Univ.)
Shuhei Wada
(Nat. Inst. of Tech., Kisarazu Coll.)

概要 In this talk, we shall introduce that weighted spectral geometric means satisfy the Ando–Hiai property. Related example and problem will be introduced.

- 19 岡 安類 (大阪教育大教育) Geometric mean of completely positive maps 15
Rui Okayasu (Osaka Kyoiku Univ.) Geometric mean of completely positive maps

概要 We introduce the geometric mean of completely positive (CP) maps on von Neumann algebras, based on the Pusz–Woronowicz theory of positive sesquilinear forms. We provide a concrete characterization via a block matrix positivity condition and establish their fundamental properties.

- 20 岡 安 類 (大阪教育大教育) Lebesgue-type decomposition of completely positive maps 15
 Rui Okayasu (Osaka Kyoiku Univ.) Lebesgue-type decomposition of completely positive maps

概要 We introduce the parallel sum of completely positive (CP) maps on von Neumann algebras, based on the Pusz–Woronowicz theory of positive sesquilinear forms. We establish a Lebesgue-type decomposition of CP maps via a parallel sum construction, thereby providing a unified framework that simultaneously generalizes Ando’s decomposition of bounded positive operators and Kosaki’s decomposition of normal positive functionals on von Neumann algebras.

- 21 武 石 拓 也 (京都工繊大基盤) Boundary actions of outer automorphism groups of Thompson-like groups 15
 Takuya Takeishi (Kyoto Inst. Tech.) Boundary actions of outer automorphism groups of Thompson-like groups

概要 This talk presents a recent result of the speaker on the C^* -simplicity of $\text{Out}(V_{n,r})$, where $V_{n,r}$ is any Higman–Thompson group. More generally, for every Cuntz–Krieger groupoid, there is a topologically free boundary action of the outer automorphism group of its topological full group on the Hilbert cube. This is a joint work with C. Bruce and X. Li.

- 22 紅 村 冬 大 (九 工 大 工) Cartan-preserving $*$ -automorphism groups: realization and obstructions for compact abelian groups 15
 Fuyuta Komura (Kyushu Inst. of Tech.) Cartan-preserving $*$ -automorphism groups: realization and obstructions for compact abelian groups

概要 Cartan subalgebras play a central role in the study of operator algebras. In this talk, we investigate automorphism groups preserving Cartan subalgebras of C^* -algebras. We describe these groups in terms of automorphisms and 1-cocycles of twisted groupoids. In particular, we show that the group of Cartan-fixing automorphisms can be identified with the 1-cocycle group. This result can be viewed as a C^* -algebraic analogue of the Feldman–Moore theorem. We then investigate compact abelian subgroups of Cartan-fixing automorphism groups. We show that every Kirchberg algebra satisfying the UCT has a Cartan subalgebra such that its Cartan-fixing automorphism group contains every second countable compact abelian group. Conversely, we establish an obstruction showing that not every Cartan subalgebra satisfies this property. As an application, we obtain the existence of inequivalent Cartan subalgebras.

12:15～12:45 2026年度日本数学会解析学賞授賞式

14:15～16:30

- 23 窪 田 陽 介 (京大理・理化学研) 第二量子化と可逆トポロジカル相 15
 Yosuke Kubota (Kyoto Univ./RIKEN) Second quantization and invertible topological phases

概要 In the theory of topological phases of matter, one studies the set of homotopy classes of families of quantum systems parametrized by a space M . For free-fermion systems, this set is known to be described by the real or complex K-theory of M . On the other hand, recent work of the speaker has shown that the classification of interacting fermionic systems also defines a generalized cohomology theory. Although these two classifications concern fermionic systems and appear to yield similar conclusions, their mathematical foundations are different. In this talk, I explain a functional-analytic construction of the so-called “free-to-interacting” map that compares the two classifications.

- 24 磯野 優介 (京大数理研) Cocycle perturbations and ergodicity for actions on type III factors ··· 15
Yusuke Isono (Kyoto Univ.) Cocycle perturbations and ergodicity for actions on type III factors

概要 We study cocycle perturbations of state preserving actions on type III_1 factors. Extending the theorem of Marrakchi and Vaes for type II_1 factors, we show that a state preserving outer $\mathbb{Z}$ -action on a type III_1 factor with trivial bicentralizer admits a unitary cocycle whose perturbation becomes an ergodic action. This partially answers a question of Marrakchi and Vaes. A major difference from the type II case is that the modular automorphism group naturally appears as part of the action, making the construction of the required cocycle more delicate.

- 25 安藤 浩志 (千葉大理) Model theory and Connes' bicentralizer problem ········· 15
I. Goldbring
(Univ. of California Irvine)
Hiroshi Ando (Chiba Univ.) Model theory and Connes' bicentralizer problem
Isaac Goldbring
(Univ. of California Irvine)

概要 We study the selfless W^* probability spaces and the triviality of the bicentralizer algebra for type III_1 factors from model theoretic viewpoint. That equivalence of a diffuse W^* -probability spaces and the triviality of the associated bicentralizer $B(M, \varphi)$ was shown in a recent work of Houdayer and Marrakchi. We extend their equivalence to arbitrary (M, φ) , which is then used to show that the class of III_1 factors with trivial bicentralizers is axiomatizable. We also deduce several permanence properties of selflessness.

- 26 柴田 夏実 (新潟大 自然) 連続関数空間の正錐とノルムのもとで加法的な写像 I ········· 15
三浦 毅 (新潟大理)
Natsumi Shibata (Niigata Univ.) Norm additive maps between the positive cones of continuous function
Takeshi Miura (Niigata Univ.) algebras I

概要 Let X and Y be locally compact Hausdorff spaces. We denote by $C_0^+(X)$ the positive cone of all real-valued continuous functions on X vanishing at infinity. In this paper, we consider a bijection $T: C_0^+(X) \rightarrow C_0^+(Y)$ satisfying the following two norm conditions for all $f, g \in C_0^+(X)$:

$$\|T(f+g)\| = \|T(f) + T(g)\|, \quad \|T(fg)\| = \|T(f)T(g)\|.$$

The main result of this paper is that such a map T is a composition operator of the form $T(f) = f \circ \tau$, induced by a homeomorphism $\tau: Y \rightarrow X$.

- 27 柴田 夏実 (新潟大 自然) 連続関数空間の正錐とノルムのもとで加法的な写像 II ········· 15
三浦 毅 (新潟大理)
Natsumi Shibata (Niigata Univ.) Norm additive maps between the positive cones of continuous function
Takeshi Miura (Niigata Univ.) algebras II

概要 We show that every bijection $T: C_0^+(X) \rightarrow C_0^+(Y)$ between the positive cones of $C_0(X)$ and $C_0(Y)$ satisfying

$$\|T(f+g)\| = \|T(f) + T(g)\|$$

for all $f, g \in C_0^+(X)$ admits a representation of the form

$$T(f)(y) = h(y)f(\tau(y)),$$

where $\tau: Y \rightarrow X$ is a homeomorphism and h is a bounded continuous function from Y to $(0, \infty)$.

- 28 江 泉 和 樹 (新潟大 自然) A variant of Tingley's problem for positive unit spheres of continuous functions that vanish at infinity 15
Min-Ruei Lin
 (National Sun Yat-sen Univ.・新潟大 自然)

三 浦 毅 (新潟大 理)

Kazuki Ezumi (Niigata Univ.) A variant of Tingley's problem for positive unit spheres of continuous functions that vanish at infinity

Min-Ruei Lin

(National Sun Yat-sen Univ./Niigata Univ.)

Takeshi Miura (Niigata Univ.)

概要 In this talk, an affirmative answer to a variant of Tingley's problem on the space of continuous functions vanishing at infinity is presented. Let $S(C_0(X))^+$ and $S(C_0(Y))^+$ denote the positive parts of the unit spheres of $C_0(X)$ and $C_0(Y)$, where X and Y are locally compact Hausdorff spaces. We prove that every surjective isometry from $S(C_0(X))^+$ onto $S(C_0(Y))^+$ is a composition operator induced by a homeomorphism between X and Y . As a consequence, such a map extends to a surjective real-linear isometry from $C_0(X)$ onto $C_0(Y)$. We also characterize surjective phase-isometries on the positive unit sphere.

- 29 越 野 克 久 (神奈川大 工) Isometries between function spaces consisting of uniformly continuous and Lipschitz continuous pseudometrics 15

Katsuhisa Koshino (Kanagawa Univ.) Isometries between function spaces consisting of uniformly continuous and Lipschitz continuous pseudometrics

概要 In this talk, we shall establish Banach–Stone type theorems on function spaces with the sup-norm consisting of uniformly continuous and Lipschitz continuous pseudometrics on uniform spaces and metric spaces.

- 30 越 野 克 久 (神奈川大 工) A variant of Tingley's problem on spaces of metrics 10

Katsuhisa Koshino (Kanagawa Univ.) A variant of Tingley's problem on spaces of metrics

概要 In this talk, we shall show that isometries between the unit spheres of spaces consisting of bounded pseudometrics on compact metrizable spaces are composition operators by homeomorphisms between the underlying spaces, and solve a variant of Tingley's problem for spaces of metrics.

16:45~17:45 特別講演

石 川 勲 (京 大 理) 合成作用素の有界性から現れる写像の力学的剛性

Isao Ishikawa (Kyoto Univ.) Dynamical rigidity of maps inducing bounded composition operators

概要 A composition operator is a linear operator induced by the pull-back of a map on the underlying domain. More generally, one may also consider weighted composition operators. Although these operators act linearly on spaces of functions, their operator-theoretic properties often reflect, and sometimes strongly restrict, the geometry and dynamics of the inducing maps. In this talk, we will discuss several rigidity results for composition operators on function spaces, including reproducing kernel Hilbert spaces, Morrey-type spaces, Besov and Sobolev spaces, and spaces of holomorphic functions. A common theme is that boundedness, compactness, and related operator-theoretic conditions impose strong restrictions on the inducing maps. These restrictions may appear as geometric constraints, affine-type rigidity, or obstructions coming from local dynamics. A main focus will be on the interaction between composition operators and local dynamical systems. In the holomorphic setting, the action on jets along periodic orbits gives finite-dimensional obstructions to boundedness and compactness of weighted composition operators. This leads to rigidity results for local holomorphic dynamics and, in certain cases, forces the inducing maps to be affine. These results illustrate a broader functional-analytic principle: nonlinear maps can be studied through the linear operators that they induce, and analytic properties of these operators can reveal hidden dynamical constraints on the maps.

統計数学

9月1日(火) 第VI会場

9:30~12:00

- 1 田原喜宏 (奈良学園大人間教育) On the tightness of resolvents satisfying intrinsic ultracontractivity ... 15
Yoshihiro Tawara (Naragakuen Univ.) On the tightness of resolvents satisfying intrinsic ultracontractivity

概要 We investigate the relationship between intrinsic ultracontractivity (IUC) and the resolvent tightness property for symmetric Hunt processes. For example, consider Schrödinger operators with power-function potentials, such as those associated with Brownian motion. In this setting, the resolvent tightness property holds for any positive power, whereas IUC holds if and only if the power is greater than 2. This suggests that IUC is a stronger condition than the resolvent tightness property. In this talk, we prove this conjecture.

- 2 土田兼治 (防衛大) Critical spectral behavior and large deviations for geometric α -stable processes 15
Kaneharu Tsuchida Critical spectral behavior and large deviations for geometric α -stable
(Nat. Defense Acad. of Japan) processes

概要 This study investigates the Schrödinger-type operator associated with geometric α -stable processes (GSP) on $\mathbb{R}^d$, focusing on the differentiability of its spectral function $C(\theta)$. Because the GSP exhibits severe local singularities in its Lévy measure, its transition semigroup lacks ultracontractivity. This unique property invalidates classical methods for proving differentiability. To overcome this obstacle, we use recent findings on the absolute continuity and the strong Feller property of the GSP, along with the existence of ground states. Consequently, we prove that $C(\theta)$ is differentiable under the condition $\alpha < d \leq 2\alpha$. Furthermore, as an application of this differentiability, we apply the Gärtner–Ellis theorem to establish a large deviation principle for the positive continuous additive functional associated with a smooth measure.

- 3 上村稔大 (関西大システム理工) 下に有界な閉形式の非対称摂動について 15
Toshihiro Uemura (Kansai Univ.) Non-symmetric perturbation of a lower bounded closed form

概要 In this talk, we consider the semigroup generation under a broad class of non-symmetric perturbations. To illustrate the validity of our main theorem, we present a specific example of non-local operators subjected to perturbations characterized by non-symmetric jump kernels.

- 4 大井拓夢 (東京理大理工) Subcriticality of subordinated Schrödinger operators and their applica-
側島基宏 (東京理大理工) tion to wave equations 15
Takumu Ooi (Tokyo Univ. of Sci.) Subcriticality of subordinated Schrödinger operators and their applica-
Motohiro Sobajima tion to wave equations
(Tokyo Univ. of Sci.)

概要 We provide a probabilistic characterization of criticality, subcriticality, and supercriticality for subordinated Schrödinger operators. We also investigate the relationship between the subcriticality of these operators and the uniform boundedness of solutions to the associated wave equation.

- 5 日野正訓 (京大理) シェルピンスキーガasket上のエネルギー密度関数の連続性と不連続性
伊縫寛治 (同志社大理工) 15
新田康平

Masanori Hino (Kyoto Univ.) Regularity and irregularity of energy densities on Sierpinski gaskets
Kanji Inui (Doshisha Univ.)
Kohei Nitta

概要 We study the pointwise regularity of energy densities associated with harmonic functions on the Sierpinski gasket with respect to the Kusuoka measure. For any nonconstant harmonic function, we prove that every Borel representative of the density is discontinuous at every point of a set of full Kusuoka measure. In sharp contrast, on each one-dimensional edge of the gasket the density admits a canonical pointwise version, which is γ_N -Hölder continuous on that edge with the explicit and optimal exponent $\gamma_N = \log_2\{(\sqrt{4N+5}+1)/(\sqrt{4N+5}-1)\}$.

- 6 甲斐大貴 (島根大総合理工) On the exit probability estimates for horizontal Lévy processes on manifolds 15
Hirotaka Kai (Shimane Univ.) On the exit probability estimates for horizontal Lévy processes on manifolds

概要 Applebaum extended the Elworthy–Malliavin construction to obtain Lévy-type processes on Riemannian manifolds by projecting the solution to Marcus-type stochastic differential equations defined on the orthonormal frame bundle. In this talk, we focus on such processes, and present exit time estimates derived from a lower bound of the sectional curvature. We also explain how these estimates imply conservativeness and the Feller property.

- 7 S. Andres (TU Braunschweig) Two-sided heat kernel bounds for $\sqrt{8/3}$ -Liouville Brownian motion ... 15
梶野直孝 (京大数理研)
K. Kavvadias (MIT)
J. Miller (Univ. of Cambridge)
Sebastian Andres (TU Braunschweig) Two-sided heat kernel bounds for $\sqrt{8/3}$ -Liouville Brownian motion
Naotaka Kajino (Kyoto Univ.)
Konstantinos Kavvadias (MIT)
Jason Miller (Univ. of Cambridge)

概要 The γ -Liouville Brownian motion (γ -LBM) is the canonical diffusion process on a γ -Liouville quantum gravity (γ -LQG) surface, where $\gamma \in (0, 2)$ is a parameter. The $\sqrt{8/3}$ -LQG sphere, considered as (the isomorphism class of) a random compact metric measure space, has been proved by Miller and Sheffield (2021) to have the same law as the Brownian sphere, which in turn was proved by Le Gall (2013) and Miermont (2013) to appear as the scaling limit of a uniform random n -face quadangulation of the sphere as $n \rightarrow \infty$.

This talk will present the main result of [arXiv:2507.13269](#) establishing, for the heat kernel of the $\sqrt{8/3}$ -LBM on the $\sqrt{8/3}$ -LQG sphere, two-sided off-diagonal sub-Gaussian bounds which are sharp up to polylogarithmic factors in the exponential.

- 8 河 備 浩 司 (慶 大 経 済) On second-level translations of Gaussian rough paths and the absence
 Zhongmin Qian (Univ. Oxford) of log-derivatives 15
 Hiroshi Kawabi (Keio Univ.) On second-level translations of Gaussian rough paths and the absence
 Zhongmin Qian (Univ. Oxford) of log-derivatives

概要 We study deterministic translations of the Gaussian rough path acting purely on the second level, leaving the underlying Gaussian process unchanged. We show that any non-trivial such translation yields a law that is mutually singular with the law of the canonical Gaussian rough path lift. Next, we show a stronger infinitesimal obstruction: in such a second-level direction, the law of the Gaussian rough path admits no L^1 -logarithmic derivative. Thus, although the differential structure of rough path space allows one to define directional derivatives in these directions, the corresponding integration-by-parts weight function does not exist in L^1 . We further show that this obstruction is in fact more fundamental, that is, the integration-by-parts functional cannot be represented even as a Watanabe distribution in the framework of Malliavin calculus.

- 9 中 島 誠 (名大 多元数理) Strict positivity of self-intersection local time 15
 楠岡 誠一郎 (京 大 理)
 白石 大典 (京 大 情報)
 Makoto Nakashima (Nagoya Univ.) Strict positivity of self-intersection local time
 Seiichiro Kusuoka (Kyoto Univ.)
 Daisuke Shiraishi (Kyoto Univ.)

概要 We consider the self-intersection local time of two or three dimensional Brownian motion at bounded away from the diagonal. We show that it is strictly positive if the Brownian motion intersects itself in the domain. This confirms that the set of self-intersection times coincides with the support of the self-intersection local time.

14:15～15:15 特別講演

- 須 田 颯 (東 北 大 理) ランダム箱玉系のソリトンに対するスケール極限
 Hayate Suda (Tohoku Univ.) Scaling limits of solitons in the randomized box-ball system

概要 The box-ball system (BBS) is a cellular automaton with a rich mathematical structure. Although its time evolution is simple to define, particles form solitons, and solitons interact through phase shifts. In recent years, with the rapid progress in the study of hydrodynamics of integrable systems, there has been a growing interest in the BBS with random initial distribution.

In this talk, we consider scaling limits of solitons in the BBS starting from certain stationary distributions. First we discuss the law of large numbers, the central limit theorem and large deviation principles for a tagged soliton. Then we discuss the fluctuations of the empirical measure of solitons around its generalized hydrodynamic limit. This talk is based on joint works with Pablo A. Ferrari, Stefano Olla and Makiko Sasada.

15:30~16:30 特別講演

- S. Junk (学 習 院 大 理) The phase transition for the directed polymer model in higher dimensions
- Stefan Junk (Gakushuin Univ.) The phase transition for the directed polymer model in higher dimensions

概要 I will review recent progress in joint work with Hubert Lacoin (IMPA) about the phase transition of the directed polymer model in spatial dimensions $d \geq 3$.

This model describes a random path (called polymer in this context) affected by a random environment of i.i.d. weights and has received much attention recently because of its (partly conjectural) relationship to the KPZ universality class. It is known that in dimensions $d \geq 3$, the model undergoes a phase transition from a weak disorder, high temperature phase (where the polymer converge to Brownian motion under the usual scaling) to a strong disorder, low temperature phase where the polymer localize into small, favorable regions and is expected to scale superdiffusively. This phase transition is characterized through the positivity (or not) of an associated martingale.

In a number of works, we have studied the nature of this phase transition: first, we showed that the phase transition is sharp in the sense that above the critical disorder intensity, the associated martingale converges to zero exponentially fast. As a consequence, we found that weak disorder persists at the critical intensity itself. Recently, we were able to show that the phase transition is smooth in the sense that its free energy decays faster than any polynomial around the critical point.

9月2日(水) 第VI会場**9:10~12:00**

- 10 山 崎 恭 (阪 大 基 礎 工) A norm equivalence result for stochastic differential equations with locally Lipschitz coefficients 15
- Kyo Yamazaki (Univ. of Osaka) A norm equivalence result for stochastic differential equations with locally Lipschitz coefficients

概要 This talk is concerned with two-sided weighted integrability estimates, often referred to as a norm equivalence result, for stochastic differential equations (SDEs). Such norm equivalence results are frequently used in the study of connections between forward-backward stochastic differential equations and partial differential equations (PDEs), particularly when PDE solutions are understood as weak solutions in the Sobolev sense. I will present a norm equivalence result for SDEs with locally Lipschitz coefficients, extending earlier results in the literature.

- 11 小 川 重 義 (立 命 館 大 理 工) Comparison theorems for solutions of noncausal SDEs 15
- Shigeyoshi Ogawa (Ritsumeikan Univ.) Comparison theorems for solutions of noncausal SDEs

概要 We are concerned with a noncausal calculus approach to the comparison theorem for solutions of SDEs, that are driven by Brownian motion. The aim of the talk is two folded: first we show that in the framework of the noncausal stochastic calculus (Ogawa, S., “Noncausal Stochastic Calculus”, 2017 Springer) the subject can be treated in a much simpler way, second we show that this approach permits us to establish similar comparison theorems for solutions of genuine noncausal SDEs that is the SDE with noncausal initial data.

- 12 田口 大 (関西大システム理工) Euler–Maruyama scheme with unbounded Hölder drift 15
 守時 良 (岡山大理)
Dai Taguchi (Kansai Univ.) Euler–Maruyama scheme with unbounded Hölder drift
Tsukasa Moritoki (Okayama Univ.)

概要 In this talk, we provide the strong rate of convergence for the Euler–Maruyama scheme for multi-dimensional stochastic differential equations with uniformly locally (unbounded) Hölder continuous drift and multiplicative noise. Our technique is based on Itô–Tanaka trick (Zvonkin transformation) for unbounded drift. Moreover, in order to apply the stochastic sewing lemma, we use the heat kernel estimate for the density function of the Euler–Maruyama scheme.

- 13 深澤 正彰 (阪大基礎工) Yet another asymptotic formula for implied volatility 15
 Masaaki Fukasawa (Univ. of Osaka) Yet another asymptotic formula for implied volatility

概要 For a general perturbation of the Black–Scholes model, we prove that the Black–Scholes implied variance is approximately the conditional expectation of the cumulative variance given that the underlying asset price at the maturity is the strike price.

- 14 竹内 敦司 (東京女大現代教養) Limit theorems on subordination of random walks 15
 仁平 杏奈 (東京女大数理)
Atsushi Takeuchi Limit theorems on subordination of random walks
 (Tokyo Woman’s Christian Univ.)
 Anna Nihei
 (Tokyo Woman’s Christian Univ.)

概要 In this talk, let us focus on the limit theorem that the scaled sequence of the discrete subordinations of random walks converges to the subordinate Brownian motion. Moreover, the rate of the convergence on the Kolmogorov distance is also studied.

- 15 永沼 伸顕 (熊本大先端) Elephant random walks on coverings of dipole graphs 15
 由良 海斗 (熊本大自然)
Nobuaki Naganuma (Kumamoto Univ.) Elephant random walks on coverings of dipole graphs
Kaito Yura (Kumamoto Univ.)

概要 We introduce an elephant random walk on a class of graphs that includes the hexagonal lattice and, more generally, coverings of dipole graphs. We show that the model exhibits a phase transition and establish limit theorems in the corresponding regimes.

- 16 有馬 佑哉 (名大多元数理) Lyapunov exponent of quadratic maps 15
 Yuya Arima (Nagoya Univ.) Lyapunov exponent of quadratic maps

概要 In this talk, we study the Lyapunov exponent of quadratic maps. The Lyapunov exponent is a quantity that measures the chaotic behavior of a dynamical system. As a fundamental concept in dynamical systems theory, it has attracted great attention. Since the Lyapunov exponent is defined as the limit of a time average, it is important to investigate its existence. In this talk, we show that, for every quadratic map, there exists a constant λ such that for Lebesgue-almost every point x the Lyapunov exponent along the orbit of x exists and is equal to λ , even though it is known that some quadratic maps exhibit non-statistical dynamics.

- 17 植田 優基 (北教大旭川) Convolution on the formal power series ring interpolating between finite free and classical probability 15
 辻 栄周平 (北教大旭川)
 Yuki Ueda (Hokkaido Univ. of Edu.) Convolution on the formal power series ring interpolating between finite free and classical probability
 Shuhei Tsujie (Hokkaido Univ. of Edu.)

概要 In this talk, we discuss a t -deformed extension of finite free convolution and finite free cumulants to the ring of formal power series. We explain how this framework gives rise to probabilistic structures and limit-type phenomena in the t -deformed setting, and how $\boxplus^t$ -continuous semigroups admit infinitesimal generators with explicit representation formulas. We also describe how the case $t = d$ recovers finite free probability, while the case $t = -1$ is connected to classical convolution and Lévy–Khinchine-type generators.

- 18 前島 信 (慶大*) Linear fractional free stable motions and selfsimilar free stable processes
 佐久間紀佳 (阪大理) 10
 Makoto Maejima (Keio Univ.*) Linear fractional free stable motions and selfsimilar free stable processes
 Noriyoshi Sakuma (Univ. of Osaka)

概要 In classical probability theory, selfsimilar stable processes were well studied in the 1980s. Among others, the so-called linear fractional stable motion is a typical example of selfsimilar stable processes, including the well-known fractional Brownian motion as a special case. In this paper, the linear fractional stable motion and selfsimilar stable processes with stationary increments are studied within the framework of free probability.

- 19 上島 芳倫 (東洋大情報連携) 量子 Ising 模型に対するレース展開 15
 坂井 哲 (北大理)
 Yoshinori Kamijima (Toyo Univ.) Lace expansion for the quantum Ising model
 Akira Sakai (Hokkaido Univ.)

概要 The lace expansion is a powerful tool for analyzing critical phenomena. It has been successful in establishing mean-field behavior for a variety of models in statistical mechanics. One of our objectives is to obtain a lace expansion for the quantum (transverse-field) Ising model. It is defined by applying a transverse field to the classical Ising model. The transverse field yields the non-commutativity and makes the system occur a different type of phase transition.

In this talk, I will show a lace expansion for the quantum Ising model and upper bounds on the expansion coefficients. The derivation is based on the random-current representation on space-time. We obtain upper bounds on the expansion coefficients by separating a connected component into several events.

- 20 中島 秀太 (慶大理工) パーセプトロンモデルのレプリカ対称鞍点の一意性 10
 Shuta Nakajima (Keio Univ.) Uniqueness of replica-symmetric saddle point in perceptron model

概要 The Ising perceptron is a fundamental model in statistical learning and spin glass theory. In this talk, I will mainly discuss mathematical progress on this model. As a recent development, I will present recent results on the uniqueness of the replica symmetric saddle point.

12:00~12:30 統計数学分科会総会

9月3日(木) 第VI会場

9:20~12:00

- 21 橋本真太郎 (広島大先進理工) 予測問題に対する不変な積率一致事前分布について 15
 Shintaro Hashimoto (Hiroshima Univ.) On invariant moment matching priors for prediction problem

概要 This paper derives objective priors that asymptotically match the mean of the Bayesian predictive distribution with that of the frequentist plug-in predictive distribution. This moment matching criterion was originally proposed by Ghosh and Liu (2011, Sankhya A) for estimation problems; the resulting priors are referred to as moment matching priors. In the predictive context, while the derived priors take a slightly different form from those for estimation, they exhibit a desirable invariance property under one-to-one parameter transformations. This is a feature not typically attained in estimation frameworks. Furthermore, this study characterizes asymptotically unbiased priors for point prediction.

- 22 丸山祐造 (千葉大理) Strictly positive-part James–Stein estimators with guaranteed domi-
 竹村彰通 (滋賀大) nance 15
 Yuzo Maruyama (Chiba Univ.) Strictly positive-part James–Stein estimators with guaranteed domi-
 Akimichi Takemura (Shiga Univ.) nance

概要 This paper presents genuine James–Stein Positive-Part estimators which dominate the classical James–Stein estimator under the quadratic loss for p -variate normal means for $p \geq 3$. Particularly, the Positive-Part estimator $\max(1/\sqrt{p}, 1 - (p - 2)/\|x\|^2)x$ dominates the classical James–Stein estimator.

- 23 仲田尚生 (東京理大創域理工) Intraclass 分割表における独立性からの隔たりを測る尺度 15
 篠田 覚 (横浜市大医)
 田畑 耕治 (東京理大創域情報)
 富澤 貞男 (東京理大創域理工)
 Naoki Nakada (Tokyo Univ. of Sci.) A measure of departure from independence for intraclass contingency
 Satoru Sinoda (Yokohama City Univ.) tables
 Kouji Tahata (Tokyo Univ. of Sci.)
 Sadao Tomizawa (Tokyo Univ. of Sci.)

概要 Consider an $r \times r$ intraclass contingency table with common row and column categories. Ishii (1960) proposed the independence model H_I for such tables. We introduce a measure that quantifies the degree of departure from H_I . The measure is constructed from the power divergence and takes values in $[0, 1]$, where 0 corresponds to independence, and 1 corresponds to complete association. It provides a useful tool for comparing the strength of association across multiple intraclass contingency tables.

- 24 白石俊輔 (広島工大情報) On a maximization problem arising from low-dimensional positive re-
 小畑経史 (追手門学院大理工) ciprocal matrices in AHP: Uniqueness of the solution 10
Shunsuke Shiraishi On a maximization problem arising from low-dimensional positive re-
 (Hiroshima Inst. of Tech.) ciprocal matrices in AHP: Uniqueness of the solution
 Tsuneshi Obata
 (Otemon Gakuin Univ.)

概要 When a pairwise comparison matrix contains missing values, various methods have been proposed to complete them. In this talk, we focus on the third coefficient of the characteristic polynomial of the pairwise comparison matrix. Since maximizing this coefficient and making it close to zero is expected to improve the degree of consistency, this criterion is adopted. The resulting problem can be naturally formulated as a convex minimization problem. In this study, we investigate the uniqueness of the solution. Although our approach relies on an exhaustive analysis, we show that, for low-dimensional cases the uniqueness of the solution is equivalent to the connectedness of the graph generated by the incomplete matrix.

- 25 田中輝雄 (広島市大情報) 多次元離散時間変数をもつ確率過程に対する最適停止問題のランダム化
 族と十分族 15
 Teruo Tanaka (Hiroshima City Univ.) Randomized and sufficient classes for multiparameter discrete time op-
 timal stopping problems

概要 We consider optimal stopping problems for discrete time multiparameter stochastic processes. We introduce a randomized class of tactics and a sufficient class of tactics with respect to a given filtration, and prove that the optimal value remains unchanged for both classes.

- 26 藤田敏治 (九工大工) 分岐型マルコフ決定過程と最大加法型評価 —事後条件付き期待値最小化—
 15
 Toshiharu Fujita Max-add criterion in diverging Markov decision process —A posteriori
 (Kyushu Inst. of Tech.) conditional expectation—

概要 We consider a max-add criterion in a stochastic decision process model with a diverging branch system. As the objective function in the stochastic environment, we adopt a posterior conditional expectation. For this decision process model, we use dynamic programming to derive a recursive formula.

- 27 下川真導 Identification and estimation of structural vector autoregressive models
 藤森洸 (信州大経法) via LU decomposition 15
 Masato Shimokawa Identification and estimation of structural vector autoregressive models
 Kou Fujimori (Shinshu Univ.) via LU decomposition

概要 Structural vector autoregressive (SVAR) models are widely used for describing simultaneous dependence structures among multivariate time series. Most existing identification methods rely on strong assumptions on the structural innovations. We consider a class of SVAR models with correlated structural innovations and propose an identification procedure based on LU decomposition under suitable zero restrictions on the coefficient matrices. Combining the asymptotic normality of reduced-form estimators with the delta method, we derive the asymptotic distributions of estimators for structural coefficients and impulse responses.

- 28 中 島 翔 平 (東京理大経営) 複数の量子軌道に基づく開放量子系のパラメータ推定 15
 小 林 光 木 (成蹊大理工)
Shohei Nakajima (Tokyo Univ. of Sci.) Parameter estimation for open quantum systems from multiple quantum
Mitsuki Kobayashi (Seikei Univ.) trajectories

概要 This talk studies parameter estimation for continuously observed open quantum systems. We consider a stochastic master equation describing the conditional state dynamics under continuous measurement, where unknown parameters enter both the Hamiltonian and the measurement operator. The likelihood-based estimation generally requires solving the filtering equation for each candidate parameter. To reduce this computational burden, we construct a contrast estimator by replacing the filter-dependent drift with a quantity computed from the deterministic averaged state. In the asymptotic regime where the number of independent trajectories tends to infinity, we establish consistency, asymptotic normality, and consistent estimation of the asymptotic variance.

- 29 深 澤 正 彰 (阪大基礎工) A quasi maximum likelihood estimation method for Bergomi-type volatil-
 富 田 明 希 (阪大基礎工) ity models 15
Masaaki Fukasawa (Univ. of Osaka) A quasi maximum likelihood estimation method for Bergomi-type volatil-
Haruki Tomita (Univ. of Osaka) ity models

概要 We consider the problem of estimating the parameters of Bergomi-type volatility models from high-frequency option-price time series. By introducing the cumulative forward variance, which can be approximately reconstructed from option prices, we reformulate the problem as parameter estimation for an infinite-dimensional stochastic differential equation. Unlike classical high-frequency inference for finite-dimensional diffusions, the resulting observation system is highly degenerate. To overcome this difficulty, we construct a contrast function based on a nondegenerate proxy distribution and prove consistency and asymptotic mixed normality of the proposed estimator.

- 30 仲 北 祥 悟 (阪大基礎工) Dimension-free statistical bounds on dynamic guidance scale learning
 P. Alquier for diffusion models 15
 (ESSEC Business School)
 今 泉 允 聡 (東大総合文化)
Shogo Nakakita (Univ. of Osaka) Dimension-free statistical bounds on dynamic guidance scale learning
 Pierre Alquier (ESSEC Business School) for diffusion models
 Masaaki Imaizumi (Univ. of Tokyo)

概要 Classifier-free guidance (CFG) is a widely used strategy to control the tradeoff between sample fidelity and diversity in diffusion models. Recent studies have extended this paradigm to incorporate dynamic and adaptive guidance scales; however, theoretical guarantees for such adaptive strategies remain scarce. In this work, we establish statistical guarantees for adaptive guidance schedules. Specifically, we analyze the uniform concentration of empirical reward functions around their population counterparts and derive dimension-free bounds for them.

14:15~15:15 特別講演

- 松 浦 峻 (慶大理工) Seemingly unrelated regression モデルにおける最良共変推定について
 Shun Matsuura (Keio Univ.) Best equivariant estimation in seemingly unrelated regression models

概要 Seemingly unrelated regression model (SUR model) is a multivariate multiple regression model with both multiple explanatory variables and response variables, where errors in response variables are correlated. In this presentation, best equivariant estimation of regression coefficients and error variance-covariance matrix in the SUR model is discussed. Best equivariant estimators are derived under several types of loss functions. Differences of best equivariant estimators under different loss functions are studied. Connection to feasible generalized least squares estimator is also presented.

15:30~16:30 特別講演

藤 澤 健 吾 (山口東京理大工) 多元分割表におけるモデリングの最近の展開

Kengo Fujisawa Recent developments in modeling for multi-way contingency tables
(Tokyo Univ. of Sci., Yamaguchi)

概要 Contingency tables are usually used to analyze the association of categorical variables. When the independence model does not hold, we are interested in applying an association model. If two variables take the same categories, the table is called a square contingency table. For square contingency tables, many observations tend to concentrate on the diagonal cells. Consequently, the analysis of square contingency tables is often focused on symmetric structures. A multi-way contingency table is a fundamental tool for analyzing associations among multiple categorical variables. In this talk, we focus on two major approaches to the analysis of multi-way contingency tables: modeling marginal distributions and association structures.

9月4日(金) 第VI会場

9:30~12:00

- 31 細 沼 璃 玖 (東京理大理) A test for sub-mean vectors in high dimension 15
川 崎 玉 恵 (青学大経済)
瀬 尾 隆 (東京理大理)
Riku Hosonuma (Tokyo Univ. of Sci.) A test for sub-mean vectors in high dimension
Tamae Kawasaki
(Aoyama Gakuin Univ.)
Takashi Seo (Tokyo Univ. of Sci.)

概要 This study considers the hypothesis testing problem for a sub-mean vector in a high-dimensional normal population. Rao's U -statistic is a classical procedure for testing a sub-mean vector, but it requires the inverse of the sample variance-covariance matrix and is therefore inapplicable when the dimension exceeds the sample size. To overcome this difficulty, we propose a new test statistic based on the L^2 -norm statistic of Zhang and Xu (2009). Under a high-dimensional asymptotic framework, the null distribution of the proposed statistic is approximated by an F -distribution. The resulting test procedure is applicable even when $p > N$. Its performance is examined by Monte Carlo simulations in terms of Type I error.

- 32 藤 森 洸 (信州大経法) 高次元線型モデルにおける漸近正規推定量 15
佃 康 司 (九大数理)
Kou Fujimori (Shinshu Univ.) Asymptotically normal estimators in high-dimensional linear regression
Koji Tsukuda (Kyushu Univ.)

概要 We study a two-step OLS estimator after variable selection in a high-dimensional linear model. The centered and scaled estimator is embedded into the sequence space ℓ^2 , and its weak convergence is established, yielding asymptotic normality and enabling standard asymptotic tools such as the continuous mapping theorem. Our framework allows the number of nonzero coefficients to diverge with the sample size under a suitable growth condition. As an application, we construct a test for linear hypotheses with asymptotically correct size control.

- 33 海野哲也 (筑波大数理物質) 強スパイク固有値モデルにおける自動スパース PCA を用いたデータ変換
 矢田和善 (筑波大数理物質) 法 15
 青嶋誠 (筑波大数理物質)
Tetsuya Umino (Univ. of Tsukuba) Data transformation method using automatic sparse PCA under the
Kazuyoshi Yata (Univ. of Tsukuba) strongly spiked eigenvalue model
Makoto Aoshima (Univ. of Tsukuba)

概要 In this talk, we consider a data transformation method for high-dimensional data under the strongly spiked eigenvalue model. Focusing on the eigenstructure of the covariance matrix, we first discuss the asymptotic properties of sample eigenvectors, noting that they suffer from severe high-dimensional noise. To overcome this difficulty, we combine an existing data transformation technique with automatic sparse PCA to propose a new transformation methodology. We establish the asymptotic properties of the proposed methodology under high-dimensional settings and, finally, consider its application to the two-sample problem.

- 34 江頭健斗 (東京理大創域情報) 高次元データにおけるカーネル階層的クラスタリングの漸近的性質 15
 高尾永太 (東京理大創域理工)
Kento Egashira (Tokyo Univ. of Sci.) Asymptotic properties of kernel hierarchical clustering for high-dimensional
Yota Takao (Tokyo Univ. of Sci.) data

概要 Hierarchical clustering is a widely used unsupervised learning method for exploring latent structures in high-dimensional data. Although asymptotic properties of conventional hierarchical clustering have been studied under the high-dimension, low-sample-size setting, the effect of kernelization on dendrogram structures has not been clarified. In this talk, we introduce kernel versions of single linkage, average linkage, and Ward's method and investigate their asymptotic properties. Focusing on the Gaussian kernel, we derive conditions under which desirable dendrogram structures appear. We show that kernelization relaxes these conditions and enlarges the parameter region where such structures are obtained. The theoretical findings are supported by numerical experiments and real data analyses, demonstrating the effectiveness of the proposed kernel hierarchical clustering methods.

- 35 高尾永太 (東京理大創域理工) 高次元データにおける樹形図の分類法と単連結法の漸近的性質 15
 江頭健斗 (東京理大創域情報)
Yota Takao (Tokyo Univ. of Sci.) Classification of dendrograms constructed from high-dimensional data
Kento Egashira (Tokyo Univ. of Sci.) and asymptotic properties of the single-linkage clustering

概要 In this presentation, we investigate the asymptotic properties of hierarchical clustering under high-dimensional and multiclass settings. It is currently known that dendrograms based on data obtained from two independent high-dimensional populations can be classified into two patterns asymptotically under appropriate conditions. On the other hand, when there are three or more independent high-dimensional populations, the method is not known to represent the structure of dendrogram, with a few exceptions. Therefore, we propose notations for systematically representing patterns of dendrogram obtained by hierarchical clustering on high-dimensional data. Using our proposed notations, we infer the relationships among parameters of each population from the structural patterns that appear in dendrograms under high-dimensional and multiclass settings.

- 36 大野 悠樹 (東京理大創域理工) 循環的優越を伴う一対比較データに対する Bradley–Terry モデルの最小
田畑 耕治 (東京理大創域情報) 拡張の提案 15
Yuki Ohno (Tokyo Univ. of Sci.) A minimal extension of the Bradley–Terry model for paired comparison
Kouji Tahata (Tokyo Univ. of Sci.) data with cyclic dominance

概要 The Bradley–Terry model is a well-established mathematical model for estimating latent rankings based on paired comparison data under the assumption of stochastic transitivity. However, empirical data sometimes exhibit cyclic dominance, thereby violating this assumption. To quantify the extent of cyclic dominance, we propose a minimal extension of the Bradley–Terry model by introducing just a single nonnegative parameter. When this additional parameter is zero, the proposed model reduces to the classical model. This parameter provides a simple and interpretable measure of departure from transitivity.

- 37 橋野 天乙 (九大 JGM I) 正則変動占有モデルにおけるシャノンエントロピーのプラグイン推定量
佃 康司 (九大数理) の漸近バイアス 15
Takato Hashino (Kyushu Univ.) Asymptotic bias of plug-in estimators for Shannon entropy under regular
Koji Tsukuda (Kyushu Univ.) variation in occupancy problems

概要 Shannon entropy is a widely used measure of uncertainty and diversity across various scientific disciplines. For distributions with infinitely many categories, entropy estimation is influenced by rare or unobserved symbols. In this study, we consider an occupancy model under regular variation and investigate the asymptotic bias of the plug-in estimator of Shannon entropy. Utilizing Poissonization techniques and asymptotic results for occupancy counts, we derive the asymptotic behavior of the bias and express it in terms of the tail index. Our results clarify the effect of power-law tails on entropy estimation.

- 38 八木 文香 (法政大経済) T^2 -type and LR test statistics for testing the adequacy in growth curve
瀬尾 隆 (東京理大理) model with two-step monotone missing data 15
Ayaka Yagi (Hosei Univ.) T^2 -type and LR test statistics for testing the adequacy in growth curve
Takashi Seo (Tokyo Univ. of Sci.) model with two-step monotone missing data

概要 We consider the test for adequacy in growth curve model when the data set has a two-step monotone pattern of missing observations. In this talk, based on the results for complete data (see, Fujikoshi, Ulyanov, and Shimizu, 2010) and the asymptotic expansion of the T^2 -type test statistic (see, Kawasaki and Seo, 2016), we discuss the problem of testing the adequacy in growth curve models using the T^2 -type test statistic with two-step monotone missing data. We propose a T^2 -type test statistic and provide approximate upper percentile of this statistic for its null distribution. Furthermore, we investigate the accuracy of the approximation by Monte Carlo simulation. We also discuss the case where the likelihood ratio test statistic is used as the test statistic.

39	山本大成 (神戸薬大薬)	Asymptotic distribution of Mardia's sample skewness based on mono-	
	兵頭昌 (神奈川大経済)	tone missing data	15
	首藤信通 (神戸薬大薬・神戸大理)		
	Taisei Yamamoto (Kobe Pharm. Univ.)	Asymptotic distribution of Mardia's sample skewness based on mono-	
	Masashi Hyodo (Kanagawa Univ.)	tone missing data	
	Nobumichi Shutoh		
	(Kobe Pharm. Univ. / Kobe Univ.)		

概要 We discuss a multivariate normality test based on Mardia's multivariate sample skewness defined under monotone missing data. We propose a novel sample skewness statistic that incorporates a 2-step monotone missing data structure and generalizes the classical Mardia's skewness to incomplete observations. We establish the asymptotic distribution of the proposed statistic under elliptical populations. The proof is completed with handling nontrivial dependence induced by the missingness structure via the covariance of hyperspherical harmonics generated from different dimensions. We show that the limiting distribution reduces to the classical complete-data result when there is no missingness.

応 用 数 学

9月1日(火) 第IX会場

9:00~12:10

- 1 穂坂大將 (横浜国大環境情報) 辺分離集合から定まる量子ウォークの解析 15
 瀬川悦生 (横浜国大環境情報)
 Taisuke Hosaka (Yokohama Nat. Univ.) Analysis of the quantum walk induced by an edge cut set
 Etsuo Segawa (Yokohama Nat. Univ.)

概要 In this talk, we consider a quantum walk induced by an edge cut set. For a simple connected graph, we assign weight $\epsilon \geq 0$ to each edge in the edge cut set, and weight 1 to all other edges. Here, ϵ can be regarded as the strength of the connectivity between the connected components. In this setting, we show that the behavior of the quantum walker is described by the weighted Laplacian associated with the graph and the edge cut set.

- 2 Xinmiao Zhang (立命館大理工) Bipartite walks on even stars 15
 赤堀次郎 (立命館大理工)
 今野紀雄
 (立命館大理工・横浜国大・日大文理自然研)
 佐藤 巖 (小山工高専)
 藤田慎也
 (横浜市大データサイエンス)
 Xinmiao Zhang (Ritsumeikan Univ.) Bipartite walks on even stars
 Jiro Akahori (Ritsumeikan Univ.)
 Norio Konno
 (Ritsumeikan Univ./Yokohama Nat. Univ./Nihon Univ.)
 Iwao Sato (Oyama Nat. Coll. of Tech.)
 Shinya Fujita (Yokohama City Univ.)

概要 We calculate the characteristic polynomials of the time evolution matrices of the bipartite walks on an even-star as a generalization of a star graph and an even cycle graph. We also calculate the characteristic polynomials of the time evolution matrices of a bipartite walk on a double star, a $2k$ ($k \geq 3$)-star and a 4-star, and present their spectra. Furthermore, we present a relation between the transition probability matrix $\mathbf{T}$ and the specified matrix $\mathbf{F} = \hat{\mathbf{P}}_0^T \hat{\mathbf{P}}_1 \hat{\mathbf{P}}_1^T \hat{\mathbf{P}}_0$ appearing in the characteristic polynomial of the time evolution matrix of a bipartite walk on a bipartite graph. As its application, we calculate the spectra of $\mathbf{F}$ for a double star, a $2k$ ($k \geq 3$)-star and a 4-star, and so present the spectra of $\mathbf{T}$ for them.

- 3 釣井達也 (東京情報大総合情報) 完全二部グラフ $K_{n,n}$ 上の n 状態 Grover walk の周期とその背後に潜む
 伊藤直治 (奈良教育大教育) 群構造について 15
 Tatsuya Tsurii
 (Tokyo Univ. of Information Sci.) On periodicity of the n state Grover walk on a complete bipartite graph
 Naoharu Ito (Nara Univ. of Edu.) $K_{n,n}$ and its group structure behind that walk

概要 In our previous papers [1] and [2], we investigated a period and a group structure of the n state Grover walk on a complete graph with n vertices and a self-loop at each vertex. In this talk, using the above method, we show that the n state Grover walk on the complete bipartite graph $K_{n,n}$ has period $2n$ if n has an odd factor, and period n otherwise.

- 4 田 中 康 平 (信州大経法) Quillen's theorem A for persistence finite posets 15
 Kohei Tanaka (Shinshu Univ.) Quillen's theorem A for persistence finite posets

概要 In this talk, we discuss a persistence version of Quillen's Theorem A for persistence finite posets. We establish an estimate for the homotopy commutative interleaving distance between persistence finite posets induced by a map whose homotopy fibers are ε -contractible.

- 5 内 海 凌 (阪 大 理) ルート系における同変版特性準多項式 15
 Ryo Uchiumi (Univ. of Osaka) Equivariant version of characteristic quasi-polynomials of root systems

概要 In this talk, we introduce an equivariant version of characteristic quasi-polynomials of root systems. We will present some of computation and show equivariant-theoretic refinements of the beautiful properties of characteristic quasi-polynomials of root systems. If time permits, we will also discuss the relationship with root systems obtained by folding of the extended Dynkin diagrams.

- 6 南 昂 佑 (神戸大システム情報) Hausdorff の構成法と combinanalytic identity I —古典直交多項式への
 松 村 英 樹 (都 立 大 理) 拡張 15
 三 島 輝 之 (アクセンチュア)
 澤 正 憲 (神戸大システム情報)

Kosuke Minami (Kobe Univ.) Hausdorff construction and combinanalytic identities I: Extension to
 Hideki Matsumura classical orthogonal polynomials

(Tokyo Metro. Univ.)

Teruyuki Mishima

(Accenture Japan Ltd)

Masanori Sawa (Kobe Univ.)

概要 Hausdorff used Gauss–Hermite quadrature to simplify the construction of the Hilbert identity in classical Waring's problem. In this talk, we introduce a generalization of this Hausdorff construction from Hermite polynomials to other classical orthogonal polynomials. More precisely, we apply the construction to the moments associated with Laguerre polynomials, Chebyshev polynomials of the first and second kinds, and Bessel polynomials. As a result, we obtain polynomial identities connecting classical combinatorial coefficients, such as binomial coefficients and Narayana numbers, with analytic data coming from zeros of orthogonal polynomials and Christoffel numbers. We call these identities combinanalytic identities.

- 7 松 村 英 樹 (都立大理・慶大理工) Hausdorff の構成法と combinanalytic identity II —二項係数・凸代数幾
 南 昂 佑 (神戸大システム情報) 何学との関連付け 15
 三 島 輝 之 (アクセンチュア)
 澤 正 憲 (神戸大システム情報)

Hideki Matsumura Hausdorff construction and combinanalytic identities II —Connection
 (Tokyo Metro. Univ./Keio Univ.) to binomial coefficients and convex algebraic geometry

Kosuke Minami (Kobe Univ.)

Teruyuki Mishima

(Accenture Japan Ltd)

Masanori Sawa (Kobe Univ.)

概要 In classical Waring's problem, Hausdorff gave a simplified construction of the Hilbert identity. In a previous talk, we generalized the Hausdorff construction to several families of orthogonal polynomials beyond the Hermite case, thereby obtaining a new class of polynomial identities, which we call “combinanalytic identities.” A combinanalytic identity is a polynomial identity connecting combinatorial quantities involving binomial coefficients and analytic quantities associated with orthogonal polynomials. In this talk, we introduce the resulting identities involving binomial coefficients and discuss a convex algebro-geometric interpretation of Narayana polynomials.

- 8 Ziao Quan (神戸大システム情報) On equidistant codes with the wildcard symbol * 15
 J. L. Borba Boccasio (神戸大工)
 澤 正 憲 (神戸大システム情報)
Ziao Quan (Kobe Univ.) On equidistant codes with the wildcard symbol *
 Joao Lucas Borba Boccasio (Kobe Univ.)
 Masanori Sawa (Kobe Univ.)

概要 We introduce *wildcard codes*, a variation of standard q -ary codes incorporating the symbol $*$. Wildcards represent coordinates that are intentionally left unspecified, extending classical equidistant codes in a geometric framework naturally suited to isometric graph embeddings. We characterize such codes via an equivalent matrix formulation and derive a general upper bound $M \leq d(q-1) + 1$ for their size. In the binary case, we show that codes equivalent to normalized Hadamard matrices. We further apply 2-distant codes to isometric embedding problems, particularly for complete multipartite graphs, odd cycles, and obtain bounds on embedding numbers. This work highlights structural properties of wildcard codes and their applications in combinatorial design and graph embeddings.

- 9 齋 藤 琢 弥 (北大 IReDD) 整数係数の線形符号の重み分布の周期性について 15
 中 島 規 博 (名 工 大 工)
 今 村 浩 二 (九 大 I M I)
Takuya Saito (Hokkaido Univ.) On the periodicity of the weight distribution of linear code with integer
 Norihiro Nakashima coefficients
 (Nagoya Inst. of Tech.)
 Koji Imamura (Kyushu Univ.)

概要 In the theory of error-correcting codes, the minimum weight and the weight enumerator play a crucial role in evaluating the error-correcting capacity. In this talk, by viewing the weight enumerator as a quasi-polynomial, we reduce the calculation of the minimum weight to that of a code over a smaller integer residue ring. We also give a transformation formula between the Tutte quasi-polynomial and the weight enumerator. Furthermore, we compute the number of maximum weight codewords for the codes related to the matroids N_k and Z_k . This is equivalent to computing the characteristic quasi-polynomial of the hyperplane arrangements related to N_k and Z_k .

- 10 佐 竹 翔 平 (福 岡 大 理) On quasi-perfect Lee codes from abelian Ramanujan graphs 15
 Shohei Satake (Fukuoka Univ.) On quasi-perfect Lee codes from abelian Ramanujan graphs

概要 Lee codes are error-correcting codes defined with respect to the Lee metric. As perfect Lee codes are known to be highly restricted and difficult to construct, quasi-perfect Lee codes have emerged as an important relaxation that preserves strong packing and covering properties.

In this talk, we present a new explicit construction of 2-quasi-perfect Lee codes. The proof relies on a characterization of quasi-perfect Lee codes via diameters of the associated Ramanujan graphs, together with algebraic-geometric estimates for rational points on cubic curves.

- 11 盧 曉 南 (岐 阜 大 工) 有理的区間デザインの明示的構成法について II 15
 三 島 輝 之 (アクセントチュア)
 澤 正 憲 (神戸大システム情報)
 内 田 幸 寛 (都 立 大 理)
 Xiao-Nan Lu (Gifu Univ.) On explicit constructions of rational interval designs II
 Teruyuki Mishima
 (Accenture Japan Ltd)
 Masanori Sawa (Kobe Univ.)
 Yukihiro Uchida (Tokyo Metro. Univ.)

概要 This talk focuses on antipodal rational 5-designs for the Chebyshev measure $(1 - t^2)^{-1/2} dt / \pi$ on $(-1, 1)$. We show that an antipodal rational 5-design with $2N + 1$ points exists if and only if $N \geq 17$. The key new ingredient is an explicit 37-point example. Together with known 35- and 39-point examples and an infinite family of 6-point designs, this gives explicit constructions for every odd number of points at least 35. We also describe how the 37-point example is obtained by a meet-in-the-middle computer search combined with elementary number-theoretic restrictions.

- 12 萩 田 真 理 子 (お茶の水女大理) 差集合と射影平面の被覆問題 15
 Mariko Hagita (Ochanomizu Univ.) Covering problems in difference sets and projective planes

概要 We introduce FLIP, a relation-finding puzzle constructed from block designs arising from difference sets. By assigning related pieces of information to points in the design, one can construct card sets and polyhedral puzzles in which any two objects share a prescribed number of matching or corresponding information pairs.

Motivated by this construction, we investigate a covering problem for the symmetric design arising from a $(21, 5, 1)$ difference set. We determine the structure of all 6-block coverings of the 21-point set and show that the result extends to projective-plane designs with parameters $(q^2 + q + 1, q + 1, 1)$. The talk presents both the puzzle construction and the associated combinatorial covering theorem.

14:15～15:15 特別講演

- 栗 原 大 武 (山 口 大 創 成) 多変数直交多項式を支える有限組合せ構造を探して
 Hirotake Kurihara (Yamaguchi Univ.) Finite combinatorial structures underlying multivariate orthogonal polynomials

概要 Classical P - and Q -polynomial association schemes provide finite combinatorial models for one-variable orthogonal polynomials, and Leonard's theorem is central to this theory. This talk explores how the classical framework extends to multivariate orthogonal polynomials. I explain recent definitions of bivariate and multivariate P - and Q -polynomial association schemes, emphasizing a viewpoint based on a small number of generators, monomial orders, and vanishing conditions on intersection and Krein numbers. Examples include direct products, nonbinary Johnson schemes, and schemes from attenuated spaces. I also discuss connections with m -distance-regular graphs, elimination theory, higher-dimensional analogues of Leonard theory, and codes and designs, and indicate several open problems.

15:25~16:50

- 13 小畑久美 (近畿大工) Rooted tree polylogarithms 15
 田中立志 (京都産大理)
 若林徳子
 (大阪電通大共通教育機構)

Kumi Kobata (Kindai Univ.) Rooted tree polylogarithms
Tatsushi Tanaka (Kyoto Sangyo Univ.)
Noriko Wakabayashi
 (Osaka Electro-Comm. Univ.)

概要 This presentation introduces multiple polylogarithms indexed by rooted forests, which we call rooted tree polylogarithms. Rooted tree polylogarithms are functions in one variable defined as certain nested sums associated with rooted forests. By definition, one finds that each of them is expressed as a linear combination of the ordinary multiple polylogarithms. We extract their algebraic characterization and show that almost all primitive elements give relations among rooted tree polylogarithms.

- 14 木村直記 (東京理大理) 結び目内在でないグラフの複雑さとルジャンドル空間埋め込み 15
Naoki Kimura (Tokyo Univ. of Sci.) Complexity of non-intrinsically knotted graphs and Legendrian spatial embeddings

概要 A graph G is said to be intrinsically knotted if for any spatial embedding f of G , $f(G)$ contains a non-trivial knot. In this talk, we introduce a numerical invariant of non-intrinsically knotted graphs in terms of Legendrian spatial embeddings. We also present calculation results of the invariant for several graphs.

- 15 市原一裕 (日大文理) 平面偶角形分割の半単色彩色について 10
 田村優羽 (日大総合基礎)
Kazuhiro Ichihara (Nihon Univ.) The half-monochromatic colorings of plane graphs with even polygonal
Yuha Tamura (Nihon Univ.) faces

概要 An upper bound was given by Enami–Ozeki–Yamaguchi on the maximum number of colors for proper anti-rainbow colorings on a planar quadrangulation in terms of its independence number. In this talk, as an extension, we introduce the half-monochromatic coloring on a plane graph with even polygonal faces, and give an upper bound on the maximum number of colors for such colorings in terms of the independence number.

- 16 野口健太 (東京理大創域情報) 完全グラフと道のデカルト積の厚さ 15
Kenta Noguchi (Tokyo Univ. of Sci.) The thickness of the Cartesian product of a complete graph and a path

概要 In this talk, we determine the thickness of the Cartesian product $K_{6p+4} \square P_2$ for $p \geq 0$ and of the Cartesian product $K_8 \square P_m$ for $m \geq 1$, where K_n and P_m denote the complete graph on n vertices and the path on m vertices, respectively.

- 17 善本 潔 (日大理工) 辺着色完全 p 部グラフにおける彩色ハミルトンパスと彩色全域木 15
 岩崎祐也 (日大理工)
Kiyoshi Yoshimoto (Nihon Univ.) Properly colored Hamilton paths and spanning trees in edge-colored
Yuya Iwazaki (Nihon Univ.) multipartite graphs

概要 A 1-path-cycle factor is a spanning subgraph consisting of pairwise disjoint one path and several cycles. The results of Bang-Jensen and Gutin and Feng et al. imply that an edge-colored complete graph has a properly colored Hamilton path if and only if it has a properly colored 1-path-cycle factor. In this paper, we investigate extensions of the result for complete multipartite graphs.

17:00～18:00 2025年度日本数学会応用数学賞受賞特別講演

斎藤 明 (日大文理) 虹色禁止部分グラフが誘導する前順序

Akira Saito (Nihon Univ.) Preorder induced by rainbow forbidden subgraphs

概要 A subgraph H of an edge-colored graph G is rainbow if all the edges of H receive distinct colors. If G does not contain a rainbow subgraph isomorphic to H , we say that G is rainbow H -free. For connected graphs H_1 and H_2 , we write $H_1 \leq H_2$ if every rainbow H_1 -free complete graph edge-colored with sufficiently many colors is rainbow H_2 -free. The binary relation $\leq$ is a preorder. It is easy to see that if H_1 is a subgraph of H_2 , then $H_1 \leq H_2$. However, the converse does not hold. In this talk, we give an overview of the status of research on $\leq$.

9月2日(水) 第IX会場

9:00～12:00

18 上 苳 隆 宏 (横浜国大環境情報) On graphs without cycles of length 0 modulo 3 or 4 modulo 6 15

Takahiro Ueoro (Yokohama Nat. Univ.) On graphs without cycles of length 0 modulo 3 or 4 modulo 6

概要 This talk concerns an extremal problem for graphs with forbidden cycle lengths. We study graphs containing no cycle whose length is congruent to 0 modulo 3 or to 4 modulo 6. We prove that every n -vertex graph with no such cycles has at most $11n/8 - 7/4$ edges, and we determine all extremal graphs attaining equality. This result is nontrivial in the sense that, if one of the forbidden residue classes is removed, the maximum number of edges becomes larger. Thus, forbidding these two families of cycles together imposes a genuinely stronger structural restriction. A key ingredient of the proof is that every graph with no cycles of length congruent to 0 modulo 3 or 4 modulo 6 is planar.

19 鹿 島 柊 (慶大理工) グラフの最長閉路に関する Grünbaum 予想について 15

小 関 健 太 (横浜国大環境情報)

Leilei Zhang (横浜国大環境情報)

Masaki Kashima (Keio Univ.) Grünbaum's conjecture on longest cycles of graphs

Kenta Ozeki (Yokohama Nat. Univ.)

Leilei Zhang (Yokohama Nat. Univ.)

概要 Grünbaum defined a class $\Gamma(k, k)$ as the set of graphs whose circumference is exactly its order minus k , and the deletion of every k of whose vertices results in a Hamiltonian graph. While there are infinitely many graphs in the class $\Gamma(1, 1)$, which are called hypohamiltonian graphs, Grünbaum conjectured that $\Gamma(k, k)$ is empty for $k \geq 2$. Motivated by the conjecture, we consider the class of graphs in $\Gamma(k, k)$ with the specified order n , and give an upper bound on the maximum degree of such graphs in terms of n and k . This provides a lower bound on the number of vertices of graphs in $\Gamma(k, k)$ for every fixed k .

20 三 家 雅 弘 (東京理大理) スプリットグラフにおけるタフネスと閉路被覆およびハミルトン閉路を持つ k -因子 15Masahiro Sanka (Tokyo Univ. of Sci.) Toughness, collections of cycles covering all vertices and Hamiltonian k -factors in split graphs

概要 For a real number $t > 0$, a graph G is said to be t -tough if for every $S \subset V(G)$, if $G - S$ is disconnected, then the number of components of $G - S$ is at most $|S|/t$. A graph G is said to be a split graph if $V(G)$ can be partitioned into an independent set and a clique of G . It is known that every $3/2$ -tough split graph has a Hamiltonian cycle. In this talk, we extend the known hamiltonicity theorem for tough split graphs as follows: every $(1 + \frac{1}{2k})$ -tough split graph has a collection of at most k cycles covering all vertices. Moreover, we show that every $(k - 1 + \frac{1}{k})$ -tough split graph has a k -factor admitting a Hamiltonian cycle.

- 21 小 関 健 太 (横浜国大環境情報) 3-超グラフのライングラフがハミルトン閉路を持つ支配数型条件 10
 Leilei Zhang (横浜国大環境情報)
 Kenta Ozeki (Yokohama Nat. Univ.) A domination number condition for line graphs of 3-hypergraphs to have
 Leilei Zhang (Yokohama Nat. Univ.) a Hamiltonian cycle

概要 Thomassen conjectured that every 4-connected line graph has a Hamiltonian cycle. Motivated by this conjecture, Zheng, Broersma, Wang, Zhang, and Vrána, Zhan, and Zhang studied domination number conditions that guarantee Hamiltonian properties of line graphs. In this talk, we extend their results to line graphs of 3-hypergraphs. We prove that the line graph $L(H)$ of a 3-hypergraph H has a Hamiltonian cycle whenever $L(H)$ is 3-connected and has domination number at most 4. This domination number bound is best possible and coincides with the corresponding bound for line graphs of ordinary graphs.

- 22 太 田 克 弘 (慶 大 理 工) A Chvátal–Erdős condition for 2-connected $[2, b]$ -factors of small size
 小 関 健 太 (横浜国大環境情報) 15
 山下登茂紀 (近畿大理工)
 Katsuhiko Ota (Keio Univ.) A Chvátal–Erdős condition for 2-connected $[2, b]$ -factors of small size
 Kenta Ozeki (Yokohama Nat. Univ.)
 Tomoki Yamashita (Kindai Univ.)

概要 Let $k \geq 2$ and $b \geq 2$ be integers. It was proved by Brandt (unpublished) for b being even that every k -connected graph with independence number at most $bk/2$ contains a 2-connected $[2, b]$ -factor. In this talk, we prove that the same result also holds when b is odd. Moreover, we show the existence of a 2-connected $[2, b]$ -factor with small number of edges.

- 23 渡 邊 康 聖 (名大多元数理) 特定の有向グラフに対する単純閉路を用いた伊原ゼータ関数の行列式表示について 15
 Kosei Watanabe (Nagoya Univ.) Determinant formulas of Ihara zeta functions of some digraphs using simple cycles

概要 We show that Ihara zeta functions of certain digraphs have determinant formulas written in terms of simple cycles on their line digraphs without backtrack. While the Hashimoto expression implies the existence of such cycles, we observe that the inverse of the Ihara zeta function can be expressed as a vertex-weighted clique polynomial by utilizing trace monoids. In this talk, we introduce a method to construct a “good” graph whose adjacencies yields this polynomial.

- 24 北野力暉 (立命館大理工) Walk/zeta correspondence for quantum walks on path graphs 15
 赤堀次郎 (立命館大理工)
 今野紀雄
 (立命館大理工・横浜国大・日大文理自然研)
 佐藤 巖 (小山工高専)
 Riki Kitano (Ritsumeikan Univ.) Walk/zeta correspondence for quantum walks on path graphs
 Jiro Akahori (Ritsumeikan Univ.)
 Norio Konno
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)
 Iwao Sato (Oyama Nat. Coll. of Tech.)

概要 We study determinant zeta functions for reflected random walks and Szegedy walks on finite path graphs. By introducing the discrete reflection group $\mathcal{G}_{0,N+1}$ generated by the endpoint reflections, we obtain an exact spatial trace formula decomposing each finite determinant into local factors indexed by reflection words. After a symmetrizing similarity transform, this decomposition yields a termwise Konno–Sato correspondence between the classical and quantum factors. As $N \rightarrow \infty$, the normalized zeta functions converge uniformly on compact subsets of $|u| < 1$ to the local return zeta functions of the corresponding free walks on $\mathbb{Z}$. We also prove distributional trace limits in the symmetric case and a double-scaling determinant limit to a one-dimensional massive Dirac-type zeta function.

- 25 陳 承 典 (日大総合基礎) 自己辺と長距離辺を持つ円環グラフの固有空間 15
 井手勇介 (日大文理)
 齋藤 溪 (日大文理)
 渡邊 聡 (KDDI 総合研)
 今野紀雄
 (立命館大理工・横浜国大・日大文理自然研)
 Chengdian Chen (Nihon Univ.) Eigenspaces for a cycle graph with self-loops and a long range edge
 Yusuke Ide (Nihon Univ.)
 Kei Saito (Nihon Univ.)
 Satoshi Watanabe
 (KDDI Research, Inc.)
 Norio Konno
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)

概要 In this talk, we analyze the eigenspaces of a cycle graph with self-loops and a long range edge. By exploiting the symmetry of the graph, we apply the notion of equitable partition that reduces the original graph to a simpler weighted graph. This reduction allows us to derive the eigenvalues of its adjacency matrix and investigate the structure of the corresponding eigenspaces. We would like to discuss further about the application of the structure we found including quantum walks.

- 26 塚 夏 紀 (立命館大理工) 素数ウォークとランダムウォークの挙動の比較 15
 赤 堀 次 郎 (立命館大理工)
 青 木 伶 依 (立命館大理工)
 林 太 郎 (立命館大理工)
 今 野 紀 雄
 (立命館大理工・横浜国大・日大文理自然研)

Natsuki Tsuka (Ritsumeikan Univ.) Comparison of behavior of prime walks and random walks
 Jiro Akahori (Ritsumeikan Univ.)
 Ray Aoki (Ritsumeikan Univ.)
 Taro Hayashi (Ritsumeikan Univ.)
 Norio Konno
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)

概要 Fraile et al. introduced and studied two dimensional prime walks. We investigate the prime walk in one, two, and three dimensions. In particular, we consider the comparison of behavior of the prime walk and corresponding random walk.

- 27 成 松 明 廣 (神奈川大情報) 欠陥付き量子ウォークの確率分布を再現するランダムウォークに関する
 開 滉 一 郎 (神奈川大工) 研究 15
 御 堂 輝 哉 (神奈川大工)

Akihiro Narimatsu (Kanagawa Univ.) A study on random walks reproducing the probability distributions of
 Kouichiro Hiraki (Kanagawa Univ.) quantum walks with defects
 Daiya Midou (Kanagawa Univ.)

概要 In this study, we investigated, both numerically and theoretically, the behavior and transition probability distributions of random walks that reproduce the probability distributions of quantum walks, particularly those employing coin operators with defects.

- 28 齋 藤 溪 (日 大 文 理) Golden random/quantum walk のパスカウンティング 10
 松 下 翔 太 (日 大 文 理)

Kei Saito (Nihon Univ.) Path counting method for Golden random/quantum walks
 Shota Matsushita (Nihon Univ.)

概要 Krapivsky and Redner (2004) introduced the Golden random walk, in which the step length changes with time. Unlike ordinary random walks, the walker may return to the starting vertex after three steps, and therefore standard path-counting methods cannot be applied directly. In this study, we consider both the Golden random walk and its quantum counterpart, the Golden quantum walk. In either case, the key to the analysis is an equivalence relation on paths determined by the coincidence of the associated vertices. By recursively determining the corresponding equivalence classes, we obtain explicit expressions for the probability distributions.

- 29 齋藤 溪 (日大文理) 量子探索アルゴリズムの歩き直し 15
 井手 勇介 (日大文理)
 渡邊 聡 (KDDI 総合研)
 今野 紀雄
 (立命館大理工・横浜国大・日大文理自然研)
 Kei Saito (Nihon Univ.) Revisiting quantum search algorithms via random walks
 Yusuke Ide (Nihon Univ.)
 Satoshi Watanabe
 (KDDI Research, Inc.)
 Norio Konno
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)

概要 Recently, beginning with the pioneering work of Ambainis, Kempe, and Rivosh, the fundamental theory and analytical methods of quantum search algorithms based on quantum walks have been extensively developed. In this talk, we revisit these methods from the perspective of underlying classical random walks rather than quantum walks. Our approach can be viewed as a modern reformulation and extension of Szegedy's framework. The connection between classical random walks and quantum walks is provided by the spectral mapping theorem established by Segawa and Suzuki. In the context of quantum search algorithms, Fuda, Narimatsu, Saito, and Suzuki further investigated this theorem for quantum walks on d -dimensional lattices.

13:00~14:00

- 30 岡本 陸希 (立命館大理工) 自己ループ付き完全グラフ上の Grover walk のスペクトル解析とその諸
 赤堀 次郎 (立命館大理工) 性質 15
 今野 紀雄
 (立命館大理工・横浜国大・日大文理自然研)
 佐藤 巖 (小山工高専)
 永田 式経 (立命館大理工)
 向井 悠之介 (立命館大理工)
 釣井 達也 (東京情報大総合情報)
 Rikuki Okamoto (Ritsumeikan Univ.) Spectral analysis and properties of the Grover walk on a complete graph
 Akahori Jiro (Ritsumeikan Univ.) with self-loops
 Konno Norio
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)
 Sato Iwao (Oyama Nat. Coll. of Tech.)
 Nagata Nino (Ritsumeikan Univ.)
 Mukai Yunosuke (Ritsumeikan Univ.)
 Tsuru Tatsuya
 (Tokyo Univ. of Information Sci.)

概要 This study reports on the dynamics of the Grover walk on a complete graph with a self-loop at each vertex, and its application to the absolute zeta function. It is well known that the Grover walk on a standard complete graph generally lacks periodicity for integers greater than or equal to 4. However, on the complete graph, where a single self-loop is added to each vertex, the dynamics change fundamentally, exhibiting a finite period of $2n$. In this presentation, we perform a rigorous spectral analysis by block-diagonalizing the time-evolution matrix using the Fourier transform. Based on this analysis, we demonstrate that the corresponding absolute zeta function can be explicitly expressed as a finite product of multiple gamma functions.

- 31 佐藤大翼 (日大文理) Strongly Deza graph 上の Grover walk の周期性 15
齋藤 溪 (日大文理)
Daisuke Sato (Nihon Univ.) Periodicity of Grover walks on strongly Deza graphs
Kei Saito (Nihon Univ.)

概要 The Deza graph is a generalization of a strongly regular graph. It is a k -regular graph with n vertices such that, for any pair of distinct vertices, the number of common neighbors takes exactly two values, a and b ($a < b$). Associated with a Deza graph are two children graphs, G_A and G_B , where two vertices are adjacent whenever they have exactly a or b common neighbors, respectively. A Deza graph is called a strongly Deza graph if both children graphs are strongly regular. In this study, we investigate the periodicity of Grover walk on strongly Deza graphs. By combining spectral analysis with techniques from algebraic number theory, we examine the existence or nonexistence of periodicity.

- 32 永田 弐 経 (立命館大理工) Deterministic reduction and orthogonal local statistics for Grover walks
赤堀 次郎 (立命館大理工) on random lifts 15
今野 紀雄
 (立命館大理工・横浜国大・日大文理自然研)
佐藤 徹 (小山工高専)
鈴木 良一 (東京理大経営)
田村 勇真 (東京理大経営)
向井 悠之介 (立命館大理工)
Nino Nagata (Ritsumeikan Univ.) Deterministic reduction and orthogonal local statistics for Grover walks
Akahori Jiro (Ritsumeikan Univ.) on random lifts
Konno Norio
 (Ritsumeikan Univ./Yokohama Nat. Univ.*/Nihon Univ.)
Sato Iwao (Oyama Nat. Coll. of Tech.)
Suzuki Ryoichi (Tokyo Univ. of Sci.)
Yuma Tamura (Tokyo Univ. of Sci.)
Yunosuke Mukai (Ritsumeikan Univ.)

概要 The spectrum of the Grover matrix on a finite regular graph can be reduced to that of the simple random walk via the Konno–Sato formula. In this study, we consider random lifts of fixed 3-regular base graphs (K_4 and the Petersen graph). By applying an exact compression, we remove the deterministic old sector inherited from the base graph and focus on the positive Grover eigenangle process in the new sector. We establish a Kesten–McKay-type global law for this sector. Furthermore, our numerical analysis of local statistics, using nearest-neighbor spacings and spacing ratios, demonstrates strong consistency with the orthogonal random-matrix benchmark.

- 33 久保田 匠 (愛知教育大教育) Arc search in graphs via Szegedy walks 15
吉野 聖人 (東邦大理)
Sho Kubota (Aichi Univ. of Edu.) Arc search in graphs via Szegedy walks
Kiyoto Yoshino (Toho Univ.)

概要 In this talk, we study the search for a single arc in a graph using the Szegedy walk. Arc search can be interpreted as finding a quantum particle not only in its position but also with a specific internal state. The quantum walk employed here is essentially the model proposed by Segawa and Yoshie for edge search. First, we investigate how graph symmetry is reflected in the time evolution matrix, and provide a sufficient condition under which the success probability is independent of the marked arc. In particular, if a graph is arc-transitive, this probability is independent of the choice of the marked arc. Next, we analyze path and cycle graphs and complete bipartite graphs, showing that the search is ineffective for path and cycle graphs but performs well for complete bipartite graphs.

9月3日(木) 第IX会場

9:30~12:00

- 34 大西 勇 (広島大 理) Algebraic variational framework for robust entanglement in driven-dissipative Kerr resonators: Foundations for integrated photonic quantum technologies 10

Isamu Ohnishi (Hiroshima Univ.) Algebraic variational framework for robust entanglement in driven-dissipative Kerr resonators: Foundations for integrated photonic quantum technologies

概要 We present a variational framework for robust entanglement in driven dissipative multi mode Kerr resonators for integrated photonic quantum technologies. Treating Wigner negativity volume as target observable in the quantized Lugiato Lefever equation, we apply super symmetric Lie observable dependent renormalization together with Golden Fractal Topology introducing golden ratio scaling nested couplings. After high order renormalization group reduction to quadratic model and super symmetric pairing between Kerr nonlinearity and dissipative jumps, the Lindblad dynamics shows variational equivalence between protected negativity flow and normal variation of nested minimal surface on the Golden Fractal manifold. We prove that entanglement measure equals fractal area of the minimal surface plus ultraviolet counterterm. This establishes a fractal generalization of the Ryu Takayanagi formula purely from algebraic and variational principles without Einstein equations or bulk metric. The framework unifies Wigner negativity theorems in open quantum optics with variational holographic principles and delivers predictions for quantum frequency comb stabilization and cat encoded photonic qubits. Simulations confirm the fractal area law.

- 35 大西 勇 (広島大 理) Lie-algebraic observable-dependent renormalization with transactional handshakes: Advanced/retarded observable sectors and bidirectional RG flows in open quantum systems 10

Isamu Ohnishi (Hiroshima Univ.) Lie-algebraic observable-dependent renormalization with transactional handshakes: Advanced/retarded observable sectors and bidirectional RG flows in open quantum systems

概要 We develop a bidirectional extension of Lie algebraic observable dependent renormalization incorporating advanced and retarded observable sectors on equal footing. Motivated by the Wheeler Feynman absorber theory and recent experiments on advanced electromagnetic radiation, we introduce a transactional Lie bracket on the direct sum of retarded and advanced algebras to encode emitter absorber handshakes. We construct a bidirectional renormalization map satisfying direct sum compatibility, transactional covariance, and complete positivity preservation. Under a Lipschitz condition on the transactional beta operator, we prove the existence of a unique transactional fixed point invariant under the renormalization flow and establish trace norm convergence to this fixed point. The framework provides a consistent setting for advanced boundary conditions in observable dependent renormalization without violating complete positivity. Applications include non Markovian open quantum dynamics, symmetry protected subspaces in quantum error correction, and extensions of holographic entanglement entropy with future directed contributions. Open questions on unbounded observables and experimental implications are discussed.

- 36 V. Syrjaenen (京都先端科学大工) On the maximum ionization problem's constant for Hartree-Fock 15
 Ville Syrjaenen On the maximum ionization problem's constant for Hartree-Fock
 (Kyoto Univ. of Adv. Sci.)

概要 Experimentally, we understand that one cannot keep adding electrons to an atomic or a molecular system indefinitely and expect it to bind them. However, proving this mathematically is challenging. One way forward is to consider a reduced space of systems; for this talk, we will consider the Hartree-Fock model. Even then, our current proofs do not disallow the possibility of very strongly negatively charged ions. This talk will discuss the proof for the maximum charge a negative ion may have in the Hartree-Fock setting.

- 37 山口哲志 (一橋大経済) Large-scale numerical experiments on Hardy conjecture for the Gauss
 藤間昌一 (茨城大理) circle problem 15
 倉坪茂彦 (弘前大*)
 中井英一 (茨城大理)
 米田剛 (一橋大経済)
 Satoshi Yamaguchi (Hitotsubashi Univ.) Large-scale numerical experiments on Hardy conjecture for the Gauss
 Fujima Shoichi (Ibaraki Univ.) circle problem
 Kuratsubo Shigehiko (Hirotsaki Univ.*)
 Eiichi Nakai (Ibaraki Univ.)
 Yoneda Tsuyoshi (Hitotsubashi Univ.)

概要 The Gauss circle problem concerns the error term $E(t) = A(t) - \pi t$, where $A(t)$ denotes the number of lattice points inside the circle $x^2 + y^2 \leq t$. A famous conjecture of Hardy states that $E(t) = O(t^{1/4+\varepsilon})$ for every $\varepsilon > 0$. In this talk, we report large-scale numerical computations of $E(t)$ carried out on a supercomputer. Extending previous computations, we evaluate $E(t)$ for values of t up to 1.22×10^{18} . Using a least-squares analysis of the computed data, we estimate the growth exponent θ in the relation $E(t) = O(t^\theta)$ and obtain the numerical value $\theta \approx 0.26$. This value is close to the exponent $1/4$ predicted by Hardy conjecture. The computed data therefore provide further numerical support for the validity of Hardy conjecture.

- 38 鷲野朋広 (奈良工高専) 3層ニューラルネットワークの特異領域における学習係数の計算 15
 高橋正 (羽衣国際大現代社会)
 Tomohiro Washino Computation of learning coefficients in the singular regions
 (Nat. Inst. of Tech., Nara Coll.)
 Tadashi Takahashi
 (Hagoromo Univ. of Int. Stud.)

概要 We consider a three-layer neural network with two hidden units as the statistical model. Watanabe resolved the singularities and defined the learning coefficient [1]. Amari analyzed the learning dynamics in singular regions by applying coordinate transformations [2]. We computed the true parameter set and the singularity set that realizes the true distribution [3]. When the number of hidden units decreases from two to one, the Kullback information between the statistical model and the true distribution is known to be expressible as a finite sum of squares of polynomials. In this presentation, for the singular points that realize the true distribution, we repeatedly apply blow-ups in the singular regions and compute the learning coefficient using Mathematica.

- 39 池田 幸太 (明大総合数理) 最適速度モデルから導出される差分微分方程式における周期解 15
 宮路 智行 (京大理)
 Kota Ikeda (Meiji Univ.) Periodic solution in a difference-differential equation derived from the
 Tomoyuki Miyaji (Kyoto Univ.) optimal velocity model

概要 This study investigates periodic solutions of a differential-difference equation derived from the Optimal Velocity (OV) model for traffic flow. Numerical results indicate that the periodic solution consists of two flat regions, corresponding to the free-flow and congested phases, connected by transition layers. The purpose of this study is to construct a periodic solution by combining two monotone functions characterized by a limit equation. Due to analytical difficulties in directly applying the contraction mapping principle, we introduce a modified equation under a density conservation constraint. This modification ensures the invertibility of the linearized operator. We rigorously prove the existence of the periodic solution for sufficiently large parameters, providing a mathematical justification for the structural profile of traffic congestion.

- 40 木村 正人 (金沢大理工) P1 有限要素法に基づく 2D/3D 線形弾性体のばねブロック近似における
 O. Ounissi (金沢大自然) 隠れた対称性と正定性 15
 野津 裕史 (金沢大理工)
 Masato Kimura (Kanazawa Univ.) Hidden symmetry and positive definiteness of spring-block approxima-
 Oussama Ounissi (Kanazawa Univ.) tions derived from P1-FEM for 2D/3D linear elasticity
 Hirofumi Notsu (Kanazawa Univ.)

概要 This talk presents a mathematical study of hidden symmetry and positive definiteness of tensor-valued spring constants arising in spring-block approximations of linear elasticity derived from P1-FEM. The hidden symmetry refers to the matrix symmetry $K_{ij} = K_{ij}^T$, which does not follow directly from the classical major and minor symmetries of the elasticity tensor but emerges from the structure of the finite element discretization. While this property was previously established in two dimensions, its extension to three dimensions is highly nontrivial. Using an identity involving jumps of finite element gradients, we provide a unified 2D/3D proof of the hidden symmetry. We also derive necessary and sufficient conditions for positive definiteness and discuss implications for spring-block fracture models.

- 41 野津 裕史 (金沢大理工) 1 次元移流拡散方程式に対するラグランジュ・ガレルキン移動メッシュ法
 プトリカリスマスリャ の誤差評価 15
 (金沢大理工)
 コルベニクラス
 (RWTH Aachen Univ.)
 鈴木 佑 (金沢大理工)
 Hirofumi Notsu (Kanazawa Univ.) Error estimates for Lagrange–Galerkin moving mesh methods for the
 Kharisma Surya Putri one-dimensional convection-diffusion equation
 (Kanazawa Univ.)
 Niklas Kolbe (RWTH Aachen Univ.)
 Tasuku Suzuki (Kanazawa Univ.)

概要 We present first- and second-order Lagrange–Galerkin moving mesh schemes for a one-dimensional convection-diffusion equation. The mesh movement is governed by a discretized dynamical system that allows the mesh nodes to follow the transport and diffusion of the solution. We prove mesh validity, discrete mass conservation, stability, and optimal convergence for both schemes. A key ingredient is a new estimate for a time-dependent interpolation operator on moving finite element spaces. Numerical experiments confirm the theoretical results and demonstrate that the proposed method can significantly improve the accuracy of conventional fixed-mesh Lagrange–Galerkin schemes for solutions with sharp gradients or concentration phenomena.

- 42 陳 逸 軒 (阪 大 情 報) A GPU-accelerated micropolar δ^+ -SPH framework with enhanced particle shifting for complex fluid dynamics 15
 邵 其 然 (阪 大 情 報)
 杉 山 由 恵 (阪 大 情 報)
Yixuan Chen (Univ. of Osaka) A GPU-accelerated micropolar δ^+ -SPH framework with enhanced particle shifting for complex fluid dynamics
Qiran Shao (Univ. of Osaka)
Yoshie Sugiyama (Univ. of Osaka)

概要 We present a weakly-compressible micropolar δ^+ -SPH framework for complex fluid dynamics. At usable resolutions, standard SPH dissipates vorticity rapidly and develops irregular particle distributions. Our solver addresses both: an enhanced particle-shifting technique maintains a uniform distribution while suppressing spurious scattering near free surfaces, and a micropolar formulation preserves vorticity through a two-way coupling between the velocity and an independent micro-rotation field. The entire pipeline runs on the GPU via cross-vendor OpenGL compute shaders, enabling real-time visualization on NVIDIA, AMD, and Intel hardware. We validate against lid-driven cavity, elliptical-cylinder, and NACA0015-airfoil benchmarks, agreeing with published reference data. On a single RTX 5090, the solver exceeds 300 fps for one million particles.

14:15~16:15

- 43 奥 村 真 善 美 (甲南大知能情報) SBP-SAT 法を用いた動的境界条件下の Allen–Cahn 方程式に対する構造保存スキーム 15
Makoto Okumura (Konan Univ.) A structure-preserving scheme for the Allen–Cahn equation with dynamic boundary conditions using the SBP-SAT method

概要 Recently, Umezu et al. have designed a spatially high-accuracy structure-preserving scheme based on the discrete variational derivative (DVD) method by Furihata and Matsuo, using the SBP operator, which corresponds to the discrete space derivative, and a projection matrix. However, constructing such a projection matrix is difficult for complex boundary conditions, such as dynamic boundary conditions that include the time derivative of an unknown function. Thus, in this study, instead of using a projection matrix, we incorporated a simultaneous approximation term corresponding to the residual of the boundary conditions. This enabled us to design a spatially high-accuracy DVD scheme for the Allen–Cahn equation under dynamic boundary conditions. Indeed, through numerical examples, we confirmed that the proposed scheme achieves high spatial accuracy.

- 44 土 屋 拓 也 (明治学院大経済) 非線型相互作用項をもつ Klein–Gordon–Proca 系の構造保存型数値計算
 中 村 誠 (阪 大 情 報) について 15
Takuya Tsuchiya (Meiji Gakuin Univ.) Structure-preserving numerical calculations of the Klein–Gordon–Proca
Makoto Nakamura (Univ. of Osaka) system with a nonlinear interaction term

概要 We construct a system with a nonlinear interaction term for the Klein–Gordon equation for a scalar field and the Proca equation for a vector field, and aim to apply structure-preserving numerical computation. Furthermore, we construct initial values that satisfy the constraints and present the results of applying this structure-preserving numerical computation.

- 45 石井 克幸 (神戸大 海事) 平均曲率流方程式の障害物問題に対する時間周期解について 15
 小池 茂昭 (早大 理工)
 大塚 岳 (東京理大創域理工)

Katsuyuki Ishii (Kobe Univ.) Time periodic solutions of mean curvature flow equation with bilateral
 Shigeaki Koike (Waseda Univ.) obstacles
 Takeshi Ohtsuka (Tokyo Univ. of Sci.)

概要 The existence of time-periodic solutions of fully nonlinear second-order parabolic equations with bilateral obstacles is studied. For a given pair of time-periodic bilateral obstacles and a viscosity solution of the obstacle problems for mean curvature flow, we construct a time-periodic viscosity solution. This result is established with the comparison principle of time periodic solutions and Barles–Perthame’s limit procedure by an approximating equation for the mean curvature flow equation. Several numerical simulations in this study are also presented in this talk.

- 46 中村 遥河 (東大 数理) Hamilton–Jacobi–Bellman 方程式に対する単調スキームとその収束性について 15

Haruka Nakamura (Univ. of Tokyo) On a monotone scheme for Hamilton–Jacobi–Bellman equations and its convergence

概要 This study proposes a numerical scheme for Hamilton–Jacobi–Bellman (HJB) equations in a setting where the Hamiltonian is prescribed directly. Most existing HJB solvers rely on Lagrangian-based formulations, with semi-Lagrangian schemes being a representative example. Such schemes must solve many minimization problems, which can make them computationally costly. In contrast, when the Hamiltonian is available, the HJB equation can be discretized directly, avoiding such minimization problems. We then construct a monotone scheme inspired by the monotone scheme of Crandall and Lions. As a key feature, despite the presence of diffusion terms, the CFL condition for the proposed explicit scheme remains comparable to that for first-order PDEs. We further derive error estimates for viscosity solutions and present numerical results.

- 47 石渡 哲哉 状態依存遅れが引き起こす解の爆発について 15
 (芝浦工大システム理工)

西口 純矢
 (摂南大理工・東北大 AIMR)
 Tetsuya Ishiwata Blow-up of solutions induced by state-dependent delays
 (Shibaura Inst. of Tech.)

Junya Nishiguchi
 (Setsunan Univ./Tohoku Univ.)

概要 State-dependent delays introduce additional nonlinear effects into delay differential equations. In this talk, we discuss the role of such nonlinearities in the finite-time blow-up of solutions. Focusing on the dependence of the delay on the solution, we derive sufficient conditions under which positive solutions blow up in finite time. The results indicate that the state dependence of the delay itself can act as a mechanism leading to blow-up. We also present numerical experiments illustrating the theoretical results and discuss several cases in which the sufficient conditions are not satisfied.

- 48 石井宙志 (北大電子研) Boundary-induced nonlocal kernels generated by reaction-diffusion systems on the half-line 15
- Hiroshi Ishii (Hokkaido Univ.) Boundary-induced nonlocal kernels generated by reaction-diffusion systems on the half-line

概要 This talk addresses time-evolution equations with nonlocal interactions on a domain with a boundary and investigates how boundary conditions determine the form of the nonlocal kernel. As a fundamental setting, we consider the half-line and derive nonlocal interactions from reaction-diffusion systems with boundary conditions at the origin. We characterize a class of nonlocal kernels that finite linear combinations of the Green functions of the corresponding elliptic problem can approximate. This provides a characterization of a class of nonlocal kernels generated by reaction-diffusion dynamics with boundary effects.

- 49 長山ゆい (北大理) 非局所移流項を持つ反応拡散方程式における分岐と多重安定性 15
- 長山雅晴 (北大電子研)
- 石井宙志 (北大電子研)
- Yui Nagayama (Hokkaido Univ.) Bifurcation and multistability in a reaction-diffusion equation with non-
- Masaharu Nagayama (Hokkaido Univ.) local advection
- Hiroshi Ishii (Hokkaido Univ.)

概要 We investigate bifurcation and multistability in a reaction-diffusion equation with nonlocal advection by combining local and numerical bifurcation analysis. The nonlocal advection term represents interaction effects through convolution with a kernel; the kernel shape characterizes aggregation or repulsion, while a model parameter controls the interaction strength. By local bifurcation analysis, we rigorously prove the existence of pitchfork bifurcations from the trivial solution and show that their direction is determined by the unstable Fourier mode and the Fourier transform of the kernel. We further prove that the bifurcation is subcritical for kernels satisfying a suitable condition. Finally, numerical bifurcation analysis for several kernels reveals multistability associated with such subcritical bifurcations, including coexistence of the trivial solution with nontrivial stationary or periodic solutions.

16:30~17:30 特別講演

- 田崎創平 (北大理) 細菌の細胞社会形成の数理
- Sohei Tasaki (Hokkaido Univ.) Mathematics of bacterial community formation

概要 Microbial communities organize into colonies and, under specific environmental conditions, mature into robust biofilms through complex self-organization. Despite their prevalence, standard methodologies for bridging the gap between single-cell behaviors and tissue-level emergent patterns remain elusive. In this talk, we present mathematical advances in bacterial community formation, focusing on how evolutionarily shaped motility responses to resources drive these processes. By examining optimization problems for diffusive motility and chemotaxis, we have established a robust modeling framework to identify primary response functions. We further utilize this framework to analyze the existence and dynamics of traveling fronts and pulses, demonstrating the principles underlying pattern selection. Finally, we discuss a multilevel modeling approach to predict the diverse collective morphologies of *Escherichia coli* and *Bacillus subtilis*, aiming to uncover the universal principles by which individual cells transition into complex multicellular systems.

9月4日(金) 第IX会場

9:30~12:00

- 50 渡部善隆 (九大情報基盤研究開発センター) 特異項を持つ無限次元微分作用素の精度保証付き逆作用素ノルム評価の効率化 15
小林健太 (一橋大経営管理)
Yoshitaka Watanabe (Kyushu Univ.) Efficient numerical verification procedure of norm bound for infinite-dimensional differential operator with singular term
Kenta Kobayashi (Hitotsubashi Univ.)

概要 This talk presents a numerical verification procedure for a norm bound on an infinite-dimensional differential operator. The operator comes from a nonlinear ordinary differential equation involved with self-similar blowup in wave equations and has a singular term. Our procedure was inspired by a result of Buenger and Rump (Inter. Equ. Oper. Theory, 2019), which it generalizes. Concrete verification examples reveal the effectiveness of the proposed approach.

- 51 宮島信也 (東北大情報) Numerical computation of the complementary error matrix function .. 15
A. Sadeghi (Islamic Azad Univ.)
Shinya Miyajima (Tohoku Univ.) Numerical computation of the complementary error matrix function
Amir Sadeghi (Islamic Azad Univ.)

概要 A solution to systems of partial differential equations can be written by using the complementary error matrix function. In this talk, we propose three numerical algorithms for computing the matrix function. The first, second, and third algorithms are based on the truncation of the Taylor expansion, Gauss–Legendre quadrature, and quadrature based on the double exponential formula, respectively. The first algorithm is designed such that the truncation error is equal or smaller than a given tolerance. The second and third algorithms are constructed so that the sum of truncation and discretization errors is equal or smaller than the tolerance. Numerical experiments showed that the proposed algorithms improve upon the use of general purpose alternatives when the input matrix is unsymmetric or the norm of the matrix is not large.

- 52 土屋卓也 (阪大MMDs・愛媛大*) Error analysis of Raviart–Thomas interpolation on anisotropic simplicial elements 15
小林健太 (一橋大経営管理)
Takuya Tsuchiya Error analysis of Raviart–Thomas interpolation on anisotropic simplicial elements
(Osaka Univ./Ehime Univ.*)
Kenta Kobayashi (Hitotsubashi Univ.)

概要 In this presentation, we provide an error estimation of Raviart–Thomas interpolation of degree 0 on anisotropic simplices without imposing any geometric condition on the elements. Although the results are known, we present an alternative proof using a unified approach based on the Babuska–Aziz trick.

- 53 本永翔也 (九工大情報工) ある連立遅延微分方程式系に対する星形周期解の計算機援用存在証明 .. 15
高安亮紀 (筑波大システム情報)
Shoya Motonaga Computer-assisted existence proofs for star-shaped periodic solutions of a system of delay differential equations
(Kyushu Inst. of Tech.)
Akitoshi Takayasu (Univ. of Tsukuba)

概要 This talk presents computer-assisted existence proofs for star-shaped periodic solutions of a system of delay differential equations introduced by Hara et al. The system extends classical scalar delayed feedback equations and exhibits rich dynamics, including circular periodic orbits and conjectured star-shaped solutions. We focus on specific parameter values and prove the existence of the corresponding star-shaped solutions. The key idea is an ansatz $z(t) = e^{i\mu t}w(t)$, where $w(t)$ is 2-periodic, which reduces the problem to a validated Fourier spectral computation. Using rigorous a posteriori estimates for a Newton-type operator, we prove the existence of these star-shaped periodic solutions.

- 54 穴田 浩一 (早大高等学院) ある準線形放物型偏微分方程式の球対称な自己相似解に関する一考察 . . 15

石渡 哲哉

(芝浦工大システム理工)

牛島 健夫 (東京理大理工)

Koichi Anada

(Waseda Univ. Senior High School)

Tetsuya Ishiwata

(Shibaura Inst. of Tech.)

Takeo Ushijima (Tokyo Univ. of Sci.)

A Remark on radially symmetric self-similar solutions of a quasilinear parabolic partial differential equation

概要 In this talk, we consider radially symmetric self-similar solutions to a quasi-linear parabolic partial differential equation, known as the curvature equation in the curve shortening problem for convex curves, and as the equation governing the resistive diffusion model of a force-free magnetic field in plasma confined between two walls. We first prove the existence of nontrivial, radially symmetric self-similar solutions. Next, we investigate their properties by introducing special radial functions defined in terms of Bessel functions. This motivation is connected to earlier work on finite-time blow-up in a quasi-linear parabolic partial differential equation.

- 55 松江 要 振動爆発解の無限遠ダイナミクスと漸近展開由来の構造の対応 15

(九大IMI・九大I2CNER)

Kaname Matsue

(Kyushu Univ./Kyushu Univ.)

Correspondence between dynamics at infinity and asymptotic-expansion structures for oscillatory blow-up solutions

概要 We study type-I oscillatory blow-up solutions of ordinary differential equations. Previous studies showed that periodic orbits on the boundary of a compactified phase space induce periodic blow-up solutions, and that stationary blow-up admits a correspondence between the balance law from asymptotic expansions and dynamics at infinity. In this talk, we extend this correspondence to periodic blow-up using Floquet theory and invariant subbundles for linear differential equations. In particular, we show that a hyperbolic periodic orbit of the balance law yields a finite-time blow-up solution with oscillatory behavior.

- 56 矢ヶ崎 一幸 (京大*) 微分同相写像に対する可積分性の定義 15

Kazuyuki Yagasaki (Kyoto Univ.*)

Definition of integrability of diffeomorphisms

概要 Motivated by Bogoyavlenskij's definition of integrability for systems of differential equations, we propose a notion of integrability for diffeomorphisms that need not be symplectic. We further prove a Liouville–Arnold type theorem and discuss its relations to the standard definition of integrability for symplectic diffeomorphisms.

- 57 矢ヶ崎 一幸 (京大*) 微分同相写像の線形化と可積分性 15

Kazuyuki Yagasaki (Kyoto Univ.*)

Linearization and integrability of diffeomorphisms

概要 We extend previous results for ordinary differential equations to discrete dynamical systems generated by diffeomorphisms. In particular, adopting a recently introduced definition of integrability, we show that many diffeomorphisms are linearizable and integrable on suitable regions of the phase space.

- 58 石 原 有 喜 (帝京大理工) 回転構造の見直し—焦点をシステムからプロセスへ— 12
 中 宮 賢 樹 (帝京大理工)
Yuki Ishihara (Teikyo Univ.) Reconsidering the structure of rotation: From systems to processes
Masaki Nakamiya (Teikyo Univ.)

概要 In the conventional rotation representations such as $SO(3)$ and $SU(2)$, the rotation process is specified by an initial system and a final system. Within this framework, the initial and final systems are considered primary because the process is characterized by the system. On the other hand, the intermediate rotation process through which the system reaches its final system is typically regarded as secondary. However, rotation can also be reconsidered as a relational structure of rotation processes when the relations among the processes are treated as primary. Therefore, this perspective may provide a basis for reexamination rotation theory in terms of how process structures are organized by rotation relations.

14:15~16:15

- 59 近 藤 真 純 (岡山理大理工) Conditional Ulam stability for fish growth model with Allee effect 15
 鬼 塚 政 一 (岡山理大理)
Masumi Kondo (Okayama Univ. of Sci.) Conditional Ulam stability for fish growth model with Allee effect
Masakazu Onitsuka
 (Okayama Univ. of Sci.)

概要 In this study, we examine the conditional Ulam stability of the von Bertalanffy model incorporating the Allee effect. The von Bertalanffy model is known as a model that describes fish weight growth. The Allee effect refers to the phenomenon whereby survival and reproduction become more difficult as the population size of an organism decreases. Furthermore, Ulam stability means that the difference between the exact solution and the approximate solution is at most bounded. In other words, Ulam stability is a concept that guarantees the stability of the model itself.

- 60 長 山 雅 晴 (北大電子研) 枯草菌コロニー形成の数理モデル 15
 田 崎 創 平 (北 大 理)
 中 山 ま ど か (東京科学大ILA)
 魚 川 柊 悟 (北 大 理)
 納 谷 敬 介 (北 大 理)
Masaharu Nagayama (Hokkaido Univ.) Mathematical modeling of bacterial colony formation
Sohei Tasaki (Hokkaido Univ.)
Madoka Nakayama (Sci. Tokyo)
Shugo Uokawa (Hokkaido Univ.)
Keisuke Naya (Hokkaido Univ.)

概要 The purpose of this study is to construct a mathematical model that describes the colony formation process of *Bacillus subtilis* and to reproduce the experimentally reported morphological phase diagram. In particular, this study focuses on the formation of concentric-ring patterns and proposes a new mathematical model that incorporates recent biological findings on cell-state transitions in *Bacillus subtilis*.

- 61 李 澤 旭 (北 大 理) バクテリアの栄養走性によるリング形成の数理解析 15
 中山 ま ど か (東京科学大ILA)
 Changwook Yoon
 (Chungnam National Univ.)
 田 崎 創 平 (北 大 理)
 Zexu Li (Hokkaido Univ.) Mathematical analysis of ring formation driven by bacterial trophotaxis
 Madoka Nakayama (Sci. Tokyo)
 Changwook Yoon
 (Chungnam National Univ.)
 Sohei Tasaki (Hokkaido Univ.)

概要 This study investigates bacterial chemotactic ring formation driven by nutrient consumption. By analyzing a one-dimensional nonlinear reaction-diffusion system where nutrient diffusion is negligible, we mathematically prove the existence of classical traveling wave solutions connecting two equilibria via phase-plane analysis. We also derive specific conditions for monotonic density profiles of bacteria. Numerical simulations reveal two distinct traveling wave types: front waves and pulse waves. Further numerical result analyze how key parameters govern wave speed and amplitude. This demonstrated partial agreement between the theoretical analysis and the numerical results regarding the traveling wave speed.

- 62 岡 本 朋 揮 (武蔵野大工) Monotonicity of two eigenvalues arising from a nonlocal term in a lin-
 森 竜 樹 (武蔵野大工) earized eigenvalue problem for a 1D phase-field model 15
 Tomoki Okamoto (Musashino Univ.) Monotonicity of two eigenvalues arising from a nonlocal term in a lin-
 Tatsuki Mori (Musashino Univ.) earized eigenvalue problem for a 1D phase-field model

概要 We investigate the spectral structure of a nonlocal linearized eigenvalue problem arising from a one-dimensional phase-field model. Because of the nonlocal term, Sturm–Liouville theory cannot be applied, and additional ideas are required to understand the spectral structure. Miyamoto–Mori–Tasaki–Tsuji-kawa–Yotsutani (JDE, 2025) considered the case in which the coefficient multiplying the nonlocal term is small. They determined the spectral structure around symmetric solutions and described the behavior of the eigenvalues. In this talk, we consider the case in which this coefficient is large. We prove that the monotonicity of the two eigenvalues arising from the nonlocal term changes as the diffusion coefficient varies, and that both eigenvalues are monotone in the diffusion coefficient when the parameter multiplying the nonlocal term exceeds 4.

- 63 渡 邊 陸 (北 大 理) 細胞極性を記述するバルク-表面反応拡散系における領域形状に依存した
 パルスダイナミクス 15
 Riku Watanabe (Hokkaido Univ.) Geometry-induced pulse dynamics in a bulk-surface reaction-diffusion
 system for cell polarization

概要 This talk is about a bulk-surface reaction-diffusion system modelling cell polarization in a two-dimensional domain. Using singular perturbation methods, we formally derive reduced ordinary differential equations describing the wave-pinning dynamics on a fast time scale and the subsequent slow drift of pulse solutions induced by domain geometry. The resulting slow dynamics is a gradient flow of a potential function whose geometry-dependent part is expressed in terms of the Neumann Green’s function. We then analyze the reduced dynamics in several concrete geometries, including dumbbell-shaped domains and perforated disks. In these examples, we characterize stationary pulse positions, their stability, and the bifurcation structures arising from changes in geometric parameters.

- 64 寺 本 敬
(京都女大データサイエンス) Localized radially symmetric spot solutions in a singularly perturbed FitzHugh–Nagumo model 10
Takashi Teramoto Localized radially symmetric spot solutions in a singularly perturbed
(Kyoto Women’s Univ.) FitzHugh–Nagumo model

概要 We investigate stationary localized spot solutions in a singularly perturbed FitzHugh–Nagumo-type model. Using an action functional approach, we derive existence conditions for radially symmetric spot solutions with N interfaces in two and three dimensions.

- 65 森 田 善 久 (龍 谷 大*) Nonconstant stable solutions to the bistable reaction-diffusion equation
物 部 治 徳 (阪 公 大 理) on metric tree graphs 15
Yoshihisa Morita (Ryukoku Univ.*) Nonconstant stable solutions to the bistable reaction-diffusion equation
Harunori Monobe (Osaka Metro. Univ.) on metric tree graphs

概要 The purpose of this study is to construct nonconstant stable solutions to a bistable reaction-diffusion equation on metric tree graphs subject to the Kirchhoff condition at the nodes and the Neumann condition at the endpoints. A metric tree graph is a connected graph without cycles and can be viewed as being composed of star graphs. Using the stable solutions on star graphs established in our previous work, we develop a gluing procedure for constructing stable solutions on metric tree graphs.

16:30～17:30 特別講演

- 時 枝 正 (スタンフォード大) 数も式もない計算
Tadashi Tokieda (Stanford Univ.) Calculation that involves neither numbers nor formulas

概要 Friction, viscosity, jamming, . . . we tend to pooh-pooh at these conditions as spoilers which dull life. This talk, however, will perform a few table-top demos and share a diversity of counter-intuitive phenomena that pop out of these conditions, and to understand them via minimal, widely applicable models.

トポロジー

9月1日(火) 第VII会場

9:30~12:00

- 1 坂井 健人 (東大数理) Large-scale geometry of electric Teichmüller spaces and k -multicurve graphs 15
 Kento Sakai (Univ. of Tokyo) Large-scale geometry of electric Teichmüller spaces and k -multicurve graphs

概要 The Teichmüller space of a finite-type surface S is the space of marked complex structures on S . For each simple closed curve on S , the corresponding thin part consists of Riemann surfaces on which the curve has sufficiently small length. The electric Teichmüller space is obtained by collapsing these thin parts. Masur and Minsky proved that the curve graph is quasi-isometric to the electric Teichmüller space. In this talk, we discuss a generalization of their result to k -multicurve graphs and describe the large-scale geometry of electric Teichmüller spaces.

- 2 早見 峻 (長野大共創情報) Quandles from gauge transformations 15
 Ryo Hayami (Nagano Univ.) Quandles from gauge transformations

概要 In this talk, I will introduce a quandle structure induced by an augmented rack arising from a gauge transformation group. I will explain how to construct a quandle from a principal bundle and its discrete generalization. When we see a group as a (discrete) principal bundle over a point, this quandle becomes equivalent to the generalized Alexander quandle for its inner automorphism. Moreover, I will introduce a Lie and Noether quandle structure from a smooth gauge transformation.

- 3 蒲谷 祐一 (北見工大工) コクセターカンドルの変種 15
 Yuichi Kabaya (Kitami Inst. of Tech.) Variants of Coxeter quandles

概要 We study two variants of Coxeter quandles, especially their inner automorphism groups. One is the quandle obtained by pulling back a Coxeter quandle to the Pin group. The other one is obtained as a subset consisting of right angle rotations in a Spin group.

- 4 白濱 瑞己 (立命館大理工) 一般化 w 不変量の関係式について 15
 Mizuki Shirahama (Ritsumeikan Univ.) Relations for the generalized w -invariant

概要 One of the fundamental questions in four-dimensional differential topology in which intersection forms can be realized by smooth 4-manifolds whose boundary is a homology 3-sphere. In this talk, we focus on the generalized w -invariant, which was introduced by Fukumoto and Furuta by applying an orbifold version of the 10/8-inequality arising from Seiberg–Witten theory. It is known that, for Seifert homology 3-spheres, the w -invariant agrees with the Neumann–Siebenmann $\bar{\mu}$ -invariant. On the other hand, the generalized w -invariant has aspects analogous to the Fintushel–Stern invariant arising from Donaldson theory, and its behavior with respect to Spin-c structures is not well understood. In this talk, we discuss to what extent the known relation between the w -invariant and the $\bar{\mu}$ -invariant extends to the generalized w -invariant.

- 5 和久田 葵 (東大数理) 閉曲面上の高べきループの Turaev cobracket 15
 Aoi Wakuda (Univ. of Tokyo) The Turaev cobracket of high powers of loops on closed surfaces

概要 The Turaev cobracket is a Lie cobracket defined on the free module generated by free homotopy classes of loops on a surface. Chas and Krongold proved that, for surfaces with boundary and negative Euler characteristic, the vanishing of the Turaev cobracket of α^n ($n \geq 3$) is equivalent to α being a power of a simple closed curve. They also showed that, for $n \geq 4$, the self-intersection number of α is determined by the number of terms appearing in the Turaev cobracket of α^n . In this talk, we prove that both results remain valid for closed orientable surfaces. In particular, the corresponding statements hold for $n \geq 3$ and $n \geq 12$, respectively.

- 6 和久田 葵 (東大数理) Goldman Lie 代数における単純閉曲線の可換元 15
 A. Kabiraj
 (Indian Inst. of Tech. Palakkad)
 Aoi Wakuda (Univ. of Tokyo) Centralizers of simple closed curves in the Goldman Lie algebra
 Arpan Kabiraj
 (Indian Inst. of Tech. Palakkad)

概要 The Goldman Lie algebra is a Lie algebra defined on the free module generated by free homotopy classes of loops on a surface. Goldman proved that, for a simple closed curve x and a loop y , the Goldman bracket $[x, y]$ vanishes if and only if the geometric intersection number of x and y is zero. We extend this result from individual loops to arbitrary linear combinations by determining the centralizers of simple closed curves in the Goldman Lie algebra. More precisely, the centralizer of x is generated by free homotopy classes having zero geometric intersection number with x . As an application, we determine the center of the Goldman Lie algebra for surfaces of negative Euler characteristic other than pairs of pants. We also obtain analogous results for the homotopy skein algebra.

- 7 浜 天星 (日大総合基礎) アフィンカクタス群の CAT(0) 性と双曲性について 15
 Takatoshi Hama (Nihon Univ.) CAT(0) property and hyperbolicity of affine cactus groups

概要 In this presentation, we will first review the definition of affine cactus groups and then introduce our two main theorems.

- 8 逆井 卓也 (東大数理) Refinements of groups defined by Kim and Manturov 10
 田所 勇樹 (東京理大理)
 田中 心 (東京学大教育)
 Takuya Sakasai (Univ. of Tokyo) Refinements of groups defined by Kim and Manturov
 Yuuki Tadokoro (Tokyo Univ. of Sci.)
 Kokoro Tanaka (Tokyo Gakugei Univ.)

概要 We consider refinements of the groups Γ_n^4 defined by S. Kim and V. O. Manturov. We investigate the structure of these refinements from a group-theoretic point of view and compare them with the original groups.

14:20~15:20 特別講演

谷口正樹 (京大理) 4次元同境の幾何と Floer 理論

Masaki Taniguchi (Kyoto Univ.) Four-dimensional cobordisms and Floer theory

概要 The topology of smooth four-dimensional manifolds is deeply influenced by the behavior of their three-dimensional boundaries. I will discuss several problems in four-dimensional topology from this point of view: when a homology 3-sphere bounds a smooth homology 4-ball, when a boundary diffeomorphism extends over a 4-manifold, when a boundary (four dimensional) Dehn twist is smoothly isotopic to the identity, when a knot bounds a smoothly embedded disk in the 4-ball, and when two slice disks bounded by the same knot are exotically knotted.

In joint work with several groups of collaborators, we have developed variants of gauge-theoretic Floer theory to give partial answers to these problems. The main theories appearing in this talk are: filtered instanton Floer homology for 3-manifolds, filtered singular instanton Floer homology for knots, $\mathbb{Z}/p\mathbb{Z}$ -equivariant Seiberg–Witten Floer homotopy types for equivariant 3-manifolds, real Seiberg–Witten Floer homotopy types for knots. I will explain how these theories have been developed and survey several applications to four-dimensional cobordisms, diffeomorphisms, and knot concordance.

15:40~17:40

- 9 安田順平 (阪公大理) 2 プラット 2 次元結び目の分類 10

Jumpei Yasuda (Osaka Metro. Univ.) On the classification of 2-plat 2-knots

概要 An oriented 2-knot is called n -plat if it is isotopic to the plat closure of 2-dimensional $2n$ -braid. Every 1-plat 2-knot is a trivial 2-knot. In this talk, we classify 2-plat 2-knots up to ambient isotopy. To classify them, we introduce a new invariant of 2-knots. Furthermore, we show that it is an obstruction to invertibility of 2-knots.

- 10 門上晃久 (金沢大理工) The half Alexander polynomials of amphicheiral 2-bridge knots 15

Teruhisa Kadokami (Kanazawa Univ.) The half Alexander polynomials of amphicheiral 2-bridge knots

概要 For a negative amphicheiral knot, the Alexander polynomial of the knot decomposes into $f(t)f(t^{-1})$. Then we call $f(t)$ the half Alexander polynomial. We compute the half Alexander polynomial of an amphicheiral two bridge knot.

- 11 角田真一郎 (早大理工) 一般の色に対する色付き Jones 多項式の体積予想 15

Shinichiro Kakuta (Waseda Univ.) On the volume conjecture of the colored Jones invariants with arbitrary colors

概要 This talk concerns a volume conjecture for colored Jones invariants with sequences of colors corresponding to deformations of hyperbolic structures of link complements. I will discuss the cases of the figure-eight knot and the Borromean rings, and explain how certain asymptotic limits of the colored Jones invariants are related to the volumes of hyperbolic cone manifolds. The proof uses explicit finite-sum formulae, potential functions, volume formulae involving the Lobachevsky function, and the Poisson summation formula.

- 12 金 信 泰 造 (阪公大数学研) 結び目の4移動距離 II 10
 滝 岡 英 雄 (金 沢 大 理 工)
 Taizo Kanenobu (Osaka Metro. Univ.) 4-Move distance of knots II
 Hideo Takioka (Kanazawa Univ.)

概要 Changing 2 half twists to (-2) half twists in a knot, and its inverse operation, is called a 4-move. Since it remains an open problem whether the 4-move is an unknotting operation, we define the 4-move distance as the minimum number of 4-moves required to transform one knot into another, allowing for infinity. In particular, the 4-move distance to the unknot is called the 4-move unknotting number. While lower bound estimation methods (1) through (6) had been previously obtained, we have now successfully established new lower bound estimation methods (7) through (10). As a result, we improve the table of 4-move unknotting numbers for knots with up to 9 crossings, as well as the table of 4-move distances for knots with up to 7 crossings.

- 13 堤 康 嘉 (神戸親和大教育) Purely cosmetic surgeries and Casson–Walker–Lescop invariants 10
 市 原 一 裕 (日 大 文 理)
 鄭 仁 大 (近 畿 大 理 工)
 Yasuyoshi Tsutsumi Purely cosmetic surgeries and Casson–Walker–Lescop invariants
 (Kobe Shinwa Univ.)
 Kazuhiro Ichihara (Nihon Univ.)
 In Dae Jong (Kindai Univ.)

概要 Using the rational surgery formula for the Casson–Walker–Lescop invariant of links in the 3-sphere, we show that any null-homologous knot in a rational homology sphere admits at most two pairs of integral purely cosmetic surgeries.

- 14 高 橋 夏 野 (日 大 理 工) 結び目トレースのトライセクション種数 15
 Natsuya Takahashi (Nihon Univ.) Trisection genus of knot traces

概要 The trisection genus is an integer-valued invariant of a smooth 4-manifold and can be considered a 4-dimensional analogue of the Heegaard genus of a 3-manifold. In this talk, we study the trisection genus of knot traces. We classify knot traces with trisection genus at most 2. In addition, we show that there exist infinitely many torus knots whose traces have trisection genus 3, as well as infinitely many hyperbolic knots whose traces have trisection genus 4.

- 15 M. Boileau (Aix-Marseille Univ.) A ribbon knot which is not a symmetric union 15
 北 野 晃 朗 (創 価 大 理 工)
 野 崎 雄 太 (北 大 理)
 Michel Boileau (Aix-Marseille Univ.) A ribbon knot which is not a symmetric union
 Teruaki Kitano (Soka Univ.)
 Yuta Nozaki (Hokkaido Univ.)

概要 A basic open question motivated by the study of ribbon knot diagrams asks whether every ribbon knot can be presented as a symmetric union. In this talk, we give a negative answer to this question by exhibiting a ribbon Montesinos knot which does not admit a symmetric union presentation.

9月2日(水) 第Ⅲ会場

10:00~10:15 2026年度日本数学会幾何学賞授賞式

10:20~11:20 2026年度日本数学会幾何学賞受賞特別講演 (幾何学学科会と合同)

馬場伸平 (阪大理) Riemann 面上の複素射影構造と曲面群の表現

Shinpei Baba (Univ. of Osaka) Complex projective structures on a Riemann surface and representations of the surface group

概要 Complex projective structures on a surface provide a rich interplay between Riemann surface structures, hyperbolic geometry, and representations of its fundamental group into $PSL(2, C)$. In particular, their holonomy representations are not necessarily discrete, and projective structures provide geometric meaning to such general representations. In this talk, we discuss various relations between complex projective structures and their holonomy representations.

13:00~14:00 2026年度日本数学会幾何学賞受賞特別講演 (幾何学学科会と合同)

安井弘一 (阪大情報) 4次元多様体のエキゾチック微分構造と種数関数

Kouichi Yasui (Univ. of Osaka) Exotic smooth structures on 4-manifolds and genus functions

概要 A central problem in 4-dimensional topology asks whether a given smooth 4-manifold admits an exotic smooth structure (i.e., another smooth 4-manifold homeomorphic but not diffeomorphic to the given one), and if so, whether it admits infinitely many pairwise non-diffeomorphic exotic smooth structures. To approach this problem, various methods for constructing and distinguishing exotic smooth structures have been developed over the past four decades. In this talk, I will survey some of these methods, focusing on the roles of handlebodies, corks, and genus functions. I will also discuss closely related topics such as exotically knotted submanifolds in 4-manifolds.

9月3日(木) 第Ⅶ会場

9:30~12:00

16 児玉大樹 (広島大SKCM2) ブーリアンネットワークの構造的振動性判定条件 15

Hiroki Kodama (Hiroshima Univ.) Structural oscillatory criterion of Boolean networks

概要 A Boolean dynamical system is a discrete dynamical system determined by a map

$$f: \{0, 1\}^N \rightarrow \{0, 1\}^N$$

on the finite set $\{0, 1\}^N$. When each component function f_i is monotone with respect to every variable, the system can be represented by a signed directed graph, called a Boolean network. Boolean networks have been extensively studied as models of gene regulatory networks and biochemical reaction systems.

In this talk, we present a graph-theoretic criterion for determining whether a Boolean network has no fixed points—that is, whether the associated dynamical system is oscillatory—using only the structure of the underlying network.

17 菅原朔見 (北大理) 位相的直線配置のトポロジー: コホモロジー環の組合せ的記述 10

Sakumi Sugawara (Hokkaido Univ.) Topology of topological line arrangements: Combinatorial description of the cohomology ring

概要 It is known that the cohomology ring of the complement of a hyperplane arrangement is isomorphic to the Orlik–Solomon algebra. This means the cohomology ring of the complement is determined by its combinatorial structure. In this talk, we generalize this result to topological line arrangements, which are defined as a union of embedded 2-spheres in the complex projective space. Since we cannot apply classical methods to prove, we developed a new homological method.

- 18 菅原 朔見 (北 大 理) 位相的直線配置のトポロジー: 補集合の極小性 10
 Sakumi Sugawara (Hokkaido Univ.) Topology of topological line arrangements: Minimality of the complement

概要 The complement of a complex hyperplane arrangement is an intersecting object from a topological viewpoint; for example, it yields many Eilenberg–MacLane spaces. It is known that the complement is homotopy equivalent to a minimal CW complex, a CW complex whose number of k -cells equals the k -th Betti number for each k . In this talk, we consider the minimality of the complements of topological line arrangements. We show that the complement of a symplectic line arrangement has a minimality. Also, we provide an example of topological line arrangement whose complement fails to the minimality.

- 19 山 岸 義 和 (龍谷大先端理工) 正単体の最遠点写像 10
 Yoshikazu Yamagishi (Ryukoku Univ.) The farthest point map on the regular simplex

概要 The farthest point map on the boundary of the regular n -simplex is a piecewise rational multimap. If n is greater than four, every farthest point is a vertex of the simplex. If we assume $n = 4$ and consider a farthest point q of some point p , then either q itself or its farthest point is a vertex. The ratio of the intrinsic radius to the intrinsic diameter decreases monotonically with respect to the dimension n .

- 20 西 島 昂 亮 (早 大 理 工) フラクタル・オイラー数とパーシステント・ホモロジー 15
 Kosuke Nishijima (Waseda Univ.) Fractal Euler number and persistent homology

概要 In the context of geometric measure theory, Llorente–Winter introduced the (average) fractal Euler number as a notion of the Euler characteristic for fractals embedded in Euclidean space. However, the class of fractals to which it is applicable remains very limited. In fact, their approach excludes even classical fractals such as the Cantor dust and the Menger sponge. In this talk, we present a modification of their definition by applying perspectives of persistent homology and partly the theory of magnitude, which have recently come from applied topology and category theory. We then demonstrate concrete calculation of our average ph-fractal Euler number for some classically well-known fractals, especially the Cantor dust and the Menger sponge.

- 21 玉 木 丞 (阪 大 理) 局所有限凸 2-配置の極小性 15
 吉 永 正 彦 (阪 大 理)
 Jo Tamaki (Univ. of Osaka) Minimality of locally finite convex 2-arrangement
 Masahiko Yoshinaga (Univ. of Osaka)

概要 A CW complex is called minimal if all boundary homomorphisms in its cellular chain complex are zero maps. Minimal CW complexes are important because they realize a given homotopy type with the smallest possible number of cells. Lofano and Paolini proved that the complements of the complexifications of locally finite real hyperplane arrangements are minimal. It is also known, by work of Adiprasito, that the complements of finite 2-arrangements are minimal. In this talk, the speakers will present a common generalization of these two previous results: the complement of a locally finite 2-arrangement restricted to a convex open set is minimal.

- 22 北 島 耀 (阪 大 理) 有限次数付き半順序集合のフィルター付き順序複体とマグニチュードホモロジー 15
 Yoh Kitajima (Univ. of Osaka) Filtered order complexes and magnitude homology of finite graded posets

概要 We study the family of subcomplexes of the order complexes of finite graded posets, defined via its rank function. Especially, we describe the general topological properties in relation to magnitude homology of graded posets. We also present some results on posets related to the triangulation of manifolds, and the intersection posets of hyperplane arrangements.

- 23 田 嶋 優 (佐世保工高専) Magnitude homology of metric fibrations 15
 浅 尾 泰 彦 (九 大 I M I)
 吉 永 正 彦 (阪 大 理)
 Yu Tajima (Sasebo Nat. Coll. of Tech.) Magnitude homology of metric fibrations
 Yasuhiko Asao (Kyushu Univ.)
 Masahiko Yoshinaga (Univ. of Osaka)

概要 T. Leinster introduced the notion of metric fibration, and proved that the magnitude of a metric fibration with finitely many points is equal to product of those of the base and the fiber. We proved the same is true for the magnitude homology using Algebraic Morse theory.

14:20~15:20 特別講演

- 浅 尾 泰 彦 (九 大 I M I) マグニチュードホモロジーから見たグラフのホモロジー
 Yasuhiko Asao (Kyushu Univ.) Graph homology viewed from magnitude homology

概要 Category theory and Euler characteristic are two fundamental ideas that play important roles throughout modern mathematics in different ways. Magnitude is a concept that emerged from an attempt to bring these ideas together, providing a common framework for studying seemingly different objects such as categories, graphs, and metric spaces.

In this talk, I will focus on magnitude homology, a categorification of magnitude, and introduce its definition and basic properties. I will then survey its connections with geometric group theory, path homology, and the representation theory of quivers. Through these connections, I hope to illustrate how the perspective of magnitude theory sheds new light on a variety of mathematical structures and problems.

15:40~17:10

- 24 黒 田 直 樹 (東 大 数 理) Unstable Thom spectra に対する Pontryagin–Thom 定理の精密化とその応用 15
 Naoki Kuroda (Univ. of Tokyo) A refinement of the Pontryagin–Thom theorem for unstable Thom spectra and its applications

概要 The Pontryagin–Thom construction relates cobordism groups to the homotopy groups of Thom spectra. This talk presents a refinement of this construction for unstable Thom spectra. The refinement gives a concrete geometric interpretation of the relevant homotopy groups and allows certain cobordism groups to be realized as homotopy groups of unstable Thom spectra. As an application, I discuss the existence problem for Spin manifolds whose boundary is S^n and which are equipped with a line subbundle orthogonal to the boundary, and determine exactly for which values of n such manifolds exist.

- 25 小 池 悠 耶 (阪 大 情 報) 3次元 locally standard T -pseudomanifold について 15
 Yuya Koike (Univ. of Osaka) On 3-dimensional locally standard T -pseudomanifolds

概要 In our previous work, we introduced locally standard T -pseudomanifolds, which are topological stratified pseudomanifolds equipped with torus actions. Their equivariant homeomorphism types were classified by characteristic data under a certain homotopy equivalence condition. Up to torus-equivariant homeomorphism, this class contains complete toric varieties and quasitoric manifolds (introduced by Davis and Januszkiewicz). In this talk, we show that this homotopy equivalence condition can be removed when the dimension is at most three.

- 26 多 寶 雅 樹 (東 大 数 理) Diffeological spaces with a non-smooth derivation 15
 Masaki Tahō (Univ. of Tokyo) Diffeological spaces with a non-smooth derivation

概要 We show that on certain diffeological spaces there exist linear derivations that satisfy the Leibniz rule but are not smooth with respect to the given diffeology. This reveals that the notion of tangent space defined via all such derivations is strictly larger than the one defined using only smooth derivations, showing that smoothness cannot be recovered from the Leibniz rule alone.

- 27 堀 内 遼 (佛 教 大 教 育) Lawvere クォンタールの Witt ベクトルについて 15
 Ryo Horiuchi (Bukkyo Univ.) On the Witt vectors in the Lawvere quantale

概要 Categories enriched over the Lawvere quantale $\mathbb{L}$ have been studied as generalized metric spaces. In this talk, we consider the monoidal category $\mathbb{W}(\mathbb{L})$ of Witt vectors in $\mathbb{L}$ and explore some basic properties of categories enriched over $\mathbb{W}(\mathbb{L})$. We also construct a monoidal functor from $\mathbb{L}$ to $\mathbb{W}(\mathbb{L})$, which induces a fully faithful functor from the category of $\mathbb{L}$ -enriched categories to that of $\mathbb{W}(\mathbb{L})$ -enriched categories, and investigate the relationship between them.

無限可積分系

9月1日(火) 第VIII会場

9:30~10:30

- 1 松ヶ下和也 (近畿大総合理工) $(A_5 + A_1)^{(1)}$ 対称性をもつ 4 次元パウルヴェ系の初期値空間 15
鈴木貴雄 (近畿大理工)
Kazuya Matsugashita (Kindai Univ.) Initial value space of the four dimensional Painlevé system with $(A_5 +$
Takao Suzuki (Kindai Univ.) $A_1)^{(1)}$ symmetry

概要 The initial value spaces of the Painlevé equations are proposed by Okamoto. They are symplectic manifolds in which the Painlevé equations are described as polynomial Hamiltonian systems on all coordinates. In this talk, we construct an initial value space of the four dimensional Painlevé system with affine Weyl group symmetry of type $(A_5 + A_1)^{(1)}$.

- 2 高崎金久 (京大*・阪大数学研) Direct linearization and Sato Grassmannian 15
Kanehisa Takasaki Direct linearization and Sato Grassmannian
(Kyoto Univ.* / Osaka Metro. Univ.)

概要 Fu and Nijhoff proposed an infinite matrix formalism for the direct linearization of Fokas and Ablowitz, and applied it to the KP hierarchy and its relatives as well as their reductions and special solutions. In this talk, I will point out that the Sato Grassmannian is hidden in the infinite matrix formalism of the direct linearization. To this end, I construct a matrix from the fundamental matrix U of the Fu–Nijhoff formalism, and show that it represent a point of the Sato Grassmannian that encodes the KP hierarchy.

- 3 加藤正輝 (立命館大情報理工) 多重対称関数と離散可積分系 15
Masaki Kato (Ritsumeikan Univ.) Multiple polylogarithms and discrete integrable systems

概要 This talk introduces an analogue of Schur-type quasisymmetric function defined using a two-parameter deformation L of multiple polylogarithms and explains its connection with discrete integrable systems. Analogous to the classical Jacobi–Trudi formula, this function admits a determinant representation. By combining this representation with q -difference relations satisfied by L , we derive a system of bilinear difference equations. In special cases, these equations reduce to the bilinear forms of known discrete integrable systems, including the R_I lattice and the discrete relativistic Toda lattice.

- 4 谷口東曜 (東大数理) The universal framed KZB connection in higher genera 15
Toyo Taniguchi (Univ. of Tokyo) The universal framed KZB connection in higher genera

概要 The Knizhnik–Zamolodchikov (KZ) connection is a flat connection on the configuration space of points in the complex plane. Its associated monodromy is described by multi-zeta values, and gives rise to an important example of a Drinfel’d associator. In particular, the pentagon relation, a non-linear equation automatically satisfied by the monodromy above, implies the double shuffle relation by the work of Furusho. The higher genus version of the KZ connection was introduced by Enriquez, leading to the definition of higher genus multi-zeta values, but may not have clear identities just like the pentagon relation. The talker introduces the framed KZB connection, which is an enhancement of Enriquez’s connection and satisfies a set of relations coming from surface braid groups.

10:45~11:45 特別講演

- 関 真 一 朗 調和数に関する Euler の恒等式の一般化
 (長浜バイオ大バイオサイエンス)
 Shin-ichiro Seki Generalizations of Euler's identity for harmonic numbers
 (Nagahama Inst. of Bio-Sci. and Tech.)

概要 Euler's identity for harmonic numbers, involving binomial coefficients, has been generalized in many directions. From the viewpoint of “multiple” analogues, one definitive formulation is the identity due to Hoffman and Kawashima, which itself can be further generalized in various directions. In this talk, I will present several generalizations obtained so far, including polylogarithmic, q -Ohno, and diamond versions, and then discuss their applications to multiple zeta values and finite multiple zeta values. The content of this talk is based on several joint works with Kenji Sakugawa, Shuji Yamamoto, Minoru Hirose, Takumi Maesaka, and Taiki Watanabe.

14:30~16:30

- 5 尾 角 正 人 (阪 公 大 理) Kirillov–Reshetikhin 加群に付随する幾何クリスタルの装飾関数について
 15
 Masato Okado (Osaka Metro. Univ.) Decoration functions for geometric crystals associated to Kirillov–Reshetikhin
 modules
- 6 赤 木 亮 太 (名 大 多 元 数 理) ランク 3 団輪状行列の G 扇の構造 15
 Ryota Akagi (Nagoya Univ.) Structure of G -fans associated with rank 3 cluster-cyclic exchange ma-
 trices

概要 In cluster algebra theory, G -fans are among the most important objects that express the periodicity of cluster patterns. In spite of this importance, their explicit structures are not well known due to the complexity of the fans. In this talk, I will explain the structures of the G -fans associated with cluster-cyclic exchange matrices and some corollaries. This talk is based on joint work with Zhichao Chen.

- 7 山 口 瑞 樹 (東大総合文化) 量子スピ系における Yang–Baxter 可積分性の直接判定法 15
 白 石 直 人 (東大総合文化)
 石 井 風 雅 (東 大 教 養)
 Mizuki Yamaguchi (Univ. of Tokyo) A direct criterion for Yang–Baxter integrability in quantum spin systems
 Naoto Shiraishi (Univ. of Tokyo)
 Fuga Ishii (Univ. of Tokyo)

概要 We present a direct criterion for Yang–Baxter integrability of quantum spin systems. For a nearest-neighbor Hamiltonian density h , the Reshetikhin condition is a necessary condition written solely in terms of h . It arises as the first nontrivial consistency condition in the expansion of the regular difference-form Yang–Baxter equation. We prove that this condition is also sufficient: if h satisfies the Reshetikhin condition, then there exists a regular difference-form R -matrix with $R(0) = P$ and $R'(0) = Ph$. The proof is based on an analysis of the Yang–Baxter defect. We also discuss its relation to a quantum Liouville–Arnold type problem.

- 8 小谷久寿 (九大IMI) The Kontsevich invariant and the action of the Grothendieck–Teichmüller group on 2-component string links 15
野崎雄太 (北大理)
Hisatoshi Kodani (Kyushu Univ.) The Kontsevich invariant and the action of the Grothendieck–Teichmüller group on 2-component string links
Yuta Nozaki (Hokkaido Univ.)

概要 The Kontsevich invariant of links is independent of the choice of associator, whereas for tangles this is not the case in general. In this talk, we focus on 2-component string links and investigate to what extent the Kontsevich invariant depends on the choice of associator. As an application, we show that the action of the unipotent part of the Grothendieck–Teichmüller group on the algebra of proalgebraic 2-component string links is non-trivial, which provides a partial answer to a problem posed by Furusho.

- 9 島崎達史 (明石工高専) 階段状 Young 図形のフック長比と Jacobi 多項式の特値 15
Tatsushi Shimazaki Staircase hook-length ratios and special values of Jacobi polynomials
(Nat. Inst. of Tech., Akashi Coll.)

概要 We study semistandard Young tableaux associated with staircase partitions. The ratio of the numbers of tableaux for adjacent staircase partitions is expressed as a special value of a Jacobi polynomial. We extend this result to the K -theoretic setting using Grothendieck polynomials and GP polynomials. Under the specialization corresponding to set-valued tableaux, we obtain a divisibility property by powers of 3 and discuss its combinatorial interpretation via excited Young diagrams.

- 10 藤井大計 (お茶の水女大理) 変形 Noumi–Sano 作用素の固有値問題の積分変換 15
信川喬彦 (皇學館大教育)
Taikei Fujii (Ochanomizu Univ.) Integral transform for eigenproblem of deformed Noumi–Sano operator
Takahiko Nobukawa (Kogakkan Univ.)

概要 The deformed Noumi–Sano operator $H_{n,m}(x, y; u)$ of trigonometric case is a difference operator with respect to x and y , given by power series of u . It is well-known that the super-Macdonald polynomials are eigenfunctions of $H_{n,m}(x, y; u)$. In special cases, the operator $H_{n,m}(x, y; u)$ reduces to the Macdonald–Ruijsenaars operator and Noumi–Sano operator. In this talk, we construct an integral transform associated with eigenvalue problem for $H_{n,m}^R(x, y)$, where $H_{n,m}(x, y; u) = \sum_{R=0}^{\infty} H_{n,m}^R(x, y) u^R$.

- 11 土見怜史 (近畿大総合理工) A generalization of the μ -function associated with the Kontsevich function 15
渋谷元樹 (北見工大工)
Satoshi Tsuchimi (Kindai Univ.) A generalization of the μ -function associated with the Kontsevich function
Genki Shibukawa
(Kitami Inst. of Tech.)

概要 In this talk, we introduce the big μ -function that is a one-parameter deformation of the (generalized) μ -function [ST], and show that it coincides with the q -Borel summation of a divergent series solution of the q -Kummer equation. Also, We present several identities satisfied by the big μ -function such as q -difference relations, connection formulas and symmetric properties. Furthermore, we describe its connection with the big q -Hermite polynomials.

9月2日(水) 第VIII会場

9:20~10:45

- 12 大島 利雄 (東大*) Riemann 球面上の線型微分方程式の分類 15
 Toshio Oshima (Univ. of Tokyo*) A classification of linear differential equations on the Riemann sphere

概要 Linear differential equations on the Riemann sphere are classified by their Riemann schemes, or spectral types. We consider irreducible equations admitting unramified irregular singularities and study transformations generated by Möbius transformations, additions, Laplace transformations, confluences and unfoldings. We show that complete representatives of equivalence classes defined by these transformations are given by Fuchsian equations with E_8 -fundamental spectral type.

- 13 松ヶ下 和也 (近畿大総合理工) 簾の合流に由来する 4 次元 q -ガルニエ系の退化 15
 鈴木 貴雄 (近畿大理工)
 土見 怜史 (近畿大総合理工)
 Kazuya Matsugashita (Kindai Univ.) A degeneration of the four dimensional q -Garnier system arises from
 Takao Suzuki (Kindai Univ.) confluences in quivers
 Satoshi Tsuchimi (Kindai Univ.)

概要 The q -Garnier system was first proposed by Sakai and its other directions of discrete time evolutions were given by Nagao and Yamada. Afterward, all of those directions of discrete time evolutions were derived from a birational representation of an extended affine Weyl group which arises from the cluster algebraic construction established by Masuda, Okubo and Tsuda. In this talk, we investigate a degeneration structure of the four dimensional q -Garnier system by using confluences in quivers.

- 14 長尾 秀人 (岐阜聖徳学園大教育) 離散パレルヴェ方程式の退化図式の変数化 15
 Hidehito Nagao Multivariable generalization of the degeneration diagram of discrete
 (Gifu Shotoku Gakuen Univ.) Painlevé equations

概要 Elliptic Garnier systems are known as multivariable analogues of the elliptic difference Painleve equation. In this talk, we discuss a multivariable generalization of the degeneration diagram of discrete Painleve equations, focusing on the degeneration from e-E8 type to q-E8 type and then to q-E7 type. In the discrete case, the increase of shiftable parameters can be regarded as an increase of independent variables, corresponding to the increase of dependent variables. We study whether the resulting multivariable Garnier-type systems can be described by birational transformations.

- 15 信川 喬彦 (皇學館大教育) Middle Laplace transform の q 類似と $A_4^{(1)}$ 型 q -Painlevé 方程式 15
 安達 駿弥 (宇都宮大教育)
 Takahiko Nobukawa (Kogakkan Univ.) A q -analog of middle Laplace transform and q -Painlevé equation of type
 Shunya Adachi (Utsunomiya Univ.) $A_4^{(1)}$

概要 Recently, the middle Laplace transform $\mathcal{ML}$ for linear differential equations is constructed as a Laplace transform analog of Katz's middle convolution. In this talk, we introduce a q -analog of $\mathcal{ML}$ and show its several properties. We also apply the q -middle Laplace transform to a Lax linear equation for q -Painlevé equation of type $A_4^{(1)}$.

- 16 渋川 元樹 (北見工大工) Three-term relations and some specializations of the μ function 15
 Genki Shibukawa Three-term relations and some specializations of the μ function
 (Kitami Inst. of Tech.)

概要 We derive explicit formulas for three-term relations of the μ function by the Al-Salam–Ismail polynomial. As an application, we provide explicit formulas for specializations of the μ function.

11:00~12:00 特別講演

L. Vinet (Univ. de Montreal) Algebras and bispectrality

Luc Vinet (Univ. de Montreal) Algebras and bispectrality

概要 Superintegrable systems provide a rich source of connections between mathematical physics, algebra, and special functions. This lecture will discuss symmetry and dynamical algebras of superintegrable models, with emphasis on the generic system on the two-sphere. It will also present recent links with quadratic algebras and orthogonal polynomials, including bivariate Jacobi polynomials.