Final: 2026/2/16

日本数学会

2026年度年会

英　文　サ　マ　リ　集

2026年3月

於　東京理科大学

2026　日本数学会
年会プログラム

期　日　2026年3月23日(月)～3月26日(木)

会　場　東京理科大学神楽坂キャンパス
東京都新宿区神楽坂1–3

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一般社団法人 日本数学会

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	企画特別講演　13:00～14:00								
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	日本数学会賞授賞式(6号館2階624教室) …… (14:30～15:00) 総合講演(〃) 日本数学会賞春季賞受賞者 …… (15:15～16:15) 清水扇丈(京大理) …… (16:30～17:30) 懇親会(PORTA神楽坂 理窓会倶楽部) …… (18:00～20:00)								
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総　合　講　演

3月24日(火)　総合講演会場

2026年度日本数学会賞春季賞受賞講演

日本数学会賞春季賞受賞者 ····· (15:15〜16:15)

Spring Prize Winner

清　水　扇　丈 (京　　大　　理)　最大正則性定理に基づく流体方程式の自由境界問題 ····· (16:30〜17:30)

Senjo Shimizu　(Kyoto Univ.)　Free boundary problems for fluids based on the maximal regularity theorem

概要 Free boundary problems for the Navier–Stokes equations have been studied since the pioneering work of Solonnikov in 1977. In such problems, the Navier–Stokes equations are often treated as quasilinear equations by transforming the free boundary problem into a fixed boundary problem. Over the past three decades, maximal L^p-regularity has been established as one of the most powerful methods for solving quasilinear parabolic equations. Nevertheless, the well-posedness of free boundary problems for the Navier–Stokes equations in scale-invariant spaces has not been established.

In this talk, we discuss the global well-posedness of free boundary problems for the Navier–Stokes equations in scaling-critical Besov spaces. Our approach is based on a newly established maximal L^1-regularity theorem for the corresponding Stokes system, which is not covered by the existing theoretical framework.

企 画 特 別 講 演

3月23日(月)

第I会場

宮 部 賢 志 (明 大 理 工) アルゴリズム的ランダムネス: その理論と解析学との接点 · (13:00～14:00)
Kenshi Miyabe (Meiji Univ.) Algorithmic randomness: its theory and connection with analysis

概 要 Algorithmic randomness provides a refined framework for understanding information, complexity, and prediction by incorporating the notion of computability into classical probability theory. In this talk, I will introduce the basic ideas and motivations behind algorithmic randomness, highlighting how the concept captures random behavior from the viewpoint of computation. I will then discuss several connections with analysis, including links to differentiability, ergodic theorems, fractal geometry, and computable aspects of measure theory. By viewing these phenomena through the lens of computation, we gain a new perspective on typical behavior, one shaped by Kolmogorov complexity. Finally, I will briefly discuss recent developments related to learning theory, illustrating how algorithmic randomness offers a unifying perspective across learning and prediction.

第II会場

特別招待講演(日本応用数理学会)
松 尾 宇 泰 (東大情報理工) 構造保存的な数値計算法とその応用 · (13:00～14:00)
Takayasu Matsuo (Univ. of Tokyo) Structure-preserving numerical methods and their applications

概 要 This lecture surveys structure-preserving numerical methods for differential equations, focusing on algorithms that retain geometric or energetic structures of the underlying continuous systems. After introducing the historical development and major classes of such methods—symplectic integrators, discrete gradient methods, and variational and multisymplectic schemes—the talk highlights discrete gradient methods as a representative framework, explaining their theoretical foundations and qualitative properties such as energy dissipation and asymptotic behavior. The application of continuous optimization is discussed, illustrating how numerical analysis can contribute beyond simulation to the theoretical understanding of algorithms. If time allows, some recent research progress is also mentioned.

第III会場

矢 ヶ 崎 達 彦 (京 都 工 繊 大*) 非コンパクト多様体の同相群及び微分同相群の位相的性質について · (13:00～14:00)
Tatsuhiko Yagasaki (Kyoto Inst. Tech.*) On topologies of homeomorphism groups and diffeomorphism groups of noncompact manifolds

概 要 In this survey talk, we revisit standard topologies on groups of homeomorphisms and diffeomorphisms of manifolds; (i) compact-open topology, (ii) (very) strong Whitney topology, (iii) uniform topology and (iv) direct limit topology. For compact manifolds, all of these topologies coincide and are well-behaved for many purposes. However, for noncompact manifolds each of them has its own defect deviating from our intuition. In the first half of this talk, we discuss on this issue. In the latter half, we review our works on homeomorphism groups and diffeomorphism groups of noncompact manifolds; (1) Compact-open topology: (i) Homotopy types and topological types of groups of homeomorphisms (diffeomorphisms) of noncompact 2-manifolds, (ii) Group of measure-preserving homeomorphisms (volume-preserving diffeomorphisms) of noncompact manifolds and mass flow toward ends, (2) Uniform topology: Deformation of uniform homeomorphisms on noncompact metric manifolds, (3) very strong Whitney topology: Local topological types of groups of homeomorphisms (diffeomorphisms) (with compact support).

3月25日(水)

第X会場

斉 藤 義 久 (立 教 大 理)♭ 楕円ルート系とその表現論への応用 ····· (13:00〜14:00)

Yoshihisa Saito (Rikkyo Univ.)　Elliptic root systems and thier applications to representation theory

概要 In the middle of 1980's, K. Saito introduced the notion of "elliptic root systems", motivated by study of singularity theory. They are generalizations of affine root systems which have two null directions.
As well known, if a root system is given, then associated algebraic structures are also given. (For example, the Weyl group, the Hecke algebras, or the Lie algebras, etc.) In this talk, we will explain what kind of algebraic structures appear in association with elliptic root systems, and certain applications to representation theory.

第XI会場

山 崎 教 昭 (神奈川大情報)　The topology of the space of convex functions and its applications ····· (13:00〜14:00)

Noriaki Yamazaki (Kanagawa Univ.)　The topology of the space of convex functions and its applications

概要 In this talk, we first introduce the definition and properties of the topology of the space of convex functions. Next, by using the topology of the space of convex functions, we discuss the solvability and the stability of solutions to abstract nonlinear evolution equations governed by time-dependent subdifferentials. Finally, we consider the generalization of optimal convex function control problems by using the concept of the local gap of two control convex functions. In addition, we apply our general results to some model problems.

3月26日(木)

第X会場

根 上 生 也 (横 浜 国 大*)　位相幾何学的グラフ理論, その誕生から未来まで ····· (13:00〜14:00)

Seiya Negami (Yokohama Nat. Univ.*)　Topological graph theory, its birth to the future

概要 Topological graph theory is a field amalgamating topology and graph theory. The author developed a theory on embeddings of graphs on closed surfaces in 1980's and has been known as the pioneer of this field in Japan. Moreover, he produced many results, such as a theory of diagonal flips in triangulations on closed surfaces and Ramsey theorem of spacial graphs, by various groundbreaking ideas. In particular, "Planar Cover Conjecture" he proposed in 1986 is worldwide famous as one of unsolved open problems in topological graph theory. In this lecture, he will outline these research themes that he himself proposed and present future prospects for topological graph theory.

第XI会場

安 田 健 彦 (阪　大　理)　ディオファントス幾何における特異点 ····· (13:00〜14:00)

Takehiko Yasuda (Univ. of Osaka)　Singularities in Diophantine geometry

概要 In Diophantine geometry, problems concerning rational and integer solutions to equations are said to be governed by the geometry of the algebraic variety defined by those equations. This talk will focus on the question: What role do singularities of algebraic varieties play in Diophantine geometry? The motto is: "The more singular a variety is, the more rational points it has." Quantifying the degree of singularity and the abundance of rational points leads to intriguing assertions and conjectures. Furthermore, viewing "Diophantine geometry" and "singularities" in a broad sense provides new perspectives on a wider range of subjects. In this talk, I wish to introduce several phenomena related to this theme from my personal viewpoint.

数 学 基 礎 論 お よ び 歴 史

3月23日(月)　第VI会場

9:00〜11:25

概要 For every positive integer m, we construct a weakly o-minimal theory whose models have exactly m dimension functions possessing the van den Dries property.

概要 A non-isolated type $p \in S(T)$ is said to have the strong tree property (STP), if there are $a, b, c \models p$ such that $tp(bc/a)$ is non-algebraic,isolated, and b, c are independent. In my talk, I will explain the relationship between theories with STP and the number of countable models.

概要 We show the following result: Let G be a graph whose theory has U-rank one, meaning that every element in the monster model has U-rank at most 1. Assume $\chi(G) \geq \omega$. Then G must contain an infinite clique.

概要 Distal theories are NIP theories regarded as purely unstable in a suitable sense. This talk concerns the question of when an expansion of a distal theory remain distal. We first present a criterion for distalty based on a form of quantifier elimination and separation of terms. Then, we introduce our main result: $(\mathbb{Z}; <, +, R)$, $(\mathbb{Q}_p; +, \cdot, p^{\mathbb{Z}})$, and $(\mathbb{Q}_p; +, \cdot, p^{\mathbb{Z}}, p^R)$ are distal, where R is an almost sparse sequence in $\mathbb{Z}$.

概要 Let M be a generic graph obtained by Hrushovski construction using a predimension function with a coefficient α. We have already reported (with Tsuboi) that the chromatic number of M is always finite. We have shown that the chromatic number of M can be arbitrarily large: For any integer $k > 0$ there is a real number $\varepsilon > 0$ such that if $0 < \alpha < \varepsilon$ then the chromatic number of M is greater than k.

Toshio Suzuki (Tokyo Metro. Univ.)
Masahiro Kumabe
(Open Univ. of Japan)
Kenshi Miyabe (Meiji Univ.)

The field generated by left c.e. reals below a weakly computable real

概要 Extending Miller's work (2017), we study a subfield of the real numbers generated by left c.e. real numbers below a weakly computable real number with respect to Solovay reducibility. We discuss, from algorithmic randomness perspective, the relationship between the following two operations on a weakly computable real number; (i) operation of taking field extension by adding the weakly computable real to the field of computable real numbers, and (ii) operation of taking the lower Solovay cone. This talk is based on the talk of the same name given at Asian Logic Conference 2025, Kyoto, September 2025.

Kohtaro Tadaki (Chubu Univ.)

The Wigner–Deutsch collaboration

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. Deutsch's thought experiment is a variant of it, which can, in principle, verify the effect of the consciousness of observer on the reduction of the state vector. In this talk, we introduce a combination of the Wigner's friend paradox and Deutsch's thought experiment, and make an analysis of it in our framework of quantum mechanics based on the principle of typicality.

Makoto Fujiwara (Tokyo Univ. of Sci.)
Benno van den Berg
(Univ. of Amsterdam)

Goodman's theorem and Markov's principle

概要 Goodman's theorem states that intuitionistic finite-type arithmetic HA^ω augmented with the axiom schema of choice AC is conservative over intuitionistic first-order arithmetic HA. However, the situation dramatically changes already when we add a weak logical axiom (with function parameters) to the theory in the premise. In fact, for each natural number n, there exists a HA-sentence Φ such that Φ is provable in $\mathsf{HA}^\omega + \mathrm{AC}$ augmented with Markov's principle MP (with function parameters) but not provable even in HA augmented with the law-of-excluded-middle schema restricted to Σ_n-formulas. On the other hand, for any HA-sentence Φ constructed from Σ^0_{n+1}-formulas using only $\wedge, \to$ and $\forall$, if Φ is provable in $\mathsf{HA}^\omega + \mathrm{AC} + \mathrm{MP}$, then it is provable in HA augmented with the double-negation-elimination schema restricted to Σ_{n+1}-formulas.

9 金子柚月 (東北大理)　Quasi-metric spaces in reverse mathematics ····· 15
横山啓太 (東北大理)

Yuzuki Kaneko (Tohoku Univ.)
Keita Yokoyama (Tohoku Univ.)

Quasi-metric spaces in reverse mathematics

概要 We introduced a representation of quasi-metric spaces within second-order arithmetic. It is known that every T_0 countably based space is isometric to a separable quasi-metric space, and specifially, it is a Π^0_2 subspace of $\mathcal{P}(\mathbb{N})$ as the product of the Sierpinski space if it is complete (quasi-Polish). Hence our representation enables us to deal with more topological spaces in the setting of reverse mathematics. We also see that a quasi-Polish space is homeomorphic to a UF space, a variant of a poset space, and formalize this idea in second-order arithmetic. We then consider which subsystem of second-order arithmetic is needed to prove theorems for quasi-metric spaces in reverse mathematics.

11:40〜11:55　数学基礎論および歴史分科会総会

14:15〜15:15　特別講演

田村誠 (大阪産大全学教育機構)　北京大学蔵秦簡牘中の算術書について

Makoto Tamura (Osaka Sangyo Univ.)

On the arithmetic books in the Qin Bamboo Slips housed at the Peking University

概要 The Qin Bamboo Slips housed at the Peking University were donated to the university in 2009. After the publication of the report books with photographs of the slips in 2023, the research on them has been progressed widely. Although the excavation circumstances of the slips are unknown, they containes 761 bamboo slips, 21 wooden slips, 6 wooden tablets, 1 non-rectangular wooden card, 1 wooden die, and 61 bamboo counting rods as well as fragments of the bamboo container that held them. The presence of counting rods suggests that the contents were largely arithmetic-related. The arithmetic texts comprise five books: the Math Books (Type A: 235 slips, Type B: 37 slips, and Type C: 71 slips), "Chengtian" (22 slips), and "Tianshu" (50 slips), along with a wooden tablet inscribed with a multiplication table. The latest possible date for these texts is 216 BCE, based on a reference to "the thirty-first year of Emperor Qin Shi Huang" found in the "Zhiri". This fact indicates that they are the oldest known arithmetic books in China. This paper will provide an overview of the content of the arithmetic books of the Qin Bamboo Slips housed at the Peking University and compare them with other ancient arithmetic books of the Qin-Han periods.

15:30〜17:30

10 脇克志 (山形大理)♭　NDL 古典籍 OCR-Lite を用いた和算書図形区域の抽出 ····· 15

Katsushi Waki (Yamagata Univ.)

Extraction of geometric areas from Wasan books using NDL Classical Books OCR-Lite

概要 In the previous presentation, I extracted candidate graphic regions through layout analysis using NDL_Layout, but many non-graphic regions were also extracted as graphic regions. This time, I attempted to narrow down the candidate graphic regions using NDL Classical Books OCR-Lite.

概要 During the Edo period (1603–1867) in Japan, both samurai and commoners studied mathematics. Schools sprang up across the country, and Sangaku (mathematical tablets) were dedicated at shrines and temples. It is known that the methods of mathematical expression differed between schools. We compare the mathematical expressions of several schools: the Seki school, which was the largest; the Takuma school, a Kansai-based school; the Shisei Sanka school; the Saijyo school; and the Miike school. The Saijyo School and the Shisei Sanka school had similar expressions with the Seki School, but the Takuma School and the Miike School can be said to possess their own unique methods of expression.

概要 Ajima Naonobu's Renjutsu is known as a method for calculating the radius of each circle in a circle chain. Some problems in Japanese mathematics are designed so that all the diameters of the circles in the circle chain are rational numbers. In this study, we explore the conditions under which all the diameters of the circles in the circle chain are rational numbers, and consider how to construct the initial four circles of such a circular chain.

概要 It goes without saying that the *Jinkouki* is an abacus book, but modern researchers do not necessarily read it as such. This talk discusses the knowledge gained from actually operating an abacus, including fingering, the difficulty of manipulation, positioning (decimal) points, special ways of calculating quotients, and comparisons with the *Sanyouki*.

概要 On the publication of Katsuyousanpou We discus on reasons why there are several vertions of Katsuyousanpou.

概要 In his examination of the three-body problem in 1836, Jacobi encountered a dynamical system in which the force function explicitly depended on time. Building on this insight, Jacobi extended Hamilton's achievements in dynamics from 1834–35 to encompass such systems. As a result, inspired by Hamilton's approach of solving mechanical problems by reducing them to partial differential equations, Jacobi conceived this idea in 1837 and went on to construct a theory of the calculus of variations in his lectures on dynamics delivered in 1842–43.

16 斎藤　憲　ギリシャ数学文献を読むためのギリシャ語語彙集作成 ····· 15
(阪府大⋆・四日市大関孝和数学研)
Ken Saito　Making vocabulary of ancient Greek to read Greek mathematical works
(Osaka Pref. Univ.⋆/Yokkaichi Univ.)

概要 Greek mathematical works are very simple from the linguistic point of view, but they contain conjugations that are rare in normal writing, unusual words, and usages that are specific to mathematical arguments. Our goal is to create a specific vocabulary book for Greek mathematics, for readers who want to read Greek mathematics in the original language. We present a prototype version for the first six Books of Euclid's *Elements*.

17:45〜18:00　歴史部門懇談会

3月24日(火)　第VI会場

9:00〜11:45

17 林　佑亮 (神戸大システム情報)　定常集合によるリスト彩色について ····· 15
Yusuke Hayashi (Kobe Univ.)　Stationary list colorings

概要 In this talk, we introduce stationary list coloring for infinite graphs. This is a variant of list coloring in which each vertex is assigned an arbitrary stationary subset of a regular cardinal κ as its list of colors, and we ask whether the graph has a good coloring obtained by choosing each vertex's color from its list. We compare stationary list colorability with the usual list colorability and Komjáth's restricted list colorability. Moreover, we obtain an analogue of a result of Komjáth regarding restricted list coloring. Finally, by a forcing construction, we obtain a consistency result showing that stationary and restricted list colorability does not have the monotonicities in the cardinal parameter.

18 津久浦健太 (水　産　大)　非可算集合の3つ組の彩色 ····· 15
Kenta Tsukuura (Nat. Fisheries Univ.)　Coloring triples of uncountable sets

概要 We show that, if there is a $<\kappa$-non-reflecting stationary subsets of $E^{\lambda}_{<\kappa}$ then $\mathcal{P}_{\kappa}\lambda \not\to [I^{+}_{\kappa\lambda}]^{3}_{\lambda}$.

19 丹野俊将 (神戸大システム情報)　一般化されたソロヴェイモデルにおける完全集合二分法 ····· 15
Toshimasa Tanno (Kobe Univ.)　Perfect set dichotomy theorem in generalized Solovay model

概要 The perfect dichotomy theorem for an equivalence relation E on $\mathbb{R}$ asserts that either $\mathbb{R}/E$ is well-orderable or there exists a perfect set of pairwise E-inequivalent reals. We show that in the Solovay model, the perfect set dichotomy holds for any equivalence relation. Furthermore, we consider a generalization of the Solovay model for an uncountable regular cardinal μ, and show the perfect set dichotomy theorem for μ^{μ} also holds in that model. In this talk, we present these results together with some combinatorial consequences and related propositions. This is a joint work with Hiroshi Sakai.

20 南　裕明 (愛知学院大教養)　mad族上の分離基数と非分離基数 ····· 15
Hiroaki Minami (Aichi Gakuin Univ.)　The splitting and reaping number for mad families

概要 We study cardinal invariants of the quotient Boolean algebra $\mathcal{P}(\omega)/\mathcal{I}(\mathcal{A}))$ where $\mathcal{I}(\mathcal{A})$ is the ideal generated by a mad family $\mathcal{A}$. Using a matrix iteration of ccc posets we obtain the consistency of $\mathfrak{b} = \mathfrak{a} = \mathfrak{s}(\mathcal{A}) < \mathfrak{s}$ and the consistency of $\mathfrak{r}(\mathcal{A}) > \mathfrak{r}$. This is joint work with Jörg Brendle.

概要 For a cardinal κ, let MCV(κ) denote the statement that every subset of the $\mathbb{R}$-vector space of dimension κ has a maximal convex subset. Under ZF, we show that MCV(3) is equivalent to the axiom of uniformization, a fragment of the axiom of choice. We also observe consequences of MCV(2^ω) and MCV(ω_1). This work is a continuation of the study on which the speaker presented at the 2024 spring meeting of the MSJ.

概要 Sorensen and Urzyczyn provided a proof of the so-called Girard's paradox in the system of lambda U-. They expounded the powerful universe A as kind polymorphism in terms of an inductive kind. In this talk, we show that a type isomorphic to A can be introduced in the form of a weakly initial T-algebra under some functor. Moreover, we give a dual one, i.e., a weakly final T-coalgebra that can constitute a framework to establish Girard's paradox as well.

概要 This paper investigates neighborhood models for predicate modal logics with ω-rules, including non-normal cases. We prove that each of these logics is characterized by a neighborhood model with constant domains. Related results for normal modal logics with ω-rules were obtained by Tanaka, while similar results for non-normal modal logics without ω-rules were presented by Arló-Costa and Pacuit and by Tanaka. The result presented here extends these works. As applications, we show that a predicate extension of GL is sound and complete with respect to a class of neighborhood frames with constant domains, and that a predicate common knowledge logic is Kripke incomplete but neighborhood complete.

概要 Substructural logics are obtained by removing structural rules, such as exchange, weakening or contraction, from standard sequent calculi. Recent studies have also investigated extensions of non-associative substructural logics. A central issue is contraposition, which links implication and negation. When exchange is absent, two implication operators and two corresponding negations are required. In the Full Lambek calculus, contraposition is closely tied to associativity; however, in non-associative settings, several alternative forms arise. This paper examines these variations by adding contraposition axioms to non-associative substructural logics, classifying the resulting systems according to their strength.

概要 We show that several weak principles inspired by non-normal modal logic suffice to derive various refined forms of the second incompleteness theorem. Among the main results, we show that the set $\{\mathbf{E}, \mathbf{C}, \mathbf{D3}\}$ suffices to establish the unprovability of the consistency statement $\neg \mathrm{Pr}_T(\ulcorner 0 = 1 \urcorner)$. We also prove that the set $\{\mathbf{E}^{\mathrm{U}}, \mathbf{CB}_\exists\}$ yields formalized Σ_1-completeness.

概要 We study provability predicates $\mathrm{Pr}_T(x)$ satisfying the following condition **E** from a modal logical perspective:
E : if $T \vdash \varphi \leftrightarrow \psi$, then $T \vdash \mathrm{Pr}_T(\ulcorner\varphi\urcorner) \leftrightarrow \mathrm{Pr}_T(\ulcorner\psi\urcorner)$.
For this purpose, we develop a new method of embedding models based on neighborhood semantics into arithmetic. Our method broadens the scope of arithmetical completeness proofs. In particular, we prove the arithmetical completeness theorems for the non-normal modal logics EN, ECN, ENP, END, and ECNP.

13:00〜14:00　特別講演

概要 Dynamic Epistemic Logic (DEL) is a branch of modal logic for reasoning about dynamics of epistemic states, such as knowledge change or belief revision, caused by communication. In this talk, we first give a brief introduction to DEL. We then present our previous research contributions: (i) a unified framework for DEL, which employs two-layered Kripke models, referred to as model transition systems (MTSs), to represent transitions of epistemic states, (ii) modal correspondences between axioms and semantic properties of epistemic actions, where each property is represented as a set of MTSs, and (iii) an extension of DEL with inverse action operators, whose semantics is defined in a natural way using MTSs. In the final part of the talk, we provide a brief overview of ongoing research related to these topics.

代　数　学

3月23日(月)　　第I会場

9:30〜12:00

概要 The McKay correspondence for finite Abelian subgroups of SL(3,C) has been well established. There is a generalization of the Abelian case via the McKay quiver to the case of algebras associated to dimer models. The arrow contraction operation contracts an arrow in the quiver corresponding to the dimer model. In this paper, we show that after the arrow contraction algorithm under the assumption that the removed cones comprise a convex region, the consistency condition is preserved. This is one of the essential ingredients towards the construction of the McKay correspondence.

概要 Let D be a triangulated category and Stab(D) the space of stability conditions on D. Suppose that D is the bounded derived category of an infinitesimal deformation X of a smooth projective curve X_0 over a field. We show that Stab(D) is naturally isomorphic to the space of stability conditions on the original curve X_0.

概要 I will discuss equivalences between derived categories of algebraic varieties that are not necessarily proper. For projective varieties, many results on derived equivalences are known, including theorems of Bondal–Orlov, Huybrechts, and Kawamata. Favero extended the Bondal–Orlov reconstruction theorem to certain non-proper varieties. In contrast, little is known when the canonical or anticanonical bundle is not ample. In this talk, I will present results on derived categories of open subsets of abelian varieties, proving finiteness and lifting conjectures in this setting. I will also explain a geometric description of equivalences via Matsui's triangular spectrum, which provides a universal framework for realizing and classifying such equivalences.

概要 In studying the derived category of coherent sheaves on an algebraic variety X, two natural themes arise. The first is to investigate algebraic varieties that are derived equivalent to X, and the second is to analyze the structure of the group of autoequivalences of the derived category. In this work, we focus on bielliptic surfaces defined over an algebraically closed field of arbitrary characteristic. We prove that the only algebraic variety derived equivalent to X is X itself. Moreover, we determine generators for the group of autoequivalences of the derived category of X.

概要 We study whether a derived equivalence between Calabi–Yau threefolds can remain compatible with geometric transitions. Focusing on one of Inoue's examples of a derived-equivalent but non-birational pair (X^2, Y^2) with Picard number 2, we show that X^2 admits a geometric transition to a Picard-number-1 Calabi–Yau threefold X^1, identified with Kanazawa's degree-5 Pfaffian threefold. Using homological projective duality (HPD) for the Grassmannian–Veronese join and its blow-up variant, we establish a twisted derived equivalence between X^1 and the noncommutative Calabi–Yau threefold $Y^1_{\mathrm{n.c.}}$. Also, we discuss a mirror-symmetric interpretation of the geometric transition, expressing the fundamental periods as Hadamard products of periods of elliptic curves.

概要 The chiral algebra theory of Beilinson–Drinfeld (AMS, 2004) is applicable without modifications until now in principle, although there are some new recent investigations by the theory of operator algebras. The author once studied the $\beta\gamma$-CFTs which are "compactified" to del Pezzo surfaces in 2007. This study can be regarded as an "interpretation of Witten's index theorem by quantum anomaly theory" by applying the Deligne–Riemann–Roch theorem to (free loop spaces of) "curved space-time". In this talk, I will try to interpret the Operator-Product-Expansions (OPEs) for the Beilinson–Drinfeld's chiral algebra theory by toric degenerations and Gaitsgory's ind-coherent sheaves.

概要 The triangulated category of mixed motives was constructed to have the universal property for various cohomology theories, which have common properties. We construct the stable ∞-category of mixed motives from the ∞-category of non-unitable algebras, which is pointed and locally finitely presentable. The excisive approximation, which is the Goodwillie approximation of degree one, has the universal property by Heuts' theory: Goodwillie approximation of ∞-categories. By using this advantage, we establish the theory of mixed motives and prove the comparison theorem to Voevodsky's construction.

概要 For the root system of type A_n, we consider the permutohedral variety X_{A_n}. Using purely combinatorial methods, we obtain an explicit formula expressing the product of Chern classes $c_k c_{n-k}$ as a multiple of the top Chern class c_n in the rational cohomology ring $H^*(X_{A_n}; \mathbb{Q})$, where the coefficient depends only on k and n and is given by a closed-form expression. As an application, we compute the Chern number $\langle c_k c_{n-k}, [X_{A_n}] \rangle$.

9　中野竜之介 (北　大　理)　4種4項平均の反復極限定理の代数幾何学的側面 ····· 13
松本圭司 (北　大　理)

Ryunosuke Nakano (Hokkaido Univ.)
Keiji Matsumoto (Hokkaido Univ.)
Algebro-geometric aspects of the iterative limit theorem for a quaternary of means of four terms

概要 J. M. Borwein and P. B. Borwein (1991) express the iterative limit of a pair of means of two terms by the Gauss hypergeometric series by using an analogue of Jacobi's period formula. T. Kato and K. Matsumoto (2009) extend this pair to a quaternary of means of four terms, and express its iterative limit by the Lauricella hypergeometric series F_D in three variables. We study this limit theorem by the period map *per* for a family of algebraic curves of genus 6 to the 3-dimensional complex ball $\mathbb{B}_3$. We present a multi-variable version of Jacobi's period formula, and introduce four modular forms on $\mathbb{B}_3$ expressing per^{-1} and a unitary transformation R on $\mathbb{B}_3$ such that the four means appear as the actions of R on the four modular forms. By these results, we obtain an alternative proof of this limit theorem.

14:15〜15:15　特別講演

榎園　誠 (東　大　数　理)　堀川曲面の正規な安定退化について

Makoto Enokizono (Univ. of Tokyo)
Normal stable degenerations of Horikawa surfaces

概要 Horikawa surfaces are algebraic surfaces of general type satisfying the equality of the Noether inequality. In the 1970s, Horikawa conducted a detailed study of smooth Horikawa surfaces, providing a classification of these surfaces and describing their moduli spaces. In this talk, I will present an explicit classification of normal stable degenerations of Horikawa surfaces. Specifically, I will discuss the following results: (1) Classification of Horikawa surfaces with Q-Gorenstein smoothable log canonical singularities. (2) Criterion for determining the (global) Q-Gorenstein smoothability of the surfaces described in (1). (3) Description of the KSBA moduli spaces for Q-Gorenstein smoothable normal stable Horikawa surfaces. This is joint work with Hiroto Akaike, Masafumi Hattori and Yuki Koto.

15:30〜18:00

10　岩見智宏 (九　工　大　工)　Triple covers of certain irregular three-folds with small c_1^3 or c_1c_2, Part I ····· 13

Tomohiro Iwami (Kyushu Inst. of Tech.)
Triple covers of certain irregular three-folds with small c_1^3 or c_1c_2, Part I

概要 For 3-dimensional extremal neighborhood $(X, C) \subset \mathbb{C}^4$ with reduced irreducible extremal curve C, as infinitesimal deformations of C, i) extensions of $S^2(\mathrm{gr}^1_C\Omega^1_X)$ to ω_X and ii) 0-, or 1-dimensional supports of Du Val members of $|-K_X|$, under abundance property, work for the existence of flips of type k1A or k2A ([S.Mori,1988]). Based on them, the author had presented ([I.2018-2024]): a) 3-dimensional Miyaoka–Yau type inequality with c_3, abbreviated as $(\mathrm{MY})_{3,c_3}$, via ii), and for reducible $C(=: C_s)$, b) 3-dimensional Miyaoka–Yau type inequality with c_3, driven by associated symmetric 2-forms, abbreviated as $(\mathrm{MY})_{3,c_3,S^2}$, by cofibered products of C_s via i), and moreover, c) homological property for both of $(\mathrm{MY})_{3,c_3}$ and $(\mathrm{MY})_{3,c_3,S^2}$ by (tri-)diagonals in such cofibered products as infinitesimals of C_s, via ii). As succeeding to them, the author show: for $(X, C_s) \subset \mathbb{C}^4$ with non-trivial extension of $S^2(\mathrm{gr}^1_{C_s}\Omega^1_X)$, by $\exists$ (locally) triple cover $f : X \to Y$ associated to $S^2\mathscr{E} \to \wedge^2\mathscr{E}$ with subsheaves $\exists\mathscr{E} \subset \Omega^1_X$ ([Miranda,1985]) via a) and b), 1) homological equivalent deformation for Chern classes in related total Chern polynominals via c), 2) alternatives of [Miyaoka,1977;Theorem 3] by 1), and 3) related 3-folds of general type which slighly bocome a counter-part of [Horikawa,1991;Section 6].

概要 In 1997, B. Mazur completed the classification, up to isomorphism, of the torsion subgroups of elliptic curves defined over the rational number field $\mathbb{Q}$. Since then, many analogous results have been obtained for several families of elliptic curves defined over several families of number fields. In this talk, after giving a brief overview of some of these previous results, I will discuss the classification, up to isomorphism, of torsion subgroups of elliptic curves with rational j-invariant. I will then present results for two specific families: elliptic curves defined over the maximal elementary abelian 2-extension of $\mathbb{Q}$, and elliptic curves defined over quartic number fields, both under the assumption of a rational j-invariant.

概要 The multiplicity-one theorem for the simultaneous equations determining the superspeciality of hyperelliptic curves was proved by Igusa in 1958 for the genus-one case, and by Harashita–Yamamoto in 2026 for the genus-two case. In this paper, we generalize this result to arbitrary genus. Our approach uses the Lauricella system (of type D) of hypergeometric series in $2g+1$ variables, whose truncations form the entries of a Cartier–Manin matrix, and we study partial differential equations involving these entries. On this basis, we establish the multiplicity-one theorem.

概要 An irreducible space curve is said to be tangentially degenerate if a general tangent line meets the curve again at another point. In the case of positive characteristic, in 1994, Esteves and Homma presented the first example of a tangentially degenerate curve such that the Gauss map is birational onto its image. For a long time, there has been no another example. In this talk, focusing on "non-classical" automorphisms, I present a method of constructing tangentially degenerate curves admitting a birational Gauss map.

概要 In this talk, I propose a conjecture that symplectic automorphisms of a $K3$ surface X act trivially on the indecomposable part $\mathrm{CH}^2(X,1)_{\mathrm{ind}} \otimes \mathbf{Q}$ of Bloch's higher Chow group. This is a higher Chow analogue of Huybrechts' conjecture on the symplectic action on 0-cycles. We give several partial results verifying our conjecture, some conditional and some unconditional. Our unconditional results include the full proofs for Picard-general Kummer surfaces of Jacobian type and product type, and $K3$ surfaces of finite automorphism groups.

概要 Dual graphs which can arise from the minimal resolution of a two-dimensional rational triple point were classified by Artin in 1966. Tjurina proved in 1968 that any complex rational triple point is taut, i.e., its local structure is determined uniquely by dual graph, to solve the classification problem. Extending her result to characteristic $p > 0$ is still incomplete. In this talk, i) I give a criterion for a rational triple point to be taut, which completes the classification of taut rational triple points in $p > 0$. ii) I present a candidate for the classification table of rational triple points. It no longer seems to be true in $p = 2$ that there are only a finite number of isomorphism classes for each dual graph. iii) I give a peculiar equisingular family in view of a question imposed by Wahl.

概要 The F-signature is an invariant defined for Noetherian local rings of positive characteristic, which detects strong F-regularity. Since strong F-regularity is a positive-characteristic analogue of klt singularities, it is natural to expect that the limit F-signature should be positive when the ring has klt singularities. In this talk, we confirm this conjecture for the case of reductive quotient singularities. Key ingredient of the proof is the notion of the F-alpha invariant, introduced by Pande, as a positive-characteristic analogue of the classical alpha-invariant. This talk is based on joint work with Shunsuke Takagi.

概要 Globally generated vector bundles on projective varieties are fundamental objects in algebraic geometry, but their classification for small first Chern classes has only been studied fairly recently. In this talk, we provide such a classification for the del Pezzo threefold of degree 6 with Picard number 2, the general hyperplane section of the Segre embedding of $\mathbb{P}^2 \times \mathbb{P}^2$.

概要 A vector bundle whose projectivization becomes a weak Fano variety is called a weak Fano bundle. We present classification results for rank 2 weak Fano bundles on higher-dimensional quadrics Q^n of dimension $n \geq 5$.

概要 In positive characteristic, the relative Frobenius morphism induces the generalized Verschiebung, a rational map on the moduli spaces of stable vector bundles on smooth projective curves. For genus 2, Osserman (2006) computed the generic degree of this map. In this talk, we present a uniform, combinatorial description of its generic degree for arbitrary genus g. Our approach uses the theory of higher-level dormant opers developed by Y. Wakabayashi.

3月24日(火)　第I会場

9:00〜12:00

20 堂本陽輝 (山口大創成)　A problem on a-kernel of an integer ····· 10
井川祥彰
南出真 (山口大理)
谷川好男

Haruki Domoto (Yamaguchi Univ.)　A problem on a-kernel of an integer
Tadaaki Igawa
Makoto Minamide (Yamaguchi Univ.)
Yoshio Tanigawa

概要 We consider a problem on a certain kernel of an integer. Let $a \geq 0$ be a fixed integer. For any natural number n, we define $k_a(1) = 1$ and $k_a(n) = \prod_{p|n,\, p\geq a}(p-a)$ if $n > 1$. We set $k_a(n) = 1$ if the product is empty. When $a = 0$, $k_0(n)$ is called the kernel of n. We investigate the average of $k_a(n)$ for $n \leq x$. This is a generalization of a problem by Ramaré.

21 坂井遥 (山口大創成)　On a theorem of Turán ····· 10
南出真 (山口大理)
谷川好男

Haruka Sakai (Yamaguchi Univ.)　On a theorem of Turán
Makoto Minamide (Yamaguchi Univ.)
Yoshio Tanigawa

概要 We consider a generalization of Turán's theorem. Let $\omega(n)$ denote the number of distinct prime divisors p of n. In 1934, Turán showed that $\sum_{n\leq x}(\omega(n) - \log\log x)^2 = O(x\log\log x)$. Concerning this problem, Granville and Soundararajan showed a generalization. We show a new estimate on this their proposition for odd power moments.

22 中井啓太 (名大多元数理)　Effective estimates of universality for Hurwitz zeta-functions with rational parameters ····· 13

Keita Nakai (Nagoya Univ.)　Effective estimates of universality for Hurwitz zeta-functions with rational parameters

概要 In 1975, Voronin proved the universality theorem for the Riemann zeta-function. Roughly speaking, universality for the Riemann zeta-function states that any non-vanishing holomorphic function can be approximated by the Riemann zeta-function shifted by $+i\tau$, and the set of such τ has a positive lower density. In 2003, Garunkštis obtained a non-trivial lower bound for the lower density in the universality theorem for the Riemann zeta-function. In this talk, we generalize Garunkštis's result to universality for Hurwitz zeta-functions with rational parameters.

23 宮川貴史 (尾道市大経済情報)　Barnes 多重ゼータ関数の平均値 ····· 13
村原英樹 (北九州市大経済)

Takashi Miyagawa (Onomichi City Univ.)　On the mean values of the Barnes multiple zeta function
Hideki Murahara (Univ. of Kitakyushu)

概要 In this talk, I will present the results on the mean square values for the Barnes multiple zeta function $\zeta_r(s, a, \mathbf{w})$, together with an outline of the proof. The obtained results differ in the three cases $r - 1/2 < \sigma < r$, $\sigma = r - 1/2$ and $r - 1 < \sigma < r - 1/2$, respectively, and these results are analogous to those for the mean square values of the Riemann zeta function $\zeta(s)$.

概要 We give some generating functions of special values of the multiple zeta functions at non-positive integer points by Akiyama–Tanigawa.

概要 It is well known that modular L-functions admit both series and integral representations. Manin focused on the integral representation and introduced iterated integrals of cusp forms. Subsequently, Choie and Ihara revealed the relationship between such iterated integrals and multiple modular L-functions. More recently, Brown proved that the iterated integrals of a broad class of functions, including modular forms, are in fact rational functions. In this talk, I will report on a generalization of the work of Choie and Ihara to arbitrary modular forms. If time permits, I will also mention the application to multiple zeta values.

概要 Multiple Eisenstein series are holomorphic functions on the upper half-plane introduced by Gangl, Kaneko and Zagier, which are iterated multiple sum generalizations of the classical Eisenstein series. They are also regarded as q-analogues of multiple zeta values. Bachmann and Kühn formulated a dimension conjecture for the $\mathbb{Q}$-linear space spanned by all multiple Eisenstein series. Although this conjecture suggests that there exist many linear relations among multiple Eisenstein series, no conjectural family of relations is previously known to generate all such relations. In this talk, we introduce a conjectural family of relations that is expected to give all linear relations among multiple Eisenstein series. This talk is based on a joint work with Henrik Bachmann (Nagoya University).

概要 It is known that the classical Bernoulli numbers can be expressed by Stirling numbers of the second kind. We call it the explicit formula. As a generalization of the classical Bernoulli numbers, poly-Bernoulli numbers (resp. multi-indexed poly-Bernoulli numbers) are defined using polylogarithmic function. (resp. multiple polylogarithmic function). In this research, we obtain the explicit formula for multi-indexed poly-Bernoulli numbers of general indices. Note that the case of double-indexed poly-Bernoulli numbers were obtained by Baba–Nakasuji–Sakata in 2025. The result of this talk is the generalization of their result.

概要 In this talk, we introduce our reslut on linear equations on tensor powers of the Carlitz module using the theory of Anderson dual t-motives and a detailed analysis of a specific Frobenius difference equation. As an application, we present sufficient conditions for the linear independence of Carlitz polylogarithms at algebraic points, simultaneously in the ∞-adic and v-adic settings. This is joint work with Yen-Tsung Chen in Pennsylvania State University.

概要 Let k be a field of positive characteristic $p > 0$. For a log scheme over the log point k^0, one can define a category of (log overconvergent) isocrystals depending on the choice of a base ring and a log structure on it. In particular, by considering the trivial, hollow, and canonical log structures on the base ring, we obtain three distinct categories of isocrystals. As comparison results among them, I will present three kinds of homtopy exact sequences and the Hyodo–Kato isomorphism between the corresponding tannakian fundamental groups.

概要 Let U be the complement in $\mathbb{P}^1$ of the p-adic open unit disks around 0, 1, and ∞. An interpretation of p-adic polylogarithms as a mixed p-adic sheaf on U was given by Bannai. Furthermore, for elements of the K-group of a number field arising from points in U, their images under the p-adic regulator map are described by the p-adic polylogarithm functions, as shown by Gros–Kurihara, Somekawa, and Besser–de Jeu. In this talk, I will extend these results to the natural setting obtained by replacing U with $\mathbb{P}^1 \setminus \{0, 1, \infty\}$. As a byproduct of this research, we also obtain an alternative expression of the p-adic zeta values in terms of ordinary iterated integrals, without using Coleman integration.

概要 Maass (1949) explicitly constructed Maass forms in the case of real quadratic fields with narrow class number one. In this talk, I extend his construction to arbitrary real quadratic fields. Furthermore, I explicitly compute the Petersson inner product of the constructed Maass forms and show that the resulting formula provides a natural analogy to Stark's (1975) result for modular forms.

32 境　優一 (久留米工大工)　KZ-方程式のシュワルツ微分とその応用 ····· 13
堤　裕之 (大阪体育大)

Yuichi Sakai (Kurume Inst. of Tech.)
Hiroyuki Tsutsumi
(Osaka Univ. of Health and Sport Sci.)

The Schwarzian derivative of the KZ equation and its applications

概要 For an ordinary linear differential equations given by Kaneko and Zagier, which is called KZ-equation, it is generally unknown whether solutions for KZ-equation of rational weights possess the modularity except for the already known results. In this talk, we will give some observations whether modular-form solutions exist for those cases.

12:50〜14:00

33 藤田晃平 (北大理)　An analogue of Ogus's theorem for certain hypergeometric curves ···· 13

Kohei Fujita (Hokkaido Univ.)

An analogue of Ogus's theorem for certain hypergeometric curves

概要 For a family whose Picard–Fuchs equation is given by a certain hypergeometric differential equation, we express the Frobenius action on the de Rham cohomology as products of p-adic gamma values. Such an expression is known in specific cases, Fermat curves and CM elliptic curves, but remains unknown in general. In this talk, I will present new examples. The idea of the proof is to reduce the statement to CM elliptic curve case according to a transformation formula of hypergeometric functions.

34 安藤千紘 (横浜国大環境情報)　The Lang–Trotter conjecture on average for genus-2 curves with Klein-4
原下秀士 (横浜国大環境情報)　or S_3 reduced automorphism group ····· 13

Chihiro Ando (Yokohama Nat. Univ.)
Shushi Harashita
(Yokohama Nat. Univ.)

The Lang–Trotter conjecture on average for genus-2 curves with Klein-4 or S_3 reduced automorphism group

概要 For an elliptic curve E over $\mathbb{Q}$ without complex multiplication, Lang and Trotter conjectured that the number of primes $p < X$ at which E has a supersingular reduction is asymptotically equal to $c\sqrt{X}/\log X$, where $c > 0$ is a constant depending only on E. Fouvry and Murty obtained an average estimation related to the Lang–Trotter conjecture, called the Lang–Trotter conjecture on average. In this talk we extend the Lang–Trotter conjecture on average to genus-2 curves. More precisely, we study genus-2 curves with a reduced automorphism group containing the Klein 4-group or symmetric group S_3 and obtain analogous results for each case.

35 銭　毅 (横浜国大工)　代数体上中心的単純環のイデアルに関するノルムの明示的上界 ····· 13

Ki Sen (Yokohama Nat. Univ.)

Explicit bounds for the norms of ideals of central simple algebras over number fields

概要 Classically, there is a well-known bound, called the Minkowski bound, for the norms of ideals in number fields. In this talk, we show explicit bounds of the norms of locally principal integral right ideals in right ideal classes of orders in central division algebras over number fields. Moreover, we also show explicit bounds for maximal orders in central simple algebras over number fields.

36 塩見大輔 (山形大理)　円分関数体の相対類数の可除性について ····· 10

Daisuke Shiomi (Yamagata Univ.)

On the divisibility of the relative class number of cyclotomic function fields

概要 For a prime p and a positive integer r, we set $q = p^r$. For a monic $N \in \mathbb{F}_q[T]$, we denote by h_N^- the relative class number of the N-th cyclotomic function field. In previous work, the author gave a complete criterion for the p-divisibility of h_N^- when $r \geq 2$ and $\deg N = 2$. In this talk, we generalize these results and determine the p-divisibility of h_N^- when $r \geq 2$ and $N = (T-a)^d - b$ with $a, b \in \mathbb{F}_q$.

概要 Using $\sigma^2(a) = \sigma(\sigma(a))$ we define new perfect numbers to be a such that $\sigma^2(a) - 2a = -m$ where m is a given integer.
For a perfect number k, define perfect numbers 2.0 a to be positive integers satisfying $\sigma^2(a) - 2a = 2 + 2k$

3月25日(水)　第I会場

9:00〜12:00

概要 When we arrange a finite set of lines in a two-dimensional real vector space, the complement of the lines can be regarded as a division of the plane. Let us call the maximal connected components chambers. It is well known that the number of chambers becomes maximal when all intersection points are double points. However, determining the arrangement that gives the minimal number is much more difficult. A very famous theorem in the theory of hyperplane arrangements, called Yoshinaga's criterion, provides a lower bound for the number of chambers in an algebraic way. We study the relationship between the chamber structures of line arrangements in $\mathbb{R}^2$ and algebraic structures called logarithmic derivation modules.

概要 In this talk, we introduce an equivariant version of the characteristic quasi-polynomials as the permutation characters on the complement of mod q hyperplane arrangements. We show that its character is a quasi-polynomial in q and can be expressed as a sum of the induced characters of an equivariant version of the Ehrhart quasi-polynomials. In addition, we present the results for the Coxeter arranegements with Weyl group actions.

概要 We classify hyperplane arrangements $\mathcal{A}$ in $\mathbb{C}^n$ whose intersection posets $L(\mathcal{A})$ satisfy $L(\mathcal{A}) = \pi_i^{-1} \circ \pi_i\big(L(\mathcal{A})\big)$ for $i = 1, \ldots, n$. Here π_i denotes the projection from $\mathbb{C}^n$ onto $\mathbb{C}^{n-1}$ defined by forgetting the coordinate x_i of $(x_1, \ldots, x_n) \in \mathbb{C}^n$, and $\pi_i\big(L(\mathcal{A})\big) = \{\pi_i(S) \mid S \in L(\mathcal{A})\}$. We show that such arrangements $\mathcal{A}$ arise as pullbacks of the mirror hyperplanes of complex reflection groups of type A or B.

概要 We give the Whitney-type relations in the quantum K-ring of the flag manifold of type C. We denote by $\lambda_y(\mathcal{E})$ the (Hirzebruch) λ_y-class of the vector bundle $\mathcal{E}$ over the flag manifold in the sense of the K-ring. Then, for each short exact sequence $0 \to \mathcal{E}_1 \to \mathcal{E}_2 \to \mathcal{E}_3 \to 0$ of vector bundles, we have $\lambda_y(\mathcal{E}_1) \cdot \lambda_y(\mathcal{E}_3) = \lambda_y(\mathcal{E}_2)$. This identity is known as the K-theoretic Whitney relation. We compute the quantum K-theoretic analog of such Whitney relation in type C; that is, we compute a product of two λ_y-classes, associated to the tautological sequence of the trivial bundle $\mathbb{C}^{2n}$, in the quantum K-ring of the flag manifold of type C.

概要 Persistence modules (i.e. representations of posets) have attracted attention due to the success and recent developments of persistent homology. We study persistence modules via a Galois connection (an adjoint pair of posets) whose left adjoint is the inclusion of a full subposet and the right adjoint is its floor function. Such a full subposet is called an interior system. We call the left Kan extension along this floor function the contraction functor, which is left adjoint to the induction functor. In this talk, we introduce a subclass of interior systems which we call aligned interior systems. For this subclass, we show that both induction and contraction functors send interval modules to interval modules. Then, we use them to study interval covers and resolutions. This work is based on [1] (arXiv:2506.21227).

概要 Jacobian algebras play a central role in the categorification of cluster algebras. In this talk, we study those associated with non-degenerate quivers with potentials and show that several finiteness conditions, such as representation-finiteness, τ-tilting finiteness, g-finiteness, and E-finiteness, are equivalent in this setting. This unifies different notions of finiteness in the study of Jacobian algebras.

概要 The generalized Markov equations are deeply connected with the generalized cluster algebras of Markov type. We construct a deformed Fock–Goncharov tropicalization for the generalized Markov equations and prove that their tropicalized tree structure is essentially the same as that of the classical Euclid tree. We then define the generalized Euclid tree and prove that it converges to the classical Euclid tree up to a scalar multiple. Moreover, by means of cluster mutations, we exhibit an asymptotic phenomenon, up to some limit q, between the logarithmic generalized Markov tree and the classical Euclid tree. A rationality conjecture of q is then put forward. We also propose a generalized Markov uniqueness conjecture for the generalized Markov equations, which illustrates an application of the asymptotic phenomenon.

概要 The theory of polyptych lattices is a framework to obtain a family of toric degenerations whose polytopes are related by piecewise-linear transformations. It can be regarded as a generalization of toric degenerations arising from cluster algebras. In this talk, we study polyptych lattices consisting of transfer maps for marked chain-order polytopes, and obtain a family of toric degenerations to marked chain-order polytopes for the Gelfand–Tsetlin poset.

概要 We consider the group zeta function that counts subgroups of a finite group. The function was introduced by Yumiko Hironaka. For finite abelian groups, equality of zeta functions determines the isomorphism class. Once nonabelian groups are included, the statement fails in general. There exist counterexamples given by an abelian p-group and a nonabelian p-group that share the same zeta function. The conditions under which nonisomorphic groups have equal zeta functions remain open. This talk focuses on semidirect p-groups, beginning with metacyclic p-groups, and determine the answer to the problem. We also discuss the relation to isomorphism of subgroup lattices.

概要 We would like to obtain some good upper bounds for a given cyclotomic number $(a,b)_e$. We improve upper bounds for $(a,b)_e$ by using matroid theory, especially some complexes of their linear matroid over the matrix associated with $(a,b)_e$. Complexes of the linear matroid $M\left[C^{(a,b)}\right]$ associated with $(a,b)_e$ have a relationship between their reduced Eular charactaristic and rank of $C^{(a,b)}$. We introduce the upper bound for $(a,b)_e$ come from invariants of their matroids.

概要 The fundamental theorem of homomorphisms plays a central role in abstract algebra, which states that for every homomorphism, the quotient algebra modulo its kernel is isomorphic to its image, a subalgebra of its codomain. In category theory, the theorem can be reformulated as a decomposition of a morphism into a regular epimorphism (= quotient) followed by a monomorphism (= subalgebra). However, as the notion of algebras is generalized, a longer sequence of regular epimorphisms can be required for such a decomposition. For example, in the category of (small) categories, we require two regular epifunctors to factorize a functor through a subcategory. In this talk, I will present several examples of calculating the supremum length of such decompositions.

14:15〜14:30　2026年度(第29回)日本数学会代数学賞授与式

14:40〜15:40　2026年度(第29回)日本数学会代数学賞受賞特別講演

越谷重夫(千葉大*)　有限群のモジュラー表現論の研究

Shigeo Koshitani (Chiba Univ.*)　Research on modular representation theory of finite groups

概要 We will discuss modular representation theory of finite groups. More precisely, what has been going on since Richard Brauer (1901–1977), who was one of students of I. Schur. Namely, in 1963 Brauer gave a survey talk on the subject. In fact, he announced then 40 problems, some/several of which are/have been called Brauer's conjectures (or problems). As usual some of them have been solved and some of the others are still open. We will not discuss all of them but focus on certain problems/conjectures such as Alperin's weight conjecture (AWC for short) (due to Jonathan L. ALperin) announced in 1986, Dade's conjecture (due to E.C. Dade) announced right after AWC, and then Broue's abelian defect group conjecture (due to M. Broue) announced around 1990. We might discuss also McKay's conjecture due to John McKay announced in 1971, which has been solved positively just a couple years ago by M. Cabanes and B. Spaeth for any prime number p. If we would have still time to talk, we could discuss Donovan's conjecture (due to P. Donovan) and also Puig's finiteness conjecture (due to L. Puig).

16:00〜17:00　2026年度(第29回)日本数学会代数学賞受賞特別講演

山名俊介(阪公大理)　保型形式とL関数

Shunsuke Yamana (Osaka Metro. Univ.)　Automorphic forms and L-functions

概要 The purpose of this talk is to overview investigations by the speaker in automorphic forms and L-functions.

The first topic is the definition of L-functions of automorphic representations of classical groups. The speaker generalized the local theory of L-factors from GL(n) to other classical groups, using the integral representation discovered by Piatetski-Shapiro and Rallis.

The second topic is the construction of Hilbert–Siegel cusp forms. This is a joint work with Tamotsu Ikeda. Ikeda constructed a lifting associating to an elliptic cusp form a Siegel cusp form in 2001. We generalized it to Hilbert cusp forms by a different method.

The third topic is constructions of p-adic L-functions. The speaker has recently constructed p-adic L-functions for PGSp(4), GL(2)xGL(2)xGL(2), U(3)xU(2), U(2,1)xU(1,1). These are joint works with Ming-Lun Hsieh and Michael Harris.

In this talk other works by the speaker will also be mentioned.

3月26日(木)　第I会場

9:30〜12:00

49 前田恭佑 (日大総合基礎)
奥間智弘 (山形大理)
渡辺敬一 (日大文理・明大研究・知財)
吉田健一 (日大文理)
Classification on nearly Gorenstein rational surface singularities with almost reduced fundamental cycle ····· 13

Kyosuke Maeda (Nihon Univ.)
Tomohiro Okuma (Yamagata Univ.)
Kei-ichi Watanabe (Nihon Univ./Meiji Univ.)
Ken-ichi Yoshida (Nihon Univ.)
Classification on nearly Gorenstein rational surface singularities with almost reduced fundamental cycle

概要 In this talk, we classify all nearly Gorenstein rational surface singularities with almost reduced fundamental cycle in terms of resolution graph, which generalizes a classfication theorem on Gorenstein rational surface singularities.

50 奥間智弘 (山形大理)
吉田健一 (日大文理)
渡辺敬一 (日大文理・明大研究・知財)
The canonical trace ideal of elliptic surface singularities ····· 13

Tomohiro Okuma (Yamagata Univ.)
Ken-ichi Yoshida (Nihon Univ.)
Kei-ichi Watanabe (Nihon Univ./Meiji Univ.)
The canonical trace ideal of elliptic surface singularities

概要 In this talk, we describe the canonical trace ideal of two-dimensional normal surface singularities in terms of cycles on a resolution. As an application, we provide a criterion for an elliptic singularity to be nearly Gorenstein.

51 渡辺敬一 (日大文理)
奥間智弘 (山形大理)
吉田健一 (日大文理)
Normal graded ring の nearly Gorenstein 性 ····· 13

Kei-ichi Watanabe (Nihon Univ.)
Tomohiro Okuma (Yamagata Univ.)
Ken-ichi Yoshida (Nihon Univ.)
Nearly Gorenstein normal graded rings

概要 Let R be a normal graded domain over a field. We discuss “nearly Gorenstein” property of such rings using the inverse of the canonical module K_R. The graded structure of K_R and its inverse, Demazure’s conctruction of R using ample Q divisor on X = Proj(R) are fully investigated.

52 尾崎太河 (東京科学大理)
宮下空 (阪大情報)
On higher-dimensional Teter rings via the canonical trace ideal ····· 13

Taiga Ozaki (Sci. Tokyo)
Sora Miyashita (Univ. of Osaka)
On higher-dimensional Teter rings via the canonical trace ideal

概要 We study Puthenpurakal’s higher-dimensional Teter rings via the canonical trace ideal. We give a sufficient criterion for Teterness and show that, in the standard graded case, it is also necessary, yielding a characterization. Consequently, several nearly Gorenstein families are Teter; moreover, under certain hypotheses, the Cohen–Macaulay type of nearly Gorenstein rings is bounded by the projective dimension.

概要 This talk is based on joint research with Shinya Kumashiro. Recent work by the speaker and Varbaro classified the canonical traces of Stanley–Reisner rings that are Gorenstein on the punctured spectrum, under the Cohen–Macaulay assumption. We aim to generalize the result to the non-Cohen–Macaulay case. First, we establish an explicit formula for the canonical trace of graded fiber products of Noetherian rings and apply it to Stanley–Reisner rings of disconnected simplicial complexes. This allows us to reduce the problem to the case of connected simplicial complexes. In that case, we succeed in weakening the Cohen–Macaulay assumption in their result to the Serre's condition (S_2), obtaining a similar classification. Finally, by combining these results, we provide a description of the canonical trace of a Stanley–Reisner ring satisfying (S_2).

概要 From a combinatorial motivation, Stanley assigned the ideal I_P in a polynomial ring S to a simplicial poset P . The ideal I_P is graded with respect to a somewhat unusual grading of S. As a first step toward studying the local cohomology modules $H^i_{I_P}(S)$, we examine injective envelopes in this grading and the morphisms between them.

概要 Let $(R, \mathfrak{m})$ be a regular local ring with $d = \dim R \geq 2$, and let I be an integrally closed $\mathfrak{m}$-primary ideal of R. In this talk, we address the question of when the Rees algebra $\mathcal{R}(I) = \bigoplus_{n\geq 0} I^n$ becomes a Cohen–Macaulay normal domain. The speaker provided a positive answer to the case where I is generated by $d+2$ elements at the MSJ Autumn Meeting 2024. In the present talk, we take a further step and establish a similar affirmative result for monomial ideals I generated by $d+3$ elements in a polynomial ring $k[X_1, X_2, \ldots, X_d]$ over a field k of characteristic zero. The results to be presented are based on joint work with B. Ulrich and J. Hong.

概要 The matching polytope of a graph G is the convex hull of the indicator vectors of the matchings on G. In this talk, we give a characterization when the Ehrhart rings of matching polytopes are Gorenstein. Moreover, we show that matching polytopes whose Ehrhart rings are Gorenstein have the integer decomposition property.

概要 In this talk, we prove that the Hilbert–Kunz multiplicity $e_{HK}(A_{p,d})$ of the quadric hypersurface $A_{p,d}$ can be written by Ehrhart polynomial of a Fibonacci polytope. Moreover, we show several applications.

58 東谷章弘 (阪大情報)　円分多項式の積が h 多項式として現れる標準的次数付き代数 ····· 13
上山健太 (信州大理)
Akihiro Higashitani (Univ. of Osaka)　On the h-polynomials of cyclotomic standard graded commutative algebras
Kenta Ueyama (Shinshu Univ.)

概要 We call a standard graded commutative $\Bbbk$-algebra cyclotomic if its h-polynomial has all its roots on the unit circle in the complex plane. Complete intersections provide typical examples of cyclotomic algebras, since the h-polynomial of any standard graded complete intersection is a product of polynomials of the form $1+t+\cdots+t^{m-1}$. We refer to such polynomials as being of type CI. A natural question is whether there exists a cyclotomic standard graded $\Bbbk$-algebra whose h-polynomial is not of type CI. In this talk, we give a partial answer to this question.

14:15〜15:15　特別講演

土谷昭善 (東邦大理)　可換代数とグラフ彩色理論の交差点
Akiyoshi Tsuchiya (Toho Univ.)　Interactions between commutative algebra and graph coloring theory

概要 Toric ideals and toric varieties are important objects in commutative algebra and algebraic geometry, and they allow one to apply combinatorial methods to study algebraic structures. Conversely, by considering toric ideals and toric varieties arising from discrete structures such as graphs, one can investigate those discrete structures through algebraic and geometric techniques. In this talk, we discuss connections between commutative algebra and graph coloring theory. Given a graph, one can define an algebraic object called the stable set ideal, which is a toric ideal. The question of when this ideal is generated by quadratic binomials is linked to the classical graph-theoretical concept of Kempe equivalence. Using this correspondence, we present an algebraic method to examine Kempe equivalence. Moreover, we propose an algebraic analogue of the perfectly contractile graph conjecture.

15:30〜17:15

59 木村海渡 (名大多元数理)　On conductors, test ideals, and parameter ideals ····· 13
Kaito Kimura (Nagoya Univ.)　On conductors, test ideals, and parameter ideals

概要 When the ring is Gorenstein and local, the question of whether the conductor of a reduced ring or the (parameter) test ideal of a ring of positive characteristic can be contained in a parameter ideal is related to the validity of the monomial conjecture. In this talk, we consider whether such containment holds in a more general setting.

60 大竹優也 (名大多元数理)　Auslander と Martsinkovsky の不変量へのアプローチ ····· 13
Yuya Otake (Nagoya Univ.)　An approach to the invariant of Auslander and Martsinkovsky

概要 The Auslander–Buchweitz theory ensures that every finitely generated module over a Gorenstein local ring admits a Cohen–Macaulay approximation. Auslander introduced the δ-invariant of a module via its minimal Cohen–Macaulay approximation, and later Martsinkovsky extended the theory to arbitrary noetherian local rings by defining the ξ-invariant, which coincides with the δ-invariant in the Gorenstein case. In this talk, we study an increasing sequence converging to the ξ-invariant and describe each term through Auslander's approximation theory.

概要 Let R be a commutative noetherian ring. The singularity category, introduced by Buchweitz, is a triangulated category that reflects the singularity of R. The concepts of (strong) generation in triangulated categories, developed by Bondal, Rouquier, and Van den Bergh, are fundamental to studying its structure. Iyengar and Takahashi characterized the existence of generators in the derived and singularity categories through the openness of the regular locus. Following this, Dey, Lank, and Takahashi established a connection between the strong generation of the bounded derived category and the nonvanishing of the cohomology annihilator. In this talk, we introduce a new form of cohomology annihilator and characterize the existence of a generator in the singularity category in terms of its nonvanishing.

概要 In Scholze's theory of perfectoid spaces, the *tilting* operation plays a crucial role. *Fontaine's monoidal map* is particularly useful for comparing certain ring-theoretic properties such as being (completely) integrally closed under tilting. However, it behaves well only for non-Noetherian rings. To overcome this difficulty, the notion of *perfectoid towers* was introduced as a class of sequences of (Noetherian) rings that approximate perfectoid rings. In this context, we apply Fontaine's monoidal map to perfectoid towers and obtain a stability result in this framework. Furthermore, we present a new construction of perfectoid towers arising from ramification theory. This talk is based on a joint work with Shinnosuke Ishiro and Kazuma Shimomoto.

概要 This paper is one of the series of papers which are dedicated to the complete classification of noncommutative conics. In this paper, we define and study noncommutative affine pencils of conics, and give a complete classification result. We also fully classify 4-dimensional Frobenius algebras. It turns out that the classification of noncommutative affine pencils of conics is the same as the classification of 4-dimensional Frobenius algebras.

概要 We consider a certain four-dimensional nonassociative division algebra A over $\mathbf{F}_2$. For any vectors (x, y) and (x', y') in A^2 we decide when the subspaces $A(x, y)$ and $A(x', y')$ of A^2 coincide.

概要 We introduce (op)lax twisted arrow constructions for (∞, n)-categories. Building on work of Johnson-Freyd and Scheimbauer, who defined (op)lax arrow (∞, n)-categories, we propose twisted variants of their constructions, which also recover the classical twisted arrow $(\infty, 1)$-category of Lurie and others in the case $n = 1$. Moreover, we establish a relationship between full dualizability in a given (∞, n)-category and full dualizability in the three associated twisted arrow (∞, n)-categories.

幾　何　学

3月23日(月)　　第IV会場

9:30〜11:30

概要 Fukaya and Oh studied the correspondence between pseudoholomorphic disks in T^*M which are bounded by Lagrangian sections $\{L_i^\epsilon\}$ and gradient trees in M which consist of gradient curves of $\{f_i - f_j\}$. Here, L_i^ϵ is defined by $L_i^\epsilon = \mathrm{graph}(\epsilon df_i)$. When $M = \mathbb{R}$ and Lagrangian sections are affine, pseudoholomorphic disks w_ϵ can be constructed explicitly, and the image of w_ϵ is a polygon. We proved that pseudoholomorphic disks w_ϵ converge to the gradient tree in the limit $\epsilon \to +0$ when the image of w_ϵ is a generic convex quadrilateral which has no parallel sides and whose diagonal lines are not orthogonal to horizontal line. In this talk, we study the convergence of pseudoholomorphic disks whose images are non-generic quadrilaterals.

概要 We study a problem of identification of spaces by integral geometric functions, such as Riesz energy functions and interpoint distance distributions, and show that they can identify "generic" planar polygonal domains.

概要 The celebrated Hopf–Rinow theorem shows the equivalence of several completeness notions on Riemannian manifolds, but a similar statement fails in Lorentzian geometry. Beem introduced Lorentzian analogues of completeness conditions —finite compactness, timelike Cauchy completeness, and Condition A— and proved their equivalence on globally hyperbolic C^2-spacetimes. In this talk, we extend Beem's notions to the metric framework of Lorentzian length spaces and clarify their implications, namely that finite compactness implies timelike Cauchy completeness and that timelike Cauchy completeness implies Condition A for globally hyperbolic Lorentzian length spaces. Moreover, for globally hyperbolic C^1-spacetimes, we establish the equivalence of the three conditions under assumptions that guarantee good causal geodesic behavior. These results constitute a Hopf–Rinow-type theorem for low-regularity Lorentzian geometry.

概要 This study generalizes the notion of Bishop frames from curves in 4-dimensional Euclidean space to timelike regular curves in the 4-dimensional Lorentz space. We show that, up to reordering the frame vectors while keeping the tangent fixed, there are four possible types of generalized Bishop frames for such curves. Moreover, these frames admit a hierarchical structure analogous to the Euclidean case. Building on this hierarchy, we propose a new classification of timelike curves in L^4.

5 古賀　勇 (九州国際大現代ビジネス)
長友康行 (明大理工)
髙橋正郎 (久留米工高専)
球面間の同変調和写像の分類 ····· 15

Isami Koga (Kyushu Int. Univ.)
Yasuyuki Nagatomo (Meiji Univ.)
Masaro Takahashi (Kurume Nat. Coll. of Tech.)
A classification of equivariant harmonic maps between spheres

概要 At the last spring meeting, we talked about classification results for equivariant harmonic maps between spheres with respect to the special unitary groups and the symplectic groups. This talk is a continuation of that presentation. We consider subgroups of the special orthogonal group which act transitively on the standard sphere except the special unitary groups and the symplectic groups. (For example, such groups are described in Besse's book.) When the subgroup is the exceptional Lie group G_2 or the spin group $Spin(7)$, we obtain rigidity results. In the other cases, we describe the moduli spaces of equivariant harmonic maps up to image equivalence. Finally, we introduce identity theorems for certain equivariant harmonic maps.

6 納谷　信 (名大多元数理)
写像の分散最大化問題の smoothing operator への一般化について ····· 15

Shin Nayatani (Nagoya Univ.)
Generalizing the variance maximization problem for maps to that for smoothing operators

概要 We generalize the variance maximization problem for smooth maps into a Hilbert space to one for smoothing operators. We report the result that the strong duality holds for the new problem and the first eigenvalue maximization problem, where the first eigenvalue is that of the Bakry–Émery Laplacian.

14:15〜16:15

7 久保田景 (阪大理)
時間的 Hausdorff 測度と体積比較不等式 ····· 15

Hikaru Kubota (Univ. of Osaka)
Timelike Hausdorff measure and its volume comparison

概要 Recently, synthetic Lorentzian geometry has been studied intensively. In this talk, the speaker will summarize definitions of Lorentzian pre-length space (LpLS) and the timelike Hausdorff measure. LpLS is a corresponding notion to a metric space for Riemannian manifolds, and the timelike Hausdorff measure is the corresponding notion to the standard Hausdorff measure. The speaker will propose a volume comparison inequality with respect to the timelike Hausdorff measure using timelike Lipschitz maps.

8 宮本俊明 (東北大理)
Gromov のピラミッドの直和と分解について ····· 15

Toshiaki Miyamoto (Tohoku Univ.)
Direct sums and decompositions of Gromov's pyramids

概要 Gromov studied the concentration topology on the set of all isomorphism classes of metric measure spaces, called mm-spaces, and introduced a pyramid, which is a kind of directed family of mm-spaces. The theory of the concentration topology and pyramids has been mainly studied with respect to the convergence of a sequence of mm-spaces whose dimensions diverge to infinity. In this talk, we define the direct sum of pyramids and show that it naturally appears as a limit of a sequence of mm-spaces whose measures concentrate on several mutually separated regions. Furthermore, we present the direct sum decomposition of a pyramid of infinite observable diameter.

概要 We extend the law of large numbers from the framework of exponential families to that of q-exponential families, where the independence of random variables is not assumed.

概要 It is known that a shell membrane in equilibrium where a constant purely normal load acts on the membrane, and where the principal curvature lines coincide with the principal stress lines, forms an integrable system called a membrane O surface. This paper formulates the governing equations for membrane O surfaces of the 1st and 2nd kind, which are analogues to Guichard surfaces of the 1st and 2nd kind introduced by Calapso. Furthermore, under this formulation, we show that membrane O surfaces are a subclass of Demoulin's Ω surfaces, and that the Bäcklund transformation for membrane O surfaces preserves membrane O surfaces of the 1st and 2nd kind, respectively.

概要 It has recently been recognized that zero mean curvature surfaces in the three-dimensional Euclidean space, the Lorentz space, and the isotropic space are closely related to each other through certain correspondences given by decomposition theorems. In this talk, we show the uniqueness of these decomposition theorems by means of the Weierstrass-Enneper type representation formula, and also present the fact that such decompositions preserve various geometric properties.

概要 Surfaces with zero mean curvature are among the major topics in the study of the Heisenberg group. Under suitable settings, such surfaces can be constructed from harmonic maps, and they induce constant mean curvature surfaces in semi-Euclidean spaces. It has recently been found that zero mean curvature surfaces in the Heisenberg group with a Lorentzian metric can naturally admit singularities. In this talk, we present criteria for some singularities on timelike minimal surfaces in the Heisenberg group equipped with a certain Lorentzian metric, and provide some examples via the duality with constant mean curvature surfaces in the semi-Euclidean space.

16:30〜17:30　特別講演

赤嶺新太郎（日大生物資源）　退化した計量を持つ空間内の平均曲率一定曲面について

Shintaro Akamine (Nihon Univ.)　Constant mean curvature surfaces in certain spaces with degenerate metrics

概要 The geometry of submanifolds is usually studied in pseudo-Riemannian manifolds equipped with non-degenerate metrics. However, in certain situations, spaces with degenerate metrics arise naturally as ambient spaces. For example, any minimal surface in the three-dimensional Euclidean space $\mathbb{E}^3$ can be locally deformed into a maximal surface in the three-dimensional Minkowski space $\mathbb{L}^3$ while preserving the mean curvature, by continuously varying the ambient space. During this deformation, one encounters zero mean curvature surfaces in a space with a degenerate metric, called the isotropic space $\mathbb{I}^3$. Studying such surfaces in $\mathbb{I}^3$ thus directly contributes to the understanding of the original minimal surfaces.
In this talk, we will present local and global properties of zero or constant mean curvature surfaces in the isotropic space and constant mean curvature surfaces in the light cone, both of which appear in correspondence with minimal surfaces in $\mathbb{E}^3$ and maximal surfaces in $\mathbb{L}^3$.

3月24日(火)　第IV会場

9:30〜11:00

13　橋本義規（阪公大理）　経路積分の類似を用いた測度距離空間に対するマグニチュードの定式化 ····· 10

Yoshinori Hashimoto (Osaka Metro. Univ.)　Magnitude for metric measure spaces by means of an analogue of path integrals

概要 The magnitude of finite metric spaces is an invariant discovered by Leinster. Its definition depends on the similarity matrix which can only be defined for finite metric spaces. In this talk, by performing an analogue of path integrals over the space of geodesics, we define the magnitude for a general length space with a Borel measure. This definition extends the original one for finite metric spaces.

14　橋本義規（阪公大理）　楕円曲線から射影空間への isotropic な調和写像の剛性について ····· 10
B. Mera
(Univ. de Lisboa・東北大AIMR)
小澤知己（東北大AIMR）

Yoshinori Hashimoto (Osaka Metro. Univ.)　Rigidity of isotropic harmonic maps from elliptic curves to projective spaces
Bruno Mera
(Univ. de Lisboa / Tohoku Univ.)
Tomoki Ozawa (Tohoku Univ.)

概要 It is known that any harmonic map of positive degree from an elliptic curve to a projective space is constructed in a specific manner, called isotropic, by a theorem of Eells–Wood. In this talk, we prove that if two isotropic harmonic maps are isometric, then one can be obtained from the other by means of the unitary linear action on the projective space.

15 橋本義規 (阪公大理)　幾何学的不変式論と $SU(3)$ の複素構造 ····· 10
石田裕昭 (阪公大理)
糟谷久矢 (名大多元数理)

Yoshinori Hashimoto (Osaka Metro. Univ.)　Geometric invariant theory and complex structure of $SU(3)$
Hiroaki Ishida (Osaka Metro. Univ.)
Hisashi Kasuya (Nagoya Univ.)

概要 The quotient space $M = SL(3,\mathbb{C})/U$ of $SL(3,\mathbb{C})$ by its maximal unipotent subgroup U admits an action of $(\mathbb{C}^*)^2$ from both sides. In this talk, we give a necessary and sufficient condition for M to agree with the stable locus in terms of geometric invariant theory. Combining this result with the previous result due to Ishida–Kasuya, we give a sufficient condition for the existence of double-sided invariant complex structure of $SU(3)$ in terms of geometric invariant theory.

16 今田夏暉 (早大理工)　Higher Killing spinors on 3-dimensional manifolds ····· 15
本間泰史 (早大理工)
大野走馬 (早大理工)

Natsuki Imada (Waseda Univ.)　Higher Killing spinors on 3-dimensional manifolds
Yasushi Homma (Waseda Univ.)
Soma Ohno (Waseda Univ.)

概要 Killing spinors are one of the important objects in spin geometry. The existence of a Killing spinor imposes strong restrictions on the geometry of the underlying manifold. In this talk, we extend the concept of Killing spinors to the spin-$j/2$ bundle and discuss their properties. In particular, we will focus on spin-$j/2$ Killing spinors on 3-dimensional manifolds. Furthermore, we give a construction of higher Killing spinors on the 3-sphere. This is joint work with Yasushi Homma and Soma Ohno.

17 髙田土満 (新潟大教育)　Hilbert 多様体の位相幾何と非可換幾何 ····· 15

Doman Takata (Niigata Univ.)　Topology and noncommutative geometry of Hilbert manifolds

概要 For an oriented non-compact manifold M, there exists a map $H_p(M) \to H_c^{\dim(M)-p}(M)$. In the K-theory version of this map, the target group $K_c^{\dim(M)-p}(M)$ is a noncommutative geometric invariant, because it is isomorphic to the operator K-theory of the continuous function algebra of M by the Serre–Swan theorem.
In this talk, we formulate an infinite-dimensional version of this map. For the left-hand side of the map, we use the Baum–Douglas geometric K-homology. For the right-hand side of the map, we use the operator K-theory of the "C^*-algebras of Hilbert manifolds". This construction gives a K-theory element of this C^*-algebra.

13:00〜14:00　特別講演

渡邉忠之 (京大理)　グラフ複体と微分同相群

Tadayuki Watanabe (Kyoto Univ.)　Graph complexes and diffeomorphism groups

概要 The graph complexes, introduced by Kontsevich, are huge combinatorial objects related to several important problems in geometry and topology. In this talk, I will discuss about a topological realization of the graph complexes in the moduli spaces of smooth higher-dimensional disks, and its related results on the spaces of automorphisms of manifolds. This talk is partially based on a joint work with Boris Botvinnik.

3月25日(水)　第IV会場

9:30〜11:30

18 陣内智史 (阪　大　理)　巨大類における小林ヒッチン対応について ····· 15
Satoshi Jinnouchi (Univ. of Osaka)　On the Kobayashi–Hitchin correspondence for big classes

概要 Given a Kähler class on a compact complex manifold, one can define the classical notions of slope stability and Hermitian–Yang–Mills metrics for holomorphic vector bundles. The Kobayashi–Hitchin correspondence asserts that a holomorphic vector bundle over a compact Kähler manifold is slope polystable if and only if it admits a Hermitian–Yang–Mills metric. Big cohomology classes provide a current-theoretic generalization of Kähler classes. In this talk, we introduce the concepts of slope stability and Hermitian–Yang–Mills metrics in the setting of big classes, and establish a version of the Kobayashi–Hitchin correspondence for big classes in certain special cases.

19 小林和志 (福岡教育大教育)　複素トーラス上の正則直線束に対するある非可換変形とSYZ変換について ····· 15
Kazushi Kobayashi (Univ. of Teacher Edu. Fukuoka)　On a noncommutative deformation of holomorphic line bundles on complex tori and the SYZ transform

概要 By regarding a given n-dimensional complex torus X^n as the trivial torus fibration $X^n \to \mathbb{R}^n/\mathbb{Z}^n$, we can obtain a mirror dual complexified symplectic torus $\check{X}^n$ based on the SYZ construction. In the middle 2000s, Kajiura studied the noncommutative deformation X^n_θ of X^n associated to the (real) deformation quantization of $X^n \to \mathbb{R}^n/\mathbb{Z}^n$ by a Poisson bivector θ defined along the fibers. In particular, he constructed the noncommutative deformations $L_\theta \to X^n_\theta$ of holomorphic line bundles on X^n associated to the deformation from X^n to X^n_θ. The purpose of this talk is to explain how to construct a mirror partner $\check{X}^n_\theta$ of X^n_θ ($\check{X}^n_\theta$ is also a deformation of $\check{X}^n$) and the objects defined on $\check{X}^n_\theta$ which are mirror dual to noncommutative objects $L_\theta \to X^n_\theta$.

20 四ツ谷直仁 (静　岡　大　理)
DongSeon Hwang (IBS Center for Complex Geometry)
佐藤　拓 (福　岡　大　理)　Toric Fano manifolds that do not admit extremal Kähler metrics ····· 15
Naoto Yotsutani (Shizuoka Univ.)
DongSeon Hwang (IBS Center for Complex Geometry)
Hiroshi Sato (Fukuoka Univ.)　Toric Fano manifolds that do not admit extremal Kähler metrics

概要 We show that there exists a 10-dimensional toric Fano manifold that does not admit any extremal Kähler metric in its first Chern class, thereby answering a question posed by Mabuchi in 2011. Moreover, by taking the product with a suitable toric Fano manifold, we construct toric Fano manifolds of arbitrary dimension $n \geq 11$ that likewise admit no extremal Kähler metrics in their first Chern class.

21 四ツ谷直仁 (静　岡　大　理)
King Leung Lee (Univ. of Montpellier)　偏極トーリック多様体におけるチャウ・ウェイトの爆発公式およびその応用 ····· 15
Naoto Yotsutani (Shizuoka Univ.)
King Leung Lee (Univ. of Montpellier)　On the blow-up formula of Chow weights for polarized toric manifolds and its application

概要 Let X be a smooth projective toric variety, and let $\widetilde{X}$ denote the blow-up of X at finitely many distinct torus-invariant points. We derive an explicit combinatorial formula for the Chow weight of $\widetilde{X}$ in terms of the base toric manifold X and the symplectic cuts of its associated Delzant polytope. As an application, we compute this formula for the projective plane and compare the Chow stability of toric blow-ups with that of blow-ups at general points.

22　村山庄太郎（東京理大理）　Fano 許容多様体の満渕定数と満渕ソリトン ····· 15
新田泰文（東京理大理）

Shotaro Murayama (Tokyo Univ. of Sci.)
Yasufumi Nitta (Tokyo Univ. of Sci.)

Mabuchi constants and Mabuchi solitons on Fano admissible manifolds

概要 A Mabuchi soliton is a canonical Kähler metric on a Fano manifold introduced by Toshiki Mabuchi, regarded as a generalization of the Kähler–Einstein metric. While every Kähler–Einstein metric is a Mabuchi soliton, the converse does not hold in general. Moreover, there exist Fano manifolds that admit a Mabuchi soliton but no Kähler–Einstein metric. An obstruction to the existence of Mabuchi solitons is given by the so-called Mabuchi constant, and a necessary condition for a Fano manifold to admit a Mabuchi soliton is that this constant is strictly less than one. In this talk, we will present explicit formulas for the Mabuchi constant in the class of Fano admissible manifolds, and discuss the existence problem of Mabuchi solitons on such manifolds fibered over complex projective spaces.

23　川村昌也（椙山女学園大教育）　擬 Kähler 多様体上の Calabi フローについて ····· 15

Masaya Kawamura (Sugiyama Jogakuen Univ.)

On the Calabi flow on quasi-Kähler manifolds

概要 In this talk, we introduce the Calabi flow on a compact quasi-Kähler manifold and provide a priori estimates along the flow under the assumption of a uniform bound on the Chern scalar curvature of the evolving metric. Using these estimates, we show that if the Chern scalar curvature is uniformly bounded for all time, then the flow converges smoothly to the unique Chern–Ricci-flat metric in almost Hermitian geometry.

14:15〜16:15

24　澤井　洋（沼津工高専）　非 Vaisman 型局所共形ケーラー可解多様体の基本 2 次形式 ····· 15

Hiroshi Sawai (Numazu Nat. Coll. of Tech.)

The fundamental 2-form on a non-Vaisman LCK solvmanifold

概要 On a locally conformal Kähler (LCK, for short) structure, it is said to be Vaisman if the Lee form is paralell with respect to Levi–Civita connection, and the fundamental 2-form of a Vaisman structure is given by Lee form and the complex struture. In this talk, we investigate the fundamental 2-form of a non-Vaisman LCK structure on a solvmanifold, and prove that the solvable Lie algebra has a unimodular subalgebra with a Kähler structure.

25　桑田　健（香川高専）　4 次元 Fano 超曲面の楕円曲線の数と Gromov–Witten 不変量 ····· 15
秦泉寺雅夫（岡山大自然）

Ken Kuwata (Nat. Inst. of Tech., Kagawa Coll.)
Masao Jinzenji (Okayama Univ.)

The number of elliptic curves and Gromov–Witten invariants for four-dimensional Fano hypersurfaces

概要 We propose a conjectural formula relating the number of elliptic curves of degree d and the Gromov–Witten invariants for four-dimensional Fano hypersurfaces. In this talk, we introduce this conjecture.

概要 Let X be a smooth quasi-projective variety. Assume that the topological fundamental group $\pi_1(X,x)$ is torsion-free nilpotent. We prove that if the first Betti number $b_1(X) \leq 3$, then $\pi_1(X,x)$ is isomorphic to either $\mathbb{Z}^n$ for $n = 1,2,3$, a lattice in the Heisenberg group $H_3(\mathbb{R})$, or a lattice in $\mathbb{R} \times H_3(\mathbb{R})$. Furthermore, if the rank is at most seven, then $\pi_1(X,x)$ is abelian or 2-step nilpotent. More precisely, we determine the real nilpotent Lie groups that admit such lattices up to ranks six and seven, respectively. Our results give a partial affirmative answer to a question of Aguilar–Campana on nilpotent (quasi-)Kähler groups.

概要 We construct a 4-dimensional phase space using the orbit space by S^1-action in hyperbolic 3-space and the Lagrangian by the Hsiang–Lawson metric. We then consider certain integrable systems as Hamiltonian systems on the phase space,and we give a Haantjes operator on the 4-dimensional phase space and construct a concrete symplectic-Haantjes manifold. In particular, we construct this manifold using a rewritten conditional formulation of the definition formula given by Tempesta and Tondo.

概要 Collino prove that the fundamental group of a Zariski open set of the symmetric square of a hyperelliptic curve is isomorphic to the integral Heisenberg group. We compute the mixed Hodge structure on this fundamental group, and show that the second extension class is expressed by the Abel-Jacobi invariant of the canonical class and the marked points of the hyperelliptic curve.

概要 The tt*-equation was introduced by S. Cecotti and C. Vafa in physics. In mathematics, B. Dubrovin formulated the tt*-equation as a flatness condition (tt*-structure) and described the tt*-structure as an isomonodromic deformation of a certain linear differential equation. In this talk, we review Dubrovin's formulation in the case of tt*-structure over $\mathbb{C}^*$ and characterize the tt*-equation by an upper uni-triangular matrices (Stokes matrix). We also discuss the ambiguity of the resulting Stokes matrices. Furthermore, we construct the tt*-equation from the ADE Cartan matrices by solving a Riemann–Hilbert problem. This method was used by M. Guest, A. Its and C. Lin to solve the tt*-Toda equation and we generalized their approach to more general tt*-equations.

3月26日(木)　第IV会場

9:30〜10:45

30　井川　治 (京都工繊大工芸)　実旗多様体の交叉の Betti 数の総和 ····· 15
田崎博之 (都立大理・筑波大数理物質)

Osamu Ikawa (Kyoto Inst. Tech.)　Sum of Betti numbers of intersections of real flag manifolds
Hiroyuki Tasaki (Tokyo Metro. Univ./Univ. of Tsukuba)

概要 We show that the sum of Betti numbers of intersections of real flag manifolds in a complex flag manifold is equal to that of the real flag manifold.

31　加藤直樹 (中京大教育院)　Infinitely many left-symmetric structures on nilpotent Lie algebras ··· 15

Naoki Kato (Chukyo Univ.)　Infinitely many left-symmetric structures on nilpotent Lie algebras

概要 Dekimpe and Ongenae constructed infinitely many pairwise non-isomorphic complete left-symmetric structures on $\mathbb{R}^n$ for $n \geq 6$. In this talk, we construct a family of complete left-symmetric structures on the cotangent Lie algebra $T^*\mathfrak{g}$ of a certain n-dimensional almost abelian nilpotent Lie algebra $\mathfrak{g}$ and give a condition under which two left-symmetric structures in this family are isomorphic. As a consequence, we obtain infinitely many pairwise non-isomorphic left-symmetric structures on $T^*\mathfrak{g}$. Moreover, as an application of this construction, we obtain infinitely many symplectic structures on $T^*\mathfrak{g}$ which are pairwise non-symplectomorphic up to homothety.

32　石川元稀 (立命館大理工)　Stability analysis for the pseudo-Riemannian geodesic flows of step-two
多羅間大輔 (立命館大理工)　nilpotent Lie groups ····· 15

Genki Ishikawa (Ritsumeikan Univ.)　Stability analysis for the pseudo-Riemannian geodesic flows of step-two
Daisuke Tarama (Ritsumeikan Univ.)　nilpotent Lie groups

概要 This talk deals with the geodesic flows of step-two nilpotent Lie groups equipped with a left-invariant pseudo-Riemannian metric. The left-invariant geodesic flow of a Lie group can be formulated as the Lie–Poisson equation on the dual space of its Lie algebra. In particular, in the case of step-two nilpotent Lie groups, the Lie–Poisson equation can be described in terms of the so-called j-mapping, a linear operator associated to the step-two nilpotent Lie algebras equipped with the induced scalar product. In this talk, the stability of equilibrium points for the Hamilton equation is determined in terms of their Williamson types. This talk is based on a joint work with Daisuke Tarama (Ritsumeikan Univ.).

11:00〜12:00　特別講演

田丸博士 (阪公大理)　カンドルと対称空間

Hiroshi Tamaru (Osaka Metro. Univ.)　Quandles and symmetric spaces

概要 The notion of quandles, which originated in knot theory, is now playing an important role in many branches of mathematics. Among various areas of study, quandles can be regarded as a generalization of symmetric spaces. We are studying quandles from the perspective of symmetric spaces, and in this talk, we will introduce some recent developments.
In the theory of symmetric spaces, the Chen–Nagano theory focuses on point symmetry, which aligns well with the study of quandles. One aspect of our work aims to discretize the Chen–Nagano theory or transfer it to quandles.

函　数　論

3月23日(月)　　第V会場

9:30〜11:00

1 宮 地 秀 樹 (金 沢 大 理 工)　写像類群の力学系的研究に向けて ····· 15
Hideki Miyachi (Kanazawa Univ.)　Towards a dynamical perspective on the mapping class group

概要 In this talk, I will discuss a dynamical perspective on the mapping class group by analogy with the theory of Kleinian groups.

2 細 川 卓 也　Hyperbolic derivative via composition operators ····· 15
大 野 修 一
Takuya Hosokawa　Hyperbolic derivative via composition operators
Shûichi Ohno

概要 We here pose a new problem for composition operators on Bloch and little Bloch spaces. Could a compact composition operator with an analytic symbol imply the compactness of composition operator with product of it and any analytic self-map of the open unit disk? We will investigate the hyperbolic derivative of products of analytic self-maps of the unit disk and so provide explicit and new examples of products that induce compact composition operators on Bloch and little Bloch spaces.

3 柳 下 剛 広 (山 口 大 工)　普遍被覆写像のレブナー鎖の初等的な例について ····· 15
Masahiro Yanagishita (Yamaguchi Univ.)　On an elementary example of Loewner chains of universal covering mappings

概要 A Loewner chain is originally defined as a one-parameter family of univalent functions $\{f_t\}_{t\in I}$ on the unit disk such that f_s is subordinate to f_t whenever $s,t\in I$ with $s<t$. Recently, Yanagihara has extended this concept to one-parameter families of universal covering mappings on the unit disk. In this talk, we introduce an example of such extended Loewner chains using only elementary functions.

4 櫻 井 映 里 香 (早 大 教 育)　数論的三角群の指数有限部分群である四角群 ····· 15
相 馬 啓 佑 (早 大 教 育)
小 森 洋 平 (早 大 教 育)
Erika Sakurai (Waseda Univ.)　On quadrilateral groups which are index finite subgroups of arithmetic triangle groups
Keisuke Souma (Waseda Univ.)
Yohei Komori (Waseda Univ.)

概要 We classify non cocompact quadrilateral groups which are index finite subgroups of arithmetic triangle groups.

5 熊 谷　　駿 (八 戸 工 大)　Self-affinity, Möbius geometry and Schwarzian-pre-Schwarzian derivative ····· 15
梶 原 健 司 (九 大 I M I)
Shun Kumagai (Hachinohe Inst. of Tech.)　Self-affinity, Möbius geometry and Schwarzian-pre-Schwarzian derivative
Kenji Kajiwara (Kyushu Univ.)

概要 Self-affinity is a symmetry of planar curves and is regarded as playing a crucial role in characterizing log-aesthetic curves (LACs), which have been studied as reference curves for designing aesthetic shapes in CAD systems. Inoguchi et al. showed a variational principle and an integrable deformation of LACs in similarity geometry, as well as its application to geometric shape generation. In this talk, we present results showing that the self-affinity can be reformulated as a differential equation using Schwarzian and pre-Schwarzian derivatives, which induces constant-curvature curves in Möbius geometry.

14:20〜15:20　特別講演

藤 村 雅 代 (防　衛　大)　有限ブラシュケ積の幾何学的性質について

Masayo Fujimura (Nat. Defense Acad. of Japan)　Geometric properties of finite Blaschke products

概要 For a Blaschke product B of degree d, we introduce the interior curve and the exterior curve associated with B. We also discuss the geometric properties of these curves and their connection to some classical geometric theorems.

3月24日(火)　第V会場

9:30〜11:30

6 大 沢 健 夫 (名大多元数理)♭　Extending holomorphic functions from analytic complements of complete Kähler domains ····· 15

Takeo Ohsawa (Nagoya Univ.)　Extending holomorphic functions from analytic complements of complete Kähler domains

概要 Let M be a complex manifold and let X be a complex analytic subset of M. In the situation where $M \setminus X$ admits a complete Kähler metric, a condition is given for a holomorphic function on X to be extendable holomorphically to M.

7 綾 野 孝 則 (阪公大数学研)　無限遠点が2つの超楕円曲線に付随するシグマ関数 ····· 15
V. M. Buchstaber (Steklov Math. Inst.)

Takanori Ayano (Osaka Metro. Univ.)　Sigma function associated with a hyperelliptic curve with two points at infinity
Victor M. Buchstaber (Steklov Math. Inst.)

概要 The Riemann theta function associated with a compact Riemann surface is a quasi-periodic entire function, which depends on a canonical homology basis. F. Klein posed the following problem. Construct a quasi-periodic entire function which does not depend on a canonical homology basis. This problem was solved by Korotkin, Shramchenko, and Nakayashiki for any compact Riemann surface. On the other hand, Buchstaber, Enolski, and Leykin posed the following problem. In the case where a defining equation of an algebraic curve is given, construct a quasi-periodic entire function whose power series expansion is determined only by the coefficients of the defining equation of the curve algebraically. In this talk, we will solve this problem for hyperelliptic curves with two points at infinity.

8 Shaolin Chen (Guangxi Normal Univ.)　Hardy spaces on bounded symmetric domains I ····· 15
濱 田 英 隆 (九州産大理工)

Shaolin Chen (Guangxi Normal Univ.)　Hardy spaces on bounded symmetric domains I
Hidetaka Hamada (Kyushu Sangyo Univ.)

概要 In this talk, we give the completeness of the pluriharmonic Hardy space and establish a Littlewood–Paley type theorem of holomorphic functions in bounded symmetric domains. Next, we provide a close relationship between the integral means of pluriharmonic (holomorphic) functions and those of their derivatives in bounded symmetric domains.

概要 In this talk, using the weights and a new characterization of pluriharmonic Hardy space (the Littlewood–Paley type theorem), the composition operators from the planar harmonic Bloch type spaces to pluriharmonic Hardy spaces in bounded symmetric domains will be discussed. The obtained results provide the improvements and extensions of the corresponding known results.

概要 In this talk, we give a closed domain D in $\mathbb{R}^2$ such that for $(\alpha,\beta)\in D$ and the Roper–Suffridge type extension operator $\Psi_{\alpha,\beta}$, $\Psi_{\alpha,\beta}(f)$ can be embedded as the initial element of a normal Loewner chain on B for any $f\in S$. Note that D contains points $(\alpha,\beta)\in\mathbb{R}^2$ such that $\alpha<0$ and/or $\beta<0$. For the proof, we use a new method which is different from those used in the previous works. As a corollary, we obtain that for $(\alpha,\beta)\in D$, $\Psi_{\alpha,\beta}$ preserves starlikeness. We also show that if $(\alpha,\beta)\in\mathbb{R}^2\setminus\{(0,1/2)\}$, then the operator $\Psi_{\alpha,\beta}$ does not preserve convexity.

概要 In this talk, we give a covering theorem for biholomorphic mappings on bounded domains in a complex Banach space. Next, as an application of this covering theorem, we give the Koebe one-quarter theorem for normal Loewner chains on the unit ball of a complex Banach space. We give also several applications of this result. Finally, as another application of the above covering theorem, we give a covering theorem for nonlinear resolvents on the unit ball of a complex Banach space.

概要 We study an increasing sequence of plurisubharmonic functions $\{\phi_n\}$ on a complex manifold X, converging to a psh function ϕ. Our focus is the stability of the weighted Bergman spaces $H^2(X,\phi_n)=\{f\in\mathcal{O}(X)\mid\int_X|f|^2e^{-\phi_n}<\infty\}$. The question is whether any element of the limit space $H^2(X,\phi)$ can be approximated by elements of $H^2(X,\phi_n)$. This problem has two aspects: geometric conditions on X, and analytic conditions on the sequence $\{\phi_n\}$. We discuss both viewpoints and present situations in which such approximation becomes possible.

13:00〜14:00　特別講演

竹 内 有 哉（筑波大数理物質）　CR Paneitz 作用素と埋め込み可能性

Yuya Takeuchi (Univ. of Tsukuba)　CR Paneitz operator and embeddability

概要 The CR Paneitz operator, a CR invariant fourth-order linear differential operator, plays a crucial role in three-dimensional CR geometry. It is deeply connected with global embeddability, the CR positive mass theorem, and the logarithmic singularity of the Szegő kernel. In this talk, I will present recent progress on the spectrum of the CR Paneitz operator, focusing in particular on how its nature differs between the embeddable and non-embeddable cases.

函 数 方 程 式 論

3月23日(月)　第II会場

9:30〜12:00

1 後藤良彰 (小樽商大)　1次元複素トーラスの直積上の Riemann–Wirtinger 積分について ····· 12

Yoshiaki Goto (Otaru Univ. of Commerce)　The Riemann–Wirtinger integral on the product of two one-dimensional complex tori

概要 The Riemann–Wirtinger integral is an analogue of the hypergeometric integral, which is defined on a one-dimensional complex torus. As an example of its generalization, we define the Riemann–Wirtinger integral on the product of two one-dimensional complex tori. We study the structure of the twisted cohomology group associated with the Riemann–Wirtinger integral, and derive a system of differential equations satisfied by this integral.

2 大内忠 (上智大*)　Another elementary approach to WKB analysis ····· 12

Sunao Ōuchi (Sophia Univ.*)　Another elementary approach to WKB analysis

概要 We treat a singular perturbation problem called WKB equation
(Eq) $h^2u(x,h) - Q(x)u(x,h) = 0$, $h > 0$ is a small parameter.
Investigation of (Eq) has long history. Recently it has developed by a new method named "Exact WKB Analysis" based on Borel resummation method and new analytic results. We study (Eq) by another elementary method. We only apply advanced calculus, elementary theories of complex functions and differential equations to (Eq). We neither assume turning points are simple nor there is no Stokes curve that connects two turning points.

3 谷川智幸 (阪公大理)　半分線形微分方程式の振動解の振幅と零点分布について ····· 12
草野尚 (広島大*)
J. Jaroš (Comenius Univ.)
宇佐美広介 (岐阜大*)

Tomoyuki Tanigawa (Osaka Metro. Univ.)　Amplitude and zero distribution of oscillatory solutions of half-linear differential equations
Takaŝi Kusano (Hiroshima Univ.*)
Jaroslav Jaroš (Comenius Univ.)
Hiroyuki Usami (Gifu Univ.*)

概要 In this talk, since results on the amplitude and zero distribution of oscillatory solutions for linear differential equations, namely those of Sturm–Liuoville type, have already been established, we attempt to extend these results obtained for linear differential equations to the nonlinear case of half-linear differential equations.

4 Mingzhu Qu (Hulunbuir Univ.)　2つの分布型遅れをもつ線形微分方程式の漸近安定性 ····· 12
Wei Zheng (Heilongjiang Univ.)
松永秀章 (阪公大理)

Mingzhu Qu (Hulunbuir Univ.)　Asymptotic stability of linear differential equation with two distributed delays
Wei Zheng (Heilongjiang Univ.)
Hideaki Matsunaga (Osaka Metro. Univ.)

概要 The purpose of this study is to establish explicit necessary and sufficient conditions for the asymptotic stability of the zero solution to a scalar linear differential equation with two distributed delays. The stability conditions are derived by the careful root analysis of the associated characteristic equation.

概要 We consider asymptotic behavior of solutions of a class of half-linear ordinary differential equations. We give a necessary condition for such equations to have solutions behaving exponentially near ∞.

概要 This study investigates the conditional Ulam stability for the discrete logistic model, also known as the Beverton–Holt model. This research is a joint work with D. R. Anderson. We compare our results with existing results for continuous and discrete logistic models. We show that our results align with the continuous case when the step size is small, and, significantly, they provide a better estimate than previous discrete results when the step size is unity.

概要 For $M = 1, 2, 3, \cdots$ and $m = 1, 2$, the best constant $C(M, m)$ of the m-th Sobolev inequality

$$\left(\sup_{|y| \le L} | u^{(m)}(y) | \right)^2 \le C \int_{-L}^{L} \left| u^{(M)}(x) \right|^2 dx$$

has obtained. The function $u(x)$ satisfy the clamped boundary condition $u^{(i)}(\pm L) = 0$ $(0 \le i \le M-1)$. In the background, there is $2M$-th order ordinary differential equation $(-1)^M u^{(2M)} = f(x)$ on an interval $(-L, L)$ with clamped boundary condition $u^{(i)}(\pm L) = 0$ $(0 \le i \le M-1)$. The solution u is given by the Green function $G(x, y)$. The best constant of Sobolev inequality is expressed by using Green function.

概要 We consider the one-dimensional nonlocal elliptic equations of Kirchhoff type with convolutional Kirchhoff functions. We obtain the exact solutions u_λ and global bifurcation curves $\lambda(\alpha)$. Here, $\alpha := \|u_\lambda\|_\infty$ represents the maximum norm of the solution u_λ.

9 田中　敏 (東北大理)
眞鍋佳菜子 (J. G. コーポレーション)
Morse index and global bifurcation of positive solutions to the one-dimensional Liouville type equation with a step function weight ····· 12

Satoshi Tanaka (Tohoku Univ.)
Kanako Manabe (JG Corporation)
Morse index and global bifurcation of positive solutions to the one-dimensional Liouville type equation with a step function weight

概要 We consider a boundary value problem involving a step function weight. We precisely compute the Morse index of the positive even solutions. Furthermore, applying global bifurcation theory, we establish the existence of an unbounded connected set of positive non-even solutions that bifurcates from a symmetry-breaking point.

10 豊島　啓 (東北大理)♭
猪奥倫左 (東北大理)
双曲空間上の Hénon 型方程式に対する球対称解の層構造 ····· 12

Akira Toyoshima (Tohoku Univ.)
Norisuke Ioku (Tohoku Univ.)
The separation property of radial solutions to Hénon type equation on the hyperbolic space

概要 We consider Hénon type equation $\Delta_{\mathbb{H}^n} u + (\sinh r)^\sigma |u|^{p-1}u = 0$ in the hyperbolic space with $n \geq 2, \sigma > 0, p > 1$, and classify the separation property of radial solutions which remained open in pioneering works by Hasegawa (2017). Main technical tool is a transformation, which enable us to work on the Euclidean space. As a byproduct, we reveal that Hasegawa's exponen p_c can be written explicitly by using the Joseph–Lundgren type exponent p_{JL}.

14:15〜16:45

11 鈴木　貴 (阪大 M M D S)♭
豊田洋平 (奈良工高専)
多強度点渦系平均場汎関数の有界性 ····· 5

Takashi Suzuki (Osaka Univ.)
Yohei Toyota (Nat. Inst. of Tech., Nara Coll.)
Boudedness of the variational functionals associated with point vortices with multi-intensities

概要 We study the boundedness attainability of the variational functional associated with point vortices with multi-intensities. Three categories are considered: discrete, one-sided, and two-sided. Sufficient conditions for the boundedness in these cases are given.

12 濱本直樹 (阪公大理)
球体上の接境界条件付きベクトル場に対する Poincaré 定数 ····· 12

Naoki Hamamoto (Osaka Metro. Univ.)
Poincaré constant for vector fields on the ball with tangential boundary condition

概要 This lecture deals with the optimal constant of the Poincaré inequality

$$\int_B |\nabla \boldsymbol{u}|^2 dx \geq C_N \int_B |\boldsymbol{u}|^2 dx$$

for vector fields $\boldsymbol{u} = \boldsymbol{u}(\boldsymbol{x}) : B \to \mathbb{R}^N$ on the $N(\geq 2)$-dimensional unit ball $B \subset \mathbb{R}^N$. We compute the best constant C_N under the tangential boundary condition $u_\nu = 0$ which is slightly weaker than the full Dirichlet boundary condition $\boldsymbol{u} = \boldsymbol{0}$ on the unit sphere $\partial B = \mathbb{S}^{N-1}$.

13 梶木屋龍治 (大阪電通大共通教育機構)
非有界領域における Hénon 方程式の解の非対称性 ····· 12

Ryuji Kajikiya (Osaka Electro-Comm. Univ.)
Asymmetry of solutions for the Hénon equation in unbounded domains

概要 We study the Hénon equation in unbounded domains Ω which are G invariant, where G is a closed subgroup of the orthogonal group. Ω (or $u(x)$) is called G invariant if $g(\Omega) = \Omega$ (or $u(gx) = u(x)$) for any $g \in G$. We call $u(x)$ a least energy solution if it is a minimizer of the Rayleigh quotient. We prove that no least energy solution is G invariant.

14　茂木響太郎 (東京科学大理)　外力項付き平均曲率流の弱解に対する正則性定理 ····· 12

Kotaro Motegi (Sci. Tokyo)　A regularity theorem for weak solutions to mean curvature flow with forcing term

概要 The Brakke flow is a weak notion of mean curvature flow that allows singularities. While the $C^{1,\alpha}$-regularity for Brakke flows with forcing term has been established, the second-order regularity had previously been obtained only under additional assumptions. In this talk, we show that graphical Brakke flows with forcing term are solutions to the forced mean curvature flow equation, without imposing any further assumptions.

15　北野修平 (東大数理)　1-Laplace 型方程式に対する ABP 最大値原理について ····· 12

Shuhei Kitano (Univ. of Tokyo)　ABP maximum principle for 1-Laplace type equations

概要 In our talk, we precent an upper bound of viscosity solutions to 1-Laplace type fully nonlinear equations in terms of the L^{n-1}-norm of inhomogeneous terms. A key ingredient in the proof is the geometric structure of the quasi-concave envelope of solutions, which plays a role analogous to that of the concave envelope in the classical ABP estimate. Unlike in the classical theory, however, we must handle both singularity and degeneracy in the equations. To overcome these difficulties, we introduce a new regularization scheme together with new sup-convolution techniques.

16　坪内俊太郎 (東大数理)　Gradient continuity for the parabolic $(1, p)$-Laplace system with an external force term ····· 12

Shuntaro Tsubouchi (Univ. of Tokyo)　Gradient continuity for the parabolic $(1, p)$-Laplace system with an external force term

概要 In this talk, the speaker would like to report an interior regularity result for a certain singular parabolic system involving both the one-Laplacian and the p-Laplacian with $1 < p < \infty$. The main result is that a weak solution to this system has a continuous spatial derivative. An external force term is also treated in parabolic Lebesgue spaces under an optimal condition.

17　坂口茂 (東北大*)　3 次元球面上の Serrin の過剰決定問題と Clifford トーラス ····· 12

A. Bisterzo
(Scuola Normale Superiore)

Shigeru Sakaguchi (Tohoku Univ.*)　Serrin's overdetermined problem on the three-dimensional sphere and Clifford tori

Andrea Bisterzo
(Scuola Normale Superiore)

概要 We consider Serrin's overdetermined torsion problem on the three-dimensional sphere. Domains admitting a solution to the problem are called Serrin domains. By introducing an isoparametric foliation with Clifford tori and using the Crandall–Rabinowitz bifurcation theorem, we construct two distinct types of sequences of Serrin domains, respectively of small and large volume, each of whose boundary is connected and is neither isometric to a geodesic sphere nor to a Clifford torus.

18　中島徹 (静岡大工)　安定定常調和写像の孤立特異点について ····· 10

Toru Nakajima (Shizuoka Univ.)　On isolated singular points of stable-stationary harmonic maps

概要 Stable-stationary haromonc maps from a three dimensional Euclidean domain to a compact Riemannian manifold may have a singular point. We discuss their behavior around thier isolated singular points.

19 田代紀一 (東京科学大理)　自由境界 Allen–Cahn エネルギーの特異極限について ····· 12
Jingeon An (Univ. of Basel)
Kiichi Tashiro (Sci. Tokyo)　On singular limit of the free boundary Allen–Cahn energy
Jingeon An (Univ. of Basel)

概要 The free boundary Allen–Cahn equation has recently attracted considerable attention because, while significantly more tractable, it retains the essential features of the usual Allen–Cahn equation. In this talk, I will discuss the free boundary analogue of the seminal Hutchinson–Tonegawa theory, developing the varifold convergence framework for solutions of the free boundary Allen–Cahn equation to minimal surfaces.

20 林　道問 (沖縄科学技術大)　Liouville theorem for a semi-linear sub-elliptic equation on the quaternionic Heisenberg group ····· 12
Yang Zhou (Univ. of Sci. Tech. of China)
Daowen Lin (Okinawa Inst. of Sci. and Tech. Grad. Univ.)　Liouville theorem for a semi-linear sub-elliptic equation on the quaternionic Heisenberg group
Yang Zhou (Univ. of Sci. Tech. of China)

概要 We prove that the subcritical semi-linear sub-elliptic equation on the quaternionic Heisenberg group admits no positive solution using the vector field method.

17:00〜18:00　2025年度(第24回)日本数学会解析学賞受賞特別講演

谷口雅治 (岡山大異分野基礎研)　反応拡散方程式において $(n+1)$ 次元進行波が生成する n 次元全域解
Masaharu Taniguchi (Okayama Univ.)　Traveling front solutions of dimension $n+1$ generate entire solutions of dimension n in reaction-diffusion equations

概要 In reaction-diffusion equations, multidimensional traveling front solutions (35C07) and entire solutions (35B08) have been studied independently so far. To study the relationship between them we deal with bistable reaction-diffusion equations, for an imbalanced case and for a balanced case. We show that the limit of $(n+1)$-dimensional multidimensional traveling front solutions as the speeds go to infinity generates an entire solution of the same reaction-diffusion equation in the n-dimensional space.
For an imbalanced case, we prove the existence of an n-dimensional polyhedral entire solution as the speeds of $(n+1)$-dimensional pyramidal traveling front solutions go to infinity. Conversely, as the time goes to $-\infty$, an n-dimensional polyhedral entire solution gives n-dimensional pyramidal traveling front solutions. For a balanced case, we prove the existence of an n-dimensional radially symmetric or asymmetric entire solution as the speed of an $(n+1)$-dimensional axially symmetric or asymmetric traveling front goes to infinity.

3月24日(火)　第II会場

9:00〜12:00

21 中島主恵 (東京海洋大海洋環境・東北大理)
宮本安人 (東大数理)
非一様なスカラーフィールド方程式の集積スパイク解の線形化固有値問題について ····· 12

Kimie Nakashima (Tokyo Univ. of Marine Sci. and Tech./Tohoku Univ.)
Yasuhito Miyamoto (Univ. of Tokyo)
Eigenvalues of spike cluster solutions of inhomogeneous scalar field equations

概要 We construct a spike cluster solution that has $n(\geq 2)$ spikes of the Neumann problem

$$\epsilon^2 u'' + h(x)^2(-u+u^p) = 0 \quad \text{for} \quad 0<x<1, \qquad u'(0)=u'(1)=0,$$

where $p>1$ and $\epsilon>0$ is small. We determine all the negative eigenvalues of the linearization problem. Specifically, the first n eigenvalues λ_j, $j=0,\cdots,n-1$, converge to $-(p+3)(p-1)h(x_0)^2/4$ as $\epsilon\to 0$, the next n eigenvalues λ_j, $j=n,\cdots,2n-1$, are negative and they converge to 0. Moreover, we show that $\lambda_{2n-1}<0<\lambda_{2n}$ for small $\epsilon>0$ and hence it is nondegenerate and the Morse index is $2n$. In the proof we construct three approximate eigenfunctions associated to λ_0, λ_n and λ_{2n} by gluing local approximate eigenfunctions near spikes and between two successive spikes to obtain lower bounds of these eigenvalues.

22 竹村剛一 (お茶の水女大理)
宮本安人 (東大数理)
若狭徹 (九工大工)
The Lamé equation on a circle and applications to singular limit eigenvalue problems ····· 10

Kouichi Takemura (Ochanomizu Univ.)
Yasuhito Miyamoto (Univ. of Tokyo)
Tohru Wakasa (Kyushu Inst. of Tech.)
The Lamé equation on a circle and applications to singular limit eigenvalue problems

概要 Let $n\in\{1,2,\ldots\}$, $\ell\in\{1,2\}$ and $0<k<1$. We are concerned with the eigenvalues of the Lamé equation of the form

$$-\phi''+\ell(\ell+1)\left\{e_3+k^2\mathrm{sn}^2(x,k)\right\}\phi=\lambda\phi \text{ for } x\in\mathbb{R}/2nK(k)\mathbb{Z},$$

where $e_3:=-(1+k^2)/3$ is a constant. We obtain exact expressions of all eigenvalues and establish asymptotic formulas for all eigenvalues as $k\to 1$. It is known that the Lamé equation appears as a linearized eigenvalue problem of important semilinear elliptic equations including the Allen–Cahn equation, a scalar field equation and the sine-Poisson equation. We also establish asymptotic formulas for the eigenvalues of the linearization of various boundary value problems of semilinear elliptic equations.

23 比佐幸太郎 (福岡大理)
宮本安人 (東大数理)
Threshold property of a singular stationary solution for semilinear heat equations with exponential growth ····· 10

Kotaro Hisa (Fukuoka Univ.)
Yasuhito Miyamoto (Univ. of Tokyo)
Threshold property of a singular stationary solution for semilinear heat equations with exponential growth

概要 Let $N\geq 3$. We are concerned with a Cauchy problem of the semilinear heat equation

$$\begin{cases}\partial_t u-\Delta u=f(u), & x\in\mathbb{R}^N,\ t>0,\\ u(x,0)=u_0(x), & x\in\mathbb{R}^N,\end{cases}$$

where f satisfies certain assumptions. We establish a positive radial singular stationary solution u^* such that $u^*(x)\to\infty$ as $|x|\to 0$. Then, we prove the following: The problem has a nonnegative global-in-time solution if $0\leq u_0\leq u^*$ and $u_0\not\equiv u^*$, while the problem has no nonnegative local-in-time solutions u such that $u\geq u^*$ if $u_0\geq u^*$ and $u_0\not\equiv u^*$.

概要 We consider nonnegative radially symmetric solutions of the Hénon type parabolic equation $\partial_t u = \Delta u + |x|^\sigma u^p$ in a finite ball under the Dirichlet boundary condition, where $p > 1$ and $\sigma > 0$. We assume that the exponent p is supercritical in the Sobolev sense. Since the spatial potential term $|x|^\sigma$ vanishes at the origin, there is no reaction effect there, and solutions seem less likely to blow up at the origin. Our aim is to construct a solution that blows up at the origin. We also carry out an analysis of blow-up rate of solutions that blow up at the origin.

概要 We consider the semilinear heat equation in possibly non-convex and unbounded domains. Our main result shows the nonexistence of type II blow-up for possibly sign-changing solutions in the energy subcritical range, and it also implies the blow-up of the scaling critical norm.

概要 We study the one-dimensional nonlinear Schrödinger equation in $-u'' + (\lambda^2 + b(x))u = f(u)$ in $\mathbb{R}$, $u(x) \to 0$ as $|x| \to \infty$, where $\lambda > 0$, $b(x)$ satisfies $m_1 \mu e^{-\mu|x|} \le |b(x)| \le m_2 \mu e^{-\mu|x|}$, and f is a locally Lipschitz function with $f(0) = 0$, under assumptions as general as possible From f, we explicitly determine a constant $\gamma \ge \lambda$ and our main results are as follows. If $m_1 > \gamma$, then there exist no non-trivial solutions for large μ. If $m_2 < \lambda$, then there exists at least a positive solution for large μ. If $\gamma < m_1 < m_2 < \lambda$ and $b(-x) = b(x)$, then there exist at least two positive solutions for large μ. Our approach is based on a shooting method initiated from $\pm\infty$.

概要 We consider the existence of ground state solutions for the Schrödinger–Poisson system with a doping profile and the Sobolev critical exponent. We remark that our system exhibits a "double" lack of compactness because of the unboundedness of the domain and the critical growth of the nonlinear term. Due to the appearance of the doping profile, the corresponding energy functional is not invariant under the translation, which causes a difficulty of obtaining the compactness of minimizing sequences and the uniqueness of a maximum point of a fibering map. We overcome this difficulty by the combination of Lions' compactness lemma and analytical techniques.

概要 This talk is concerned with nonlinear scalar field equations with power-type absorption terms under L^2 constraints. The main result establishes the existence of nontrivial solutions to the L^2-constrained problem under certain assumptions, which are closer to the so-called Berestycki–Lions condition than those in previous works, and in some aspects may even go beyond it.

概要 This talk deals with a special case of a quasilinear fully parabolic attraction-repulsion chemotaxis system. The purpose of this talk is to show boundedness by applying energy methods and to show finite-time blow-up by using a Lyapunov type functional in this system.

概要 We consider a chemotaxis system with supercritical flux-dependent sensitivity, and show stability of radial steady states, which generalizes the one for the classical chemotaxis system. The proof is based on establishing a layer structure of the family of radial steady states, which is useful to construct suitable subsolutions and supersolutions.

概要 In the study of chemotaxis-growth systems existence of blow-up solutions is known to be a difficult problem. In the previous results, the results on existence of blow-up solution are only for some simplified problem, and there do not seem to be any results concerning fully parabolic systems. The purpose of this work is to show existence of blow-up solutions and their properties.

32 芝田康将 (阪大情報) Existence of axis-symmetric blow-up solutions with multiple peak aggregations for the 2-D Keller-Segel system coupled with a bipolar source-sink flow ····· 12
杉山由恵 (阪大情報)
関　行宏 (都立大理)

Kosuke Shibata (Univ. of Osaka) Existence of axis-symmetric blow-up solutions with multiple peak aggregations for the 2-D Keller-Segel system coupled with a bipolar source-sink flow
Yoshie Sugiyama (Univ. of Osaka)
Yukihiro Seki (Tokyo Metro. Univ.)

概要 We consider the two-dimensional Keller–Segel system coupled with a bipolar source–sink flow. Under an axis-symmetric but non-radial configuration, we establish finite-time blow-up for initial data with total mass exceeding 16π. In sharp contrast to the classical radial case, where blow-up occurs only at the origin, multiple blow-up points arise in symmetric pairs along the x_1-axis. A crucial ingredient is a sharp ε-regularity theorem, originally due to Luckhaus–Sugiyama–Vel'azquez and reformulated here for the flow setting. It ensures uniform boundedness in suitable space–time cylinders whenever the local mass is sufficiently small, enabling us to identify the finitely many blow-up points and to characterize their symmetric arrangement.

13:00〜14:00　2025年度(第24回)日本数学会解析学賞受賞特別講演

赤木剛朗 (東北大理) 定量的勾配不等式に基づく非線形拡散方程式の解の漸近解析

Goro Akagi (Tohoku Univ.) Asymptotic analysis of solutions to nonlinear diffusion equations based on quantitative gradient inequalities

概要 This talk is concerned with the asymptotic behavior of energy solutions to the Cauchy–Dirichlet problem for the fast diffusion equation posed on bounded domains. In particular, we will overview recent developments in the quantitative analysis of the convergence of energy solutions to asymptotic profiles, based on "quantitative" gradient inequalities.

3月25日(水)　第II会場

9:00〜12:00

33 岡　優丞 (東大数理) Distribution を非斉次項に有する半線形分数冪熱方程式の可解性 ····· 12

Yusuke Oka (Univ. of Tokyo) On the solvability of fractional semilinear heat equations with distributional inhomogeneous terms

概要 We consider the solvability of the Cauchy problem for the fractional semilinear heat equation with distributional inhomogeneous terms. In terms of Besov-type spaces, we provide necessary conditions and sufficient conditions on inhomogeneous terms for the existence of local-in-time mild solutions belonging to Lorentz spaces.

34 片山　翔 (東大数理) Fundamental solution to the heat equation with a dynamical boundary condition ····· 12
石毛和弘 (東大数理)
川上竜樹 (龍谷大先端理工)

Sho Katayama (Univ. of Tokyo) Fundamental solution to the heat equation with a dynamical boundary condition
Kazuhiro Ishige (Univ. of Tokyo)
Tatsuki Kawakami (Ryukoku Univ.)

概要 We give an explicit representation of the fundamental solution to the heat equation on a half-space of $\mathbb{R}^N$ with the homogeneous dynamical boundary condition, and obtain upper and lower estimates of the fundamental solution. These enable us to obtain sharp decay estimates of solutions to the heat equation with the homogeneous dynamical boundary condition.

35　M. R. Haque (Rajshahi Univ.)，小川卓克 (早大理工)，岡田篤子 (北里大一般教育)　一様局所 Lebesgue 空間における対流拡散方程式系の初期値問題の大域的適切性について ····· 12

Md. Rabiul Haque (Rajshahi Univ.), Takayoshi Ogawa (Waseda Univ.), Atsuko Okada (Kitasato Univ.)　Global well-posedness of initial value problems for systems of convection-diffusion equations in uniformly local Lebesgue spaces

概要 We show the global well-posedness of a system of convection-diffusion equations in the scaling critical uniformly local Lebesgue space . The class of solutions includes almost periodic solutions in space or spatially non-decaying solutions as x tends to infinity. For the local well-posedness, we apply the uniformly local Lp-Lq estimate and a fixed-point argument of Banach–Caccioppoli type. For the global well-posedness, we employ the Bernstein-type argument via the Caccioppoli-type estimate to obtain an a priori estimate for the solution.

36　澁谷光祐 (東北大理)，小川卓克 (早大理工)　半 Laplacian の消散効果を持つ臨界型対流拡散方程式の臨界 Besov 空間における小さな初期値に対する大域可解性について ····· 12

Kosuke Shibuya (Tohoku Univ.), Takayoshi Ogawa (Waseda Univ.)　Global solvability for small initial data in critical Besov spaces for the convection-diffusion equation with fractional dissipation

概要 In this talk, we consider the global well-posedness of the convection-diffusion equation with the critical fractional dissipation in critical Besov spaces. Miao–Wu (2009) and Ru–Chen (2017) established well-posedness in the critical Besov space $\dot{B}^{n/q}_{q,1}$, $n \le q < \infty$ using the Chemin–Lerner spaces. In this talk, we consider the global well-posedness for small initial data in the critical Besov space in the endpoint case $\dot{B}^{n/q}_{q,1}$, $q = \infty$.

37　関坂歩幹 (明大総合数理)，関坂(山本)宏子 (理化学研 AIP)　非局所発展方程式に対する反応拡散近似と積分核に応じた不安定化のメカニズム ····· 12

Ayuki Sekisaka (Meiji Univ.), Hiroko Sekisaka-Yamamoto (RIKEN)　Instability mechanism for a nonlocal reaction-diffusion equation

概要 We study a nonlocal evolution equation with a convolution-type interaction kernel J and its approximation by a generalized reaction-diffusion system obtained via reaction-diffusion approximation. Under suitable assumptions we justify this approximation and describe how the spectral properties of the linearization depend on the symmetry of J. For an Allen–Cahn nonlinearity and a specific asymmetric kernel we show, via a convective Turing bifurcation, the existence of stable traveling wave trains in the approximating system.

38　伊藤涼 (神奈川大理)，二宮広和 (明大総合数理)　最小速度における非有界な進行波解の存在と非存在 ····· 12

Ryo Ito (Kanagawa Univ.), Hirokazu Ninomiya (Meiji Univ.)　Existence and nonexistence of unbounded traveling wave solutions for reaction-diffusion equations

概要 We investigate the existence problem of unbounded traveling wave solutions for one-dimensional reaction-diffusion equations. For bounded traveling wave solutions, it is well known that the range of admissible wave speeds depends on the type of nonlinearity. Specifically, in the monostable case, there exists a threshold speed, referred to as the minimal speed, that separates the existence and nonexistence of traveling wave solutions, while in the bistable case, a traveling wave solution exists only for a unique speed. In our previous study, we establish, for unbounded traveling wave solutions, the existence of the minimal speed under mild technical assumptions on the nonlinearity, even in the bistable case. In this talk, we describe the corresponding existence and nonexistence conditions for unbounded traveling wave solutions at the minimal speed.

概要 We study a predator-prey model with a protection zone, where prey can inhabit but predators cannot. The model incorporates nonlinear cross-diffusion describing the predators' tendency to move toward regions of high prey density. Previous results established the existence and bifurcation of positive steady states and their dependence on the diffusion parameter. We further analyze the nonlinear diffusion limit and reveal a global bifurcation branch of positive solutions in the limiting system. The branch bifurcates from the semi-trivial state, remains uniformly bounded in one component, and becomes unbounded in the other, reflecting a rich spatial interaction structure.

概要 In this talk, we discuss the convergence of solutions of reaction-diffusion systems toward traveling wave solutions. By employing Lyapunov-type methods, we establish that when the initial data is sufficiently close to a wave profile at infinity, the corresponding solution converges to this traveling wave as time goes to infinity. As an application, we analyze predator-prey systems and demonstrate the stability of traveling waves, thereby providing new insights into the dynamics of non-cooperative systems.

概要 We study nonlocal evolution equations with arbitrary integral kernels. We show that an advection-reaction-diffusion system can effectively approximate such nonlocal equations. Moreover, if time permits during the talk, we will introduce another reaction-diffusion system that approximates the nonlocal equations.

概要 We consider global-in-time dynamics of the Landau–Lifshitz–Gilbert (LLG) equation in 2D and 3D cases. If the energy consists of the Dirichlet and DMI terms, LLG has an explicit stationary solution which periodically depends on spatial variables, called the helical state. We prove that the helical state is dynamically stable under localized perturbation.

43 金井拓海 (東京理大理)　ポテンシャル付き分数冪 Schrödinger 方程式の解の波面集合の特徴付け
村松　亮 (東京理大理)　· · · · · 12
杉山裕介 (東京理大理)

Takumi Kanai (Tokyo Univ. of Sci.)　Characterization of the wave front set of solutions to the fractional Schrödinger equation with potentials
Ryo Muramatsu (Tokyo Univ. of Sci.)
Yuusuke Sugiyama (Tokyo Univ. of Sci.)

概要 In this talk, we present a theorem characterizing the wave front set $\mathrm{WF}(u(t))$ of the solution $u(t)$ to the fractional Schrödinger equation $i\partial_t u = (-\Delta)^{\theta/2}u + V(x)u,\ 0 < \theta < 2$ with a potential $V(x)$. Depending on the value of θ, we investigate the growth rate of the potential $V(x)$ that allows the propagation of singularities. The proof is based on the wave packet transform and the characterization theorem of wave front sets via the wave packet transform.

44 村松　亮 (東京理大理)　長距離型磁場中のシュレーディンガー方程式のモジュレーション空間における適切性 · · · · · 12

Ryo Muramatsu (Tokyo Univ. of Sci.)　Well-posedness on modulation spaces for Schrödinger equations with long-range magnetic fields

概要 Inspired by the work of E. Cordero, F. Nicola and L. Rodino, we have obtained a well-posedness result in modulation spaces for the Schrödinger equation in a long-range magnetic field. This type of result for the magnetic Schrödinger equation was not covered in the previous paper and could not be achieved without modifying the approach taken there. In this talk, we show that such an extension is possible by carrying out a detailed analysis of the associated classical trajectories.

45 瀧澤　駿 (東京理大理)　Strichartz estimates in Wiener amalgam spaces for Schrödinger equations with at most quadratic potentials · · · · · 12

Shun Takizawa (Tokyo Univ. of Sci.)　Strichartz estimates in Wiener amalgam spaces for Schrödinger equations with at most quadratic potentials

概要 For Schrödinger equations with potentials which grow at most quadratically at spatial infinity, we prove Strichartz estimates in Wiener amalgam spaces. These estimates provide a stronger recovery of local-in-space regularity than the classical estimates in Lebesgue spaces. Our result is a generalization of the results by Cordero and Nicola, which are stated for the potentials $V(x) = 0, \pm|x|^2/2$.

14:15〜16:45

46 駒田洸一 (立命館大R-GIRO)　Large data scattering for the defocusing generalized Boussinesq equation · · · · · 12

Koichi Komada (Ritsumeikan Univ.)　Large data scattering for the defocusing generalized Boussinesq equation

概要 We consider the defocusing generalized Boussinesq equation for spatial dimensions $d \geq 3$ and nonlinear exponent $1 + 4/d \leq p \leq 1 + 4/(d-2)$. We show that for all initial data in energy space, the corresponding solutions globally exist and scatter. Our result is an extension of the previous result by Chen–Guo–Shao (2023) for the radial case to the non-radial case.

47 周　羽 (北大理)　Nonlinear wave equations on the half-line with nonlinear boundary condition · · · · · 12
久保英夫 (北大理)

Yu Zhou (Hokkaido Univ.)　Nonlinear wave equations on the half-line with nonlinear boundary condition
Hideo Kubo (Hokkaido Univ.)

概要 The lifespan of solutions to wave equations on the half-line with both an interior nonlinearity $|u_t|^p|u|^q$ and a nonlinear boundary condition $|u(0,t)|^r$ is analyzed. For small initial data, we show that the interior and boundary nonlinearities can jointly produce a "combined effect."

概要 We study the Cauchy problem for one-dimensional dispersive equations posed on $\mathbb{R}$, under the hypothesis that the dispersive operator behaves as a Fourier multiplier by $i|\xi|^\alpha\xi$ with $1 \le \alpha \le 2$. We prove the unconditional local well-posedness of the Cauchy problem in $H^s(\mathbb{R})$ for $s \ge \frac{5-2\alpha}{4}$ whenever $1 \le \alpha < \frac{3}{2}$, and for $s > \frac{1}{2}$ whenever $\alpha \in [\frac{3}{2}, 2]$. The main novelty of this work is an improvement of the refined bilinear estimates on $\mathbb{R}$.

概要 We study travelling wave solutions to Korteweg–de Vries type equations which have double power nonlinearities with integer indices, such as the Gardner equation, and fractional dispersion. Whether these equations have ground state solutions depends on signatures of nonlinearities and parity combinations of the two indices. The aim of this study is to give the classification of phenomena of travelling wave solutions from the perspective of the signatures and parities of the indices. In this talk, we focus on unstable travelling wave solutions.

概要 We consider the Cauchy problem for nonlinear Klein–Gordon equations in Friedmann–Lemaître–Robertson–Walker spacetimes (FLRW spacetimes for short). The equation involves time-dependent coefficients in the scale factor $a(t)$, damping term $b(t)$, and mass term $m(t)$. In this talk, we introduce blow-up phenomena for small initial data and upper bounds on the lifespan estimates. As a concrete example, we focus on the exponentially contracting case $a(t) = e^{-Ht}$ with $H > 0$, which corresponds to the Klein–Gordon or wave equations in a contracting universe. The obtained lifespan is quite short as estimated by logarithmic order in the smallness parameter in some cases.

概要 We discuss L^2-decay estimates for solutions to nonlinear Schrödinger equations with power-type dissipative nonlinearities. Our equation does not possess an L^2-conservation law, and the L^2-norm of solutions decreases monotonically over time. In particular, it is known that the L^2-norm decays over time if the power of the nonlinearity is less than or equal to the Barab–Ozawa exponent; otherwise, it does not. In this talk, we focus on the case where the power is below the Barab–Ozawa exponent, and present results on the decay rate of the L^2-norm under the attractive dissipative condition, where solutions may exhibit local concentration.

概要 In this talk, we discuss a threshold phenomenon for the existence of scattering states in nonlinear Schrödinger equations. The nonlinearity under consideration includes a non-oscillatory power-type term with an exponent strictly below the Strauss exponent. We prove that no scattering states exist in certain weighted Sobolev spaces, even when the initial data are smooth and compactly supported. Our result highlights the role of the Strauss exponent as a sharp threshold that determines whether scattering occurs in the weighted setting.

概要 We consider the Cauchy problem for semilinear Schrödinger equations on the torus. Using an ODE approach, we prove the non-existence of solutions to these equations.

概要 We consider the Cauchy problem for fractional Schrödinger equations on the torus. Using a modified energy method, we establish a sufficient condition on the nonlinearity for the Cauchy problem to be well-posed in the Sobolev space.

55 眞崎　聡 (北　大　理)
瀬片純市 (九大数理)
瓜屋航太 (岡山理大理)
ある 3 次常微分方程式系における非多項式型保存量について ····· 12

Satoshi Masaki (Hokkaido Univ.)
Jun-ichi Segata (Kyushu Univ.)
Kota Uriya (Okayama Univ. of Sci.)
On non-polynomial conserved quantity for a class of cubic ODE system

概要 This talk concerns a class of coupled cubic ordinary differential equation systems that appear in the study of nonlinear Schrödinger systems. We investigate the existence of non-polynomial conserved quantities, which are characterized by the eigenstructure of a real matrix naturally associated with the system. These quantities generalize the notion of polynomial conservation laws and provide an effective tool for controlling the long-time behavior of solutions. We show that, under certain spectral conditions, the systems possess global-in-time solutions whose amplitudes remain uniformly bounded. Two representative examples are presented, together with a discussion of the classification of systems satisfying these conditions.

56 眞崎　聡 (北　大　理)
瀬片純市 (九大数理)
瓜屋航太 (岡山理大理)
ある 1 次元 3 次の非線形シュレディンガー方程式系の時間大域解の存在について ····· 12

Satoshi Masaki (Hokkaido Univ.)
Jun-ichi Segata (Kyushu Univ.)
Kota Uriya (Okayama Univ. of Sci.)
Global existence of solutions to a system of cubic nonlinear Schrödinger equations in one dimension

概要 In this talk, we study the asymptotic behavior of small solutions to the initial value problem for a system of cubic nonlinear Schrödinger equations in one spatial dimension. We identify a new class of NLS systems for which the global boundedness and asymptotic profiles of small solutions can be established, even in the absence of any effective conserved quantity. The key idea of our analysis is to exploit conserved quantities associated with a system of ordinary differential equations derived from the original NLS system. Previously, S. Masaki investigated conserved quantities represented by quartic polynomials. In contrast, the conserved quantities considered in this talk are of a different nature and are not necessarily polynomial.

17:00〜18:00　特別講演

肥田野久二男 (東京都市大共通教育)
Global existence and combined effect for systems of nonlinear wave equations without the null condition

Kunio Hidano (Tokyo City Univ.)
Global existence and combined effect for systems of nonlinear wave equations without the null condition

概要 We consider global existence of small solutions to the Cauchy problem for certain systems of nonlinear wave equations in three space dimensions. As is well known from the work of John, in finite time, singularity generally occurs in solutions to the Cauchy problem for the scalar wave equation $\partial_t^2 u - \Delta u = (\partial_t u)^2$ even for small and smooth initial data. We first start with the null condition of Klainerman which is a sufficient condition, concerning the form of quadratic nonlinear terms, for global existence of small solutions. Paying attention on the feature that this condition creates some gain of time decay together with a kind of loss of derivatives, we go over the proof of his global existence theorem.

We should note that the null condition is not a necessary condition for global existence. With their new weighted space-time L^2 estimates of certain special derivatives, Alinhac and Lindblad–Rodnianski independently gave an alternate proof of the theorem of Klainerman, achieving remarkable improvement concerning uniform in time bound on the highest-order energy. On the basis of their insight, we then discuss the problem of existence of global solutions to a class of systems without the null condition.

Finally, we turn our attention to non-trivial effects of the super Strauss-critical term $|u|^q$ $(q > 1+\sqrt{2})$ on the lifespan of small solutions, to observe that, for a class of systems, "combined effect" occurs and combined terms yield solutions with much shorter lifespan. This talk is based on joint work with YOKOYAMA Kazuyoshi (Hokkaido University of Science).

3月26日(木)　第II会場

9:30〜12:00

57 高山正宏 (慶大理工)　閉じた紐の運動について ····· 12
井口達雄 (慶大理工)

Masahiro Takayama (Keio Univ.)　The motion of an inextensible closed string
Tatsuo Iguchi (Keio Univ.)

概要 We consider the motion of an inextensible closed string in non-gravitational field. The motion of the string is governed by nonlinear and nonlocal hyperbolic equations. We show that the initial value problem to the equations of motion is well-posed locally in time in the Sobolev spaces. To prove this, we need to show a strict positivity of the tension, and for this, it is crucial to derive a precise lower bound of the Green's function for the corresponding Sturm–Liouville problem.

58 古戸喜紀 (東北大理)　放物型 Lamé system の高階微分評価 ····· 12
岩渕　司 (東北大理)

Yoshinori Furuto (Tohoku Univ.)　Higher order derivative estimates of the parabolic Lamé system
Tsukasa Iwabuchi (Tohoku Univ.)

概要 We consider the parabolic Lamé system on a bounded domain. This system derives from a linearized model of the compressible Navier–Stokes equations. We focus on two types of inequalities for higher-order derivatives of solutions. The first is related to an L^p-L^p estimate locally in time in the Lebesgue space setting, which includes the endpoint cases $p = 1$ and $p = \infty$. The second concerns the equivalence between the $L^q_t L^p_x$ norm of the solution and the Besov norm of the initial data.

59 荻野尚三 (東北大理)♭　圧縮性 Navier–Stokes–Poisson 方程式のスケール臨界空間における準中性極限について ····· 12

Shozo Ogino (Tohoku Univ.)　On the quasi-neutral limit of the compressible Navier–Stokes–Poisson equations in the scaling critical spaces

概要 We study the quasi-neutral limit of the compressible Navier–Stokes–Poisson equations with initial data near a constant equilibrium state in the whole space. We deal with the two physical parameters which come from the effect of pressure and electric potential. We show that the compressible Navier–Stokes–Poisson equations converge to the incompressible flow strongly in the critical Besov spaces. It turned out that whether it oscillate or converge vary depending on the regularity imposed on the functional spaces.

60 橋本伊都子 (阪大理・阪公大数学研)　粘性・熱伝導性気体の理想ポリトロピックモデルの球対称定常解の存在について ····· 12
松村昭孝 (阪大*)

Itsuko Hashimoto (Univ. of Osaka / Osaka Metro. Univ.)　Existence of radially symmetric stationary solutions for viscous and Heat-conductive ideal Gas
Akitaka Matsumura (Osaka Univ.*)

概要 We consider the existence of radially symmetric stationary solutions of the compressible viscous and heat-conductive polytropic ideal fluid on the unbounded exterior domain of a sphere where the boundary and far-field conditions are prescribed. The unique existence of the stationary solution is shown for both inflow and outflow problems in a suitably small neighborhood of the far-field state. Estimates of the algebraic decay rate toward the far field state are also obtained.

61 影浦雅也 (神戸大海事)　単独粘性保存則に現れる非線形合成波の安定性解析 ····· 12
上田好寛 (神戸大海事)

Masaya Kageura (Kobe Univ.)
Yoshihiro Ueda (Kobe Univ.)

Stability of the composite wave for the scalar viscous conservation law

概要 In this talk, we consider the asymptotic behavior of solutions to the initial value problem for a scalar viscous conservation law. In particular, we focus on the case where the flux function is non-convex. When the corresponding Riemann problem admits a solution consisting of an Oleinik shock and a rarefaction wave, we will show the asymptotic stability of the composite wave composed of the viscous Oleinik shock and the rarefaction wave.

62 黄　裕淙 (東京科学大情報理工)　Asymptotic stability of the spherically symmetric stationary solution to
西畑伸也 (東京科学大情報理工)　outflow problem for compressible viscous fluid ····· 12

Yucong Huang (Sci. Tokyo)
Shinya Nishibata (Sci. Tokyo)

Asymptotic stability of the spherically symmetric stationary solution to outflow problem for compressible viscous fluid

概要 In this talk, we study the asymptotic stability of multi-dimensional spherically symmetric stationary solution to the out-flowing compressible Navier–Stokes equations in the unbounded exterior domain. On the boundary of the domain, the fluid is flowing out at a constant speed. We show that for large spherically symmetric initial perturbations in certain suitable weighted Sobolev space, the stationary solution is stable asymptotically in time.

63 黄　裕淙 (東京科学大情報理工)　Asymptotic stability of the stationary state for out-flowing viscous gas
西畑伸也 (東京科学大情報理工)　under non-spherically symmetric initial perturbations ····· 12

Yucong Huang (Sci. Tokyo)
Shinya Nishibata (Sci. Tokyo)

Asymptotic stability of the stationary state for out-flowing viscous gas under non-spherically symmetric initial perturbations

概要 In this presentation, I will discuss the time-asymptotic stability of a 3-dimensional spherically symmetric out-flowing stationary solution to the compressible Navier–Stokes equations. More specifically, the fluid under consideration occupies an exterior domain of the unit ball. At the surface of the ball, the fluid is flowing out at a constant speed in the normal direction to the sphere. The main aim of the talk is to illustrate that stationary solution to this outflow problem is stable asymptotically in time under general, possibly non-spherically symmetric, small initial perturbation in the H^3 Sobolev space.

64 藤田隼輔 (早大理工)　確率 gCLMG 方程式の大域解の存在と長時間挙動 ····· 12
福泉麗佳 (早大理工)
坂上貴之 (京大理)

Shunsuke Fujita (Waseda Univ.)
Reika Fukuizumi (Waseda Univ.)
Takashi Sakajo (Kyoto Univ.)

Global existence and long-time behavior of solutions to the stochastic gCLMG equation

概要 We provide a mathematical analysis of a one-dimensional model of turbulence based on a stochastic generalized Constantin–Lax–Majda–DeGregorio (gCLMG) equation. In this model, the parameter a governs the strength of the advection term. We focus on the specific case $a = -2$, which allows some effective energy estimates. These estimates enable us to prove the global well-posedness of solutions in the mean-zero Sobolev space on the one-dimensional torus and the existence of an invariant measure. The uniqueness of the invariant measure is proved under a sufficiently large viscosity condition. This is a joint work with Reika Fukuizumi (Waseda University) and Takashi Sakajo (Kyoto University).

65　岩渕　司 (東北大理)　有界領域における非粘性表面準地衡方程式に対する時間局所解 ····· 12

Tsukasa Iwabuchi (Tohoku Univ.)　Local solutions for the inviscid SQG in a bounded domain

概要 We study the inviscid surface quasi-geostrophic equation in a bounded domain of the two dimensional space with a smooth boundary, considering the Dirichlet boundary condition. Our focus is on the critical Besov space, which is a subspace of C^1. We establish the existence of local solutions in the critical setting.

66　檜垣充朗 (神戸大理)　有孔領域におけるラグランジュ的可制御性 ····· 10
Jiajiang Liao (北京航空航天大)
F. Sueur
(Univ. of Luxembourg)

Mitsuo Higaki (Kobe Univ.)　Lagrangian controllability in perforated domains
Jiajiang Liao (Beihang Univ.)
Franck Sueur (Univ. of Luxembourg)

概要 Lagrangian controllability is the question of whether a patch of fluid particles governed by fluid equations can be transported to a target location within a given time interval by means of remote action (control). In this talk, we investigate the Navier–Stokes equations with the no-slip boundary condition in a perforated domain Ω^ε, and we report on Lagrangian controllability in the parameter regime of Euler homogenization.

14:15〜16:45

67　米田　剛 (一橋大経済)　3 次元非圧縮 Euler 方程式に基づく渦崩壊の動力学の局所性について ·· 12

Tsuyoshi Yoneda (Hitotsubashi Univ.)　On the locality of vortex breakdown dynamics based on the three-dimensional incompressible Euler equations

概要 We consider the 3D incompressible Euler equations under the following situation: a vortex being transported by a certain Lagrangian flow. Then we figure out that the vortex breakdown time is completely determined by the transport dynamics. The key idea is not using any kind of singular integral expression of the pressure term, instead, constructing an effective Lagrangian coordinate so that the Lie bracket is identically zero. This idea enables us to investigate the locality of the pressure term.

68　青木基記 (京大理)　領域上における非圧縮性オイラー方程式の解のエネルギー保存条件について ····· 12
岩渕　司 (東北大理)

Motofumi Aoki (Kyoto Univ.)　On energy conservation law for incompressible Euler equations in bounded domains
Tsukasa Iwabuchi (Tohoku Univ.)

概要 In this talk, we consider a sufficient condition such that a weak solution of the incompressible Euler equations in a bounded domain satisfies the energy conservation law. Constantin, E, and Titi proved the energy conservation law for weak solutions that are smoother than order 1/3 in the whole space. Cheskidov et al. also proved energy conservation in the whole space under a condition with the 1/3-fractional derivative. For the bounded domain case, Bardos and Titi proved the energy conservation law for weak solutions that are smoother than order 1/3, corresponding to the result of Constantin–E–Titi. We show the energy conservation law under the condition corresponding to that of Cheskidov et al., with approximations satisfying the slip boundary condition.

69 藤井幹大 (名古屋市大理)　異方的 Navier–Stokes 方程式の時間大域解の時空間変数に関する実解析性 ····· 12
Yang Li (Anhui Univ.)
Mikihiro Fujii (Nagoya City Univ.)　Analyticity in space and time for global solutions to the anisotropic
Yang Li (Anhui Univ.)　Navier–Stokes equations

概要 We consider the real analyticity of the global solutions to the 3D incompressible anisotropic Navier–Stokes equations. We show that if only the horizontal component of initial velocity is small and analytic in x_3, then there exists a unique global solution which is analytic in $t > 0$ and $x \in \mathbb{R}^3$. Our functional framework lies in some anisotropic Besov spaces based on $L^p(\mathbb{R}^3)$. To our best knowledge, our result is the first contribution to the well-posedness of the anisotropic Navier–Stokes equations in function spaces of the Besov type based on the full $L^p(\mathbb{R}^3)$ setting.

70 藤井幹大 (名古屋市大理)　外力つき Navier–Stokes 方程式の解の漸近不安定性 ····· 12
鶴見裕之 (徳島大理工)
Mikihiro Fujii (Nagoya City Univ.)　Asymptotic instability for the forced Navier–Stokes equations
Hiroyuki Tsurumi (Tokushima Univ.)

概要 In $\mathbb{R}^n$ with $n \geq 3$, it is easily proved by the standard argument that if the given small external force decays at temporal infinity, then the small forced Navier–Stokes flow also strongly converges to zero as time tends to infinity in the framework of the critical Besov spaces $\dot{B}^{n/p-1}_{p,q}(\mathbb{R}^n)$ with $1 \leq p < n$ and $1 \leq q < \infty$. We show that this asymptotic stability *fails* for $p \geq n$ with $n \geq 3$ and $1 \leq p \leq \infty$ with $n = 2$ in the sense that there exist arbitrary small external forces whose critical Besov norm decays in large time, whereas the corresponding Navier–Stokes flows oscillate and do not strongly converge as $t \to \infty$ in the framework of the critical Besov spaces $\dot{B}^{n/p-1}_{p,q}(\mathbb{R}^n)$.

71 野田　慶 (京　大　理)　3 次元有界領域における電磁流体力学方程式の周期解 ····· 12
小薗英雄 (早大理工・東北大 MathCCS)
清水扇丈 (京　大　理)
Kei Noda (Kyoto Univ.)　Periodic solutions of the 3D MHD equations in bounded domains with
Hideo Kozono (Waseda Univ. / Tohoku Univ.)　arbitrary geometry
Senjo Shimizu (Kyoto Univ.)

概要 We prove existence and uniqueness of time periodic strong solutions to the three dimensional MHD equations in bounded domains without geometric restrictions. The analysis uses L^r theory for the magnetic Laplace operator by Kozono–Shimizu–Yanagisawa (2025) and adapts the fixed point framework of Kozono–Nakao (1996). For small periodic forces we construct global mild solutions and then show the regularity of the solutions when the given data are sufficiently smooth.

72 津田和幸 (九州産大理工)
R. Farwig (TU Darmstadt)
Kazuyuki Tsuda (Kyushu Sangyo Univ.)
Reinhard Farwig (TU Darmstadt)

Time periodic problem of the Navier–Stokes equations in an exterior domain with periodically moving boundary ····· 12

Time periodic problem of the Navier–Stokes equations in an exterior domain with periodically moving boundary

概要 In this talk we consider the Navier–Stokes equations in exterior domains of $mathbbR^n$, $n \geq 3$, with moving boundary $\partial\Omega(t)$ periodically in time and with a periodic 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. 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. To deal with perturbation terms of even second order —coming from a coordinate transform and the moving boundary— in weighted, homogeneous Sobolev spaces a maximal L^1 type regularity estimate is used in weighted Lorentz spaces. To control the convective term an $\mathcal{H}^\infty$-calculus in weighted spaces of the Stokes operator is established used to control fractional powers of the Stokes operator.

73 村田美帆 (静岡大工)
D. Barbera (Politecnico di Torino)
柴田良弘 (早大*)
Miho Murata (Shizuoka Univ.)
Daniele Barbera (Politecnico di Torino)
Yoshihiro Shibata (Waseda Univ.*)

Global solvability of the Q-tensor model for nematic liquid crystals in the half-space ····· 10

Global solvability of the Q-tensor model for nematic liquid crystals in the half-space

概要 In this talk, we consider the Q-tensor model of nematic liquid crystals, which couple the Navier–Stokes equations with a parabolic-type equation describing the evolution of the directions of the anisotropic molecules, in the half-space. The aim of this talk is to prove the global solvability for the Q-tensor model in the L_p-L_q framework. Our proof is based on Banach fixed point argument. To control the higher-order terms of the solutions, we prove the weighted estimates of the solutions for the linearized problem by the maximal L_p-L_q regularity. On the other hand, the estimates for the lower-order terms are obtained by the analytic semigroup theory.

74 齋藤平和 (電通大情報理工)
Xin Zhang (Tongji Univ.)
Hirokazu Saito (Univ. of Electro-Comm.)
Xin Zhang (Tongji Univ.)

On the dispersive effect of internal gravity waves for the two-phase Stokes semigroup ····· 12

On the dispersive effect of internal gravity waves for the two-phase Stokes semigroup

概要 In this talk, we consider the two-phase Stokes equations in the N-dimensional Euclidean space for $N \geq 2$ under the uniform gravitational field acting vertically downward. Our aim is to show the dispersive effect of internal gravity waves for the two-phase Stokes semigroup, associated with the two-phase Stokes equations, in terms of L_p-L_q decay estimates.

75 岡部考宏 (横浜国大国際社会)
牛越恵理佳 (横浜国大環境情報)
Takahiro Okabe (Yokohama Nat. Univ.)
Erika Ushikoshi (Yokohama Nat. Univ.)

時間依存領域における Helmholtz–Weyl 分解の領域依存性について ···· 12

Domain dependence of the Helmholtz–Weyl decomposition on time dependent domains

概要 In this talk, we analyze the domain dependence of the each component in the Helmholtz–Weyl decomposition when the domain moves along to time. In our previous result, we established the domain dependence of components in case that the harmonic vector field has value to the normal direction on the boundary. In this talk, we consider the case that the harmonic vector field has a value to the tangential direction, which has a difficulty to deal with directly.

17:00〜18:00　特別講演

三 浦 達 彦 (弘 前 大 理 工)　薄い球殻と単位球面上のナヴィエ・ストークス方程式の弱解に対する差分評価

Tatsu-Hiko Miura (Hirosaki Univ.)　Difference estimate for weak solutions to the Navier–Stokes equations in a thin spherical shell and on the unit sphere

概要 We consider the Navier–Stokes equations in a three-dimensional thin spherical shell and on the two-dimensional unit sphere, and estimate the difference of weak solutions on the thin spherical shell and the unit sphere. Assuming that the weak solution on the thin spherical shell is a Leray–Hopf weak solution satisfying the energy inequality, we derive difference estimates for the two weak solutions by the weak-strong uniqueness argument. The main idea is to extend the weak solution on the unit sphere properly to an approximate solution on the thin spherical shell, and to use the extension as a strong solution in the weak-strong uniqueness argument.

実　函　数　論

3月25日(水)　　第V会場

9:30〜11:45

概要 In this talk, we study two composite functional equations

$$f(x) = xf(1 - x + f(x))$$

and

$$f(x + f(y)) = (x + f(y))f(1 - x + f(x)),$$

where $f : \mathbb{R} \to \mathbb{R}$. These functional equations are associated with the Dirichlet function. We study many general properties of these functional equations. In addition, we study monotonic solutions of these equations.

概要 We would like to consider a case where the indefinite integral takes an infinite value. For that purpose, we extend the concept of integrals. In this talk, we discuss some properties of the extended integral.

概要 In this presentation, we characterize the Choquet, Shilkret, and Sugeno integrals as integral functionals on function spaces. These integrals are particularly important concepts of integration under nonadditive measures. The features of our setting and the results obtained are as follows:
(1) They are applicable even when the function space is a proper subspace of measurable functions, such as the family of continuous functions.
(2) The domain of the representing measure does not require assumptions about structures such as lattices, rings, or fields.
(3) Existing results for the case where X is a finite set are extended to general sets.
(4) They include known results for the characterization of the Shilkret and Sugeno integrals.

概要 We investigate the uniform structure of the Sugeno-type function space $\mathcal{L}_1$(Su). Using the translation-invariant functional $I(f,g)$ and building on the (p.g.p.)-condition for non-additive measures, we characterize when the associated family of entourages defines a genuine uniformity. Under quasimonotonicity, this occurs exactly when the underlying measure μ is uniform. We also identify the condition on μ under which $\mathcal{L}_1$(Su) becomes an additive topological group.

概要 This report examines whether the extension formula of a refinement of the triangle inequality for three vectors in a Banach space can be generalized to geodesic convex quadrilaterals, which are defined as the geodesic convex hulls of four points, in complete Busemann spaces.

概要 In this talk, we study approximation of fixed points of mean nonexpansive mappings by new iterative methods. We prove weak and strong convergence theorems for these mappings. Further, we prove convergence theorems for some generalized nonexpansive mappings.

概要 In this talk, we investigate the weakest possible conditions for fixed point theorems concerning Kannan mapping. We employ the so-called CJM condition, which has been successfully applied to the classical Banach-type mappings by Ćirić. We show that the CJM condition is nearly the weakest possible to have a fixed point even for Kannan mapping, and that a slight modification yields the weakest condition.

14:15〜15:30

8 飯田毅士 (福島工高専)　Compostion of the Orlicz fractional maximal operators ····· 15

Takeshi Iida (Fukushima Nat. Coll. of Tech.)　Compostion of the Orlicz fractional maximal operators

概要 This talk explores the structure of Orlicz-fractional maximal operators. More precisely, we demonstrate that when a set of Young functions (Φ_1, Φ_2, Φ_3) meets a particular condition, the Orlicz fractional maximal operator $M_{\Phi_3,\alpha_1+\alpha_2}$ provides pointwise control of the composition $M_{\Phi_1,\alpha_1} \circ M_{\Phi_2,\alpha_2}$. Using this theoretical context, we establish the boundedness of the fractional integral operator with homogeneous kernels within Orlicz–Morrey spaces.

9 松岡勝男 (東邦大理)　New "weak" estimates of some sublinear operators on Herz spaces with variable exponent $\dot{K}^{\alpha,p}_{q(\cdot)}(\mathbb{R}^n)$ ····· 15

Katsuo Matsuoka (Toho Univ.)　New "weak" estimates of some sublinear operators on Herz spaces with variable exponent $\dot{K}^{\alpha,p}_{q(\cdot)}(\mathbb{R}^n)$

概要 In the investigation of the weak boundedness of some sublinear operators for the Herz spaces $\dot{K}^{\alpha,p}_{q}(\mathbb{R}^n)$, in order to obtain more precise estimates than the usual weak estimates, the author and the other (2008) introduced the new "weak" Herz spaces $\widetilde{W}\dot{K}^{\alpha,p}_{q}(\mathbb{R}^n)$ and showed the new "weak" boundedness on $\dot{K}^{\alpha,p}_{1}(\mathbb{R}^n)$. In this talk, we will extend the above new "weak" estimates to the sublinear operators satisfying another size condition, and further to one's on the Herz spaces with variable exponent $\dot{K}^{\alpha,p}_{q(\cdot)}(\mathbb{R}^n)$.

10 波多野修也 (阪大情報)　Poincaré–Sobolev の不等式とその荷重付き一般化について ····· 15

Naoya Hatano (Univ. of Osaka)　Weighted generalization of the Poincaré–Sobolev inequality

概要 In this talk, we introduce a weighted generalization of the Poincaré–Sobolev inequality and, as an application, provide a refinement of Sobolev's embedding theorem. Here, we use Morrey and Bourgain–Morrey spaces as the classes of weights.

11 澤野嘉宏 (中大理工)　モーメント分解因子化性と超微分作用素 ····· 15

L. Neyt (Univ. of Vienna)

Yoshihiro Sawano (Chuo Univ.)　Moment-wise decomposition factorization property and ultradifferential operators

Lenny Neyt (Univ. of Vienna)

概要 We introduce the notion of moment-wise decomposition factorization property (MDFP). We establish the existence of MDFP by the use of the ultradifferential operators. As application, we characterize the bounded sets in a function space describing the smoothness of infinite order.

15:45〜16:45　特別講演

福 田 亮 治 (大 分 大 理 工)　Möbius transform and related developments

Ryoji Fukuda　(Oita Univ.)　Möbius transform and related developments

概要 In this talk, I will discuss aspects of the Möbius transform for non-additive set functions. Originally, the Möbius transform is defined for set functions on finite sets, where it yields a one-to-one correspondence through its inverse transform. Using this representation, the Choquet integral can be expressed as a linear combination whose coefficients are the Möbius parameters, viewed as a finite set of unknowns. This enables us to identify the set function via linear regression. Moreover, when k-additivity is assumed, the number of parameters can be reduced, and this plays an important role in the practical handling of set functions in applications.

For infinite sets, various approaches have been proposed. In our research, we began by generalizing the notion of k-additivity. Using this framework, we investigated convergence theorems for a certain type of integrals and explored connections with strong null additivity. The Möbius transform can naturally be regarded as a finitely additive set function, and several researchers have developed σ-additive extensions of the Möbius representation. In our work, we have also studied σ-additive extensions from a slightly different perspective. This leads to an natural problem of extending a finitely additive set function to a σ-additive one in a general context.

I will present results obtained through joint research with Prof. Emeritus Y. Okazaki (Kyushu Institute of Technology) and Prof. A. Honda (Kyushu Institute of Technology), focusing on the topics described above.

3月26日(木)　第V会場

9:00〜12:00

12　深 尾 武 史 (龍谷大先端理工)　Robin 型の条件を含む接合問題とその漸近解析 ····· 15

Takeshi Fukao (Ryukoku Univ.)　Asymptotic analysis of transmission problems with parameter-dependent Robin conditions

概要 We study a transmission problem of Neumann–Robin type involving a parameter and perform an asymptotic analysis with respect to this parameter. The limits as the parameter goes to zero and to infinity correspond respectively to complete decoupling and full unification of the problem, and we obtain rates of convergence for both regimes. We also clarify the relationship between the asymptotic analysis with respect to this parameter and the asymptotics of the system in connection with the convergence of convex functionals known as Mosco convergence.

13　柴 田 旺 典 (東 京 理 大 理)　Global weak solvability of degenerate chemotaxis systems with threshold density ····· 15
横 田 智 巳 (東 京 理 大 理)

Osuke Shibata (Tokyo Univ. of Sci.)　Global weak solvability of degenerate chemotaxis systems with threshold density
Tomomi Yokota (Tokyo Univ. of Sci.)

概要 We study degenerate chemotaxis systems with threshold density. The purpose of this talk is to show global existence and uniqueness of weak solutions.

概要 In this study, we study the large-time behavior of solutions to an inhomogeneous pseudo-parabolic total variation flow with time-dependent coefficients. The problem extends previous results by incorporating the external forcing and the time-dependence of damping coefficients. Under suitable assumptions, we establish the existence and uniqueness of time-global solution and characterize their asymptotic properties as time tends to infinity. The limiting profiles are expected to be closely related to the solutions of the corresponding elliptic steady-state problem, which may admit nonsmooth solutions in the space of BV-functions. This work aims to provide a mathematical foundation for regular pseudo-parabolic approximating processes toward the nonsmooth BV-asymptotics, with potential applications to image processing and related optimization problems.

概要 In this talk we consider the one-dimensional free boundary problem describing a bread baking process. For the problem, the domain is assumed to be occupied by the bread consists of crumb, crust and the evaporation front, and unknown functions are the position of the front, the temperature field, and the water mass distribution. We have previously established uniqueness and global existence of solutions under the high regularity condition for initial data. Now, we aim to show that the crust region never vanishes by constructing stationary solutions and applying the comparison principle. In the proof, we improve a proof the comparison principle in order to overcome the difficulty arising from the time-dependence of the latent heat term.

概要 This paper discusses a quasi-variational inequality in a plasticity model with nonlinear kinematic hardening law. From a physical perspective, it is natural that the yield surface depends on unknown variables. This model is designed to describe plastic deformation through nonlinear translation of the convex constraint characterized by time-nonlocal dependence of the unknown function, which differs from perfect plasticity models and generalizes the linear translation treated in previous studies to the nonlinear case. To establish the existence of a solution for this plasticity model with nonlinear kinematic hardening, we apply the Banach fixed point theorem to the solution operator, as in the linear case. The key point is that contractivity is obtained by appropriately setting the domain of the solution operator through a priori estimates of the solution.

17 小杉千春 (山口大理)　特異性をもつ応力関数を伴う弾性閉曲線の伸縮運動を表す初期値境界値問題のエネルギー保存系での可解性 ····· 15

Chiharu Kosugi (Yamaguchi Univ.)　A class of energy conservation systems representing stretching and shrinking motions of the elastic closed curve with the compressible stress function

概要 We consider initial and boundary value problems for the beam equation as the dynamical model for the elastic closed curves on the plane. Our aim of this talk is to prove existence and uniqueness of the problem under the generalized assumption to stress functions having the singularity in the energy conservation system. Keys of this proof are uniform estimates for the solution in the energy dissipative system and the lower bounded for the strain. We have already proved the solvability of the problem in the energy dissipative system. In this talk, we also show the error estimate between the solutions of the energy dissipative system and the energy conservation system.

18 熊崎耕太 (京都教育大教育)　偏微分方程式と自由境界問題からなる連立系に対する強解の構成 ····· 15

Kota Kumazaki (Kyoto Univ. of Edu.)　Construction of a strong solution to a system consisting of partial differential equations and free boundary problems

概要 In this talk, we study a coupled system consisting of a parabolic equation describing moisture diffusion in a macroscopic domain and a free-boundary problem representing microscopic swelling in individual pores. The macroscopic domain is a bounded three-dimensional region, while each pore is modeled as a one-dimensional half-line attached to it. In our previous work, we established the existence and uniqueness of a weak solution. Here, we prove the existence and uniqueness of a strong solution. The proof relies on uniform estimates for solutions to an appropriately constructed approximation problem and on continuous dependence results. Using these, we construct a locally-in-time strong solution through a limiting procedure with respect to the approximation parameter.

19 鵜飼直孝 (千葉大融合理工)　変数依存型係数を伴う放物型エネルギー勾配系 ····· 15
水野大樹 (千葉大融合理工)
白川健 (千葉大教育)
H. Antil (George Mason Univ.)

Naotaka Ukai (Chiba Univ.)　A parabolic energy gradient system with variable dependent coefficients
Daiki Mizuno (Chiba Univ.)
Ken Shirakawa (Chiba Univ.)
Harbir Antil (George Mason Univ.)

概要 In this talk, we study a parabolic gradient system that integrates two models: the free-energy functional for anisotropic and orientation-adaptive image processing (cf. [Berkels et al., CAM Report 06-42 (2006)]; and the phase-field model of grain-boundary motion (cf. [Kobayashi et al., Physica D, 140 (2000)]. In the previous MSJ meeting, we studied a pseudo-parabolic version of this gradient system. In this talk, building on the time-discretization method for the pseudo-parabolic system, we proceed to the mathematical analysis of the corresponding parabolic system. In view of these, we now aim to clarify the well-posedness conditions for the parabolic system, and to develop an energy-dissipating time-discrete scheme that reduces the cost associated with higher-order derivatives.

20 兵頭元晴 (新潟大自然)　一般平衡則方程式の初期値問題に対するエントロピー解の一意可解性 · · 15
江幡隆典 (新潟大自然)
應和宏樹 (新潟大理)

Motoharu Hyodo (Niigata Univ.)　Uniqueness and existence of entropy solutions to the Cauchy problem for general balance laws
Takanori Ebata (Niigata Univ.)
Hiroki Ohwa (Niigata Univ.)

概要 In this talk, we study the uniqueness and existence of entropy solutions to the Cauchy problem for general balance laws. The uniqueness and existence of entropy solutions to this problem have been established by Kružkov and others under certain regularity assumptions, such as the smoothness of the flux and source functions. We prove the uniqueness and existence of entropy solutions to the Cauchy problem without assuming such regularity conditions.

21 江幡隆典 (新潟大自然)　連続関数を流束にもつ保存則方程式の初期値問題の一意可解性について
渡部翔 (新潟大自然)　· · · · · 15
應和宏樹 (新潟大理)

Takanori Ebata (Niigata Univ.)　Well-posedness of entropy solutions to the Cauchy problem with continuous flux functions
Sho Watabe (Niigata Univ.)
Hiroki Ohwa (Niigata Univ.)

概要 In this talk, we consider the Cauchy problem for conservation laws with continuous flux functions and bounded, integrable initial data. We establish the well-posedness of entropy solutions to the Cauchy problem.

22 渡部翔 (新潟大自然)　局所有界変動関数を流束にもつ保存則方程式の L^1 縮小性をもつ解 · · · · 15
菊地貴大 (新潟大自然)
應和宏樹 (新潟大理)

Sho Watabe (Niigata Univ.)　L^1 contractive solutions for conservation laws whose flux functions are of locally bounded variation
Takahiro Kikuchi (Niigata Univ.)
Hiroki Ohwa (Niigata Univ.)

概要 In this talk, we consider the Cauchy problem for conservation laws whose flux functions are of locally bounded variation. We show the existence of L^1 contractive solutions to the Cauchy problem.

14:15〜16:40

23 T. Black (Paderborn Univ.)　Global solvability and asymptotic behavior in a doubly degenerate chemotaxis-consumption system · · · · · 15
小波津晶平 (東京理大理)
Duan Wu (Paderborn Univ.)

Tobias Black (Paderborn Univ.)　Global solvability and asymptotic behavior in a doubly degenerate chemotaxis-consumption system
Shohei Kohatsu (Tokyo Univ. of Sci.)
Duan Wu (Paderborn Univ.)

概要 We consider global existence and asymptotic behavior of weak solutions to a doubly degenerate chemotaxis-consumption system. When the system has a usual consumption, previous results showed existence of global weak solutions only in the one-dimensional case, or the two-dimensional case with a convexity assumption. First, we use a new energy functional to establish existence results for the system with general consumption in higher dimensions without convexity assumptions. Second, we reveal large-time behavior of solutions, and show that the first component of solutions converges to a non-constant function, which is indeed characterized by weak solutions to the Neumann problem of a porous medium type equation.

概要 This talk deals with a quasilinear attraction-repulsion chemotaxis system with flux limitation. Boundedness of solutions to this system is known only in the one-dimensional case under some conditions on the parameters and initial data. However, there is no information about the question whether boundedness can be obtained in the higher-dimensional case. The purpose of this paper is to give an answer to this question in the higher-dimensional case.

概要 We recall the definition of Besov–Morrey spaces and give some equivalent characterization. We propose an application to the Keller–Segel system.

概要 There are some studies on conserved phase field systems. For example, Grasselli–Petzeltová–Schimperna (2007) and Colli–K. (2025) have studied nonisothermal and conserved phase field systems with inertial term. Gilardi–Rocca (2007) and Colli–K. (2020) have studied conserved phase field systems deduced from the entropy balance without inertial term. Ito–Kenmochi–Kubo (2003) have studied a conserved Penrose–Fife phase field system without inertial term. In this talk we prove existence of weak solutions to a general nonisothermal and conserved phase field system with inertial term.

概要 This talk deals with abstract time-fractional evolution equations in real Banach spaces whose dual spaces are uniformly convex. The main results concern the existence of strong solutions to abstract evolution equations governed by time-dependent m-accretive operators involving time-fractional derivatives. The abstract results are also applied to certain time-fractional partial differential equations.

概要 In this talk, we consider the initial boundary value problem for a doubly nonlinear parabolic equation with nonlinear perturbation, subject to homogeneous Dirichlet boundary conditions. Our main goal is to relax the growth condition on the nonlinear term and to reduce the constraints on the exponent range, allowing the results to cover both singular and degenerate cases. The proof relies on an L^∞-estimate for a time-discrete problem, obtained in earlier work, combined with the L^∞-energy method.

概要 We consider a Cauchy problem of a quasi-variational evolution inclusion with a conservative quantity on a real Hilbert space. Actually, we construct a certain real Hilbert space in which the conservative quantity is taken into consideration. By doing so, we can apply the general theories for quasi-variational evolution inclusions and show the existence of strong local-in-time solutions which is established in the paper. Perturbation theory of evolution inclusions on real Hilbert spaces with quasi-variational structures for inner products, Rend. Mat. Appl., 43 (2022), no. 3, 173-249.

概要 In this talk, we study a 1D (one-dimensional) optimal control problem motivated by grain-boundary motion. The state system is a simplified 1D version of the phase-field model. On this basis, the optimal control problem is formulated under a state constraint imposed on the range of the state variable and a control constraint on the domain of the cost functional. The objective of this study is to develop an optimal control framework, building upon the recent uniqueness result for the 1D state system. Under suitable assumptions, the main focus will be on the existence of optimal controls and the necessary optimality conditions.

概要 In this talk, we consider an anisotropic singular diffusion equation under periodic boundary condition, which is associated with mathematical models such as grain boundary motion and image denoising process. While its solvability is known from the theory of abstract evolution equations, this study focuses on the regularity theory of its solutions. To guarantee the H^2-regularity for the solutions, previous studies relied on isotropic diffusions to estimate boundary integrals. However, under the periodic boundary condition, such boundary terms do not appear, which enables an extension of preceding results to anisotropic cases. Based on these, we set our goal to discuss the sufficient conditions for the H^2-regularity, the uniqueness of solutions, and the fine properties under special settings.

16:50〜17:50　特別講演

柏 原 崇 人 (東 大 数 理)　Navier–Stokes 型変分不等式に対する H^2 正則性について

Takahito Kashiwabara (Univ. of Tokyo)　H^2-regularity for variational inequalities of Navier–Stokes type

概要 We consider strong solvability of parabolic variational inequalities (VIs) of Navier–Stokes type. H. Brezis (1972) proved existence and uniqueness of a strong solution in the Kiselev–Ladyzhenskaya class, assuming a two-dimensional spatial domain and the cancelation property for the convection term (which often reads $B(u,u,u)=0$ using a trilinear form). However, its H^2-regularity in space was unknown. In this talk, we construct a (local-in-time) strong solution having the H^2-regularity to the Navier–Stokes VI in the maximal L^2-regularity class and in the Kiselev–Ladyzhenskaya class for the three-dimensional domain, under the additional assumption that the stationary Stokes version of the VI has an H^2-regularity structure. Our construction is based on a semi-implicit discretization in time (Rothe's method) and does not use the cancelation property, thus allowing for Neumann-type boundary conditions in the normal direction. Regarding the regularity assumption for the stationary Stokes version of the VI, we show that Bingham models for visco-plastic fluids satisfy it if the perfect slip boundary condition is imposed and if the yield stress vanishes on the boundary.

函 数 解 析 学

3月23日(月)　第VII会場

9:30〜11:45

1　渡 辺 秀 司 (三 条 市 大 工)　外部磁場のあるときの超伝導の BCS 理論における 1 次相転移とエントロピーギャップの厳密な表式 ····· 15

Shuji Watanabe (Sanjo City Univ.)　The first-order phase transition and the entropy gap in the BCS model of superconductivity with a uniform external magnetic field

概要 We deal with a type I superconductor in a uniform external magnetic field. We established the BCS model of superconductivity with the external magnetic field. On the basis of the implicit function theorem, we show that there is a unique magnetic field (the critical magnetic field) given by a smooth function of the temperature and that there is also a unique nonnegative solution (the gap function) to the BCS gap equation given by a smooth function of both the temperature and the external magnetic field. Using the grand potential, we show that the phase 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　大 森 祥 輔 (法 政 大 経 済)　Rigged Hilbert space formulation for a quasi-Hermitian operator in composite system ····· 15

Shosuke Omori (Hosei Univ.)　Rigged Hilbert space formulation for a quasi-Hermitian operator in composite system

概要 This talk focuses on the rigged Hilbert space (RHS) formulation that describes Dirac's bra-ket formalism for a quasi-Hermitian quantum composite system. We propose an RHS that provides the bra and ket vectors and the spectral decomposition of the quasi-Hermitian operator. We also demonstrate that all descriptions by the bra-ket formalism are fully formulated within the dual spaces. These dual spaces are then used to address the issue of defining the adjoint of a quasi-Hermitian operator in non-Hermitian composite systems.

3　中 村　　誠 (阪 大 情 報)
吉 住 拓 真 (阪 大 情 報)　Nonexistence of global weak solutions of Klein–Gordon equations with gauge variant semilinear terms in FLRW spacetimes ····· 10

Makoto Nakamura (Univ. of Osaka)
Takuma Yoshizumi (Univ. of Osaka)　Nonexistence of global weak solutions of Klein–Gordon equations with gauge variant semilinear terms in FLRW spacetimes

概要 The Cauchy problem of Klein–Gordon equations with gauge variant semilinear terms in FLRW spacetimes is considered. Nonexistence of global weak solutions is reported.

4　中 村　　誠 (阪 大 情 報)
杉 本 英 一 (阪 大 情 報)　On the asymptotic behavior of the semilinear Schrödinger equation in FLRW spacetimes in one spatial dimension ····· 10

Makoto Nakamura (Univ. of Osaka)
Eiichi Sugimoto (Univ. of Osaka)　On the asymptotic behavior of the semilinear Schrödinger equation in FLRW spacetimes in one spatial dimension

概要 The Cauchy problem of the semilinear Schrödinger equation is considered in FLRW spacetimes. The asymptotic behaviors of global solutions are characterized by the behaviors of free solutions.

概要 We consider the long time behavior of solutions for discrete Schrödinger equation defined on a honeycomb lattice. In this talk, we show that the points where the Hessian of phase function associated to the free propagation of the discrete Schrödinger equation are identified with the three curves in the frequency space. We also give the ℓ^1 to ℓ^∞ dispersion estimates for the solution depending on frequency localization, and we obtain the slowest decay is of order $|t|^{-\frac{2}{3}}$.

概要 In this talk, we consider scattering problem for three dimensional Schrödinger operators with absorbing potentials.

概要 We study a quantum system where a free electron interacts with light within the dipole approximation. The model allows a fiber decomposition with respect to the electron's momentum. We show that the ground state and its energy for each fiber Hamiltonian depend holomorphically on the coupling parameter corresponding to the electric charge, within a strip-shaped region of finite width containing the real axis. As a result, the radius of convergence of the perturbation expansion is given by half the width of this strip. This means that the perturbation expansion of the ground state in the charge variable is convergent.

概要 In this talk, we evaluate the spatial decay of the ground state of the Pauli–Fierz Hamiltonian from below by using a path integral method. The evaluation from above is known, but it from below is not known and non-trivial. It can be obtained by using photon number rotations and a geodesic distance. As a result, the order of the spatial decay of the ground state is determined.

9　廣川真男 (九大システム情報)　Asymptotics for anisotropic Rabi models ····· 15
廣島文生 (九大数理)
李東潤 (九大 J G M I)

Masao Hirokawa (Kyushu Univ.)　Asymptotics for anisotropic Rabi models
Fumio Hiroshima (Kyushu Univ.)
Dong Yun Lee (Kyushu Univ.)

概要 A one-parameter family of self-adjoint operators interpolating between the quantum Rabi Hamiltonian and its rotating-wave approximation is studied. A mathematically rigorous treatment of such interpolations has been lacking. Motivated by the physical claim that counter-rotating terms dominate at strong coupling, we analyze the limit in which the coupling constant of the anisotropic Rabi model tends to infinity. Our results provide an operator-theoretic description of this limit and clarify the spectral evolution from the rotating-wave approximation to the full Rabi model.

14:15〜15:15

10　一ノ瀬弥 (信州大理)　Feynman および von Neumann の公準に基づく “時間連続な量子測定の厳密な数学的定式化” ····· 15

Wataru Ichinose (Shinshu Univ.)　A rigorous mathematical formulation of time-continuous quantum measurement based on Feynman's and von Neumann's postulates

概要 We develop a rigorous mathematical formulation of time-continuous quantum measurement based on the postulates of Feynman and von Neumann. Feynman's path-integral approach describes evolution as a superposition of histories, by imposing restrictions on the path space corresponding to continuous observation. Caves and Mensky previously proposed the restricted Feynman path integrals on phenomenological grounds. The aim of this talk is to prove that the restricted Feynman path integrals naturally emerge from Feynman's postulate under a simple approximation, and also from von Neumann's instantaneous projection postulate. Our framework is applied to spin systems and to the mathematical formulation of the multi-slit interference, the quantum Zeno effect, and the Aharonov–Bohm effect. *The results of this talk have been published in* Rev. in Math. Phys. 36 (2024).

11　樋口健太 (岐阜大教育)　量子ウォークにおける共鳴トンネル効果の漸近解析 ····· 15

Kenta Higuchi (Gifu Univ.)　Asymptotic analysis on the resonant tunneling effect for quantum walks

概要 The resonant tunneling effect for quantum walks that depend smoothly on a small parameter $\varepsilon \geq 0$ is considered. The transmission probability $T_\varepsilon(z)$ is defined as a function of the spectral parameter $z \in \mathbb{S}^1 = \{z \in \mathbb{C};\, |z| = 1\}$. The spectral parameter is related by $z = e^{-i\lambda}$ to the frequency $\lambda \in \mathbb{T} = \mathbb{R}/\mathbb{Z}$ of the oscillation. In our setting, transmission probability is zero function $T_0(z) \equiv 0$ for $\varepsilon = 0$. However, in the limit $\varepsilon \downarrow 0$, $T_\varepsilon(z)$ does not converge to $T_0(z)$ at each z which is asymptotically approached by a quantum resonance. Moreover, under a certain symmetry condition, it even asymptotically approaches one. This corresponds to the resonant tunneling effect.

12 森岡　悠 (愛媛大理工)　テイル付きグラフ上の量子ウォークに対する共鳴散乱 ····· 15
樋口健太 (岐阜大教育)
石川隆太 (アビームシステムズ)
瀬川悦生 (横浜国大環境情報)
吉村栄次郎 (愛媛大理工)

Hisashi Morioka (Ehime Univ.)　Resonant scattering for tunable quantum walks on graphs with tails
Kenta Higuchi (Gifu Univ.)
Ryuta Ishikawa (ABeam Systems Ltd.)
Etsuo Segawa (Yokohama Nat. Univ.)
Eijirou Yoshimura (Ehime Univ.)

概要 We study the resonant scattering for discrete time quantum walks on graphs with some tails. In our arguments, we reduce the study of resonances to the perturbation of eigenvalues of a finite rank matrix associated with the internal graph. Then we can apply the Kato's perturbation theory of matrices, and the reduction process of generalized eigenspaces allows us to derive an explicit asymptotic expansion of the scattering matrix. As a consequence, we obtain the resonant scattering at the resonant energies.

13 髙江洲俊光 (群馬大共同教育)　場の量子論の系におけるポテンシャルの減衰による binding condition について ····· 15

Toshimitsu Takaesu (Gunma Univ.)　On the binding condition of a quantum field model by the decay of particle's potential

概要 The system of a particle interacting with a Bose field is investigated. It is proven that the binding condition holds by the decay of particle's potential.

15:30〜16:30　特別講演

小森大地 (近畿大理工)　Čech–Dolbeault cohomology の無限階擬微分作用素の表象理論への応用

Daichi Komori (Kindai Univ.)　An application of Čech–Dolbeault cohomology to the symbol theory of pseudodifferential operators

概要 The symbol theory of pseudodifferential operators was introduced by Aoki and Kataoka for the analytic study of such operators. Using the Borel–Laplace transformation, they constructed a morphism from the sheaf of pseudodifferential operators to the sheaf of symbols and proved that this morphism is an isomorphism. Furthermore, by means of this symbol theory, they established the invertibility theorem for pseudodifferential operators, among other results. In this talk, I will review some problems in their foundational theory along with its historical background, and present a solution based on the Čech–Dolbeault cohomology. The theory of Čech–Dolbeault cohomology was introduced by Honda, Izawa, and Suwa, and provides a new approach to computing relative cohomology with coefficients in the sheaf of holomorphic functions.

3月24日(火)　第Ⅶ会場

9:45〜10:30

14 橋本康史 (琉球大理)　合同部分群 $\Gamma_0(2), \Gamma(2)$ と跡集合が等しい部分群について ····· 15

Yasufumi Hashimoto (Univ. of Ryukyus)　Full-trace subgroups of congruence subgroups $\Gamma_0(2), \Gamma(2)$

概要 In 2016, Lakeland generated full-trace subgroups of the modular group. In this talk, we generate full-trace subgroups for the congruence subgroups $\Gamma_0(2), \Gamma(2)$.

15 中 濱 良 祐 (NTT基礎数学研究センタ)　On spectral zeta functions of one-, two-photon quantum Rabi models and non-commutative harmonic oscillators ····· 15

Ryosuke Nakahama (NTT Inst. for Funda. Math.)　On spectral zeta functions of one-, two-photon quantum Rabi models and non-commutative harmonic oscillators

概要 The quantum Rabi model is a fundamental model in quantum optics, describing an interaction between a photon and an atom, and the non-commutative harmonic oscillator is a purely mathematical model introduced by Parmeggiani–Wakayama ('02). In this talk, the speaker gives explicit formulas for the special values of the spectral zeta functions of these models at positive integer points.

16 久 保 利 久 (龍 谷 大 経 済)
V. Pérez-Valdés (龍 谷 大)　The homomorphisms between Verma modules for $\mathfrak{sl}(3,\mathbb{C})$ ····· 15

Toshihisa Kubo (Ryukoku Univ.)
Víctor Pérez-Valdés (Ryukoku Univ.)　The homomorphisms between Verma modules for $\mathfrak{sl}(3,\mathbb{C})$

概要 The homomorphisms φ between (full) Verma modules for a finite-dimensional complex simple Lie algebra $\mathfrak{g}$ are classical objects in representation theory. For example, those homomorphisms φ were classified by BGG–Verma around in 1970.
In this talk, we will revisit the well-known topic from the viewpoint of the F-method. More specifically, we will discuss the classification and construction of the homomorphisms φ between Verma modules for $\mathfrak{g} = \mathfrak{sl}(3,\mathbb{C})$ via the algebraic Fourier transform F_c. It turned out that, surprisingly, a classical tridiagonal determinant called the Cayley continuant appeared in the explicit formulas of the singular vectors. If time permits, the inverse F_c^{-1} of the Fourier transform F_c and the factorization formulas of φ will also be discussed.

10:45〜11:45　特別講演

伊 藤 要 平 (青 学 大 理 工)♭　Regular and irregular Riemann–Hilbert correspondences for $\mathcal{D}$-modules

Yohei Ito (Aoyama Gakuin Univ.)　Regular and irregular Riemann–Hilbert correspondences for $\mathcal{D}$-modules

概要 The original Riemann–Hilbert problem asks whether there exists a Fuchsian differential equation having a prescribed monodromy representation. In 1984, Professor M. Kashiwara proved there exists an equivalence of categories between the triangulated category of regular holonomic $\mathcal{D}$-modules and that of $\mathbb{C}$-constructible sheaves, which is a solution to the Riemann–Hilbert problem for regular holonomic $\mathcal{D}$-modules. This correspondence is now called the regular Riemann–Hilbert correspondence. The problem of extending this correspondence to cover the case of irregular holonomic $\mathcal{D}$-modules had been open for 30 years. Professors A. D'Agnolo and M. Kashiwara made a breakthrough in this problem after two another groundbreaking developments: the first one is the theory of ind-sheaves (and subanalytic sheaves) by Professors M. Kashiwara and P. Schapira, and the second one is the theory of irregular meromorphic connections by Professor K. S. Kedlaya (in the analytic setting) and Professor T. Mochizuki (in the algebraic setting).
In this talk, I would like to explain the regular Riemann–Hilbert correspondence and results of Professors A. D'Agnolo and M. Kashiwara. Moreover, I would like to introduce some my attempts to the problem of extending the regular Riemann–Hilbert correspondence.

3月25日(水)　第VII会場

9:30〜11:25

17 廣田大輔 (鶴岡工高専)　直和 Banach 空間の単位球面上の全射等距離写像と Tingley 問題について ····· 15

Daisuke Hirota
(Nat. Inst. of Tech., Tsuruoka Coll.)

On surjective isometries on the unit sphere of direct sums of Banach spaces and Tingley's problem

概要 We investigate Tingley's problem for surjective isometries between the unit spheres of direct sums of Banach spaces, where each component is an extremely C-regular subspace of a continuous function space C(K). Our aim is to clarify which kinds of properties, such as algebraic and geometric structures, are preserved under the existence of a surjective isometry between the unit spheres. We mainly treat the ell-1 and ell-p sums of such spaces for p in (1,infinity) with p!=2, and present some related results and examples. Further perspectives on these problems are also discussed.

18 N. Evseev (沖縄科学技術大)　Weak weak* time derivatives ····· 15
M. Kampschulte (Charles Univ.)
A. Menovschikov (HSE Univ.)

Nikita Evseev
(Okinawa Inst. of Sci. and Tech. Grad. Univ.)
Malte Kampschulte (Charles Univ.)
Alexander Menovschikov (HSE Univ.)

Weak weak* time derivatives

概要 We develop a version of weak derivative for functions whose values lie in a time-dependent family of Banach spaces.

19 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 Marrakchi–Vaes's theorem for type II_1 factors, we show that a state-preserving $\mathbb{Z}$-action on a type III_1 factor with trivial bicentralizer admits a unitary cocycle, whose perturbation is an ergodic action.

20 渚勝　有限因子環上の Choquet 型の非線型トレースに関する大数の法則 ····· 15
(千葉大⋆・立命館大理工)
綿谷安男 (九大⋆)

Masaru Nagisa
(Chiba Univ.⋆/Ritsumeikan Univ.)
Yasuo Watatani (Kyushu Univ.⋆)

Law of large numbers for non-linear traces of the Choquet type on finite factors

概要 We introduced non-linear traces of the Choquet type on semi-finite factors $\mathcal{M}$ as a non-commutative analog of the Choquet integral for non-additive measures. We need a weighted dimension function on the projections of $\mathcal{M}$, which is an analog of a monotone measure. We study the law of large numbers for non-linear traces of the Choquet type on finite factors $\mathcal{M}$. Since averages do not converge in general, we study the range of their accumulation points, that is, we estimate their limit supremum and limit infimum. We examine the trials of sequences consisting of self-adjoint operators, which appear in coin toss or Powers' binary shifts. We have also found some unexpected examples of Powers' binary shifts which satisfy what we call *the uniform norm law of large numbers*. This is an attempt at non-linear and non-commutative probability theory on matrix algebras and factors of type II_1.

概要 By introducing the totally uniqueness condition for maps, we establish a one-to-one correspondence between the family of invariant sets for the -function (e.g. the -map, also known as the Collatz map), where and are arbitrary positive odd numbers, and the family of reducing subspaces for the associated -algebra. This extends the connection between the Collatz conjecture (also known as the -problem) and the irreducibility of its associated -algebra. We also introduce homomorphisms between dynamical systems with bounded conditions that preserve the structures of these dynamical systems. We prove the existence of an isomorphism between their associated -algebras is proven for every isomorphism between dynamical systems with bounded condition.

概要 For finite T_0-spaces X and Y satisfying certain conditions, we introduce reflection functors between the categories $\mathfrak{RR}(X)$ and $\mathfrak{RR}(Y)$ of ideal-related KK-theory, as well as between the categories $\mathfrak{E}(X)$ and $\mathfrak{E}(Y)$ of ideal-related E-theory. These functors are reminiscent of the BGP-reflection functors in the representation theory of quivers. Consequently, whenever the undirected graphs associated with X and Y are the same tree, the reflection functors induce equivalences $\mathcal{B}(X) \simeq \mathcal{B}(Y)$, $\mathfrak{E}(X) \simeq \mathfrak{E}(Y)$, and $\mathcal{B}_{\mathrm{E}}(X) \simeq \mathcal{B}_{\mathrm{E}}(Y)$ for the KK-theoretic bootstrap categories, ideal-related E-theory, and the E-theoretic bootstrap categories, respectively.

概要 The selfless property for C*-algebras was introduced by Robert and known to imply many important properties such as simple, stable rank one, strict comparison, unique trace in the finite case and simple purely infinite in the infinite case. I will give a survey of the selfless property for C*-probability spaces and talk my recent result showing that a large class of C*-algebras are selfless.

14:15〜15:15

概要 In this paper we investigate quantum Hellinger type divergences which were studied by Bhatia–Gaubert–Jain (2019), Pitrik–Virosztek (2020), and Dinh–Lie–Osaka–Phan (2025). In particular, when $g : [0,\infty) \to [0,\infty)$ is a convex function defined by the form $g(t) = \alpha t^s$ $(\alpha > 0, s \in [1,2])$ and $f : [0,\infty) \to [0,\infty)$ is an operator monotone function with $f'(1) = \lambda \in [0,1]$, we introduce the quantum quantitative $\Phi_{g,\sigma}(A,B) = \mathrm{Tr}(g(A\nabla_\lambda B - A\sigma_f B))$ for positive definite matrices A and B, and show that $\Phi_{g,\sigma}$ is a quantum divergence in the sense of Bhatia–Gaubert–Jain and also show that it is jointly convex and satisfies the data processing property by a trace preserving positive unital map Φ, that is, $\Psi_{g,\sigma}(A,B) \geq \Psi_{g,\sigma}(\Phi(A),\Phi(B))$.

25 瀬尾祐貴 (大阪教育大教育)　Rescaled $\natural_\alpha$-Rényi divergences of all real orders ····· 15
Yuki Seo (Osaka Kyoiku Univ.)　Rescaled $\natural_\alpha$-Rényi divergences of all real orders

概要 In this talk, we show that the rescaled $\natural_\alpha$-Rényi divergence extends to the extended orders $\alpha = 0, 1$, and it is defined for any real orders α. Moreover the positivity and equality condition hold for all α. We show that data processing inequality holds for all $\alpha \in [-1, 2]\backslash\{0, 1\}$ and joint convexity holds for $\alpha \in [0, 1]$.

26 曽我部太郎 (京大理)♭ 松本健吾 (上越教育大)　ある Cuntz–Pimsner 環の universal な表示とその応用 ····· 15
Taro Sogabe (Kyoto Univ.)　A presentation of certain Cuntz–Pimsner algebra and unique ergodicity
Kengo Matsumoto (Joetsu Univ. of Edu.)　of certain ergodic automorphism

概要 In our previous work, we gave a Pimsner construction of an ergodic automorphism of the unital Kirchberg algebras. In the construction, we observed that there is a state that is invariant under the ergodic automorphism action. We simplify a presentation of the above Pimsner construction and show that there is a unique state that is invariant under the action of the ergodic automorphism by using this simplified presentation.

27 有本諒也 (京大数理研) 曽我部太郎 (熊本大教育)　Topological full groups arising from Cuntz and Cuntz–Toeplitz algebras and their crossed products ····· 15
Ryoya Arimoto (Kyoto Univ.)　Topological full groups arising from Cuntz and Cuntz–Toeplitz algebras
Taro Sogabe (Kumamoto Univ.)　and their crossed products

概要 We investigate the topological full groups arising from the Cuntz and Cuntz–Toeplitz algebras and their crossed products with the Cartan subalgebras of Cuntz and Cuntz–Toeplitz algebras. We study the normal subgroups and abelianization of these groups and completely determine the KMS states of the reduced crossed products with respect to some canonical gauge actions.

15:30〜16:30　特別講演

伊藤公智 (前橋工科大)　種々の重み付き平均とその関係
Masatoshi Ito (Maebashi Inst. of Tech.)　Various weighted means and their relations

概要 For two positive numbers or positive operators on a Hilbert space, the arithmetic, geometric and harmonic means are well known and have their weighted versions. Besides them, there exist many other means, for example, the logarithmic, Heinz, power difference, power, Heron means. But weighted versions of some means were not investigated. In this talk, we study various weighted means and their relations. Firstly, as a definition of weighted means, we propose the notion of a transpose symmetric path of t-weighted means. Next, we discuss relations among weighted means stated above by introducing new families of operator means including the weighted logarithmic mean by Pal, Singh, Moslehian and Aujla (2016). In this argument, we can newly introduce the weighted Heinz mean and the weighted power difference mean.

統　計　数　学

3月23日(月)　　第VIII会場

9:30〜11:50

1　徐　　梓　健 (福　岡　大　理)　Monge solutions and uniqueness in multi-marginal optimal transport with hierarchical jumps ····· 15

Zijian Xu　(Fukuoka Univ.)　Monge solutions and uniqueness in multi-marginal optimal transport with hierarchical jumps

概要 We introduce a novel framework for multi-marginal optimal transport (MOT), termed Hierarchical Jump MOT (HJMOT), which generalizes the classical MOT by allowing mass to "jump" over intermediate spaces. This is achieved by augmenting each intermediate space with an isolated point, granting the transport path greater flexibility. Formulated on Polish spaces, we establish the existence of Kantorovich solutions and, under sequential differentiability and a twistedness condition, the existence and uniqueness of Monge solutions. The framework is robustly extended to smooth manifolds, where the core results hold under natural geometric adaptations of the assumptions. This provides a unified perspective for studying deterministic transport across diverse settings.

2　中　川　卓　也 (立命館大理工)♭　$L^{\alpha-1}$ distance between two one-dimensional stochastic differential equations with drift terms driven by a symmetric α-stable process ····· 15

Takuya Nakagawa (Ritsumeikan Univ.)　$L^{\alpha-1}$ distance between two one-dimensional stochastic differential equations with drift terms driven by a symmetric α-stable process

概要 This paper develops a quantitative stability theory for one-dimensional SDEs with non-zero drift and time-dependent coefficients, driven by a symmetric α-stable process for $\alpha \in (1,2)$. We establish the first explicit convergence rates for this broad class. Our main result is a Hölder-type estimate for the $L^{\alpha-1}(\Omega)$ distance between two solution paths, which quantifies stability with respect to the initial values and coefficients. In this estimate, the distance between coefficients is measured by a weighted integral norm constructed from the transition probability density of one of the solutions. The proof is based on a refined analysis of a mollified auxiliary function, for which we establish a new, sharper derivative estimate to control the drift terms.

3　土　田　兼　治 (防　　衛　　大)
大　井　拓　夢 (東京理大創域理工)
上　村　稔　大 (関西大システム理工)　コンパクトネストに適合した滑らかな測度と正値連続加法汎関数について ····· 15

Kaneharu Tsuchida (Nat. Defense Acad. of Japan)
Takumu Ooi (Tokyo Univ. of Sci.)
Toshihiro Uemura (Kansai Univ.)　Smooth measures and positive continuous additive functionals attached to a compact nest

概要 Positive continuous additive functionals (PCAFs) and smooth measures play a fundamental role in the transformation theory of stochastic processes and the fine analysis of Markov processes. These two objects are related through a one-to-one correspondence known as the Revuz correspondence, established within the framework of Dirichlet forms. Classical studies have mainly focused on Radon measures of finite energy integral. However, when dealing with more general Markov processes, one must consider smooth measures that are not Radon —sometimes nowhere Radon. This talk investigates the convergence relationship between general smooth measures and the corresponding PCAFs, using the concept of compact nests as the key analytical tool.

概要 The conditioning problem asks how the behavior of a stochastic process changes when it is conditioned not to visit a specified set. The (local-time) penalization problem is an extension: informally, it studies the behavior under a weighting that penalizes the accumulation of local time on a given set, thereby discouraging visits to that set. In this talk, for one-dimensional Lévy processes, I will present results on conditioning to avoid a bounded F_σ-set and on penalization that makes visits to finitely many points unlikely.

概要 Affine processes play an important role in mathematical finance and other applied areas due to their tractable structure. In this talk, we present probabilistic representations and integration by parts (IBP) formulas for expectations involving affine processes. These formulas are expressed in terms of expectations of affine processes with modified parameters and are derived using Fourier analytic techniques and characteristic functions. The methodology can be applied to the classic Cox–Ingersoll–Ross (CIR) model, a model for interest rates in mathematical finance, where the initial value derivative corresponds to one of the "Greeks" used in option pricing in mathematical finance. The result can contribute to improving the speed of Greeks computation.

概要 We introduce space-time occupation measures (STOMs) as an extension of positive continuous additive functionals of Markov processes, and study their convergence. We show that if a sequence of Markov processes, their heat kernels, and the corresponding Revuz measures converge, and if these Revuz measures satisfy a uniform local Kato-type condition, then the associated STOMs converge jointly with the laws of the processes.

概要 We consider the first hitting time to a square-root boundary for Brownian motion and give a formula for the joint distribution of the hitting time and the hitting place by means of Gegenbauer polynomials and the density functions of the hitting time for higher dimensions.

概要 We study ergodicity of configuration-valued Markov processes defined by Dirichlet forms with standard carré du champ. While previous results assume extremality in Gibbsian random point fields, number-rigidity, or tail-triviality, we show that only tail-triviality is essential. Using a σ-field $\mathcal{G}_\infty$, we decompose random point fields and prove ergodicity for each component. In particular, $\mathcal{G}_\infty$-triviality implies ergodicity. Our result unifies existing criteria for ergodicity of infinite particle systems and applies to Poisson, Gibbs, determinantal, and Coulomb point fields.

概要 We report that the results of D. J. Gilbert (Proc. Roy. Soc. Edinburgh, 128A, 549–584, 1998) have direct applications to some one-dimensional Schrödinger operators with random potentials. In particular, if the Lyapunov exponent of an ergodic Schrödinger operator H vanishes on a set of positive Lebesgue measure, then the absolutely continuous spectrum of H, whose existence is guaranteed by Kotani's theory, has multiplicity 2.

14:15〜15:15　2025年度(第24回)日本数学会解析学賞受賞特別講演

D. Croydon　(京大数理研)　Cover times of random walks on some special trees

David Croydon　(Kyoto Univ.)　Cover times of random walks on some special trees

概要 The cover time of a stochastic process is the time required for the process to visit every point in its state space. Motivated by applications in computer science, where the cover time can represent, for example, the running time of a randomized algorithm, there has been extensive research on how cover times scale for sequences of random walks on graphs of increasing size. After reviewing some of the major progress in this area, I will present several recent results concerning the cover time of random walks on critical Galton–Watson trees, the random conductance model on such trees, and the biased random walk on the binary tree. In each setting, the scaling limit of the cover time is random and can be expressed in terms of the cover time of a limiting stochastic process on a fractal state space. (In certain regimes of the random conductance model, the limiting process is degenerate.) The talk is based on various articles, including joint work with George Andriopoulos (NYU Abu Dhabi), Vlad Margarint (Charlotte), Laurent Menard (Paris Nanterre), and Marc Perlade (ENS Paris).

15:30〜16:30　特別講演

野場　　啓（阪　大　理）　正のジャンプを持たない確率過程のスケール関数について

Kei Noba　(Univ. of Osaka)　On the scale functions of stochastic processes with no positive jumps

概要 A one-dimensional Levy process without positive jumps is called a spectrally negative Levy process. For such processes, the associated scale function allows one to express the Laplace transform of the first exit time from an interval, as well as the potential measure when the process is killed upon exiting the interval. Owing to this utility, scale functions have been applied in various studies concerning the behavior of spectrally negative Levy processes. In recent years, motivated by their broad applicability, there has been growing interest in defining analogous scale functions for other real-valued stochastic processes without positive jumps, and in studying their properties. In this talk, I will briefly explain the properties and applications of scale functions for spectrally negative Levy processes, and introduce related results concerning scale functions for other processes without positive jumps, including some of my own work.

3月24日(火)　第VIII会場

9:30〜11:50

10 佐藤僚亮 (北大理) Conservation operator processes from representation theory and their CLT ····· 15

Ryosuke Sato (Hokkaido Univ.) Conservation operator processes from representation theory and their CLT

概要 In this talk, we will study conservation operator processes, which are operator-valued processes acting on symmetric Fock spaces and behave similarly to compound Poisson processes. We show a CLT-type result for these processes in a general setting and discuss concrete examples related to asymptotic analysis in representation theory.

11 佐久間紀佳 (阪大理) 一般化 Meixner 型の自由ガンマ分布について 2 —有限自由確率論— ··· 10
植田優基 (北教大旭川)

Noriyoshi Sakuma (Univ. of Osaka) On generalized Meixner-type free gamma distributions 2 —finite free probability—
Yuki Ueda (Hokkaido Univ. of Edu.)

概要 Our main goal is to explain how the generalized Meixner-type free gamma distributions naturally arise as the limiting distributions governing the zeros of Jacobi and Bessel polynomials when their degree becomes large. The key tool is the finite S-transform, recently introduced by the second author, which serves as a finite-dimensional analogue of Voiculescu's S-transform.

12 稲吉凌 (名城大理工) Operator information quantities of semigroups associated with functions of the number operator ····· 15

Ryo Inayoshi (Meijo Univ.) Operator information quantities of semigroups associated with functions of the number operator

概要 In this talk, we present recent developments on the operator information quantity acting on white noise functionals. In particular, we give a stochastic expression of the operator information quantity of a semigroup generated by some function of the number operator through a white noise delta distribution centered at an infinite dimensional Ornstein–Uhlenbeck process.

13 濵口雄史 (京大理) 確率 Volterra 方程式の Markov リフトとエルゴード性 ····· 15

Yushi Hamaguchi (Kyoto Univ.) Markovian lifting and ergodicity for stochastic Volterra equations

概要 The solution of a stochastic Volterra equation (SVE) is generally a (finite-dimensional) stochastic process that is non-Markovian and non-semimartingale. However, by lifting it to an infinite-dimensional space, a Markov process on a certain Hilbert space (Markovian lift) is obtained. Furthermore, the solution of the original SVE can be recovered as a projection of this Markovian lift. The purpose of this research is to obtain a limit theorem for the solution of the original SVE by investigating the long-time asymptotic behavior of the Markovian lift. Specifically, we show the exponential weak ergodicity for the Markovian lift, and as a consequence we show the ergodicity for a stationary solution of the original SVE.

14 名古路浩辰 (広島大先進理工) $\exp(\Phi)_2$-量子場モデルに付随する Dirichlet 作用素の一意性 ····· 15
河備浩司 (慶大経済)

Hirotatsu Nagoji (Hiroshima Univ.) Strong uniqueness of Dirichlet operators related to stochastic quantization for the $\exp(\Phi)_2$-model
Hiroshi Kawabi (Keio Univ.)

概要 We consider Dirichlet forms related to stochastic quantization for the $\exp(\Phi)_2$-model on the torus. We show strong uniqueness of the corresponding Dirichlet operators by applying an idea of (singular) SPDEs.

15　西野颯馬 (都立大理)　A central limit theorem for the stochastic cable equation ····· 15

Soma Nishino (Tokyo Metro. Univ.)　A central limit theorem for the stochastic cable equation

概要 There has been growing interest in the asymptotic behavior of spatial averages of solutions to SPDEs, including the stochastic heat and wave equations. Using the Malliavin–Stein method, it has been shown under various conditions that suitably rescaled averages converge to the standard normal distribution. In this talk, we show that analogous results hold for the stochastic cable equation with Dirichlet/Neumann/periodic boundary conditions. Furthermore, under an additional assumption, we establish weak convergence in a functional sense and discuss the validity of this assumption.

16　広兼巳紀雄 (阪大基礎工)　Error distributions of Euler–Maruyama and local linearization schemes
深澤正彰 (阪大基礎工)　for SDEs with additive noise ····· 15
K. Kardaras
(London School of Econ.)

Mikio Hirokane (Univ. of Osaka)　Error distributions of Euler–Maruyama and local linearization schemes
Masaaki Fukasawa (Univ. of Osaka)　for SDEs with additive noise
Kostas Kardaras
(London School of Econ.)

概要 We study the scaled error processes of two discretization schemes for SDEs with additive Brownian noise. For the Euler–Maruyama scheme with step $1/n$, we show that the error process, when scaled by n, converges stably in the space of continuous paths to a non-degenerate Gaussian limit. For a local linearization scheme on the same grid, we instead scale the error process by $n\sqrt{n}$ and obtain a different stable limit distribution, again of Gaussian type. We will describe these two fluctuation regimes and the main ideas of the proof. This is joint work with Masaaki Fukasawa and Kostas Kardaras.

17　小川重義 (立命館大理工)　On the regular solutions of noncausal SDE ····· 15

Shigeyoshi Ogawa (Ritsumeikan Univ.)　On the regular solutions of noncausal SDE

概要 The meaning and the richness as scientific notion of the SDE, $dX_t = a(t,x_t)dW_t + b(t,X_t)dt, X_0 = x_0 \in \mathbf{R}^1$, depends on the stochastic integral that gives a precise definition to the differential terme $a(t,X_t)dW_t$. With a different stochastic integral we may have a different interpretation to the symbol of SDE. Now as another candidate for the stochastic integral we have the noncausal stochastic integral $\int f d_*W_t$ that was introduced by the author in 1979 (in Comptes Rendus 1979 febrier), For the case of the noncausal integral we have the SDE $dX_t = a(X_t)d_*W_t + b(X_T)dt$ which we call the noncausal SDE. Since we are very much concerned with the property of such noncausal SDE, the aim of the talk is to show some results to the fundamental questions of the existence and uniqueness of solutions of the noncausal SDE, and to show some of its applications.

18　岡本陸希 (立命館大理工)♭　初期ノイズ修正型 SIML 高頻度統計推定関数の諸性質 ····· 15
赤堀次郎 (立命館大理工)

Rikuki Okamoto (Ritsumeikan Univ.)　Properties of the initial noise-adjusted SIML high-frequency statistical
Jiro Akahori (Ritsumeikan Univ.)　estimator

概要 The SIML high-frequency statistical estimator is an estimator for the integrated volatility of an Ito process perturbed by microstructure noise, originally proposed by Naoto Kunitomo and Seisho Sato. Similar results include methods for estimating instantaneous volatility independently introduced by P. Malliavin and M. E. Mancino. However, a major challenge has been pointed out with both of the two aforementioned methods: consistency is lost due to initial noise. Consequently, a third, initial-noise-robust methodology has been proposed. In this presentation, we report on results concerning the consistency and asymptotic normality of the initial-noise-corrected SIML-type estimator.

12:00〜12:30　統計数学分科会総会

3月25日(水)　　第Ⅷ会場

10:00〜12:00

19 後藤佑一 (九大数理)
A. Aknouche (Qassim Univ.)
C. Francq
(JST CREST・Univ. of Lille)
Mixed difference integer-valued GARCH model for $\mathbb{Z}$-valued time series ····· 15

Yuichi Goto (Kyushu Univ.)
Abdelhakim Aknouche (Qassim Univ.)
Christian Francq
(JST CREST / Univ. of Lille)
Mixed difference integer-valued GARCH model for $\mathbb{Z}$-valued time series

概要 We propose a flexible modeling framework for integer-valued time series that admits both positive and negative values, which naturally arise, for instance, after detrending nonnegative integer-valued data. The model extends the INGARCH-type structure by separately modeling the positive and negative parts and by incorporating a switching mechanism governed by Bernoulli dynamics, thereby enabling the accommodation of bimodality and sign transitions with dependence on past observations. We establish sufficient conditions for stationarity, ergodicity, and β-mixing of the proposed process, characterized by the spectral radius of a parameter matrix and by bounds on the switching probabilities. For parameter estimation, we introduce a mixed Poisson quasi-maximum likelihood estimator, and we show that it is consistent and asymptotically normally distributed under standard regularity assumptions.

20 藤森洸 (信州大経法)
白石博 (慶大理工)
蛭川潤一 (南山大理工)
K. Fokianos (Univ. of Cyprus)
Lasso-type estimators for multivariate integer-valued autoregressive models with applications to inference for Hawkes processes ····· 15

Kou Fujimori (Shinshu Univ.)
Hiroshi Shiraishi (Keio Univ.)
Junichi Hirukawa (Nanzan Univ.)
Konstantinos Fokianos
(Univ. of Cyprus)
Lasso-type estimators for multivariate integer-valued autoregressive models with applications to inference for Hawkes processes

概要 We consider Lasso-type estimation methods for the intensity functions of multivariate Hawkes processes via discrete approximations. Univariate Hawkes processes are known to be approximated by integer-valued autoregressive (INAR) models. We rigorously prove this fact in the multivariate setting. Then, we apply Lasso-type estimation methods, which have been established for vector autoregressive models, to multivariate integer-valued time series approximating Hawkes processes. We obtain an error bound for the estimator by verifying certain moment and mixing conditions of the multivariate INAR models, which serve as sufficient conditions for applying concentration inequalities for weakly dependent time series.

概要 We propose an Alternative Dependent Counting nonnegative Integer-valued AutoRegressive process of the pth-order. We first discuss its probabilistic properties of the model, including (i) the conditional higher-order central moments and (ii) strictly stationarity (with νth moment) and ergodicity. We next deal with point estimation about the model parameter and the innovation mean/variance and consider some hypothesis testing problems.

概要 The Shannon entropy, also known as the Shannon–Wiener index, is a fundamental measure for quantifying diversity and model complexity in fields such as information theory, ecology, and genetics. Although many existing studies assume that the true number of species is known, this assumption is often unrealistic in practice. Building on these developments, we propose a new entropy estimation method based on the Pitman–Yor process, a representative model in Bayesian nonparametrics. By approximating the unknown true distribution with an infinite-dimensional distribution, our approach enables stable estimation even in the presence of unobserved species. This methodology provides a principled way to handle uncertainty in species richness and improves the reliability of entropy-based diversity assessment.

概要 We consider discrete-time, risk-sensitive optimal stopping problems for multiparameter Markov processes. Using a probabilistic approach and an approximation method, we prove the continuity of the optimal stopping value function for Feller–Markov processes. In addition, we provide formulas for the corresponding optimal stopping rules and study the regularity of the approximating functions.

概要 We present discriminant analysis for weakly dependent functional time series under local regularity conditions. The proposed classifier is constructed from estimated mean functions for two categories, using the Nadaraya–Watson estimator of functional time series with bandwidth-based local smoothing to adapt to varying regularities in the sample paths. We establish the asymptotic properties for the proposed classifier under some regularity conditions. Additionally, the finite-sample performance is evaluated through simulation studies. We also apply the method to some real data.

25 陳　実 (早大理工)　Portmanteau test of copula time series ····· 15
劉　言 (早大理工)

Shi Chen (Waseda Univ.)　Portmanteau test of copula time series
Yan Liu (Waseda Univ.)

概要 We propose two portmanteau test procedures for copula time series. Copula time series capture the dependence structure independently of marginal distributions. We consider portmanteau tests by a residual-based approach and a probability integral transform-based approach to avoid effects of the nonlinear structure inherent in copula time series. The asymptotic distributions of proposed test statistics are obtained under the null hypothesis. The finite sample performance of our approaches is illustrated through numerical simulations.

26 蛭川潤一 (南山大理工)　The second order generalization of Hájek–Le Cam asymptotic minimax
谷口正信 (早大理工)　theorem ····· 15
M. Hallin
(Univ. Libre de Bruxelles)

Junichi Hirukawa (Nanzan Univ.)　The second order generalization of Hájek–Le Cam asymptotic minimax
Masanobu Taniguchi (Waseda Univ.)　theorem
Marc Hallin (Univ. Libre de Bruxelles)

概要 The basic results concerning with the asymptotic theory of estimation and testing, Le Cam introduced so-called locally asymptotically normal (LAN) family of distributions. The convolution theorem for LAN case is obtained by Hájek. The convolution result was extended by Le Cam to more general situations than that of LAN case. These results sometimes called the Hájek–Le Cam asymptotic minimax theorem. In this talk we derive the second order generalization of Hájek's convolution theorem. Furthermore, as a application of the second order Hájek's convolution theorem, we lead to the second order Hájek–Le Cam asymptotic minimax theorem. It automatically provides the conditions that the second order asymptotic efficient estimators should satisfy.

14:15〜15:15　特別講演

奥戸道子 (千葉大理)　情報幾何の基礎とベイズ統計への展開

Michiko Okudo (Chiba Univ.)　Foundations of information geometry and its applications to Bayesian statistics

概要 In this talk, I will begin with an introduction to information geometry, focusing on its fundamental geometric concepts and how it provides a framework for understanding Bayesian statistical inference. I will then review several of my recent results on Bayesian prediction and estimation from an information-geometric viewpoint. The first part proposes a construction of predictive distributions for curved exponential families by extending estimators beyond the parameter space and considering a geometric projection of Bayesian predictive distributions. The second part illustrates how geometric structures can guide prior selection, through the construction of shrinkage priors for covariance matrices of Normal models. Together, these results show that information geometry not only describes Bayesian procedures, but also suggest new ones.

15:30〜16:30　特別講演

塚 原 英 敦 (成 城 大 経 済)　Statistics of risk measures

Hideatsu Tsukahara (Seijo Univ.)　Statistics of risk measures

概要 Statistical methodology has an important role to play in risk measurement. In this talk, we will review and discuss some statistical issues on risk measures. Examples we consider are value-at-risk, expected shortfall, expectiles, and distortion risk measures. Several methods of estimating these risk measures based on time series data have been proposed, and we will try to explain them in some detail. Another main issue we would like to address is a problem of backtesting: the evaluation of risk measurement procedures using historical data, by comparing ex ante estimates of loss distributions or risk measures with the ex post realized losses. There have been several suggestions concerning backtestability of risk measures, which will be discuss in detail. We also examine and suggest backtesting procedures for predictive distributions, expected shortfall and distortion risk measures.

3月26日(木)　第VIII会場

10:00〜11:40

27 佐 藤 哲 也 (東 京 理 大 理)　Error bounds for high-dimensional Edgeworth expansion for sphericity test with two-step monotone missing data ····· 15
八 木 文 香 (東 京 理 大 理)
瀬 尾　隆 (東 京 理 大 理)

Tetsuya Sato (Tokyo Univ. of Sci.)　Error bounds for high-dimensional Edgeworth expansion for sphericity test with two-step monotone missing data
Ayaka Yagi (Tokyo Univ. of Sci.)
Takashi Seo (Tokyo Univ. of Sci.)

概要 For complete data, Muirhead (1982) studied an asymptotic expansion of the modified likelihood ratio test (LRT) statistic, and Wakaki (2007) derived the high-dimensional Edgeworth expansion and its error bound. For monotone missing data, Sato, Yagi, and Seo (2025a, 2025b) obtained asymptotic expansions of the LRT statistic and modified LRT statistic, but an error bound with monotone missing data remains unexplored. We consider the sphericity test $H_0 : \boldsymbol{\Sigma} = \sigma^2 \boldsymbol{I}_p$ and derive the high-dimensional Edgeworth expansion for the standardized test statistic with two-step monotone missing data. Furthermore, using the inverse Fourier transformation, we derive error bounds of the Edgeworth expansion.

28 間 野 修 平 (統 計 数 理 研)　逐次最尤法による条件付き分布の直接抽出 ····· 15

Shuhei Mano (Inst. of Stat. Math.)　Direct sampling from conditional distributions by sequential maximum likelihood estimations

概要 We can directly sample from the conditional distribution of any log-affine model. The algorithm is a Markov chain on a bounded integer lattice, and its transition probability is the ratio of the UMVUE of the expected counts to the total number of counts. The computation of the UMVUE accounts for most of the computational cost, which makes the implementation challenging. Here, we investigated an approximate algorithm that replaces the UMVUE with the MLE. Although it is generally not exact, it is efficient and easy to implement; no prior study is required, such as about the connection matrices of the holonomic ideal in the original algorithm.

概要 In this talk, we address sparse estimation of high-dimensional covariance matrices. We first examine the sample covariance matrix and show that its consistency can be guaranteed only under restrictive conditions, mainly because the non-diagonal elements contain substantial noise. To overcome this difficulty, we apply the methodology of automatic sparse estimation, which yields consistent estimators without requiring regularization parameters, although the computational cost remains high in high dimension. When the covariance matrix is assumed to have block diagonal structures, appropriate covariance blocks can be selected and the automatic sparse estimation procedure applied to each block, while still ensuring the consistency of the overall block-diagonal covariance matrix. We evaluate the performance of the proposed method through theoretical comparison and numerical simulations.

概要 This study considers a model selection problem in linear regression models with a group structure. The group structure is formulated by disjoint non-empty subsets of index set of regression coefficients. Our aim is to select the best combination among the candidate subsets. Based on the greedy algorithm that has attractive properties in conventional linear regression models, we construct a model selection algorithm for linear regression models with a group structure. Besides, we attempt to derive its theoretical properties from the predictive point of view under high-dimensional settings.

概要 The ordinal logit model is widely used as a model to predict ordinal categorical variables based on explanatory variables. However, applying separate ordinal logit models to two correlated ordinal categorical variables ignores the correlation between the variables. In this study, we propose new bivariate ordinal logit models for two ordinal categorical variables within the same classification. Our proposed models are particularly suitable for cases where the two variables exhibit a symmetric structure.

概要 This study addresses the testing problem of sub-mean vector in a two-sample problem with two-step monotone missing data. We extend Rao's U-type test statistic, originally proposed for the one-sample case by Hosonuma, Kawasaki, and Seo (2025), to construct a corresponding test statistic for the two-sample setting. In constructing the proposed statistic, Hotelling's T^2-type test statistic is employed. By applying a stochastic expansion, the distribution function of the test statistic is derived, and approximate upper 100α percentiles are obtained. Moreover, Monte Carlo simulations are conducted to numerically evaluate the accuracy of the approximations with respect to Type I error. The results from these simulations provide detailed insights into the performance of the proposed test under various conditions.

概要 Modeling circular distributions in a flexible and interpretable manner has long been an important topic in circular statistics. The generalized t-distribution is known for its high flexibility, as it includes the generalized von Mises, generalized wrapped Cauchy, generalized cardioid, and Jones–Pewsey distributions as special cases. In this study, we investigate the asymptotic representation of the generalized t-distribution with respect to the generalized von Mises distribution and develop hypothesis testing procedures for the null hypothesis of the underlying data follows from the the generalized von Mises distribution. We also apply the proposed method to several circular data sets.

応　用　数　学

3月23日(月)　　第IX会場

9:30〜11:35

1 神吉知博 (松江工高専)
名倉　誠 (大阪電通大基礎理工)
大谷信一 (関東学院大理工)
一般化された Stirling 数の左 production 行列について ····· 15

Tomohiro Kamiyoshi (Matsue Coll. of Tech.)
Makoto Nagura (Osaka Electro-Comm. Univ.)
Shin-ichi Otani (Kanto Gakuin Univ.)
On left production matrices of generalized Stirling numbers

概要 In general, an exponential Riordan array has both right and left production matrices. While the Fundamental Theorem of Riordan Arrays (FTRA) gives the exponential generating functions of columns of the right production matrix, it does not apply to the left one, requiring a different method. In this talk, we show that for the generalized Stirling numbers with three parameters, defined by Hsu–Shiue, the left production matrix of the associated exponential Riordan array can be explicitly determined when indices are restricted to non-negative arguments. As a result, the recurrence relations for classical Stirling numbers, Whitney numbers, and related sequences can be obtained in a unified manner.

2 栗原大武 (山口大創成)
東谷章弘 (阪大情報)
非原始的アソシエーションスキームと消去理論 ····· 15

Hirotake Kurihara (Yamaguchi Univ.)
Akihiro Higashitani (Univ. of Osaka)
Imprimitive association schemes and elimination theory

概要 Several equivalent conditions for imprimitive association schemes are known. This talk will focus on imprimitivity from the perspective of multivariate P-polynomial association schemes, and will show its relationship with the elimination monomial order.

3 松田一徳 (北見工大工)
誘導マッチング数が p, 最小マッチング数が q, マッチング数が r となる連結単純グラフの辺数の最小値について ····· 15

Kazunori Matsuda (Kitami Inst. of Tech.)
The minimum number of edges of connected simple graphs G with ind-match$(G) = p$, min-match$(G) = q$ and match$(G) = r$

概要 In this talk, we investigate the minimum number of edges of connencted simple graphs G with ind-match$(G) = p$, min-match$(G) = q$ and match$(G) = r$ for pair of integers p, q, r such that $1 \leq p \leq q \leq r \leq 2q$.

概要 In 2012, Mader conjectured that for any tree T of order m, every k-connected graph G with minimum degree at least $\lfloor \frac{3k}{2} \rfloor + m - 1$ contains a subtree $T' \cong T$ such that $G - V(T')$ remains k-connected. In 2022, Luo, Tian, and Wu considered an analogous problem for bipartite graphs and conjectured that for any tree T with bipartition (X, Y), every k-connected bipartite graph G with minimum degree at least $k + \max\{|X|, |Y|\}$ contains a subtree $T' \cong T$ such that $G - V(T')$ remains k-connected. In this work, we relax the bipartite assumption by considering triangle-free graphs and prove that for any tree T of order m, every k-connected triangle-free graph G with minimum degree at least $2k + 3m - 4$ contains a subtree $T' \cong T$ such that $G - V(T')$ remains k-connected. Furthermore, we establish refined results for specific subclasses such as bipartite graphs or graphs with girth at least five.

概要 A graph whose radius and diameter are both 3 is called a 3-self-centered graph. In this talk, we focus on 3-self-centered graphs satisfying some uniqueness condition (the unique eccentric point property) and describe their structure in the case girth ≥ 4.

概要 A proper conflict-free coloring of a graph is a proper coloring in which every non-isolated vertex has a color that appears exactly once in its neighbors. It is conjectured that every graph with maximum degree at least 3 has a proper conflict-free coloring using at most its maximum degree plus one colors. Motivated by the conjecture, in a previous research, we introduced the notion of proper conflict-free degree-choosability of graphs. In this talk, we will explain a conjecture on the relationship between the degeneracy and proper conflict-free degree-choosability of graphs, along with some partial results.

7 中本敦浩 (横浜国大環境情報) 3-染色的射影平面三角形分割における 5-彩色の Kempe 同値性 ····· 15
松本直己 (琉球大教育)
若山響介 (横浜国大環境情報)

Atsuhiro Nakamoto (Yokohama Nat. Univ.)
Naoki Matsumoto (Univ. of Ryukyus)
Kyosuke Wakayama (Yokohama Nat. Univ.)

Kempe equivalence of 5-colorings in 3-chromatic triangulations on the projective plane

概要 For a graph G, two k-colorings of G are said to be Kempe equivalent if they can be transformed into each other by exchanging two colors i and j in a component of the subgraph of G induced by the vertices with color i and j. For many graph classes, the Kempe equivalence has been considered. In our talk, we prove that any two 5-colorings of 3-chromatic triangulations on the projective plane are Kempe-equivalent.

14:15〜16:25

8 合田洋 (東京農工大工) グラフゼータとねじれアレクサンダー多項式のいくつかの表示および結び目の体積 ····· 15
森藤孝之 (慶大経済)

Hiroshi Goda (Tokyo Univ. of Agri. and Tech.)
Takayuki Morifuji (Keio Univ.)

Some expressions of graph zetas and the twisted Alexander polynomials, and the knot volume

概要 We consider the zeta function of graphs and the twisted Alexander polynomials of knots. Since they have been developed separately, we explain the relationship between them through the notion of knot graphs. We also provide a new volume presentation of hyperbolic knots using matrix-weighted graphs and Bell polynomials.

9 佐藤巖 (小山工高専) The weighted complexities of abelian coverings of a graph ····· 15
石川彩香 (室蘭工大工)
小松尭 (山梨大工)
今野紀雄 (立命館大理工・横浜国大*)
三橋秀生 (法政大理工)
森田英章 (室蘭工大工)

Iwao Sato (Oyama Nat. Coll. of Tech.)
Ayaka Ishikawa (Muroran Inst. of Tech.)
Takashi Komatsu (Univ. of Yamanashi)
Norio Konno (Ritsumeikan Univ./Yokohama Nat. Univ.*)
Hideo Mitsuhashi (Hosei Univ.)
Hideaki Morita (Muroran Inst. of Tech.)

The weighted complexities of abelian coverings of a graph

概要 We consider the weighted complexity of a regular covering of a graph G and the second weighted L-function of G. Furthermore, we show the inflation property and the induction property of the second weighted L-function of G. As applications, we present a formula for the weighted complexity of a $\mathbb{Z}_2 \times \mathbb{Z}_2$-covering G.

概要 The Grover matrix of a graph G is a typical time evolution matrix of a discrete-time quantum walk on G. We express a determinant with respect to the Grover matrix of G by using a square matrix with size equal to the number of edges in G. Furthermore, we present a new expression for determinant with respect to the Grover matrix of G by using a square matrix with size equal to the number of vertices in G and treat its related topics.

概要 Quantum walks (QWs) can be regarded as the quantum counterparts of classical random walks (RWs). Due to their interference structure, QWs exhibit diffusion and localization phenomena that are different from RWs. On the other hand, the bootstrap random walk (BRW) is a recursive model in which a new RW is constructed from the trajectory of a preceding one, thereby the generating higher-order walk in a hierarchical manner. The purpose of this study is to quantize the structure of the BRW and to introduce a new class of QWs, which we call the bootstrap quantum walk.

概要 We study a class of symmetric quantum walks on Hamming graphs, where the distance between vertices specifies the transition probability. A special model is the simple quantum walk on the hypercube, which has been discussed in the literature. Eigenvalues of the unitary operator of the quantum walks are zeros of certain self-reciprocal polynomials. We obtain a spectral representation of the wave vector, where our systematic treatment relies on the coin space isomorphic to the state space and the commutative association scheme. The limit distributions of several quantum walks are obtained.

13 関藤寛人（横浜国大環境情報）　量子グラフウォークにおける磁束に関するベクトルポテンシャルの周期性への影響 …… 15
瀬川悦生（横浜国大環境情報）
Hiroto Sekido (Yokohama Nat. Univ.)　Effects of magnetic flux on the periodicity of quantum graph walks
Etsuo Segawa (Yokohama Nat. Univ.)

概要 In Grover walks, the presence or absence of periodicity has been investigated for various classes of graphs. In this study, we examine how much of this periodicity is preserved in quantum graph walks when a magnetic field is introduced. In particular, for graphs that are periodic under Grover walks, we provide a formula that quantifies how far the powers of the time-evolution matrix deviate from the identity when a weak magnetic field is applied to a specific pair of symmetric directed edges.

14 樋口健太（岐阜大教育）　「粘着質な」量子ウォークモデル …… 15
石川隆太（愛媛大理工）
森岡悠（愛媛大理工）
瀬川悦生（横浜国大環境情報）
Kenta Higuchi (Gifu Univ.)　Sticky quantum walk model
Ryuta Ishikawa (Ehime Univ.)
Hisashi Morioka (Ehime Univ.)
Etsuo Segawa (Yokohama Nat. Univ.)

概要 We consider a quantum walk model that receives an inflow and radiates an outflow at every time step. In this model, the strength of the inflow and outflow is tunable by a parameter, κ, and weakly converges to a stationary state. We find that, for small κ, the pertuebed eigenvalues are robust to be peeled off from the unit circle; that is, they are sticky. Indeed, the distance between the perturbed eigenvalues and the unit circle is estimated by $O(\kappa^2)$. This sticky property induces scattering that penetrates the internal graph and can be observed for an appropriate frequency even with small $|\kappa|$.

16:40〜17:40　特別講演

井手勇介（日大文理）　グラフ上の量子ウォークに付随する固有空間
Yusuke Ide (Nihon Univ.)　Eigenspaces related to quantum walks on graphs

概要 The theory of Quantum Walks (QWs) has been extensively developed in various fields in the last 25 years. Because the time evolution of QWs on finite graphs are determined by unitary matrices, the eigenvalues and eigenvectors of the time evolution matrices play essential roles in their behavior. In this talk, we show relationships between eigenspaces of time evolution matrices and graph structures.

3月24日(火)　第IX会場

9:15〜11:40

15 盧暁南（岐阜大工）　Completely uniform nested pairings of Carmichael's Steiner quadruple systems on projective lines …… 15
Xiao-Nan Lu (Gifu Univ.)　Completely uniform nested pairings of Carmichael's Steiner quadruple systems on projective lines

概要 A combinatorial 3-$(v, 4, 1)$ design is also called a Steiner quadruple system (SQS) of order v. A nested pairing of an SQS is a collection that contains a partition of each block into two unordered pairs. Such a pairing is completely uniform if every possible pair of points appears with the same multiplicity. This talk presents an explicit construction for completely uniform nested pairings of Carmichael's Steiner quadruple systems on projective lines $\mathbb{F}_q \cup \{\infty\}$ for prime powers $q \equiv 7 \pmod{12}$.

16 鈴木航介 (山形大理)　2次元ソボル点集合の分離半径 ····· 15
Kosuke Suzuki (Yamagata Univ.)　Exact ℓ^∞-separation radius of the two-dimensional Sobol' sequence

概要 In this talk, we derive exact expressions for the ℓ^∞-separation radius of the first $N = 2^m$ points of the two-dimensional Sobol' sequence for all positive integer m. In particular, the separation radius of Sobol' points is $O(N^{-3/4})$, which is strictly worse than the optimal rate $N^{-1/2}$.

17 辻栄周平 (北教大旭川)　極大アローの単峰領域と正則ヴァインの対応について ····· 15
Hung Manh Tran (Phenikaa Univ.)
Tan Nhat Tran (Binghamton Univ.)
Shuhei Tsujie (Hokkaido Univ. of Edu.)　The correspondence of maximal Arrow's single-peaked domains and regular vines
Hung Manh Tran (Phenikaa Univ.)
Tan Nhat Tran (Binghamton Univ.)

概要 Consider a subset of the set of linear orders (preferences) over n alternatives such that the Condorcet paradox never arises; we call such a set a Condorcet domain. A well-known sufficient condition for being a Condorcet domain is the property of single-peakedness. In this talk I will present the correspondence between maximal Arrow's single-peaked domains and regular vines, which originate in statistics.

18 齋藤琢弥 (北大 ICReDD)　Convolution formulas for invariants of polymatroid sums and other weighted posets ····· 15
Takuya Saito (Hokkaido Univ.)　Convolution formulas for invariants of polymatroid sums and other weighted posets

概要 This talk extends the convolution formula for the characteristic polynomials of matroids of the characteristic elements of weighted posets. A weighted poset consists of a poset equipped with a weight function satisfying functorial conditions. When the weight is pure, we define the characteristic element analogously to the characteristic polynomials of matroids. The main result is a convolution formula that uses restrictions and contractions to compute the characteristic elements of the product of two weights. As an application, we obtain a convolution formula for the sum of polymatroids. This framework is also applied to other various combinatorial structures.

19 奈良知恵 (明大 MIMS)　凸多面体的リンケージの連続的平坦折りとメンガーの定理を用いた裏返し ····· 15
E. D. Demaine (MIT)
M. L. Demaine (MIT)
M. Hecher (MIT)
Rebecca Lin (MIT)
Victor Luo (MIT)
Chie Nara (Meiji Univ.)　Continuous flattening of convex polyhedral linkages and their reversing by Menger's theorem
Erik D. Demaine (MIT)
Martin L. Demaine (MIT)
Markus Hecher (MIT)
Rebecca Lin (MIT)
Victor Luo (MIT)

概要 We prove two results about transforming any convex polyhedron, modeled as a linkage L of its edges. First, if we subdivide each edge of L in half, then L can be continuously flattened into a plane. Second, if L is equilateral and we again subdivide each edge in half, then L can be reversed, i.e., turned inside-out, where Menger's theorem plays a key role.

概要 A polynomial $f(x)$ of degree d is said to be magic positive if all the coefficients of its expansion with respect to the basis $\{x^i(x+1)^{d-i}\}_{i=0}^{d}$ are nonnegative. It is known that if $f(x)$ is magic positive, then the polynomial appearing in the numerator of its generating function is real-rooted. In this talk, we explain that if a polytope is Ehrhart positive, then sufficiently large dilations make its Ehrhart polynomial magic positive, and once it becomes magic positive, it remains so under further dilations. Finally, we investigate how much certain polytopes need to be dilated to make their Ehrhart polynomials magic positive.

概要 In this talk, we give an explicit combinatorial description of the two-dimensional faces of both the order polytope $\mathcal{O}(P)$ and the chain polytope $\mathcal{C}(P)$ of a partially ordered set P. Using these descriptions, we show that for any P, $\mathcal{C}(P)$ has equally many square faces, and at least as many triangular faces, as $\mathcal{O}(P)$ does. Moreover, the inequality is shown to be strict except when $\mathcal{O}(P)$ and $\mathcal{C}(P)$ are unimodularly equivalent. This proves the case $i = 2$ of a conjecture by Hibi and Li. This talk is based on joint work with Ragnar Freij-Hollanti and Teemu Lundström.

概要 The equivariant Ehrhart theory of lattice polytopes has been introduced by Stapledon, developed by many researchers, and the study of the equivariant h^*-polynomials is getting one of the trends in the theory of lattice polytopes. On the other hand, the h^*-polynomials of order polytopes of graded posets are known to be γ-nonnegative by Brändén. In this talk, we prove that order polytopes of graded posets are always equivariant γ-nonnegative.

3月25日(水)　第IX会場

9:25〜12:00

概要 Viruses are pathogens that can cause severe disease, and much research has been conducted into the mechanisms of infection and the viral life cycle. In recent years, the importance of cell-to-cell infection, which is caused by direct contact between infectious cells and target cells, has become apparent. We have therefore constructed a mathematical model that describes cell-to-cell infection, comprising four compartments: target cells, eclipse phase cells, infectious cells and dead cells. Through simulations, we demonstrate that the constructed model exhibits traveling waves. Furthermore, we apply the phase plane analysis to obtain heteroclinic orbits corresponding to the traveling waves together with the condition for their existence.

24 浅 井 雄 介 (国立健康危機管理研究機構)
岩 見 真 吾 (名　大　理)
森 田 善 久 (龍　谷　大*)

Existence of traveling waves in a viral infection model with cell-to-cell transmission ····· 15

Yusuke Asai (JIHS)
Shingo Iwami (Nagoya Univ.)
Yoshihisa Morita (Ryukoku Univ.*)

Existence of traveling waves in a viral infection model with cell-to-cell transmission

概要 We consider a cell-to-cell infection model consisting of the variables representing the concentration of target cells, eclipse phase cells, infectious cells and dead cells. The model describes the spread of infection from infected cells to adjacent target cells by spatially discrete coupling of the nearest infectious cells. We deal with the system on one dimensional space and show the existence of the traveling waves. The spread of spatial infection is also modeled by using a system of integro-differential equations and the existence of traveling waves is also shown in a similar way to the former model.

25 國 谷 紀 良 (神戸大システム情報)　行動変容を考慮した時間遅れをもつ多集団 SIR 感染症モデルにおけるホップ分岐 ····· 15

Toshikazu Kuniya (Kobe Univ.)

Hopf-bifurcation in a time-delayed multi-group SIR epidemic model for population behavior change

概要 In this study, we construct a multi-group SIR epidemic model with time-delay for considering the effect of population behavior change. We obtain the basic reproduction number $\mathcal{R}_0$, and show that the disease-free equilibrium is globally asymptotically stable if $\mathcal{R}_0 < 1$, whereas an endemic equilibrium exists if $\mathcal{R}_0 > 1$. For a special two-group case, we obtain sufficient conditions for Hopf bifurcation. By numerical simulation, we observe the occurrence of periodic solutions in two groups representing an urban area and a non-urban area. We conjecture that the epidemic size, response intensity of behavior change and heterogeneity in different groups can affect the occurrence of recurrent epidemic waves.

26 李　聖 林 (京大高等研・京大医)　皮膚疾患におけるパターン形成 ····· 15

Sungrim Seirin Lee (Kyoto Univ./Kyoto Univ.)

Pattern formation in skin diseases

概要 Unlike the periodic and stationary skin patterns of animals described by Turing pattern formation, skin eruptions in skin diseases generally do not exhibit spatial periodicity and often display dynamically changing patterns within a relatively short time. In diseases such as urticaria, where the boundaries of eruptions are well-defined, the lesions expand and fuse, resulting in further morphological changes, and in some cases, they spontaneously disappear after a certain period of time. Thus, skin eruptions continuously form dynamic and transient patterns. We define this phenomenon as Transitional Pattern Formation. In this talk, I will introduce the fundamental mathematical structures that generate skin eruptions and discuss the pathophysiological mechanisms of chronic urticaria revealed through the analysis of mathematical models.

27 本橋　樹 (北　大　理)
池田榮雄 (富山大理)
長山雅晴 (北大電子研)
自己駆動体運動モデルに対する空間 1 次元定常パルス解の存在について ····· 15

Natsume Motohashi (Hokkaido Univ.)
Hideo Ikeda (Univ. of Toyama)
Masaharu Nagayama (Hokkaido Univ.)
On the existence of one-dimensional standing pulse solutions for a self-propelled motion model

概要 Self-propelled motion refers to the spontaneous, sustained movement of objects by modifying the physical or chemical properties of their surroundings. We focus on a phase-field model for such motion and prove the existence of standing pulse solutions. Since the model includes a non-local term, it is difficult to apply the conventional analytical singular perturbation method. However, by appropriately treating the non-local term, we can use the singular perturbation method. In this talk, we present an approach to handle the non-local term and the proofs of the existence of standing pulse solutions.

28 余　沛澤 (北　大　理)
田崎創平 (北　大　理)
Optimizing nutrient-consuming motility of bacteria with mathematical model ····· 15

Peize Yu (Hokkaido Univ.)
Sohei Tasaki (Hokkaido Univ.)
Optimizing nutrient-consuming motility of bacteria with mathematical model

概要 The random motility is often overshadowed by chemotaxis when regarding the sensitive motile behaviors of bacteria, despite its capability of describing a broader range of behavioral situations. This talk aims to explore such a gap by investigating the applicability and implications of exclusive nonlinear diffusion models in capturing the random motility of bacteria under diverse conditions. A comprehensive mathematical framework was developed to identify both advantages and drawbacks of energy-consuming motility response, and an optimization problem was then applied to evaluate the performance of different motility strategies. Numerical simulation confirms the capability of diffusion models to generalize bacterial motility strategy, as well as the existence of local optimal motility patterns under given environmental conditions.

29 中山まどか (東京科学大ILA)
高木　泉 (東北大理)
脇田順一 (中大理工)
東海林亙 (東北大 FRIS)
田崎創平 (北　大　理)
枯草菌における細胞集団の移動サイクルと環境 pH への応答 ····· 15

Madoka Nakayama (Sci. Tokyo)
Izumi Takagi (Tohoku Univ.)
Jun-ichi Wakita (Chuo Univ.)
Wataru Shoji (Tohoku Univ.)
Sohei Tasaki (Hokkaido Univ.)
Cell population migration cycle and response to environmental pH in *Bacillus subtilis*

概要 Microbial populations are ubiquitous and some form a robust, multicellular structure called biofilm that protects the cells from environmental damage. The dispersion cycle is critical for controlling the population of important target microbes. Here, we show that the hysteresis of *Bacillus subtilis* cell-type regulation with respect to auto-inducing signal strength triggers the migration cycle of the cell population. We investigate migration cycle and its dependence on environmental conditions by quantitative analysis of cyclically expanding, concentric circular colonies. Next, we construct an input/output model that controls cell types in response to environmental conditions and signal density. On the basis of this model, we propose a migration cycle model for cell populations. The proposed model will widely predict biofilm-related phenomena and provide the basis for the description of highly self-regulating multicellular systems.

30 上田肇一 (富山大理)　Pulse dynamics under internal and external environmental changes ··· 15
西浦廉政 (北大電子研・中部大)

Keiichi Ueda (Univ. of Toyama)
Yasumasa Nishiura
(Hokkaido Univ. / Chubu Univ.)

Pulse dynamics under internal and external environmental changes

概要 We investigate how traveling pulses in reaction-diffusion systems respond to spatial heterogeneities acting as external perturbations. A three-component model captures the interplay between intrinsic and extrinsic instabilities. Using a reduced ODE approach, we show that not only the strength but also the spatial configuration of heterogeneities crucially affects pulse dynamics.

31 古場　一 (阪大基礎工)　空飛ぶシャボン玉の数理モデリングへの挑戦 ····· 15

Hajime Koba (Univ. of Osaka)

Mathematical modeling of a soap bubble in air

概要 We consider the governing equations for the motion of the viscous fluids in two moving domains and on an evolving surface from both energetic and thermodynamic points of view. We make mathematical models for a soap bubble floating in the air by our energetic variational and thermodynamic approaches. More precisely, we apply our energetic variational principle and the first law of thermodynamics to derive multiphase flow systems with surface tension and flow. Moreover, we investigate the enthalpy, the entropy, the Helmholtz free energy, and the Gibbs free energy of our model by applying the thermodynamic identity.

14:15〜14:40　2025年度日本数学会応用数学賞・応用数学研究奨励賞授賞式

14:50〜16:30

32 松井一徳 (東京海洋大流通情報工)　線形移動硬化を伴う弾塑性モデルに対する数値解法 ····· 15
赤川佳穂 (京都教育大)

Kazunori Matsui
(Tokyo Univ. of Marine Sci. and Tech.)
Yoshiho Akagawa (Kyoto Univ. of Edu.)

A numerical method for an elastoplastic model with linear kinematic hardening

概要 When a large force is applied to metallic materials, plastic deformation occurs, remaining even after the force is removed. In materials subjected to cyclic loading, strain hardening is observed. One effective description of this hardening behavior is the kinematic hardening rule, which accounts for the shift of the constraint set in stress space as plastic deformation develops. In this study, we propose a new numerical scheme for an elastoplastic model with linear kinematic hardening. We prove that the solution is stable under appropriate norms. Furthermore, this stability leads to the existence of a solution to the original problem.

33 木村正人 (金沢大理工)　一般化モーメント法を用いたスモルコフスキー凝集方程式の質量保存性
宮田尚典 (金沢大自然)　とゲル化現象の解析 ····· 15

Masato Kimura (Kanazawa Univ.)
Hisanori Miyata (Kanazawa Univ.)

Mass conservation and gelation analysis of the Smoluchowski coagulation equation via the generalized moment method

概要 The Smoluchowski coagulation equation (SCE) is a population balance model that describes the time evolution of cluster size distributions arising from particle aggregation. Although the equation is formally mass-conserving, its solutions may exhibit gelation, that is, a sudden loss of mass, when the coagulation kernel grows superlinearly. In this study, we rigorously investigate mass conservation and gelation in weak solutions of the SCE with inhomogeneous coagulation kernels. By introducing a generalized moment framework, we establish sufficient conditions for both mass conservation and gelation, expressed in terms of the initial data and the structural properties of the coagulation kernel.

概要 We consider the Lagrange–Galerkin (LG) method for the convection-diffusion problems. In this talk, we consider the quadrature formula having boundary quadrature points.

概要 Hamilton–Jacobi–Bellman (HJB) equations are partial differential equations arising in dynamic programming in control theory. Their solutions, called value functions, give the minimal expected cost from a given time and state. The resulting HJB equation involves a Hamiltonian and is therefore typically nonlinear. For such nonlinear equations, monotonicity of numerical schemes often plays a crucial role, and the Semi-Lagrangian (SL) scheme is well known as a representative example. However, the SL scheme requires solving many minimization problems whose convexity or uniqueness is not guaranteed, which leads to implementation difficulties. In this talk, we propose a monotone scheme that does not rely on such minimization problems and report its convergence. We also discuss its validity by numerical experiments.

概要 We perform structure-preserving numerical calculations for the interacting system of the Klein–Gordon and Proca equations. We set initial values and investigate the difference between the results of the structure-preserving numerical calculations and those obtained using a general discretization scheme.

概要 In this talk, we will present a new gradient descent method based on a reservoir, without using the error backpropagation algorithm, which forms the core of modern AI. We will highlight the advantages of this new learning scheme. Most existing libraries (such as TensorFlow and PyTorch) fundamentally rely on the backpropagation method, and it is extremely difficult for users to modify the core algorithms at the user level. My own approach starts from mathematics, leading to a model design that achieves a slimmer and more efficient set of learnable parameters. We will also introduce machine learning results that suggest this advantage (the corresponding source code has already been made publicly available).

16:45〜17:45　特別講演

宇 田 智 紀 (富 山 大 理)　異方性を捉えるトポロジカルデータ解析の進展

Tomoki Uda (Univ. of Toyama)　Advances in anisotropy-aware topological data analysis

概要 Topological data analysis (TDA) provides a versatile framework for quantifying the shape of data, yet conventional approaches often overlook anisotropic or direction-dependent structures. In this talk, we introduce recent progress toward anisotropy-aware TDA, focusing on the development of anisotropic persistent homology and its geometric foundations. The proposed approach, based on the ellipse-cloud filtration, enhances the sensitivity of persistent homology to local anisotropy while remaining compatible with standard computational frameworks. We also briefly review the author's earlier attempts to apply TDA-inspired ideas to fluid dynamics and other interdisciplinary fields. In addition, we emphasize how modern AI-assistance tools are directly accelerating research progress and broadening the scope of data-analytic applications.

3月26日(木)　第IX会場

9:25〜12:00

概要 High-dimensional time series data often exhibit topological structural changes (regime shifts) in their cluster or network shape. We introduce a robust framework using Persistent Homology (PH) for detection. First, we establish the probabilistic foundation of classical PH statistics (Total and Maximum Persistence) by deriving moment upper bounds under general distributions and proving tightness at the variance scale for Gaussian Mixture Models. This rigorously positions their scale-dependent behavior. Next, we propose a new stable statistic, PL+JS, which combines the Persistence Landscape (PL) and Jensen–Shannon (JS) distance. We prove the Holder continuity (stability) of PL+JS, enabling robust, non-parametric testing based on permutation tests without specific distributional assumptions. Finally, we demonstrate the method's high-accuracy detection of daily governance regime shifts using time series data from a Decentralized Autonomous Organization (DAO).

概要 Our aim is to prove the stability of the verified solution for the Kolmogorov flow. This stability can be transformed to the sign of the real parts of the eigenvalues for a linearized operator at the solution; that is, if the real part is negative, then the solution is stable. Assuming linearized system at the verified solution satisfies the principle of the exchange of stabilities, we implement an eigenvalue excluding method for the real axis. We show the stability of two nontrivial solutions by proposed method.

概要 We consider a thermohaline convection in the horizontal fluid layer such that the gravity is considered. The fluid is heated from above non-uniformly. An existence theorem of the stationary solutions is provided by a fixed point argument. Some interesting flow patterns are demonstrated by numerical computations.

概要 The development of advanced functional materials requires the creation of novel molecules and exploration of their crystal structures. However, traditional approaches based on molecular dynamics and first-principles calculations demand significant computational resources and expertise. This study presents a web-based simulator that enables users to easily construct crystal structures without relying on conventional space group classifications. By extracting features from existing crystal data and applying machine learning, probabilistic interatomic distance data and Delaunay tetrahedral classifications were compiled into an SQL-based database accessible online. The integrated system supports both structure construction and analysis, successfully reproducing representative crystals such as $Cu_3Au, Mg, Cu_2Mg, BaTiO_3$ demonstrating its practical utility.

概要 Bifurcation problems of type-I blow-ups for ODEs are considered. In preceding works we have derived correspondence of intrinsic information characterizing type-I blow-ups between (1) dynamics at infinity, and (2) asymptotic expansions. Using this correspondence, we shall derive the correspondence of criteria of the existence of bifurcations.

概要 We investigate particle movements in a finite-speed traveling wave solution associated with the heat equation. We approximate the heat equation as a wave equation, which is equivalent to the Goldstein–Taylor model. The Goldstein–Taylor model is a one-dimensional system of two transport equations that proceed in opposite directions. We define the probability of a random walk through the Goldstein–Taylor model. By varying the space and time interval of the random walk, we find two different stochastic processes and one deterministic process as the final scaling limit.

概要 Using generalized eigenfunctions of the Koopman operator or its infinitesimal generator, the Lie operator, we show that finite-dimensional linearization is possible in several simply connected regions of the phase space for finite-dimensional nonlinear dynamical systems. Such linearization is shown to enable us to prove the integrability of the dynamical systems in the regions if the changes of coordinates given by the generalized eigenfunctions are sufficiently smooth or analytic. We demonstrate our theory for four examples, the Duffing oscillator, van der Pol oscillator, Lorenz system and planar restricted three-body problem, and prove their smooth or analytic linearization and integrability in simply connected regions containing only one equilibrium.

概要 We consider feedback control of twisted solutions in the Kuramoto model on nearest neighbor graphs that may be deterministic, random dense or sparse. The system is shown to be well approximated by its continuum limit, based on the previous results. Bifurcations of the twisted solutions in the continuum limit are discussed by the center manifold theory when the feedback control is applied or not applied.

概要 Dynamical responses of traveling pulses in reaction-diffusion systems to spatio-temporally local, comoving perturbation is studied both numerically and analytically. When the parameters are near the codimension two bifurcation point of drift–saddle-node type, center manifold reduction can be applied to reduce the dynamics of the traveling pulses to a finite dimensional ordinary differential equations (ODEs).The reduced ODEs allow us to numerically examine the influence of the external perturbation on the pulse dynamics by changing the intensity and/or the position of the perturbation, and to analytically clarify the mechanism behind the numerical observations. These findings obtained through the study of the ODE system are also demonstrated for traveling pulses arising in the Gray–Scott model.

14:15〜15:15

概要 Reconstruction of dynamical systems from data is an important problem in applications. In this talk, we will consider this problem from the viewpoint of category theory. First, we describe the mathematical structure of data generation by a dynamical system. Based on this framework, we show that a dynamical system can be reconstructed from the data it generates if the phase space is observable in a precisely defined sense.

概要 Driven dissipative quantum systems provide fertile ground for exploring non-equilibrium phase transitions and macroscopic quantum superposition. In this study, we investigate the second quantization of the Lugiat–Lefever equation (LLE), a paradigm model for pattern formation in nonlinear optical resonators. By mapping the classical LLE onto the Lindblad master equation in a multimode Kerr resonator, we reveal the emergence of a quantum cat state, a coherent superposition state exhibiting a negative Wigner function, in the steady state near the classical codimension 2 bifurcation point. Numerical simulations using QuTiP demonstrate spatial localization and quantum hysteresis of photon ensembles, paving the way for dissipative quantum simulators and fault-tolerant qubits. From the classical "bullet hole" model proposed by Professors W.J. Firth and A.J. Scroggie to quantum cats, optics continues to surprise.

概要 We extend the Lie algebra decoupling framework for first order evolution equations from separable Hilbert spaces to reflexive Banach spaces with a countable Schauder basis, considering equations. Leveraging the reflexivity property, which ensures well defined adjoints and weak compactness, we establish resonant conditions using adjoint representations and prove the solvability of the homological equation under nonresonance assumptions, yielding normal forms that eliminate nonresonant quadratic terms. This generalization addresses domain issues in nonHilbert settings, and extends to higher order normal forms with convergence in Gevrey classes via involutive PDE theory and the Cartan Kähler theorem, mitigating small divisors through spectral gaps.

概要 Paper 1 explores spin-polarized quantum many-body hysteresis in MOF/TI hybrids, using a QFT model coupling Klein–Gordon scalar (MOF vibrations) and Dirac spinor (TI electrons) fields via Yukawa interaction g psi-bar psi phi. RG analysis at one-loop shows infrared freedom for perturbative catalysis, predicting 20-30

Paper 2 presents a Yukawa-coupled Klein–Gordon–Dirac framework for Rashba SOI in GeSn alloys, noting low hole mass (0.061 m0), high g-factor (up to 15), and 0.462 meV spin-splitting, positioning GeSn for spintronics, quantum computing, and optoelectronics.

15:30〜16:30　特別講演

高 津 飛 鳥 (東 大 数 理)♭ 確率測度のなす空間にどのような幾何構造をいれるか

Asuka Takatsu (Univ. of Tokyo) How do we choose a geometry on the space of probability measures?

概要 Wasserstein geometry and Information geometry are the geometry on the space of probability measures, and their aspects are different from each other. Roughly speaking, Wasserstein geometry is an extrinsic metric geometry which inherits the geometry of an underlying space. In contrast, Information geometry is an intrinsic geometry of a Riemannian metric together with connections which takes into account only the properties of probability measures. In this talk, I will describe both geometries and refer to their differences.

トポロジー

3月23日(月)　第Ⅲ会場

9:30〜11:15

1 好川智也 (岡山大環境生命)　非有向 Lefschetz ファイバー空間の向き付け二重被覆について ····· 15
Tomoya Yoshikawa (Okayama Univ.)　Orientation double covers of non-orientable Lefschetz fibrations

概要 In this talk, we consider the composition of the standard orientation double covering map and a non-orientable Lefschetz fibration. As an application, we introduce three transformations with respect to monodromy factorizations of non-orientable Lefschetz fibrations which do not change their isomorphism classes, using a similar result given by Kas and Matsumoto.

2 濵田法行 (九大IMI)　Lefschetz fibrations with arbitrary signature ····· 15
R. İ. Baykur (UMass Amherst)
Noriyuki Hamada (Kyushu Univ.)　Lefschetz fibrations with arbitrary signature
R. İnanç Baykur (UMass Amherst)

概要 We develop techniques to construct explicit symplectic Lefschetz fibrations over the 2-sphere with any prescribed signature and any spin type when the signature is divisible by 16. This solves a long-standing conjecture on the existence of such fibrations with positive signature. As applications, we produce symplectic 4-manifolds that are homeomorphic but not diffeomorphic to connected sums of $S^2 \times S^2$, with the smallest topology known at the time of the work, as well as larger examples as symplectic Lefschetz fibrations.

3 濵田法行 (九大IMI)　Exotic 4-manifolds with signature zero ····· 15
R. İ. Baykur (UMass Amherst)
Noriyuki Hamada (Kyushu Univ.)　Exotic 4-manifolds with signature zero
R. İnanç Baykur (UMass Amherst)

概要 We produce infinitely many distinct irreducible smooth 4-manifolds homeomorphic to $\#_{2m+1}(\mathbb{CP}^2\#\overline{\mathbb{CP}^2})$ and $\#_{2n+1}(S^2 \times S^2)$, respectively, for each $m \geq 4$ and $n \geq 5$. These provide the smallest exotic closed simply connected 4-manifolds with signature zero known to date, and in each one of these homeomorphism classes, we get minimal symplectic 4-manifolds. Our novel exotic 4-manifolds are derived from fairly special small Lefschetz fibrations we build via positive factorizations in the mapping class group, with spin and non-spin monodromies.

4 磯島　司 (慶大自然科学研究教育センター)　Trisection と $(-n)$-section を持つ Lefschetz fibration ····· 15
薮口怜央 (岡山大環境生命)
Tsukasa Isoshima (Keio Univ.)　Trisections and Lefschetz fibrations with $(-n)$-sections
Reo Yabuguchi (Okayama Univ.)

概要 A trisection introduced by Gay and Kirby is roughly speaking a decomposition of a 4-manifold into three 4-dimensional 1-handlebodies. In 2019, for a closed 4-manifold X that admits a Lefschetz fibration over S^2 with a (-1)-section, Castro and Ozbagci explicitly constructed a trisection of X from a monodromy of the Lefschetz fibration. In this talk, for a closed 4-manifold X that admits a Lefschetz fibration over S^2 with a $(-n)$-section, where n is any integer, we explicitly construct a trisection of $X\#n\mathbb{C}P^2$ by using a method similar to that of Castro and Ozbagci. This talk is based on a joint work with Reo Yabuguchi (Okayama University).

5 山田裕一 (電通大情報理工) Seifert manifolds in 4-manifolds constructed by pairs of surgeries along torus knots ····· 10
丹下基生 (筑波大数理物質)
Yuichi Yamada (Univ. of Electro-Comm.) Seifert manifolds in 4-manifolds constructed by pairs of surgeries along torus knots
Motoo Tange (Univ. of Tsukuba)

概要 We study pairs of integer and rational positive Dehn surgeries along torus knots whose results are orientation-reversing homeomorphic Seifert manifolds. We have found that such pairs satisfy a simple summarized presentation with three integers. We study closed 4-manifolds constructed from such pairs of surgeries, by using framed links.

6 丹下基生 (筑波大数理物質) Cork equivalences ····· 10
Motoo Tange (Univ. of Tsukuba) Cork equivalences

概要 We define equivalences on the sets of the smooth structures of a 4-manifold by using cork. These quotient sets produce a sequence. On the other hand, $S^2 \times S^2$-connected sum produces a similar sequence. These sequences are related by well-defined maps. By the corollary of this observation, we show a pair of 4-manifolds that are not related by a sequence of cork twists obtained by switching one 1-handle and one 0-framed 2-handle.

14:15〜15:15

7 鈴木龍正 (明大研究・知財) プレッツェル結び目 $P(4,-3,5)$ は squeezed ではない ····· 15
飯田暢生 (東京女大現代教養)
Tatsumasa Suzuki (Meiji Univ.) The pretzel knot $P(4,-3,5)$ is not squeezed
Nobuo Iida (Tokyo Woman's Christian Univ.)

概要 We prove that an infinite family of three-strand pretzel knots is not squeezed. In particular, we show that $P(4,-3,5)$ is not squeezed. This answers a question posed by Lewark in 2022. Our proof is obtained by comparing the Rasmussen invariant with the q_M-invariant introduced by Nobuo Iida and Masaki Taniguchi.

8 市原一裕 (日大文理) Euclidean lengths and the Culler–Shalen norms of slopes ····· 10
Kazuhiro Ichihara (Nihon Univ.) Euclidean lengths and the Culler–Shalen norms of slopes

概要 In the study of exceptional Dehn fillings, two functions on slopes, called the Euclidean length on a horotorus and the Culler–Shalen norm, play important roles. In this talk, I investigate their relationship and establish two inequalities between them. As a byproduct, some bounds on the boundary slope diameter are given.

9 吉田建一 (広島大SKCM2) 織物の双曲性について ····· 15
Ken'ichi Yoshida (Hiroshima Univ.) On hyperbolicity of weaves

概要 We consider a class of links in the thikened torus, called weaves, which consist of components projected to geodesics in the vertical and horizontal directions on the torus. In this presentation, we characterize isotopy classes and hyperbolicity of weaves.

15:30〜16:30　特別講演

村 上 友 哉 (理化学研iTHEMS)　Quantum modularity for quantum invariants

Yuya Murakami　(RIKEN)　Quantum modularity for quantum invariants

概要 Quantum invariants are invariants of knots and 3-manifolds which relate deeply to mathematical physics and representation theory. In recent years, it has become increasingly clear that it is also deeply related to number theory, that is, quantum modularity for quantum invariants. This topic is interesting from a topological viewpoint since this is a refinement of establishing asymptotic expansions of quantum invariants, which is an important problem in quantum topology, and is interesting from a number-theoretic viewpoint since this gives examples of quantum modular forms, which are mysterious objects in number theory.

I have studied quantum modularity for quantum invariants. I obtained two linked results on topology and number theory: Establishing explicit asymptotic expansions of the Witten–Reshetikhin–Turaev invariants for negative definite plumbed 3-manifolds and establishing quantum modularity of false theta functions in full generality. Previous progress covers Seifert homology 3-spheres for the former and rank-one cases for the latter, both of which relied on single-variable integral representations. I address this limitation by developing two techniques: a Poisson summation formula with signature and a framework of modular series, both of which enable a precise and explicit analysis of multivariable integral representations.

In this talk, I will outline previous progress on quantum modularity for quantum invariants and my results.

3月24日(火)　第Ⅲ会場

9:30〜11:00

Yoshihito Ogasawara
(Shibaura Inst. of Tech./Miyoshigokinkogyo Co. Ltd.)　Topology as Language of epistemology

概要 Science uses mathematics as its language, and this study aims to describe epistemology topologically. Here, topology is used as a language for describing not only the concept of form, but also the form of concepts (the concepts of concepts), for the purpose of the description of "our way of seeing things" itself. In addition, a phenomenological and existentialist worldview is adopted with the aid of the concept of Primitive Chaos, instead of the conventional objective worldview that is given a priori. Then, this study struggles to construct a new science, an existentialist science, or to make science existential.

Yuto Nakajima (Doshisha Univ.)　On the topology of the limit set of non-autonomous IFS
Takayuki Watanabe (Chubu Univ.)

概要 Fractals are ubiquitous in nature, and since Mandelbrot's seminal insight into their structure, there has been growing interest in them. While the topological properties of the limit sets of IFSs have been studied—notably in the pioneering work of Hata—many aspects remain poorly understood, especially in the non-autonomous setting. In this talk, we present a homological framework which captures the structure of the limit set. We apply our novel abstract theory to the concrete analysis of the so-called fractal square, and provide an answer to a variant of Mandelbrot's percolation problem. This work offers new insights into the topology of fractals.

12 矢島幸信 (神奈川大工)　Perfect pre-images of aD-spaces ····· 15
平田康史 (神奈川大工)

Yukinobu Yajima (Kanagawa Univ.)　Perfect pre-images of aD-spaces
Yasushi Hirata (Kanagawa Univ.)

概要 A space X is *irreducible* if every open cover of X has a minimal open refinement. A space X is an *aD-space* if every closed subspace of X is irreducible. A continuous map $f : X \to Y$ is *perfect* if it is a closed map such that $f^{-1}(y)$ is compact for each $y \in Y$. We prove that Every perfect pre-image of a countably metacompact aD-space is also an aD-space.

13 富澤俊太朗 (東大数理)　Heterodimensional cycles derived from homoclinic tangencies via Hopf bifurcations ····· 15

Shuntaro Tomizawa (Univ. of Tokyo)　Heterodimensional cycles derived from homoclinic tangencies via Hopf bifurcations

概要 We analyze three-dimensional C^r diffeomorphisms ($r \geq 5$) exhibiting a quadratic focus-saddle homoclinic tangency whose multipliers satisfy $|\lambda\gamma| = 1$. For a proper unfolding family with three-parameters that split the tangency, vary the argument of the stable multipliers, and control the modulus $|\lambda\gamma|$, we show that a Hopf bifurcation occurs on this curve and that a homoclinic point to the bifurcating periodic orbit is present. As a consequence, the original map f can be C^r-approximated by a diffeomorphism exhibiting a coindex one heterodimensional cycle in the saddle case.

14 今井　淳 (千葉大理)　q-スペクトルによるジェネリック有限距離空間の識別 ····· 15

Jun O'Hara (Chiba Univ.)　Identification of generic finite metric spaces by q-spectra

概要 We introduce q-spectra of finite metric spaces by generalizing eigenvalues of adjacency matrices to functions of q, and show that they can identify "generic" finite metric spaces.

3月25日(水)　第Ⅲ会場

9:30〜11:15

15 多寶雅樹 (東大数理)　Infinitely many tangent functors on diffeological spaces ····· 15

Masaki Taho (Univ. of Tokyo)　Infinitely many tangent functors on diffeological spaces

概要 We study tangent spaces in the setting of diffeological spaces. Several distinct tangent functors have been introduced, each of which extends the classical tangent functor from smooth manifolds. In this note, we construct infinitely many non-equivalent tangent functors on diffeological spaces. We compare our constructions with existing models, including the internal and external tangent spaces. Our results show that the choice of tangent functor is far from unique outside smooth manifolds.

16 田中康平 (信州大経法)　The fundamental category of a poset-stratified space ····· 15

Kohei Tanaka (Shinshu Univ.)　The fundamental category of a poset-stratified space

概要 The fundamental category of a directed space can be regarded as an analogue of the fundamental groupoid (or group) of an ordinary topological space. In this talk, we study the fundamental category of a space decomposed by a poset, where the direction is given by the partial order. We show that the fundamental category of a totally normal stellar complex is equivalent to its face category.

17 堀内 遼 (佛教大教育) 組合せスペクトラムの階層化 ····· 15
Ryo Horiuchi (Bukkyo Univ.) On the stratification of combinatorial spectra

概要 In this talk, I apply the construction of Kan's combinatorial spectra from simplicial sets to Verity's stratified simplicial sets, yielding objects called stratified combinatorial spectra. The first is known to model spectra, and the second is expected to model weak omega-categories. Accordingly, stratified combinatorial spectra is expected to model the stabilizations of weak omega-categories. Moreover, I provide a combinatorial construction that extends the smash product of combinatorial spectra to the stratified one.

18 森谷駿二 (会津大コンピュータ理工) Embedding calculus and Vassiliev spectral sequence ····· 15
Syunji Moriya (Univ. of Aizu) Embedding calculus and Vassiliev spectral sequence

概要 Vassiliev spectral sequence and Sinha spectral sequence are both related to cohomology of the space of long knots $\mathbb{R} \to \mathbb{R}^3$. Although they have different origins, the Vassiliev E_1-page and the Sinha E_2-page are isomorphic (up to a degree shift). In this talk, we prove that they have isomorphic E_∞-pages if the coefficient ring is a field. Together with degeneracy of the Sinha sequence, this implies that the Vassiliev sequence degenerates at E_1-page over $\mathbb{Q}$ including the non-diagonal part. Our result also implies that the space of finite type n knot invariants taking values in $\mathbb{F}_p$ or $\mathbb{Z}_{(p)}$ (modulo $n-1$ invariants) is isomorphic to the space of weight systems of weight n if $n \leq p+1$.

19 森谷駿二 (会津大コンピュータ理工) Sinha's spectral sequence for long knots in codimension one and non-formality of the little 2-disks operad ····· 15
Syunji Moriya (Univ. of Aizu) Sinha's spectral sequence for long knots in codimension one and non-formality of the little 2-disks operad

概要 We compute some differentials of Sinha's spectral sequence for cohomology of the space of long knots modulo immersions in codimension one over a field of characteristic 2 or 3. This spectral sequence is closely related to Vassiliev's spectral sequence for the space of long knots in codimension ≥ 2. We prove that the d_2-differential of an element is non-zero in characteristic 2, which has already essentially been proved by Salvatore, and the d_3-differential of another element is non-zero in characteristic 3. These results have some applications to non-formality of operads.

14:30〜16:15

20 北澤直樹 (阪公大数学研) 指定したレベルセットを有する 3 次元連結コンパクト多様体上の Morse–Bott 関数の構成 ····· 15
Naoki Kitazawa (Osaka Metro. Univ.) Construction of Morse–Bott functions on 3-dimensional compact and connected manifolds with prescribed level sets

概要 We discuss reconstruction of a Morse–Bott function on a 3-dimensional compact and connected manifold with prescribed level sets and exactly one critical value in the interior of the image. The Morse function case has been solved by the speaker in 2025 and the case of Morse(–Bott) functions on closed and connected surfaces has been solved by Michalak in 2018.

概要 We discuss a classification of Morse functions on S^3 or connected sums of copies of $S^2 \times S^1$ and len spaces components of level sets containing no critical point of which are disjoint unions of spheres and tori. This is regarded as a higher dimensional version of a classification of Morse functions on closed (orientable) surfaces by Michalak in 2018. We also improve Saeki's result in 2006, characterizing the class of these fundamental 3-dimensional manifolds by the existence of Morse functions of the mentioned class. Main ingredients are local reconstruction of local Morse functions and additional arguments on Reeb digraphs of the functions, defined as the spaces of all components of all level sets of the functions.

概要 We discuss reconstruction of real algebraic functions with prescribed Reeb digraphs. Related explicit problems have been studied and affirmatively solved in the differentiable (smooth) situations. The differentiable case is started by Sharko in 2006, followed by Masumoto–Saeki in 2010. There nice smooth functions on closed surfaces have been reconstructed and critical points are represented by some very elementary polynomials. Later, in 2018, Michalak has considered reconstruction of Morse functions with prescribed Reeb digraphs, for example. The real algebraic case is essentially started by the speaker.

概要 Singularities of map-germs are classified by codimension, that is, in order of how frequently they occur. The singularities that are next most common after the most generic ones are precisely those that appear or disappear in one-parameter deformations of a map. Therefore, in this talk we will investigate the geometric properties of singularities, including the behavior that arises through their deformations.

概要 Khovanov introduced a bigraded cohomology theory for links, whose graded Euler characteristic recovers the Jones polynomial. Analogous constructions have been developed in other areas of mathematics, such as graph theory and hyperplane arrangements. The central concept of this talk is the matroid, a structure that captures the notion of abstract dependency, encompassing both cycles in graphs and linear dependence in vector spaces. In particular, we construct cohomology groups whose graded Euler characteristic gives the characteristic polynomial of a matroid, thereby generalizing the chromatic cohomology of graphs and the characteristic cohomology of hyperplane arrangements. This talk is based on a joint work with Takuya Saito.

25 寄崎恵美子 (都立大理)　The realization spaces of certain conic-line arrangements of degree 7 · · 15
坂内真三 (岡山理大理)
徳永浩雄 (都立大理)

Emiko Yorisaki (Tokyo Metro. Univ.)　The realization spaces of certain conic-line arrangements of degree 7
Shinzo Bannai (Okayama Univ. of Sci.)
Hiro-o Tokunaga (Tokyo Metro. Univ.)

概要 We study the embedded topology of certain conic-line arrangements of degree 7. Two new examples of Zariski pairs are given. Furthermore, we determine the number of connected components of the realization spaces of the conic-line arrangements with prescribed combinatorics. We also calculate the fundamental groups using `SageMath` and the package `Sirocco` in the appendix.

16:30〜17:30　特別講演

F. Schaffhauser (Heidelberg Univ.)　Moduli of vector bundles over real algebraic curves

Florent Schaffhauser (Heidelberg Univ.)　Moduli of vector bundles over real algebraic curves

概要 Moduli spaces of vector bundles over algebraic curves have been studied extensively since the foundational results of Mumford, Narasimhan, Seshadri, and Newstead in the 1960s. Thanks to the properties of the Harder–Narasimhan stratification uncovered by Desale, Ramanan. Shatz, Atiyah and Bott, it turns out that the topology of these spaces is quite tractable. Over the complex numbers, in particular, the gauge-theoretic approach of Atiyah and Bott gives a recursive formula for the Betti numbers, as well as explicit generators of the cohomology ring. In joint work with Melissa Liu, we have been interested in extending the Atiyah–Bott method to the case when the base algebraic curve is defined over the field of real numbers. Additional topological invariants are necessary to distinguish the various connected components of the moduli space of real vector bundles, but we can compute the mod 2 cohomology of these components in an explicit way as well. In this talk, I will briefly review the analogy between the complex and real case, and explain how to construct generators of the mod 2 cohomology algebra of moduli spaces of real vector bundles.

3月26日(木)　第Ⅲ会場

9:30〜11:00

26 河澄響矢 (東大数理)　曲面の $\mathbb{K}$-framing と spin 構造に関わる Johnson lifting の非可換化 · · · 15

Nariya Kawazumi (Univ. of Tokyo)　A noncommutative Johnson lifting related to $\mathbb{K}$-framings and spin structures on surfaces

概要 We introduce a notion of $\mathbb{K}$-framings on a surface for any unital commutative ring $\mathbb{K}$ and a noncommutative generalization of the Johnson lifting for spin structures. These notions clarifies the Earle cohomology class of the mapping class group with coefficients in the first cohomology group of the surface. Moreover we can define a canonical $\mathbb{K}$-framing associated with any symplectic expansion for a compact surface with one boundary component.

27　和 久 田 葵 (東 大 数 理)　TWG 括弧積を用いた向きづけ可能曲面上のループの分離判定法 ····· 15

Aoi Wakuda (Univ. of Tokyo)　Separability criteria of loops on orientable surfaces via the TWG bracket

概要 We provide algebraic criteria based on the TWG (Thurston–Wolpert–Goldman) bracket to determine whether two unoriented free homotopy classes of loops on an oriented surface have disjoint representatives. These criteria are analogous to those established in our previous work for the Goldman bracket, which deals with oriented free homotopy classes. As an application, we determine the center of the TWG Lie algebra of a pair of pants. We extend the method of Kabiraj, which was originally limited to oriented surfaces filled by simple closed geodesics with respect to a complete hyperbolic metric, and show that in this case, the center is generated by the class of loops homotopic to a point, and the classes of loops winding multiple times around a single puncture or boundary component.

28　逆 井 卓 也 (東 大 数 理)　On the dihedral invariant Lie subalgebra of the derivation Lie algebra of the free associative algebra ····· 10

Takuya Sakasai (Univ. of Tokyo)　On the dihedral invariant Lie subalgebra of the derivation Lie algebra of the free associative algebra

概要 We study a structure of the dihedral invariant Lie subalgebra of the derivation Lie algebra of the free associative algebra. This Lie algebra arose in a series of works by Kawazumi and Kuno on the Goldman–Turaev Lie bialgebra. We discuss the first and second homology groups of the dihedral invariant Lie subalgebra up to weight 6.

29　谷 口 東 曜 (東 大 数 理)　高種数での Drinfeld associator と柏原–Vergne associator の関係 ····· 15

Toyo Taniguchi (Univ. of Tokyo)　Drinfeld associators and Kashiwara–Vergne associators in higher genera

概要 A Drinfeld associator is a certain Lie series deeply related to braids on a disk, which is a genus 0 surface. On the other hand, a solution to the Kashiwara–Vergne (KV) problem, originated from Lie theory, corresponds to a solution of the formality problem of the Goldman–Turaev Lie bialgebra associated with a pair-of-pants by the result of Alekseev, Kawazumi, Kuno and Neaf. These objects are first related by Alekseev and Torossian, and Massuyeau constructed an explicit map from the set of Drinfeld associators to the solution set of the KV problem. In this talk, we extend their method to higher genera to obtain a similar map based on Gonzalez' definition of higher genus Drinfeld associators.

30　佐 藤 正 寿 (東京電機大未来)　On the 2-loop part of the Johnson cokernel ····· 15
久 野 雄 介 (津田塾大学芸)

Masatoshi Sato (Tokyo Denki Univ.)　On the 2-loop part of the Johnson cokernel
Yusuke Kuno (Tsuda Coll.)

概要 I will discuss our recent work on the structure of the Johnson cokernel, which is the quotient of the symplectic derivation Lie algebra on the free Lie algebra by the image of the Johnson homomorphism. Continuing the work of Conant in 2016, which identified the 1-loop part of the Johnson cokernel as the Enomoto–Satoh obstruction, we study the 2-loop part. We give an explicit presentation of the 2-loop space and show that, in degree 6, the 2-loop trace map captures all the components of the Johnson cokernel that cannot be detected by the Enomoto–Satoh trace.

14:15〜16:45

31 佐藤　進 (神戸大理)　ロング仮想結び目の $v_{2,1}$-不変量と $v_{2,2}$-不変量の多項式的拡張 ····· 10
和田康載 (神戸大理)

Shin Satoh (Kobe Univ.)　Polynomial generalization of the $v_{2,1}$- and $v_{2,2}$-invariants for long virtual knots
Kodai Wada (Kobe Univ.)

概要 Goussarov, Polyak, and Viro introduced two degree-two finite-type invariants $v_{2,1}(K)$ and $v_{2,2}(K)$ for long virtual knots K. In this talk, we extend these invariants to polynomial invariants $V_{2,1}(K;t)$ and $V_{2,2}(K;t)$ of K, satisfying $V_{2,1}(K;1) = v_{2,1}(K)$ and $V_{2,2}(K;1) = v_{2,2}(K)$. We show that they are not finite-type invariants of any degree with respect to virtualizations, but are of degree two with respect to crossing changes. Moreover, any pair of Laurent polynomials can be realized as $(V_{2,1}(K;t), V_{2,2}(K;t))$ for some long virtual knot.

32 鎌田直子 (名古屋市大理)　溶接結び目の 2 重化について ····· 10
鎌田聖一 (阪大理)

Naoko Kamada (Nagoya City Univ.)　Doubling of welded knots
Seiichi Kamada (Univ. of Osaka)

概要 A welded link is an equivalence class of link diagrams possibly with virtual crossings. The equivalence is generated by Reidemeister moves and some additional moves involving virtual crossings. We introduce a method constructing a welded link diagram from a given diagram such that if two original diagrams are equivalent then the diagrams obtained the method are equivalent.

33 志摩亜希子 (東海大理)　3 つの crossing を含む linear 4-chart について ····· 15
永瀬輝男 (東海大*)

Akiko Shima (Tokai Univ.)　Linear 4-charts with three crossings
Teruo Nagase (Tokai Univ.*)

概要 A chart represents an oriented closed surface embedded in 4-space. In this paper, we investigate embedded surfaces in 4-space by using charts.
Let Γ be a chart, and we denote by $Cross(\Gamma)$ the set of all the crossings of Γ, and we denote by Γ_m the union of all the edges of label m. For a 4-chart Γ, if the closure of each connected component of the set $(\Gamma_1 \cup \Gamma_3) - Cross(\Gamma)$ is acyclic, then Γ is said to be *linear*. In this talk, we shall show that any linear minimal 4-chart with three crossings is lor-equivalent (Label-Orientation-Reflection equivalent) to the chart describing a 2-twist spun trefoil knot by omitting free edges and hoops.

34 安田順平 (阪公大理)　Suciu のリボン結び目の結び目カンドルについて ····· 10

Jumpei Yasuda (Osaka Metro. Univ.)　On knot quandles of Suciu's ribbon knots

概要 The knot group of an n-knot is the fundamental group of the complement of the n-knot. In 1983, Suciu constructed infinite many ribbon n-knots with isomorphic knot groups. In this talk, we consider knot quandles of Suciu's ribbon n-knots and prove that their knot quandles are mutually non-isomorphic. Furthermore, we compute types of these quandles.

35 田中　心 (東京学大教育)　Suciu の n 次元結び目のモノドロミーについて ····· 10
逆井卓也 (東大数理)

Kokoro Tanaka (Tokyo Gakugei Univ.)　On the monodromies of Suciu's n-knots
Takuya Sakasai (Univ. of Tokyo)

概要 Suciu constructed an infinite family of fibered ribbon n-knots sharing the same knot group. Jabłonowski proved that their knot quandles are pairwise non-isomorphic, and Yasuda later provided an alternative proof. In this talk, we present yet another proof of this result by analyzing the monodromies of Suciu's n-knots, which are certain automorphisms of the free group of rank two.

概要 Let p be an odd prime. Using Mochizuki's 3-cocycle, a cocycle invariant of a shadow p-colored diagram of an unoriented link is obtained, which is independent from choice of its region p-coloring. In this talk, we introduce skein relations of the cocycle invariant for p-colored link, based on p-moves and splices, and give its recursive computation of $p = 3$ case through the skein relations.

概要 A quandle is an algebraic structure characterized by idempotence, existence of inverses, and (right) self-distributivity. It was originally introduced in the study of knot invariants and also has deep connections with symmetric spaces. In recent years, the study of quandle embeddings, particularly those into conjugation quandles associated with group actions, has received much attention. In this talk, we begin with the embeddings of spherical quindles into (S)Pin groups established by Eisermann and Yonemura, and then present a generalized framework for constructing embeddings of homogeneous quandles. As examples, we discuss embeddings of Grassmann manifold quandles and a family of spherical quandles equipped with rotation parameters.

概要 Using the forbidden moves from virtual knot theory, the Gauss diagram of an oriented classical or virtual link determines a quiver which is invariant under ambient isotopy, virtual isotopy and link homotopy. From this quiver we extract new polynomial link invariants. This is joint work with Stella Shah.

概要 Introduced in our previous research, biquandle arrow weights invariants are enhancements of the biquandle counting invariant for oriented virtual and classical knots defined from biquandle-colored Gauss diagrams using a tensor over an abelian group satisfying certain properties. In this talk, we categorify the biquandle arrow weight polynomial invariant using biquandle coloring quivers, obtaining new infinite families of polynomial invariants of oriented virtual and classical knots.

Masaki Ogawa（Tohoku Univ.）　On Khovanov homology of link in $\mathbb{R}P^3$ and S^3

概要 Khovanov homology is a homology theory defined for a knot diagram, and it yields a knot invariant. Its background lies in the Jones polynomial: taking the Euler characteristic of Khovanov homology recovers the Jones polynomial. As a knot invariant, Khovanov homology is powerful—for example, it detects the unknot. At the same time, it can be viewed as a functor from the cobordism category of knots, and its applications extend far beyond knot classification, reaching into four-dimensional topology and other areas. Khovanov homology was originally defined for knots in S^3. Later, various extensions were developed for links in other 3–manifolds. In this work, we focus on the version defined for links in $\mathbb{R}P^3$ and on its relationship with the case of S^3.

無　限　可　積　分　系

3月25日(水)　　第VI会場

10:30〜11:45

1　赤　木　亮　太 (名大多元数理)　団代数の c, g ベクトルの実成分への拡張と Coxeter 図による有限型の分類 ····· 15

Ryota Akagi　(Nagoya Univ.)　Generalization of c-, g-vectors to real entries in cluster algebras and its finite type classification via Coxeter diagrams

概要 In cluster algebras, integer vectors called c-vectors and g-vectors are important tools to study their combinatorial structures. By following a certain procedure, we may generalize them to real entries. I studied the structure of real c-, g-vectors by assuming a certain condition called sign-coherence. Then, enriched structures in the ordinary cluster algebras are preserved, and we found some hopeful observations for this generalization. In this talk, I will explain these structures and finite type classification under sign-coherence. This is a joint work with Zhichao Chen in University of Science and Technology of China.

2　赤　木　亮　太 (名大多元数理)　ランク 3 団輪状行列に対応する実 c ベクトルの符号同一性とその具体的構造 ····· 15

Ryota Akagi　(Nagoya Univ.)　Sign coherence and its structure of real c-vectors associated with cluster-cyclic matrices of rank 3

概要 In the cluster algebras, sign-coherence of c-vectors is important assumption. In general, it is difficult to determine the signs of c-vectors. We introduced the recursion of their signs when an exchange matrix is cluster-cyclic of rank 3, and due to this recursion, we gave a new proof of sign-coherence in this class. In this talk, I will explain this recursion and the structure of their signs. This is a joint work with Zhichao Chen in University of Science and Technology of China.

3　村　上　絢　香 (お茶の水女大人間文化)
竹　村　剛　一 (お茶の水女大基幹)　q ホイン方程式とその q 積分変換について ····· 15

Ayaka Murakami (Ochanomizu Univ.)
Kouich Takemura (Ochanomizu Univ.)　q-Heun equation and its q-integral transformation

概要 Takemura showed that the q-Heun equation, which is a q-deformation of Heun's differential equation, has q-integral transformations related to the kernel function. We find new solutions of the q-Heun equation by combining polynomial-type solutions with the q-integral transformations.

4　朴　　佳　南 (鳥羽商船高専)　q-middle convolution と $E_6^{(1)}$ 型 q パンルヴェ方程式 ····· 15

Kanam Park
(Toba Nat. Coll. of Maritime Tech.)　A q-middle convolution and the q-Painlevé equation of type $E_6^{(1)}$

概要 The middle convolution was introduced by Katz and formulated by Dettweiler and Reiter as an operation on Fuchsian differential systems. A q-difference analogue of the middle convolution was introduced by Sakai and Yamaguchi. Sasaki, Takagi and Takemura showed that the transformation obtained by applying the q-middle convolution to the linear equations associated with the q-Painlevé equation can be expressed in terms of the affine Weyl-group symmetries of the q-Painlevé equations. In this talk, I will report that by applying the q-middle convolution introduced by Sakai and Yamaguchi to the 3×3 matrix linear q-difference equation associated with the q-Painlevé equation of type $E_6^{(1)}$.

14:15〜15:45

5 信川喬彦 (皇學館大教育)　$E_8^{(1)}$ 型 affine Weyl 群対称性をもつ 3 × 3 線形 q 差分方程式 ····· 15

Takahiko Nobukawa (Kogakkan Univ.)　A rank 3 linear q-difference equation with affine Weyl group symmetry of type $E_8^{(1)}$

概要 We give a linear q-difference equation of rank 3, which has the affine Weyl group symmetry of type $E_8^{(1)}$. The symmetry is presented by the q-middle convolution, introduced by Sakai–Yamaguchi and reformulated by Arai–Takemura. We also characterize the above equation by the spectral types of linear q-difference equations.

6 藤井大計 (神戸大理)　Grothendieck 多項式の主特殊化と q 超幾何級数 ····· 15
島崎達史 (神戸大理)

Taikei Fujii (Kobe Univ.)　On the connection between Grothendieck polynomials and q-hypergeometric series
Tatsushi Shimazaki (Kobe Univ.)

概要 The Grothendieck polynomial $G_\lambda(x|\beta)$ was introduced by Lascoux and Schützenberger in the context of enumerative geometry. Fujii, Simazaki, and Nobukawa clarified a connection between the specialization of the Grothendieck polynomial and the Gauss hypergeometric series as well as the Holman hypergeometric series. The latter is a multivariate hypergeometric series arising from representation theory and admits a summation formula. A q-analogue of this series was introduced by Milne.
In this talk, we discuss the relationship between the value of the Grothendieck polynomial under the principal specialization and the q-hypergeometric series developed by Heine and Milne.

7 上野祐一 (皇學館大教育)　高階 Painlevé 系の量子化 ····· 15

Yuichi Ueno (Kogakkan Univ.)　Quantization of higher order Painlevé systems

概要 In this talk, we introduce a quantization of higher order Painlevé systems. Using the holomorphic property, we determine the quantum Hamiltonians for higher order Painlevé systems. These results show the method of the holomorphic property is useful also in quantum situation.

8 大川領 (京大数理研)　Whittaker functions on affine Laumon spaces ····· 15
白石潤一 (東大数理)

Ryo Okawa (Kyoto Univ.)　Whittaker functions on affine Laumon spaces
Jun'ichi Shiraishi (Univ. of Tokyo)

概要 We derive the equations for the Whittaker functions defined by affine quantum groups using the Shapovalov form and the Drinfeld–Casimir.

9 A. Stokes (早大高等研)　モノドロミー曲面のモノドロミー ····· 15

Alexander Stokes (Waseda Univ.)　Monodromy of monodromy surfaces

概要 Painlevé equations are associated to complex algebraic surfaces in two different ways, which are related by biholomorphism under different instances of the Riemann–Hilbert correspondence. On the 'left-hand side' are Sakai surfaces, which provide Okamoto's initial value spaces, and on the 'right-hand side' are monodromy surfaces coming from associated linear problems. Symmetries of Sakai surfaces form extended affine Weyl groups and provide Bäcklund transformations of the Painlevé equations. However, under the Riemann–Hilbert correspondence the actions of the affine Weyl groups become trivial on monodromy surfaces. In this talk we explain that there is still a shadow of the extended affine Weyl group symmetry on the other side of the Riemann–Hilbert correspondence, which takes the form of the monodromy group of the monodromy surface itself. Based on joint work with Pieter Roffelsen.

16:00〜17:00　特別講演

安 達 駿 弥 (宇都宮大教育)　Katz 理論的積分変換をめぐって

Shunya Adachi (Utsunomiya Univ.)　On Katz theoretic integral transformations

概要 The theory of middle convolution, introduced by N. Katz, brought about groundbreaking developments in the study of Fuchsian ordinary differential equations. Middle convolution is an operation that is a refined formulation of the Euler transform (Riemann–Liouville transform). It sends one Fuchsian system to another and has many remarkable properties. While research on Fuchsian differential equations using middle convolution —such as global analysis of solutions, isomonodromic deformations, and the Deligne–Simpson problem— has achieved significant success, various attempts have also been made to extend middle convolution itself to differential equations beyond the Fuchsian case, such as linear differential equations with irregular singularities and linear Pfaffian systems in several variables, which have led to many important results. Recently, the speaker introduced a new transformation for linear Pfaffian systems, the middle Laplace transform, which is a refined formulation of the classical Laplace transform from the viewpoint of Katz theory. In this talk, we first give a brief overview of Katz theory and the related results mentioned above. We then explain the formulation and properties of the middle Laplace transform. Using this transformation, one can generalize middle convolution to linear Pfaffian systems with irregular singularities. If time permits, we will also discuss some applications to hypergeometric functions in several variables.

3月26日(木)　第VI会場

10:30〜11:45

10　中 園 信 孝 (東京農工大工)　Exact solutions to an autonomous dKdV equation via Painlevé-type ordinary difference equations ····· 15

Nobutaka Nakazono (Tokyo Univ. of Agri. and Tech.)　Exact solutions to an autonomous dKdV equation via Painlevé-type ordinary difference equations

概要 Hirota's discrete KdV equation is a well-known integrable two-dimensional partial difference equation regarded as a discrete analogue of the KdV equation. In this talk, we demonstrate that a variation of Hirota's discrete KdV equation with an additional parameter admits two types of exact solutions: discrete Painlevé transcendent solutions and periodic solutions described by Painlevé-type ordinary difference equations.

11　渋 川 元 樹 (北 見 工 大 工)　Little μ-function, the Rogers–Ramanujan continued fraction and Schur's q-Fibonacci numbers ····· 15
土 見 怜 史 (近畿大総合理工)

Genki Shibukawa (Kitami Inst. of Tech.)　Little μ-function, the Rogers–Ramanujan continued fraction and Schur's q-Fibonacci numbers

Satoshi Tsuchimi (Kindai Univ.)

概要 We present various formulas for specializations of the little μ-function, which is the degenerate limit of the generalized μ-function [ST]. These specializations satisfy the recurrence relation for the q-Fibonacci sequence, introduced by I. Schur [S], and we show that their initial values are expressed in terms of the theta functions.

12 宮 澤 壮 太 (防　衛　大)　$U_q(\widehat{\mathfrak{sl}}_2)$ の結晶基底のパス表示とヤング図形との新奇な対応について ··· 15
高 木 太 一 郎 (防　衛　大)

Sota Miyazawa
(Nat. Defense Acad. of Japan)
Taichiro Takagi
(Nat. Defense Acad. of Japan)

A novel correspondence between paths for a crystal base of $U_q(\widehat{\mathfrak{sl}}_2)$ and Young diagrams

概要 Through an expression for the branching functions of a level 1 irreducible highest weight module of affine Lie algebra $\widehat{\mathfrak{sl}}_2$, we find their connection to the theory of minimal odd excludant in integer partitions. A new partition statistic, which we call sqrank, determines a set of partitions that are equinumerous with another set of partitions determined by the minimal odd excludant. The main result of the present work is to show that there is a combinatorial one-to-one correspondence between the set of partitions of n with sqrank r and the set of highest weight paths for a $U_q(\widehat{\mathfrak{sl}}_2)$ crystal that is associated with $2r+1$-dimensional irreducible $\mathfrak{sl}_2$ modules of degree n in a weight decomposition of the above level 1 highest weight module of $\widehat{\mathfrak{sl}}_2$.

13 小 林 雅 人 (神 奈 川 大 工)　スケルトン RSK による結晶グラフの分解 ····· 15

Masato Kobayashi (Kanagawa Univ.)

Decompositions of crystal graphs by skeleton RSK

概要 An equivalence class under standardizaiton of a type A crystal graph is a quasi-crystal. This form its connected subgraph so that a crystal naturally splits into a union of those. We then introduce a new class of polynomials, crystal skeleton polynomials to better understand such decompositions. We came up with the idea, skeleton RSK, to describe it. In this talk, we will show more details of such topics.

14:15〜15:15　特別講演

岩 尾 慎 介 (慶　大　商)　周期 TASEP のベーテ方程式の解法と完全性の証明

Shinsuke Iwao (Keio Univ.)

Solving the Bethe equations for periodic TASEP and proving completeness

概要 The periodic TASEP (Totally Asymmetric Simple Exclusion Process) is a stochastic model in which a finite number of particles move in one direction in a one-dimensional periodic lattice. The eigenvectors and eigenvalues of the Markov matrix for the periodic TASEP can be obtained by solving the corresponding Bethe equations. Although many researchers have attempted to analyze the solutions to the Bethe equations, a satisfactory method for deriving a general solution has not been achieved. In this talk, I present an algebraic-curve-based method that provides all solutions of the TASEP. This talk is based on joint work with Kohei Motegi (Tokyo University of Marine Science and Technology).