

 日本数学会

2022年度秋季総合分科会

英 文 サ マ リ 集

2022年9月

於 北海道大学

2022 日本数学会

秋季総合分科会プログラム

期 日 2022年9月13日(火)～9月16日(金)

会 場 北海道大学高等教育推進機構
北海道札幌市北区北17条西8丁目

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一般社団法人 日本数学会

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13日 (火)	函数解析学 10:00～11:45	函数方程式論 9:45～12:00 14:15～16:45	統計数学 9:30～11:50	代 数 学 9:30～12:00 14:15～16:45	応用数学 10:00～11:45 14:15～15:25	幾 何 学 9:30～11:45 14:15～16:15	トポロジー 9:30～12:00 14:20～18:00	函 数 論 9:30～12:00 14:15～15:15	無限可積分系 9:30～12:00
	企画特別講演 13:00～14:00								
14日 (水)	特別講演 14:15～15:15	特別講演 17:00～18:00	特別講演 14:15～15:15 15:30～16:30	特別講演 17:00～18:00	特別講演 15:45～16:45	特別講演 16:30～17:30		特別講演 15:30～16:30	特別講演 14:15～15:15
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	特別講演 13:15～14:15	特別講演 13:30～14:30		特別講演 13:00～14:00		特別講演 10:30～11:30 13:15～14:15		特別講演 13:30～14:30	特別講演 11:00～12:00
	日本数学会賞授賞式 (高等教育推進機構 大講堂) (15:00～15:30)								
	総合講演 (") 日本数学会賞秋季賞受賞者 (15:50～16:50)								
	佐伯 修(九大IMI) (17:10～18:10)								
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	企画特別講演 13:00～14:00								
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総 合 講 演

9月14日(水) 総合講演会場

2022年度日本数学会賞秋季賞受賞講演

日本数学会賞秋季賞受賞者 (15:50~16:50)

Autumn Prize Winner

佐 伯 修 (九 大 I M I) ジェネリックな可微分写像の大域的特異点論 (17:10~18:10)

Osamu Saeki (Kyushu Univ.) Global singularity theory of generic differentiable maps

概要 One of the most popular methods to study the topological structure of a given differentiable manifold is to use Morse functions. Such functions can be regarded as generic differentiable maps into the real line. Then, what happens if we consider generic maps into general dimensional Euclidean spaces or manifolds? This might have been a motivation of Whitney or Thom around the middle of the 20th century for studying singularities of differentiable maps between manifolds. In this talk, following such an idea, the speaker will survey some studies of structures of manifolds by using generic differentiable maps, and some global studies of generic differentiable maps with singularities themselves, including recent developments.

企 画 特 別 講 演

9月13日(火)

第IV会場

梅 田 亨 (阪公大数学研) Capelli 恒等式の過去・現在・未来 (13:00~14:00)

Tôru Umeda (Osaka Metro. Univ.) The Capelli identities, past, present, and the future

概要 The Capelli identities have been useful tools in the classical invariant theory. A notable use, aside from the works by Capelli himself, is seen in the famous book by Hermann Weyl, *The Classical Groups*. But, their representation theoretic meaning were not so clear, and actually clarified, for example, by Roger Howe's paper "Remarks on Classical Invariant Theory". Also, some generalization were given by a paper by Howe-Umeda around 1990. Since then, many investigations came up in many directions.

I would like to explain, for general audience, the basic ideas to look at these identities, including the proofs. We have still some open problems relating them. I will give some hints to grasp those problems. Also, there are many interesting facts, especially in relation to hypergeometric series.

I am afraid that I could have time to explain all those things. I will pick up some charming side of Capelli identities as far as possible.

第VI会場

柳 原 宏 (山 口 大 工) 解析の普遍被覆写像に関するレブナー理論 (13:00~14:00)

Hiroshi Yanagihara (Yamaguchi Univ.) Loewner theory on analytic universal covering maps

概要 The classical Loewner theory deals with time evolution of univalent functions f_t in the unit disk \mathbb{D} . Therefore each image domain $\Omega_t := f_t(\mathbb{D})$ is necessarily simply connected, i.e., Ω_t has no holes. In this talk, instead of univalent functions, we consider evolution families of analytic universal covering maps, and generalize Loewner theory. In this case we show that the connectivity order of Ω_t (= the number of holes in Ω_t) is non decreasing in t .

総合講演会場

特別招待講演(台湾数学会)

Jungkai Chen (国立台湾大) Explicit birational geometry of threefolds, after Mori, Kawamata and Kawakita (13:00~14:00)

Jungkai Chen (Nat. Taiwan Univ.) Explicit birational geometry of threefolds, after Mori, Kawamata and Kawakita

概要 One of the highlights of modern algebraic geometry is the minimal model program in dimension three, thanks to the work of Mori, Kawamata, Kollar, Reid, Shokurov, and many others. After that, there are then many more works to understand 3fold MMP explicitly. Other than above-mentioned mathematicians, main contributors along this direction includes Hayakawa, Kawakita, Tziolas, and Prokhorov. In this talk, we will present some results and expectations in understanding and classifying birational maps in 3fold MMP. Particularly, we will explain ideas toward the classification of divisorial contractions to curves. If time permits, we will also demonstrate some geometric applications.

9月15日(木)

第IV会場

小 澤 徹 (早 大 理 工) 非線型分散方程式に関する修正エネルギー法 (13:00~14:00)

Tohru Ozawa (Waseda Univ.) Modified Energy Method for Nonlinear Dispersive Equations

概要 We introduce the modified energy method for the proof of the existence of strong solutions to the Cauchy problem for nonlinear dispersive equations such as nonlinear Schrödinger equations, coupled Klein-Gordon-Schrödinger equations, and the Zakharov system.

第VI会場

青嶋 誠 (筑波大数理物質) 高次元現象の統計数理 (13:00~14:00)
 Makoto Aoshima (Univ. of Tsukuba) Statistical mathematics for high-dimensional phenomena

概要 The theory of conventional statistics does not hold for high-dimensional data such as genomes. When the number of dimensions exceeds the number of samples, various high-dimensional phenomena appear as a curse of dimensionality, which hinders the establishment of the theory. Our research group pioneered the theory and methodology of high-dimensional statistical analysis and developed statistical mathematics for high-dimensional phenomena. In this talk, we explain various high-dimensional phenomena and introduce statistical mathematics to deal with high-dimensional data at high speed and with high accuracy even for small samples of only a few tens. As practical examples, we give analysis examples of next-generation sequencing data with millions of dimensions and the latest high-dimensional data in space physics and advanced materials. Papers and analysis tools related to this talk are available from the following site: <https://www.math.tsukuba.ac.jp/aoshima-lab/jp/>

9月16日(金)

第IV会場

田中 公 (東大数理) 極小モデル理論について (13:00~14:00)
 Hiromu Tanaka (Univ. of Tokyo) On minimal model program

概要 Minimal model program is classification theory of algebraic varieties. It is based on the theory of algebraic surfaces established in the early 20th century. The 3-dimensional minimal model program was completed in the 1980s, however its main conjecture for the general case still remains to be an open problem. In this talk, we overview the current status of the minimal model program.

第VI会場

本田 公 (UCLA) Contact structures, convex hypersurfaces, and open book decompositions (13:00~14:00)
 Ko Honda (UCLA) Contact structures, convex hypersurfaces, and open book decompositions

概要 Contact structures, alongside symplectic structures (their even-dimensional siblings), play a central role in modern geometry and have many connections to dynamical systems, low-dimensional topology, representation theory, algebraic geometry, and mathematical physics.

This talk is concerned with the fundamental question of how to decompose contact manifolds, especially in higher dimensions, into smaller, easier-to-understand pieces. The key result — a highly nontrivial one — is to perturb a given hypersurface in a contact manifold into a nice hypersurface called a "convex" hypersurface. (This was already possible for contact 3-manifolds and was successfully applied to many classifications problems.) We also explain the relationship to open book decompositions as articulated by Emmanuel Giroux about 20 years ago. This is joint work with Yang Huang and also with Joseph Breen.

数 学 基 礎 論 お よ び 歴 史

9月15日(木) 第IX会場

10:35~12:00

- 1 只木孝太郎 (中 部 大 工) アルゴリズム的ランダムネスによる量子情報理論の精密化 VI 15
 Kohtaro Tadaki (Chubu Univ.) A refinement of quantum information theory by algorithmic randomness
 VI

概要 The notion of probability plays a crucial role in quantum mechanics. It appears as the Born rule. In modern mathematics which describes quantum mechanics, however, probability theory means nothing other than measure theory, and therefore any operational characterization of the notion of probability is still missing in quantum mechanics. In our former works, based on the toolkit of algorithmic randomness, we presented an 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. In this talk, we refine and reformulate the Holevo–Schumacher–Westmoreland theorem based on the principle of typicality, in order to demonstrate how properly our framework works in practical problems in quantum mechanics.

- 2 宮部賢志 (明 大 理 工) 実閉体を成す弱計算可能実数の部分族 15
 Kenshi Miyabe (Meiji Univ.) Subclasses of weakly computable reals that form real closed fields

概要 We give some examples of subclasses of weakly computable reals that form real closed fields. Some known examples are the class of computable reals, that of weakly computable reals, and that of non-random weakly computable reals. We extend these results by introducing strong Solovay reducibility.

- 3 池田宏一郎 (法 政 大 経 営) On regular generic structures 15
 Koichiro Ikeda (Hosei Univ.) On regular generic structures

概要 A generic structure M is said to be regular, if whenever A is a finite set of M and $a \in M$, then $a \in acl(A)$ implies $d(a/A) = 0$. Known generic structures are regular, and we do not have any example of non-regular generic structures. In this talk, we want to explain that various properties of generic structures can be simply expressed in regular generic structures, and that known examples of generic structures are usually regular.

- 4 桔梗宏孝 (神戸大システム情報) log風関数で定義されるジェネリック構造について 15
 Hirotaka Kikyo (Kobe Univ.) On generic structures defined by log-like functions

概要 Hrushovski introduced log-like functions in his 1988 paper to refute a conjecture by Lachlan. He defined classes \mathbf{K}_f depending on log-like functions f defined using some approximation of some real number. The class $(\mathbf{K}_f, <)$ has the free amalgamation property and the one point graph is closed in any non-empty graph belonging to \mathbf{K}_f for the original f . We can modify the definition of the log-like functions in the way that the classes have the free amalgamation property while the one point graph may not be closed in other graphs in the class. Still, the generic structures of the class will have model complete theories if f is unbounded, and the automorphism group of the generic structure will be simple if the real number used to define f is a rational number.

- 5 坪井明人 (筑波大*) Some comments on the difference between forking and dividing 10
Akito Tsuboi (Univ. of Tsukuba*) Some comments on the difference between forking and dividing

概要 The two notions dividing and forking are important in model theory, especially in stability theory. By definition, dividing is clearly a stronger condition than forking. But Shelah has shown that they are the same in stable theories. Kim and Pillay showed the equivalence in the case of simple theories. Of course, there are some examples that show the difference. One of the best known has the strict order property. However, this example is not satisfactory, because a simple theory does not have the strict order property. We give a (possibly) new example, which may be of interest.

14:15~14:30 数学基礎論および歴史分科会総会

14:45~16:15

- 6 津久浦健太 (筑波大数理物質) Huge cardinal and Prikry forcing 15
Kenta Tsukura (Univ. of Tsukuba) Huge cardinal and Prikry forcing

概要 The models of many kinds of saturated ideals over the successor of regular cardinals are known and have been used to solve some questions for combinatorics on the successors of regular cardinals, for example, polarized partition relations, reflection principle for graph chromatic number, and Chang's conjecture. Our interest is accomplishing these on the successors of singular cardinals. Using a huge cardinal, we can obtain some models in which the successor of large cardinals carries a saturated ideal and satisfies some of the combinatorial properties. Then we can define Prikry forcing, which is a forcing that changes a large cardinal into a singular cardinal. In this talk, we see that Prikry forcing preserves the centeredness of ideals but kills the layeredness. We also investigate some of the polarized partition relations and the reflection principle for graph chromatic number after Prikry forcing.

- 7 後藤達哉 (神戸大システム情報) 測度 0 集合の和集合に関する Goldstern の原理 15
Tatsuya Goto (Kobe Univ.) Goldstern's principle about unions of measure 0 sets

概要 In his 1993 paper, Martin Goldstern showed that the union of a family of Lebesgue measure zero sets that is parametrized by ω^ω and is increasing has also Lebesgue measure zero provided that the sets are uniformly analytic. Our aim is to study to what extent we can drop the analytic assumption. We show that Goldstern's principle for the pointclass of all subsets is independent from ZFC. Also we prove that Goldstern's principle for the pointclass of all subsets holds both under ZF + AD and in Solovay models.

- 8 D. A. Mejía (静岡大理) 強測度ゼロ集合のイデアルに関連する基数不変量 15
Diego A. Mejía (Shizuoka Univ.) Cardinal characteristics associated with the ideal of strong measure zero sets

概要 We prove new results about the combinatorics of strong measure zero sets of reals, particularly under hypothesis involving cardinal characteristics. Expanding results of Yorioka (2002) and Cardona (2022), we show that $\text{cov}(\mathcal{M}) = \mathfrak{d} = \lambda$ implies $\text{cof}(\mathcal{SN}) > \lambda$ where \mathcal{SN} denotes the strong measure zero ideal. Moreover, under further assumptions with λ regular, we guarantee that $\text{cof}(\mathcal{SN}) > \mathfrak{d}_\lambda$.

We use this result to force in ZFC that the four cardinal characteristics (additivity, covering, uniformity and cofinality) associated with \mathcal{SN} are pairwise different. Previous recent work with Cardona and Rivera-Madrid proves partial results, but it was unknown how to force the additivity smaller than everything else. We now overcome this obstacle by using forcings with finitely additive measures. This is a joint work with Jörg Brendle and Miguel Cardona.

- 9 宮内 凛 (早大理工) The continuum function on the countable unions of countable sets ... 15
 薄葉季路 (早大理工)
 Rin Miyauchi (Waseda Univ.) The continuum function on the countable unions of countable sets
 Toshimichi Usuba (Waseda Univ.)

概要 We construct a model of ZF in which the following hold: 1. For every cardinal \aleph_α , there is a countable union of countable sets $\bigcup_n A_n$ and a surjection from $P(\bigcup_n A_n)$ onto \aleph_α , and 2. There is a set X such that for every countable union of countable sets $\bigcup_n A_n$, there is no surjection from $P(\bigcup_n A_n)$ onto X .

- 10 池上大祐 (芝浦工大工) Preservation of AD via forcings 15
 Daisuke Ikegami
 (Shibaura Inst. of Tech.) Preservation of AD via forcings

概要 It is well-known that forcings preserve ZFC, i.e., any set generic extension of any model of ZFC is again a model of ZFC. How about the Axiom of Determinacy (AD) under ZF? It is not difficult to see that Cohen forcing always destroys AD, i.e., any set generic extension of a model of ZF+AD via Cohen forcing is not a model of AD. Actually it is open whether there is a forcing which adds a new real while preserving AD.

In this talk, we present several results on preservation and non-preservation of AD via forcings. This is joint work with Nam Trang.

16:30~17:30 特別講演

- 河井達治 (北陸先端大情報) Real numbers from a point-free perspective
 Tatsuji Kawai (JAIST) Real numbers from a point-free perspective

概要 We take another look at real numbers from the viewpoint of point-free topology. The intuitionistic presentation of real numbers by a spread leads to a unique representation of a real number called regular ideal. Regular ideals form the models of a certain geometric theory; thus the point-free space associated with this theory provides us with a novel notion of real numbers. As applications of this point-free real numbers, we give point-free proofs of the intermediate value theorem and Brouwer's fixed-point theorem. These point-free proofs make the finitary aspect of these theorems more explicit than their point-set counterparts.

9月16日(金) 第IX会場

10:30~12:00

- 11 関 隆 宏 (新潟大経営戦略本部) 制限された weakening と contraction を持つ結合則を持たない部分構造
 論理の可換性 15
 Takahiro Seki (Niigata Univ.) Commutativity of non-associative substructural logics with restricted
 weakening and contraction

概要 It is well-known that the associative substructural logic $\mathbf{FL}_{\mathbf{c}\mathbf{w}}$, obtained from \mathbf{FL} by adding both contraction and weakening rules, derives exchange rule. In this talk, we consider the commutativity result in non-associative substructural logics with weakening, contraction, restricted weakening and restricted contraction axioms.

- 12 加藤 裕 (東工大情報理工) 証明可能性論理 GLS の意味論とカット除去 15
 鹿島 亮 (東工大情報理工)
 Yutaka Katō (Tokyo Tech) Semantics and cut-elimination for the provability modal logic GLS
 Ryo Kashima (Tokyo Tech)

概要 Solovay (1976) introduced a modal logic GLS and proved the arithmetic completeness of GLS with respect to the standard model of PA. Kushida (2020) introduced a sequent calculus of GLS and proved the cut-elimination theorem. Our study attempt to construct a Kripke semantics of GLS and prove soundness of GLS and completeness of cut-free GLS, which gives an alternative proof of the cut-elimination theorem.

- 13 大川 裕矢 (千葉大理) 解釈可能性論理 \mathbf{IL} の部分論理に対する simplified Veltman frame による
 完全性について 15
 Yuya Okawa (Chiba Univ.) Simplified Veltman frames for sublogics of the interpretability logic \mathbf{IL}

概要 Visser proved that the interpretability logic \mathbf{IL} is sound and complete with respect to a corresponding class of simplified Veltman frames and is not complete with respect to a corresponding class of finite simplified Veltman frames. Ignatiev introduced the conservativity logic \mathbf{CL} which is a sublogic of \mathbf{IL} , and he proved that \mathbf{CL} is sound and complete with respect to a corresponding class of simplified Veltman frames. On the other hand, Ignatiev proposed the problem whether \mathbf{CL} is complete with respect to a corresponding class of finite simplified Veltman frames or not.

We investigate the completeness with respect to (finite) simplified Veltman frames for several sublogics of \mathbf{IL} . Then, we solve Ignatiev's problem affirmatively.

- 14 鈴木 信行 (静岡大理) 冠頭標準形定理が成り立つ中間述語論理についての注意 15
 Nobu-Yuki Suzuki (Shizuoka Univ.) Remarks on intermediate predicate logics enjoying prenex normal form theorem

概要 The prenex normal form theorem (PNFT) is a well-known metatheorem on classical predicate logic. It is said to characteristically express the behavior of quantifiers in classical predicate logic. We consider PNFT in the framework of intermediate predicate logics, and make some remarks.

- 15 堀 弘昌 (名大情報) 命題論理に対する無限証明体系と循環証明体系の証明能力同等性 15
 中澤 巧爾 (名大情報)
 龍田 真 (国立情報学研)
 Hiromasa Hori (Nagoya Univ.) Equivalence of infinite and cyclic proof systems for propositional logics
 Koji Nakazawa (Nagoya Univ.)
 Makoto Tatsuta
 (Nat. Inst. of Informatics)

概要 It is proved that the provabilities of infinite proof system and cyclic proof system are equivalent for some propositional logics: the propositional LK with inductively defined propositions, the propositional LK with fixed point operators, and the proof system for the linear temporal logic with fixed point operators.

14:15~15:55

- 16 田中紀子 (愛知県立旭丘高) 戦中戦後の京都における特別科学教育学級 15
 Noriko Tanaka The Experimental Class for Science Education in Kyoto in the near end
 (Aichi Prefectural Asahigaoka High School) of the World War II

概要 Following a decision of the Ministry of Education, “the Experimental Classes for Science Education” were formed in four cities of Japan in the near end of the World War II. The one of the Experimental classes were established in the Kyoto-Prefectural Kyoto First Secondary School, one each in the 3rd, 2nd and 1st year. In addition to the actual management of the class, the content of the lessons and the pupils’ careers after the class are described. I will once again shed light on the Experimental Class for Science Education, and make use of a part of science and technology education in Japan in the future.

- 17 脇克志 (山形大理) 和算書内の図形領域抽出 10
 Katsushi Waki (Yamagata Univ.) Extraction of graphic regions within WASAN books

概要 Two pre-processes that have been carried out to extract the graphic regions in the WASAN books are described. First, an evaluation of the recognition accuracy of the first pre-process, the extraction of important characters by character recognition, is presented. Next, the results of the shape area using the Hough transform are presented. Finally, the expected improvement in accuracy by combining the two pre-processing methods and future issues are explained.

- 18 真島秀行 (お茶の水女大*) 関孝和, 建部賢弘の円周率の近似計算の理論的意味づけ 15
 Hideyuki Majima (Ochanomizu Univ.*) Theoretical meaning of the calculation of Pi used by Seki Takakazu and
 Takebe Katahiro

概要 We will give some theoretical meaning on calculation of the number Pi by Seki Takakazu. Seki found the so-called Aitken’s delta-sequenced process in his theory, but there were some errors in his calculation and he only claimed that his approximate number of Pi was a bit less than 3.14159265359. Katahiro Takebe followed Seki’s method and discovered another method of calculation of Pi.

- 19 森本光生 『関算四伝書』について (2) 15
 (四日市大関孝和数学研・上智大*)
 Mitsuo Morimoto On the *Sekisan Shidensho* (2)
 (Yokkaichi Univ./Sophia Univ.*)

概要 In the *Sekisan Shidensho*, there is the list of private library of the Yamaji, masters of Seki’s wasan school. There are 175 items in this list, most of which are related with wasan but a few are important Chinese books on mathematics imported by the 8th shogun Yoshimune. We shall present a preliminary talk on this Yamaji List and discuss how the books or materials in the list are treated in the *Sekisan Shidensho* itself.

- 20 小川東 岡之只『妙矩集』における帰納的方法論 15
 (四日市大関孝和数学研)
 Tsukane Ogawa (Yokkaichi Univ.) Inductive methodology in the ‘Myouku Shu’ written by Oka Yukitada

概要 The ‘Myouku shu’ written by Oka Yukitada (1791-?) is a kind of formula collection in Edo period. The word ‘Yuzuri Koshi’ appears in the proofs of formulae 20, 21, and 23 in the book, but its meaning is not obvious so far. It could be seen as a term related to inductive reasoning, it is more appropriate to think it as an analogy. Oka was interested in whether similar results could be obtained by analogy in generalising a problem. I will illustrate this with some examples.

- 21 田村 誠 開帯従立方について 15
(大阪産大全学教育機構)

Makoto Tamura (Osaka Sangyo Univ.) On the solution of cubic equations in China

概要 “Jigu Suanjing (Continuation of Ancient Mathematics)” written shortly after 626 deals with cubic equations, but does not explain how to solve them. However, the book shows correct solutions to many cubic equations, it is natural to consider that the method had been established before the book appeared. In this talk, we consider the difference between calculating cube roots and solving cubic equations, and a numeric solution according to the text proposed by Qian Baocong.

16:00～16:15 歴史部門懇談会

16:25～17:25 特別講演

ハラルドクマレ (ドイツ日本研) 小倉金之助のヒストリオグラフィーにおける「民間数学者」の再評価

Harald Kuemmerle A re-evaluation of “civil mathematicians” in Ogura Kinnosuke’s history
(German Inst. for Japanese Stud.) riography

概要 In his historical research on mathematics since the Meiji period, Ogura Kinnosuke assigns “civil mathematicians” (minkan sugakusha) a role that was important but limited in scope. For example, in his Meiji sugakushi no kiso koji, he judges that although they did important translation work until the 1880s, their role was limited to publishing popularizing literature and test-taking journals after this. A systematic study of his statements on civil mathematicians and their context helps to highlight their relevance. As Ogura also referred to himself as a civil mathematician, studying his biography also gives important insights. Doing so, the study of mathematics in the Meiji period from the perspective of knowledge circulation through journals becomes possible and allows for international contextualization.

代 数 学

9月13日(火) 第IV会場

9:30~12:00

- 1 田島 慎一 (新潟大*) 一般固有空間と Jordan 鎖の厳密で効率的な計算 (1) 10
 小原 功任 (金沢大理工)
 照井 章 (筑波大数理物質)
 Shinichi Tajima (Niigata Univ.*) Efficient symbolic computation of Jordan chains and generalized eigenspaces
 Katsuyoshi Ohara (Kanazawa Univ.) (1)
 Akira Terui (Univ. of Tsukuba)

概要 An efficient method for computing Jordan chains of a matrix of integers or rational numbers by exact computation is proposed. A Jordan–Krylov basis, special generators in the sense of Krylov subspace, of a certain subspace over rational numbers is introduced. It is shown that computation of Jordan chains is reduced to a Jordan–Krylov basis. In this theory, the Krylov subspace is effectively used.

- 2 田島 慎一 (新潟大*) 一般固有空間と Jordan 鎖の厳密で効率的な計算 (2) 10
 小原 功任 (金沢大理工)
 照井 章 (筑波大数理物質)
 Shinichi Tajima (Niigata Univ.*) Efficient symbolic computation of Jordan chains and generalized eigenspaces
 Katsuyoshi Ohara (Kanazawa Univ.) (2)
 Akira Terui (Univ. of Tsukuba)

概要 An efficient method for computing Jordan chains of a matrix of integers or rational numbers by exact computation is proposed. A Jordan–Krylov basis, special generators in the sense of Krylov subspace, of a certain subspace over rational numbers is introduced. Efficient computation of both a Jordan–Krylov basis and Jordan chains is given.

- 3 松下 光虹 (阪大情報) 整凸多面体のトーリック環の因子類群のねじれ自由性 13
 Koji Matsushita (Osaka Univ.) Torsionfreeness for divisor class groups of toric rings of integral polytopes

概要 In this talk, we give some sufficient conditions for $Cl(\mathbb{k}[P])$ to be torsionfree, where $Cl(\mathbb{k}[P])$ denotes the divisor class group of the toric ring $\mathbb{k}[P]$ of an integral polytope P . We prove that $Cl(\mathbb{k}[P])$ is torsionfree if P is compressed, and $Cl(\mathbb{k}[P])$ is torsionfree if P is a $(0, 1)$ -polytope which has at most $\dim P + 2$ facets. Moreover, we characterize the toric rings of $(0, 1)$ -polytopes in the case $Cl(\mathbb{k}[P]) \cong \mathbb{Z}$.

- 4 宮下 空 (阪大情報) Levelness versus nearly Gorensteinness of homogeneous domains 13
 Sora Miyashita (Osaka Univ.) Levelness versus nearly Gorensteinness of homogeneous domains

概要 Levelness and nearly Gorensteinness are well-studied properties on graded rings as a generalized notion of Gorensteinness. In this presentation, we talk about the strength of these properties. Under some additional conditions, we proved that every nearly Gorenstein domain is level. We also talk about nearly Gorenstein Stanley–Reisner rings of low-dimensional simplicial complexes.

- 5 宮崎 充弘 (京都教育大) Almost Gorenstein property of the Ehrhart ring of the stable set polytope of a cycle graph and Hibi–Tsuchiya’s conjecture 13
 Mitsuhiro Miyazaki Almost Gorenstein property of the Ehrhart ring of the stable set polytope of a cycle graph and Hibi–Tsuchiya’s conjecture
 (Kyoto Univ. of Edu.)

概要 Let $G = (V, E)$ be a cycle graph. We show that the Ehrhart ring of the stable set polytope of G is almost Gorenstein. Further, we show that the conjecture of Hibi–Tsuchiya is true.

- 6 柴田孝祐 (米子工高専) Minimal free resolutions of Specht ideals for $(n-d, d)$ 13

柳川浩二 (関西大システム理工)

Kohsuke Shibata

Minimal free resolutions of Specht ideals for $(n-d, d)$

(Yonago Nat. Coll. of Tech.)

Kohji Yanagawa (Kansai Univ.)

概要 For a partition λ of a positive integer n , let I_λ^{Sp} be the ideal of $R = K[x_1, \dots, x_n]$ generated by all Specht polynomials of shape λ . It is known that if R/I_λ^{Sp} is Cohen–Macaulay then λ is of the form either $(n-d, 1, \dots, 1)$, $(n-d, d)$, or $(d, d, 1)$, and it is also known that the converse is true if $\text{char}(K) = 0$.

In this talk, we construct minimal free resolutions of $R/I_{(n-d, d)}^{\text{Sp}}$, when $\text{char}(K) = 0$ by using Specht modules and operations on Young diagrams.

- 7 吉田健一 (日大文理) Gorensteinness for normal tangent cones of elliptic ideals 13

奥間智弘 (山形大理)

渡辺敬一 (日大文理)

Ken-ichi Yoshida (Nihon Univ.)

Gorensteinness for normal tangent cones of elliptic ideals

Tomohiro Okuma (Yamagata Univ.)

Kei-ichi Watanabe (Nihon Univ.)

概要 Throughout this talk, let (A, \mathfrak{m}) be a 2-dimensional excellent normal local domain containing an algebraically closed field, and let I be an \mathfrak{m} -primary integrally closed ideal. An ideal I is called an elliptic ideal if the normal reduction number is 2. In this talk, we discuss the Gorensteinness for normal tangent cones. In particular, we give a criterion for Gorensteinness in the case of elliptic ideals.

- 8 遠藤直樹 (明大政治経済) Reflexive modules over the endomorphism algebras of reflexive trace
後藤四郎 (明大理工) ideals 13

Naoki Endo

(Meiji Univ.)

Reflexive modules over the endomorphism algebras of reflexive trace

Shiro Goto

(Meiji Univ.)

ideals

概要 In this talk, we investigate the behavior of reflexive modules over the endomorphism algebras of reflexive trace ideals in one-dimensional Cohen–Macaulay local rings. The main result generalizes both of the results of S. Goto, N. Matsuoka, and T. T. Phuong and T. Kobayashi regarding the Gorensteinness of the endomorphism algebra of the maximal ideal. We also explore the question of when the base ring has only finitely many isomorphism classes of indecomposable reflexive modules. We will show that the finiteness of the isomorphism classes implies the ring is analytically unramified and has only finitely many Ulrich ideals.

- 9 神代真也 (小山工高専) 正準加群のトレースの colength の上限 13

Shinya Kumashiro

Upper bound on the colength of the trace of the canonical module

(Oyama Nat. Coll. of Tech.)

概要 We study upper bounds of the colength of the trace of the canonical module in one-dimensional Cohen–Macaulay rings. We answer two questions posed by Herzog–Hibi–Stamate and Kobayashi.

14:15~16:45

- 10 百合草寿哉 (東北大理) Acyclic cluster algebras with dense g -vector fans 10

Toshiya Yurikusa (Tohoku Univ.)

Acyclic cluster algebras with dense g -vector fans

概要 The g -vector fans play an important role in studying cluster algebras and silting theory. We show that a connected acyclic cluster algebra has a dense g -vector fan if and only if it is either finite type or affine type. As an application, we also show that a finite dimensional, connected, hereditary algebra over an algebraically closed field has a dense g -vector fan if and only if it is Morita equivalent to the path algebra of a quiver of Dynkin or extended Dynkin type.

- 11 後藤悠一朗 (阪大 理) 擬遺伝構造の連結性 13
 Yuichiro Goto (Osaka Univ.) Connectedness of quasi-hereditary structures

概要 Dlab and Ringel showed that algebras being quasi-hereditary in all orders for indices of primitive idempotents becomes hereditary. So, we are interested in for which orders a given quasi-hereditary algebra is again quasi-hereditary. As a matter of fact, we consider permutations of indices, and if the algebra with permuted indices is quasi-hereditary, then we say that this permutation gives a quasi-hereditary structure. In this talk, we consider those which we call connectedness of quasi-hereditary structures. For two permutations s, s' giving quasi-hereditary structures, the definition of connectedness for s, s' is provided that there exists a decomposition $s's^{-1} = s_l \cdots s_2 s_1$ into adjacent transpositions such that each product $s_k \cdots s_2 s_1 s$ for $0 < k < l$ also gives a quasi-hereditary structure. We then show that any two quasi-hereditary structures are connected.

- 12 臼井 智 (東京理大理) 特異圏における終局周期加群の特徴づけとその応用 13
 Satoshi Usui (Tokyo Univ. of Sci.) Characterization of eventually periodic modules in the singularity categories, and its application

概要 The singularity category of a ring makes only the modules of finite projective dimension vanish among all modules. Hence, the singularity category is expected to capture some homological properties of modules of infinite projective dimension. In this talk, we focus on eventually periodic modules among those of infinite projective dimension and characterize them by using morphisms in the singularity categories. As an application, we show that, for the class of finite dimensional algebras over a field, being eventually periodic is invariant under singular equivalence of Morita type with level.

- 13 浅芝 秀人 (静岡大理・京大高等研・阪公大数学研) Approximation by interval-decomposables and interval resolutions of 2D persistence modules 13
 E. G. Escolar (神戸大人間発達環境) 中島 健 (岡山大AI・数理データサイエンスセンター) 吉脇 理雄 (阪公大数学研)
 Hideto Asashiba (Shizuoka Univ./Kyoto Univ./Osaka Metro. Univ.) Approximation by interval-decomposables and interval resolutions of 2D persistence modules
 Emerson Gaw Escolar (Kobe Univ.) Ken Nakashima (Okayama Univ.) Michio Yoshiwaki (Osaka Metro. Univ.)

概要 In the field of topological data analysis, two-parameter persistence can be studied using the representation theory of the 2d commutative grid, the tensor product of two A_n -type quivers. In a previous work, we studied interval approximations using restrictions to subquivers of intervals and Möbius inversion, related to the idea of the generalized rank invariant. In this work, we consider the homological approximations using the interval representations, and show that the interval global dimension is finite for the 2d commutative grid, and that it is equal to the maximum of the interval dimensions of the Auslander–Reiten translates of the interval representations. Furthermore, by a suitable modification of our interval approximation, we provide a formula linking the two conceptions of approximation.

- 14 大関 一秀 (山口大創成) The first Hilbert coefficient of stretched ideals 13
 Kazuho Ozeki (Yamaguchi Univ.) The first Hilbert coefficient of stretched ideals

概要 In this talk we explore the almost Cohen–Macaulayness of the associated graded ring of stretched \mathfrak{m} -primary ideals with small first Hilbert coefficient in a Cohen–Macaulay local ring (A, \mathfrak{m}) . In particular, we explore the structure of stretched \mathfrak{m} -primary ideals satisfying the equality $e_1(I) = e_0(I) - \ell_A(A/I) + 4$ where $e_0(I)$ and $e_1(I)$ denotes the multiplicity and the first Hilbert coefficient respectively.

- 15 足立 崇英 (山口大国際総合) Generalization of HRS-tilt 13
 榎本 悠久 (阪公大理)
 塚本 真由 (山口大創成)
 Takahide Adachi (Yamaguchi Univ.) Generalization of HRS-tilt
 Haruhisa Enomoto
 (Osaka Metro. Univ.)
 Mayu Tsukamoto (Yamaguchi Univ.)

概要 Beilinson, Bernstein and Deligne introduced the notion of t -structures on triangulated categories. As a remarkable property of t -structures, various abelian categories inside triangulated categories can be realized as hearts of t -structures. Happel, Reiten and Smalø provided a construction of new t -structures through torsion pairs in the heart of a given t -structure. This construction is called the HRS-tilt. In this talk, we introduce t -structures on an extriangulated category, which is a common generalization of triangulated categories and exact categories, and give a generalization of the HRS-tilt.

- 16 松野 仁樹 (静岡大自然) 3次元 Sklyanin 代数の twisted algebra の分類 13
 Masaki Matsuno (Shizuoka Univ.) The classification of twisted algebras of 3-dimensional Sklyanin algebras

概要 A twisting system is one of the major tools to study graded algebras, however, it is often difficult to construct a (non-algebraic) twisting system if a graded algebra is given by generators and relations. In this talk, we show that a twisted algebra of a geometric algebra is determined by a certain automorphism of its point scheme. As an application, we explain the classification of twisted algebras of 3-dimensional Sklyanin algebras up to graded algebra isomorphism.

- 17 Haigang Hu (静岡大創造科学技術) Quantum quadratic complete intersections 13
 毛利 出 (静岡大理)
 Haigang Hu (Shizuoka Univ.) Quantum quadratic complete intersections
 Izuru Mori (Shizuoka Univ.)

概要 The purpose of this research is to define and classify noncommutative analogues of quadratic complete intersections. We say that $S/(f_1, \dots, f_r)$ is a quantum (resp. Clifford) quadratic complete intersection if S is an n -dimensional Calabi–Yau (resp. Clifford) quantum polynomial algebra, and $f_1, \dots, f_r \in S_2$ a regular sequence of central elements. The main result in this talk is that there is a natural one-to-one correspondence between the set of isomorphism classes of (commutative) quadratic complete intersections and the set of isomorphism classes of Clifford quadratic complete intersections. We also give a complete classification of quantum quadratic complete intersections for $n = 3$ and $r = 1, 2, 3$.

- 18 塚本 真由 (山口大創成) Extriangulated 圏の余ねじれ対と準傾部分圏 13
 足立 崇英 (山口大国際総合)
 Mayu Tsukamoto (Yamaguchi Univ.) Cotorsion pairs and silting subcategories in extriangulated categories
 Takahide Adachi (Yamaguchi Univ.)

概要 The notion of co- t -structures on a triangulated category was introduced as an analog of t -structures. While the heart of a t -structure becomes an abelian category, the coheart of a co- t -structure becomes a so-called presilting subcategory. Bondarko and Mendoza–Santiago–Saenz–Souto gave a bijection between bounded co- t -structures and silting subcategories in a triangulated category. In this talk, we generalize their result. Namely, we provide a bijection between bounded hereditary cotorsion pairs and silting subcategories in an extriangulated category. Moreover, we show that our result recovers a bijection between contravariantly finite resolving subcategories and basic tilting modules for a finite dimensional algebra with finite global dimension.

17:00~18:00 特別講演

- A. Chan (名大多元数理) Algebras associated to surface dissections and their tilting theory
 Aaron Chan (Nagoya Univ.) Algebras associated to surface dissections and their tilting theory

概要 We are interested in two particular classes of finite-dimensional algebras. One is called Brauer graph algebra and the other is called gentle algebra. The former class has its origin traced back to the dawn of modular representation theory of finite groups, whereas the latter grew out of the studies of quiver representations for quivers of Dynkin type A and of affine Dynkin type A. Recent advances in homological mirror symmetry and cluster algebras arising from Teichmüller theory reveals a new approach to studying the homological algebra of gentle algebras. Namely, each gentle algebra can be associated to a dissection of some topological surface with vertices (marked points) on the boundary, and by doing so, one can interpret the representation theory and homological behaviour of a gentle algebra in terms of the topology or geometry of the associated dissected surface. In this talk, we will survey this connection as well as how such a connection can be exploited in the same way for Brauer graph algebras. We will also survey results on how this algebra-vs-topology connection gives us classification of objects (such as silting/tilting complexes and t-structures) that are used to study equivalences between the derived categories for these algebras.

9月14日(水) 第IV会場

9:30~12:00

- 19 C. Reyes-Bustos Spectra and Ihara zeta function of group-subgroup pair graphs 10
 (NTT 基礎数学研究センター)
 Cid Reyes-Bustos Spectra and Ihara zeta function of group-subgroup pair graphs
 (NTT Inst. for Funda. Math.)

概要 Group-subgroup pair graphs (or pair-graphs) are a non-regular generalization of Cayley graphs for group-subgroup pairs that maintain the properties of Cayley graphs to a certain extent. In particular, when the subgroup is abelian, the eigenvalues are expressed in terms of sums of irreducible characters of the subgroup. We present a new proof for the formulas of the spectrum and new formulas for the Laplacian and signless Laplacian spectra of pair-graphs, along with formulas for the Ihara zeta function in terms of the subgroup characters. In addition, we consider examples and applications for several families of non-regular graphs described by pair-graphs and compare with their regular analogs.

- 20 吉野聖人(東北大情報) 共通角度 $\arccos(1/3)$ の等角直線族 13
 Kiyoto Yoshino (Tohoku Univ.) Equiangular lines with common angle $\arccos(1/3)$

概要 I discuss sets of equiangular lines with common angle $\arccos(1/3)$, or equivalently, Seidel matrices with largest eigenvalue at most 3 by using switching roots. The switching roots were introduced to give integral lattices corresponding to sets of equiangular lines. When the common angle of a set of equiangular lines is $\arccos(1/3)$, the corresponding lattice is a root lattice. From this correspondence, the maximal sets of equiangular lines with common angle $\arccos(1/3)$ were classified. As an application, I explain why the numbers of sets of n equiangular lines with common angle $\arccos(1/3)$ in dimension 7 are almost symmetrical around $n = 14$.

- 21 L. Speyer (沖縄科学技術大) Schurian-infinite blocks of type A Hecke algebras 13
 Liron Speyer Schurian-infinite blocks of type A Hecke algebras
 (Okinawa Inst. of Sci. and Tech. Grad. Univ.)

概要 For any algebra A over an algebraically closed field \mathbb{F} , we say that an A -module M is Schurian if $\text{End}_A(M) \cong \mathbb{F}$. We say that A is Schurian-finite if there are only finitely many isomorphism classes of Schurian A -modules, and Schurian-infinite otherwise. I will present recent joint work with Susumu Ariki in which we determined that many blocks of type A Hecke algebras are Schurian-infinite. A wide variety of techniques were employed in this project—I will give more details on those required for our results concerning the principal blocks.

- 22 小 境 雄 太 (東京理大理) 巡回ブロックを被覆するブロック上の傾複体について 10
 Yuta Kozakai (Tokyo Univ. of Sci.) On tilting complexes over blocks covering cyclic blocks

概要 Let p be a prime number, k an algebraically closed field of characteristic p , G a finite group, and N a normal subgroup of G having a p -power index in G . Moreover let b be a block of kN with a cyclic defect group and B be the unique block of kG covering b . We show that the block B is a tilting-discrete algebra. Moreover we show that the set of all tilting complexes over B is isomorphic to that over b as partially ordered sets.

- 23 藤 田 直 樹 (熊本大先端) 既約表現の essential 基底と Newton–Okounkov 凸体 13
 Naoki Fujita (Kumamoto Univ.) Essential bases of irreducible representations and Newton–Okounkov bodies

概要 An essential basis is a basis of a finite-dimensional irreducible representation of a semisimple Lie algebra, which was introduced by Fang–Fourier–Littelmann as a generalization of an FFLV basis. In this talk, we slightly generalize the notion of an essential basis, and discuss an explicit description of its parametrizing set. To give such description, the notion of a Newton–Okounkov body is useful. In this talk, we focus on a specific (generalized) essential basis, and see that the corresponding Newton–Okounkov body is a marked chain-order polytope. This result connects previous realizations of Gelfand–Tsetlin polytopes and FFLV polytopes as Newton–Okounkov bodies in a uniform way.

- 24 柴 田 大 樹 (岡山理大理) 低次元 pointed ホップ・スーパー代数の分類について 10
 若 尾 亮 太 (岡山理大理)
 Taiki Shibata (Okayama Univ. of Sci.) On classification of pointed Hopf superalgebras of low dimension
 Ryota Wakao (Okayama Univ. of Sci.)

概要 In this talk, we will discuss structure on Hopf superalgebras of low dimension. Using known results on classification of Hopf algebras and the “bosonization technique”, we obtain the following two results. Let p be an odd prime. (1) There are no non-trivial Hopf superalgebras of dimension p . (2) There exists only one isomorphism class of pointed Hopf superalgebras of dimension p^2 .

- 25 栗 原 大 武 (山口大創成) 有限一般化アレキサンダーカンドルの新しい不変量とその応用 13
 東 谷 章 弘 (阪大情報)
 Hirotake Kurihara (Yamaguchi Univ.) New invariants for finite generalized Alexander quandles and their ap-
 Akihiro Higashitani (Osaka Univ.) plication

概要 Quandle is an algebraic system with one binary operation, but it is quite different from a group. In our talk, we investigate a special kind of quandles, called generalized Alexander quandles, which are defined by groups together with their group automorphisms. We give new quandle invariants for generalized Alexander quandles. Moreover, we give an equivalent condition of the quandle isomorphic property among special generalized Alexander quandles.

- 26 清水 健一 (芝浦工大システム理工) 双対テンソル圏の中山関手の公式 13
 Kenichi Shimizu (Shibaura Inst. of Tech.) A formula of the Nakayama functor of the dual tensor category

概要 The Nakayama functor for a finite abelian category plays an important role in recent study of finite tensor categories and their modules. Given a finite tensor category \mathcal{C} and a finite left \mathcal{C} -module category, the dual of \mathcal{C} with respect to \mathcal{M} , denote by $\mathcal{C}_{\mathcal{M}}^*$, is defined as the category of linear right exact left \mathcal{C} -module endofunctors on \mathcal{M} . In this talk, an explicit formula of the Nakayama functor of $\mathcal{C}_{\mathcal{M}}^*$ will be given.

- 27 鍋島 克輔 (東京理大理) ゼロ次元イデアルのネター作用素について 13
 田島 慎一 (新潟大*)
 Katsusuke Nabeshima (Tokyo Univ. of Sci.) On Noetherian operators of zero-dimensional ideals
 Shinichi Tajima (Niigata Univ.*)

概要 We consider the relations between a zero-dimensional ideal and its Noetherian operators. Upon utilizing the theory of holonomic D-modules, we present a new method for computing Noetherian operators associated to a zero-dimensional ideal. An effective algorithm that consists mainly of linear algebra techniques is proposed for computing them. Moreover, as applications, new computation methods of polynomial ideals are discussed by utilizing the Noetherian operators.

13:00~14:00 特別講演

- 元 良 直 輝 (東大 I P M U) Feigin–Semikhatov 双対性について
 Naoki Genra (Univ. of Tokyo) Feigin–Semikhatov duality

概要 W-algebras are a family of vertex (super)algebras defined by the quantized Drinfeld–Sokolov reductions of affine Lie (super)algebras. They include the Virasoro algebra, Super Virasoro algebra, N=2 super conformal algebras and so on, important algebras related to (super)symmetries in (super) conformal field theory. We talk about Feigin–Semikhatov duality, which is dualities between subregular W-algebras and principal W-superalgebras, super analogs of Feigin–Frenkel duality and generalizations of Kazama–Suzuki cosets correspondences. The Feigin–Semikhatov duality gives rise to correspondences of fusion rules of dual W-(super)algebras in rational cases, and the induced coset functors imply equivalences between blocks of the module categories in general levels. This is joint work with Thomas Creutzig, Shigenori Nakatsuka and Ryo Sato.

9月15日(木) 第IV会場

9:30~11:30

- 28 岩見智宏(九工大工)b Strong approximation property related to three-dimensional Miyaoka–Yau type inequality with the associated third Chern classes 13

Tomohiro Iwami (Kyushu Inst. of Tech.) Strong approximation property related to three-dimensional Miyaoka–Yau type inequality with the associated third Chern classes

概要 For an three-dimensional extremal neighborhood $(X, C) \subset \mathbb{C}^4$ of type A, S. Mori proved the existence of three-dimensional flip via “2-game” for 0-dimensional supports of general members of $| -K_X |$ ([M88]). Based on [M88], for an extended (X, C_s) with C_s not necessary irreducible nor reduced ([I2019Mar]), the author had found three-dimensional Miyaoka–Yau type inequality $(MY)_{3, c_3}$ with the associated c_3 ([I2018Mar, I2019Sep]), $(MY)_{3, c_3}$ with the differential operators ([I2020Sep]) and so on, moreover introduce an intermediate Jacobians ([I2022Mar et al]). Continuing to [I2022Mar], as its Part II, the author will report: 1) to introduce valuations of “continuous” differential operators related to $(MY)_{3, c_3}$, 2) to construct “quaternion algebra” data along the above 1) as adèle, and 3) to discuss strong approximation for 2) in order to determine (exponential) periods of $(MY)_{3, c_3}$.

- 29 大橋亮(横浜国大環境情報) Fast enumeration of superspecial hyperelliptic curves of genus 4 with automorphism group V_4 13

Ryo Ohashi (Yokohama Nat. Univ.) Fast enumeration of superspecial hyperelliptic curves of genus 4 with automorphism group V_4

概要 In arithmetic and algebraic geometry, superspecial curves have been studied as one of the most important objects, with practical applications to cryptography and coding theory. The enumeration of those curves is a central problem, but if $g \geq 4$ it is not even known whether a superspecial curve of genus g exists in general characteristic $p > 0$. In this paper, we propose an algorithm with complexity $\tilde{O}(p^3)$ to enumerate superspecial hyperelliptic curves of genus 4 with automorphism group V_4 . By executing the algorithm over Magma, we enumerate those curves over $\overline{\mathbb{F}}_p$ for p up to 200. We also succeeded in finding a superspecial hyperelliptic curve of genus 4 in every characteristic p with $19 \leq p < 7000$.

- 30 那須弘和(東海大理) 3次元多様体上の曲線の第1変形障害について 13

Hirokazu Nasu (Tokai Univ.) On the primary obstructions to deforming curves on a threefold

概要 In Theorem 3.3 of Internat. J. Math. 28(13) (2017) 1750099, I gave a sufficient condition for a first order deformation of a curve on a projective threefold to be primarily obstructed. However the statement of the theorem is false as it stands. In this talk, I will make a correction to the theorem and will give its reformulation.

- 31 那須弘和(東海大理) Obstructions to deforming space curves lying on a smooth cubic surface 13

Hirokazu Nasu (Tokai Univ.) Obstructions to deforming space curves lying on a smooth cubic surface

概要 In 1980s, J. O. Kleppe gave a conjecture concerning maximal families of space curves lying on a smooth cubic surface. Later, the conjecture was modified by Ph. Ellia by a counterexample. I will talk about a recent progress on the conjecture. I will also give a sufficient condition for curves lying on a smooth cubic surface to be obstructed in \mathbb{P}^3 in terms of lines on the surface.

- 32 東谷章弘(阪大情報) グラスマン多様体の matching field による 2 つのトーリック退化の組合せ的変異同値性 13

Akihiro Higashitani (Osaka Univ.) Combinatorial mutation equivalence of two toric degenerations of Grassmannians arising from matching fields

概要 Matching fields are used for the construction of toric degenerations of Grassmannians. Whenever a matching field gives rise to a toric degeneration, the associated polytope of the toric variety coincides with the matching field polytope. In this talk, we study combinatorial mutation equivalences of two certain matching field polytopes, which correspond to order polytopes and chain polytopes of Grassmannian posets.

- 33 川口良(奈良県立医大) 偏極トーリック多様体の第 i 断面幾何種数の下限 13

Ryo Kawaguchi (Nara Medical Univ.) A lower bound for the i th sectional geometric genus of polarized toric varieties

概要 The sectional genus is one of the fundamental invariants in the study of polarized varieties, and is extended to the notion of i th sectional geometric genus. The i th sectional geometric genus has an upper bound proved by Y. Fukuma, and a conjectured lower bound which has not yet been completely proven. This lower bound, however, is trivial in the case of polarized toric varieties. In this talk, we provide a new lower bound for the i th sectional geometric genus of polarized toric varieties resulting from the theory of Ehrhart h -vector of polytopes.

- 34 吉川翔(理化学研) Quasi- F -splitting 13

Shou Yoshikawa (RIKEN) Quasi- F -splitting

概要 Yobuko recently introduced the notion of quasi- F -splitting and F -split heights, which generalize and quantify the notion of Frobenius-splitting, and proved that F -split heights coincide with Artin–Mazur heights for Calabi–Yau varieties. In this talk, I will introduce a generalization of Fedder’s criterion for F -splitting and the theory of F -splittings in the context of birational geometry. The talk is based on joint work with Tatsuro Kawakami, Teppei Takamatsu, Hiromu Tanaka, Jakub Witaszek and Fuetaro Yobuto.

11:30~12:00 代数学分科会総会

14:15~17:15

- 35 永野中行(金沢大自然) クンマー曲面族を含むある K3 曲面族について 13

Atsuhira Nagano (Kanazawa Univ.) A family of lattice polarized K3 surfaces which contains the family of Kummer surfaces

概要 The speaker will introduce a family of lattice polarized K3 surfaces which contains the family of Kummer surfaces derived from principally polarized Abelian surfaces. Also, he will introduce a relation between the period mapping of this family, theta functions and invariants of a complex reflection group.

- 36 御子柴尚希(東京電機大理工) D_n 型のアーベル多様体上の Hodge サイクル 13

Naoki Mikoshiba (Tokyo Denki Univ.) Hodge cycles on abelian varieties of D_n -type

概要 Let K_n/\mathbf{Q} be a Galois CM-field with $G_n = \text{Gal}(K_n/\mathbf{Q}) \cong D_n \langle \rho \rangle$, where D_n denotes the dihedral group of degree $2n$ and ρ the complex conjugation. Let $S \subset G_n$ be an arbitrary CM-type, and let A_S be the abelian variety of CM-type such that $\text{End}_{\mathbf{Q}}(A_S) \cong K_n$ and its CM-type is given by S . Let $Hg(A_S)$ denote the Hodge group of A_S . It is known that $Hg(A_S)$ is an algebraic torus and $\dim Hg(A_S) \leq \dim A_S = 2n$. When $\dim Hg(A_S) = 2n$, A_S is said to be non-degenerate, and the Hodge ring of A_S is known to be generated by its divisor classes. In this talk we classify the CM-type S for which the abelian variety A_S is degenerate.

- 37 三浦真人 (京大数理研) Calabi–Yau 超曲面の幾何転移 13
 Makoto Miura (Kyoto Univ.) Geometric transitions for Calabi–Yau hypersurfaces

概要 Geometric transition is a process of connecting two smooth Calabi–Yau 3-folds by a birational contraction followed by a complex smoothing. It has attracted the interest of both mathematicians and physicists, since it may give the right notion to connect moduli spaces of Calabi–Yau 3-folds. For Calabi–Yau hypersurfaces in toric varieties, a well-known idea of constructing geometric transitions is the use of nested reflexive polytopes. In this talk, I will report the current situation of this approach.

- 38 川谷康太郎 (阪大大理・大和大理工) 線形圏の安定性条件の非存在 13
 Kotaro Kawatani Non-existence of stability conditions on linear triangulated categories
 (Osaka Metro. Univ./Yamato Univ.)

概要 We discuss the non-existence of Bridgeland stability conditions on an R -linear triangulated category.

- 39 松井紘樹 (徳島大社会産業理工) 導来圏のスペクトラムと代数多様体の復元問題 13
 Hiroki Matsui (Tokushima Univ.) Spectra of derived categories and reconstruction of algebraic varieties

概要 Recently, I have introduced the notion of prime thick subcategories of a given triangulated category \mathcal{T} and of the spectrum $\text{Spec}(\mathcal{T})$ as the set of prime thick subcategories of \mathcal{T} together with a certain topology. In this talk, using the spectrum, we will give an alternative proof of the Bondal–Orlov–Ballard reconstruction theorem. Also, I will give the similar reconstruction result for quasi-affine varieties.

- 40 奥山真吾 (香川高専) 偏加法的な環と \mathbb{F}_1 上の偏群スキーム 13
 Shingo Okuyama Partially additive rings and partial group schemes over \mathbb{F}_1
 (Kagawa Nat. Coll. of Tech.)

概要 We develop an elementary theory of partially additive rings as a foundation of \mathbb{F}_1 -geometry. Our approach is so concrete that an analog of classical algebraic geometry is established straightforwardly. As applications, (1) we construct a kind of group scheme $\mathbb{G}L_n$ whose value at a commutative ring R is the group of $n \times n$ invertible matrices over R and at \mathbb{F}_1 is the n -th symmetric group, and (2) we construct a projective space \mathbb{P}^n as a kind of scheme and count the number of points of $\mathbb{P}^n(\mathbb{F}_q)$ for $q = 1$ or $q = p^n$ a power of a rational prime, then we explain a reason of number 1 in the subscript of \mathbb{F}_1 even though it has two elements.

- 41 中島規博 (名工大) A 型拡張 Shi 配置と A 型拡張 Catalan 配置が遺伝的自由配置であるため
 辻栄周平 (北教大旭川) の条件 13
 Norihiro Nakashima Conditions for the extended Shi arrangements and the extended Catalan
 (Nagoya Inst. of Tech.) arrangements to be hereditarily free
 Shuhei Tsujie (Hokkaido Univ. of Edu.)

概要 In this talk, we prove that the cone of the extended Catalan arrangement of type A is always hereditarily free, while we determine the dimension that the cone of the extended Shi arrangement of type A is hereditarily free. For this purpose, we define a class of arrangements which contains the extended Shi and Catalan arrangement of type A and which closed under restriction, using digraphs with vertex weights.

- 42 南 範彦 (名 工 大) 幾何学的附値に対する 1 型の局所一意化定理 13
 Norihiko Minami A type 1 local uniformization theorem for arbitrary geometric valuations
 (Nagoya Inst. of Tech.)

概要 A geometric valuation is a special kind of Abhyankar valuation. A rank 1 geometric valuation is also called a divisorial valuation, which admits for any base field with arbitrary characteristic the so-called type 1 local uniformization, realizing its valuation ring as the local ring at its center, thanks to a 1939 classical theorem of Zariski. Motivated by my own effort to construct a birational subsheaf for any unramified sheaf in the sense of Morel, I shall report a generalization of such a type 1 local uniformization theorem for arbitrary geometric valuation.

- 43 南 範彦 (名 工 大) レトラクト $(-i)$ -有理性への双有理モチーフの 2 つの応用 13
 Norihiko Minami Two applications of the birational motive to the retract $(-i)$ -rationality
 (Nagoya Inst. of Tech.)

概要 The birational motives of Kahn–Sujatha and Rost is applied to study the following two types of implications of the retract $(-i)$ -rationality of a smooth projective variety: (1) in terms of an arbitrary \mathbb{P}^1 -invariant Nisnevich sheaf with transfer. (2) in terms of the Bloch–Srinivas type decomposition of the diagonal.

- 44 島田了輔 (東大数理) On some simple geometric structure of affine Deligne–Lusztig varieties for GL_n 13
 Ryosuke Shimada (Univ. of Tokyo) On some simple geometric structure of affine Deligne–Lusztig varieties for GL_n

概要 We study the geometric structure of affine Deligne–Lusztig varieties $X_\lambda(b)$ for GL_n and b basic. Motivated by the work of Görtz–He–Nie and Chan–Ivanov, we consider a new condition on a cocharacter λ . If this is satisfied, then $X_\lambda(b)$ is the disjoint union of classical Deligne–Lusztig varieties times finite-dimensional affine spaces.

17:30~18:30 特別講演

- 岸本 崇 (埼玉大理)^b Equivariant completions of vector groups into Fano varieties
 Takashi Kishimoto (Saitama Univ.) Equivariant completions of vector groups into Fano varieties

概要 It is well known that the structure as toric variety on a given projective variety is uniquely determined (if there exists at all), and it can be interpreted by means of complete fans. In contrast with toric varieties, namely, equivariant completions of algebraic tori, we are instead interested in equivariant completions of vector groups into projective varieties, especially into Fano varieties. Different from torus embeddings, the equivariant completions of vector groups do not have an explicit interpretation except for projective spaces, meanwhile certain varieties admit several non-isomorphic structures as equivariant vector group completions. In the talk, we will devote ourselves mainly to equivariant vector group completions into (forms of) quintic del Pezzo varieties and an observation of their automorphism groups. This is based on the joint work with Adrien Dubouloz and Pedro Montero.

9月16日(金) 第IV会場

9:30~12:00

- 45 中野 伸 (学習院大理) 5次巡回体のイデアル類群について 10
加藤 虎太郎
Shin Nakano (Gakushuin Univ.) On ideal class groups of quintic cyclic fields
Kotaro Kato

概要 We give an infinite family of quintic cyclic fields with class number divisible by any prime less than 10000.

- 46 木村 藍貴 (東北大大理) 多重ゼータ値の導分関係式から生成される双対関係式の全体について .. 13
Aiki Kimura (Tohoku Univ.) The duality relations derived from the derivation relations for multiple zeta values

概要 The duality relations are a basic family of relations for multiple zeta values. The extended double shuffle relations (EDSR) are one of the families expected to generate all linear relations among multiple zeta values, but it remains unclear whether all the duality relations can be derived from EDSR. In this talk, we consider two families of relations generated by the duality and the derivation relations, and characterize explicitly the intersection of them. Here the derivation relations are specializations of EDSR.

- 47 武田 渉 (東京理大理) Schur 多重ゼータ値の一般化双対公式の複素補間 13
大野 泰生 (東北大大理)
中筋 麻貴 (上智大理工)
Wataru Takeda (Tokyo Univ. of Sci.) An interpolation of the generalized duality formula for the Schur multiple zeta values to complex functions
Yasuo Ohno (Tohoku Univ.)
Maki Nakasuji (Sophia Univ.)

概要 One of the important research subjects in the study of multiple zeta functions is to clarify the linear relations and functional equations among them. Among many relations, the duality formula and its generalization are important families for both Euler-Zagier type and Schur type multiple zeta values. In this talk, following the method of previous works for multiple zeta values of Euler-Zagier type, we give an interpolation of the sums in the generalized duality formula, called Ohno relation, for Schur multiple zeta values. Moreover, we prove that the Ohno relation for Schur multiple zeta values is valid for complex numbers.

- 48 川崎 菜穂 (東北大大理) 荒川-金子型と Euler-Zagier 型, 2つの多重ゼータ関数の関係の明示式 . 10
Naho Kawasaki (Tohoku Univ.) An explicit formula of the relation between multiple zeta functions of Arakawa-Kaneko and Euler-Zagier types

概要 Multiple zeta functions of Arakawa-Kaneko and Euler-Zagier types are known as generalizations of the Riemann zeta function. In 2018, Kaneko and Tsumura proved the existence of functional equations between these multiple zeta functions. In this talk, we give the functional equations explicitly.

- 49 小野 雅隆 (早大 G E C) 一般の整数点における金子-Zagier 予想 13
山本 修司 (東大数理)
Masataka Ono (Waseda Univ.) Kaneko-Zagier conjecture for general integer indices
Shuji Yamamoto (Univ. of Tokyo)

概要 Finite multiple zeta values and symmetric multiple zeta values are defined for positive integer indices. Kaneko and Zagier conjectured that they satisfy the same algebraic relations. In this talk, we generalize Kaneko-Zagier conjecture for general integer indices and prove that the generalized conjecture is deduced from the original one.

- 50 小林 弘 京 (名大 多元数理) On an entire function derived from higher derivatives of Hardy's Z -function 13

Hirokata Kobayashi (Nagoya Univ.) On an entire function derived from higher derivatives of Hardy's Z -function

概要 In 2012, Matsuoka showed that the zeros of $Z^{(k+1)}(t)$ are interlaced with the zeros of $Z^{(k)}(t)$ for $t > T$ with sufficiently large T under the Riemann Hypothesis, where $Z^{(k)}(t)$ is the k th derivative of Hardy's Z -function associated with the Riemann ζ -function. We introduce a generalisation of Riemann's ξ -function derived from higher derivatives of Hardy's Z -function to try to make the proof of his result simpler. Our proof is based on the proof of special case $k = 1$ by H. M. Edwards and J. Mozer.

- 51 井上 翔 太 (東工大理) 臨界線上での L 関数の同時値分布 13
Junxian Li (Univ. Bonn)

Shotou Inoue (Tokyo Tech) Joint value distribution of L -functions on the critical line
Junxian Li (Univ. Bonn)

概要 The independence of L -functions is firstly mentioned by Selberg. Later Bombieri and Hejhal established the independence by showing the joint central limit theorem of L -functions on the critical line. In this talk, we discuss the large deviations in the central limit theorem of Bombieri and Hejhal. Our results have some consequences for moments of L -functions. For example, our results lead to a relation between the moment of the Riemann zeta-function and of the minimum of the Riemann zeta-function and Dirichlet L -functions. This is a joint work with Junxian Li (Universität Bonn).

- 52 峰 正 博 (上智大理工) Hurwitz ゼータ関数に対するディスキレパンシー評価と Mahler の分類 13

Masahiro Mine (Sophia Univ.) Discrepancy estimates for the Hurwitz zeta-functions and Mahler's classification

概要 In this talk, we consider the speed of the convergence of the limit theorem for the value-distribution of the Hurwitz zeta-functions. The estimates of the speed are sometimes called the discrepancy estimates. We prove several discrepancy estimates for the Hurwitz zeta-functions under a certain condition on the parameters, which is based on Mahler's classification of transcendental numbers.

- 53 遠藤 健 太 (名大 多元数理) Riemann ゼータ関数の対数の反復積分の普遍性定理 13
Kenta Endo (Nagoya Univ.) Universality theorem for the iterated integrals of the logarithm of the Riemann zeta-function

概要 In 1975, Voronin proved the universality theorem for the Riemann zeta-function. In this talk, we generalized this theorem to the iterated integrals of the logarithm of the Riemann zeta-function on some line parallel to the real axis.

14:15~17:00

- 54 行田 康 晃 (東大数理) $(x+y)^2 + (y+z)^2 + (z+x)^2 = 12xyz$ の正整数解と一般化マルコフ団代数 13

Yasuaki Gyoda (Univ. of Tokyo) Positive integer solutions to $(x+y)^2 + (y+z)^2 + (z+x)^2 = 12xyz$ and generalized markov cluster algebra

概要 We give a specific way of describing positive integer solutions of a Diophantine equation $(x+y)^2 + (y+z)^2 + (z+x)^2 = 12xyz$ and introduce a generalized cluster pattern behind it.

- 55 飯高 茂 (学習院大*) 完全数の一般化について 13
 齋藤 之理 (麻布中)
 Shigeru Iitaka (Gakushuin Univ.*) Generalization of perfect numbers
 Yukimasa Saito
 (Azabu Junior High School)

概要 By P we denote an odd prime, which plays Base of perfect numbers. For $a = P^e$, $\bar{P} = P - 1$ satisfies $\bar{P}\sigma(a) = P^{e+1} - 1 = aP - 1$. Let m denote translation parameter, and let $h (\neq P)$ (another odd prime) denote multiplier.

$$\bar{P}^3\sigma(\alpha) + (\bar{P} - h)P^2\varphi(\alpha) = \bar{P}P\alpha(2\bar{P} - h) - m\bar{P}^2 - h(P - 2)\bar{P}$$
 is established.

The number α which satisfies the above equality is said to be $\sigma\phi$ perfect number, which is a kind of Generalization of perfect numbers.

- 56 井川 祥彰 モジュラー群の合同部分群の指数の平均について 10
 デビカバネルジー
 (Indraprastha Inst. of Information Tech. Delhi)
 南出 真 (山口大理)
 谷川 好男
 Tadaaki Igawa On averages of indexes of congruence subgroups in the modular group
 Debika Banerjee
 (Indraprastha Inst. of Information Tech. Delhi)
 Makoto Minamide (Yamaguchi Univ.)
 Yoshio Tanigawa

概要 We shall consider averages of indexes of congruence subgroups in the modular group, and deduce some results on error terms of them.

- 57 田島 凌太 (九大 JGM I) Shadow が虚数乗法を持つモックモジュラー形式の p 進的な性質について 10
 Ryota Tajima (Kyushu Univ.) A p -adic property of mock modular forms whose shadows have complex multiplication

概要 Let f be a mock modular form and g denote the shadow of f . Then there exists a unique p -adic number $\alpha(f)$ and we can obtain a p -adic modular form from f and $\alpha(f)$. When g has complex multiplication by K and p is split in K , it is known that $\alpha(f)$ is not zero. On the other hand, we don't know much about $\alpha(f)$ for an inert prime p . The speaker proved that $\alpha(f)$ is not zero when p is inert in K under certain conditions. In this talk, I will explain the result.

- 58 境 優一 Modular linear differential equations and generalized Rankin–Cohen
 (久留米工大基幹教育センター) brackets 13
 永友 清和
 D. Zagier
 (Max Plank Inst. for Math.)
 Yuichi Sakai (Kurume Inst. of Tech.) Modular linear differential equations and generalized Rankin–Cohen
 Kiyokazu Nagatomo brackets
 Don Zagier (Max Plank Inst. for Math.)

概要 We show that all modular linear differential operators can be described in terms of Rankin–Cohen brackets and a modified Rankin–Cohen bracket found by Kaneko and Koike. We give more uniform descriptions of MLDEs in terms of an extension of Rankin–Cohen brackets.

- 59 D. Duverney (Baggio Eng. School) Folding 型の連分数展開によって生成される級数の無理測度 13
 黒沢 健 (東京理大理)
 塩川 宇賢 (慶大*)
 Daniel Duverney (Baggio Eng. School) Irrationality exponents of certain series generated by continued fraction
 Takeshi Kurosawa (Tokyo Univ. of Sci.) with folding lemma
 Iekata Shiokawa (Keio Univ.*)

概要 Let x_n be a certain fast converging sequence of rational numbers greater than one. We give the irrationality exponents of reciprocal sums of x_n using a continued-fraction expansion with the folding lemma.

- 60 村上 慎太郎 (弘前大理工) 単項式指数をもつ空隙級数の線形独立性について 10
 立谷 洋平 (弘前大理工)
 Shintaro Murakami (Hirosaki Univ.) Linear independence of certain gap series with monomial exponents
 Yohei Tachiya (Hirosaki Univ.)

概要 Let $(i, j) \in \mathbb{N} \times \mathbb{N}_{\geq 2}$ and $S_{i,j}$ be an infinite subset of positive integers including all prime numbers in some arithmetic progression. In this talk, we show the linear independence over \mathbb{Q} of the numbers

$$1, \sum_{n \in S_{i,j}} \frac{a_{i,j}(n)}{b^{in^j}}, \quad (i, j) \in \mathbb{N} \times \mathbb{N}_{\geq 2},$$

where $b \geq 2$ is an integer and $a_{i,j}(n)$ are bounded nonzero integer-valued functions on $S_{i,j}$. Our theorem generalizes a result of V. Kumar.

- 61 齋藤 耕太 (筑波大数理物質) 素数表現定数の集合の位相的性質と代数的独立性 12
 武田 渉 (東京理大理)
 Kota Saito (Univ. of Tsukuba) Topological properties and algebraic independence of sets of prime-
 Wataru Takeda (Tokyo Univ. of Sci.) representing constants

概要 Let $(c_k)_{k=1}^{\infty}$ be a sequence of positive integers. We investigate the set of $A > 1$ such that the integer part of $A^{c_1 \cdots c_k}$ is always a prime number for every positive integer k . Let $\mathcal{W}(c_k)$ be this set. The first goal of this talk is to determine the topological structure of $\mathcal{W}(c_k)$. Under some conditions on $(c_k)_{k=1}^{\infty}$, we reveal that $\mathcal{W}(c_k) \cap [0, a]$ is homeomorphic to the Cantor middle third set for some a . The second goal is to propose an algebraically independent subset of $\mathcal{W}(c_k)$ if c_k is rapidly increasing. As a corollary, we disclose that the minimum of $\mathcal{W}(k)$ is transcendental.

- 62 井手 春希 (慶大理工) Algebraic independence properties of certain entire functions with many
 田中 孝明 (慶大理工) variables 10
 Haruki Ide (Keio Univ.) Algebraic independence properties of certain entire functions with many
 Taka-aki Tanaka (Keio Univ.) variables

概要 Some entire functions of one variable are known to have the property that the values of their derivatives of any order at any nonzero distinct algebraic numbers are algebraically independent. On the other hand, there are very few results on the algebraic independence of the values of the partial derivatives of a given entire function of several variables at distinct algebraic points. In this talk we construct an entire function with arbitrary number of variables having the following property: The infinite set consisting of all the values of all its partial derivatives of any orders at all algebraic points is algebraically independent.

- 63 井手 春 希 (慶 大 理 工) Algebraic independence results for certain families of analytic functions generated by linear recurrences 10
 Haruki Ide (Keio Univ.) Algebraic independence results for certain families of analytic functions generated by linear recurrences

概要 For certain families of entire functions of one variable defined by power series and infinite products, we show the algebraic independence of the values of their derivatives at distinct algebraic numbers. This is obtained as a corollary to the algebraic independence result on the values of the partial derivatives of a certain family of entire functions of two variables.

- 64 隈 部 哲 (九 大 J G M I) Appell の超幾何関数の Supercongruence 10
 Satoshi Kumabe (Kyushu Univ.) Supercongruences for fourth Appell function

概要 In this talk, we give a congruence relation, called supercongruence, for a hypergeometric function of two variables. There are some congruence relations between a truncation of a hypergeometric series and a p -adic unit modulo a power of a prime number p . If we give an additional assumption, some of them hold modulo higher power of p . Then such congruences are called supercongruence. The purpose of this talk is to give a supercongruence relation for Appell's function F_4 .

17:15~18:15 特別講演

- 川 島 誠 (日 大 生 産 工) ジーゲルの G 関数の数論的性質について
 Makoto Kawashima (Nihon Univ.) On arithmetic properties of the Siegel G -functions

概要 The Grothendieck period conjecture predicts that all the algebraic relations among the periods of a smooth algebraic variety over a number field are only due to its geometric structure. Following the definition by C. L. Siegel, the G -function is a certain class of power series with algebraic coefficients, satisfying a linear differential equation, whose typical example is the polylogarithmic function. It is conjectured by Bombieri and Dwork that the ring of the values of G -functions at algebraic points exactly coincides with the ring of periods of the varieties above. Their observation thus suggests us to study the values of the G -functions at algebraic points together with the transcendence or the irrationality, to approach the period conjecture.

Relying on this background, we are motivated to construct Pade approximation of the values of G -functions, which is one of efficient tools to investigate such an arithmetic property. It is worth mentioning that R. Apéry succeeded in proving the irrationality of $\zeta(3)$ by Pade approximation, however, for a given number, it is in general crucial and very difficult whether we can construct Pade approximation of the number in an explicit way.

In this talk, we focus on the generalized hypergeometric G -functions and our explicit construction of Pade approximation. We give a survey of our recent progress on arithmetic properties of the values of the functions, including the linear independence criteria, which have been unknown.

幾何学

9月13日(火) 第VI会場

9:30~11:45

- 1 大野 優 (北大 理) 多次元正規分布の甘利-Chenstov の α 接続の特徴づけ 15
 小林 真平 (北大 理)
Yu Ohno (Hokkaido Univ.) A characterization of the alpha-connections on the statistical manifold
Shimpei Kobayashi (Hokkaido Univ.) of multivariate normal distributions

概要 In this talk, we show that the statistical manifold of multivariate normal distribution admits solvable Lie group structure. In addition, we give a characterization of Amari-Chenstov α -connections of it.

- 2 藤井 忍 (千歳科学技術大理工) 対称 Clifford 系に付随する部分空間配置 15
 Shinobu Fujii Subspace arrangements associated with symmetric Clifford systems
 (Chitose Inst. of Sci. and Tech.)

概要 A symmetric Clifford system is a finite set of real symmetric matrices satisfying some relations. In this talk, we define subspace arrangements associated with symmetric Clifford systems which are named Clifford arrangements. Moreover, we show several properties of Clifford arrangements.

- 3 森本 真弘 (阪公大数学研) Hermann 作用から誘導される path 群作用の軌道の幾何学 15
 Masahiro Morimoto Geometry of orbits of path group actions induced by Hermann actions
 (Osaka Metro. Univ.)

概要 It is known that an isometric action of a Lie group on a compact symmetric space gives rise to a proper Fredholm action of a path group on a path space via the gauge transformations. In this talk, I will introduce my recent results concerning the principal curvatures and the austere property of orbits of path group actions induced by Hermann actions. Here a submanifold is called austere if the set of principal curvatures in the direction of each normal vector is invariant under the multiplication by minus one. The results greatly extend the author's previous result in the case of the standard sphere and show that there exist a larger number of infinite dimensional austere submanifolds in Hilbert spaces.

- 4 馬場 蔵人 (東京理大理工) コンパクト対称三対の標準形と二重佐武図形 15
 井川 治 (京都工繊大基盤)
Kurando Baba (Tokyo Univ. of Sci.) Double Satake diagrams and canonical forms in compact symmetric
Osamu Ikawa (Kyoto Inst. Tech.) triads with applications to Hermann actions

概要 We show that there exists a representative with good properties in the isomorphism class of a compact symmetric triad. We call such a representative a canonical form of the compact symmetric triads. In order to study the geometry of Hermann actions, it is sufficient to consider ones obtained from canonical forms. We also show that canonical forms give sections of Hermann actions.

- 5 杉本 恭司 (東京理大理工) Para-real forms of para-Hermitian symmetric spaces and real forms of
 pseudo-Hermitian symmetric spaces 15
 Kyoji Sugimoto (Tokyo Univ. of Sci.) Para-real forms of para-Hermitian symmetric spaces and real forms of
 pseudo-Hermitian symmetric spaces

概要 We show that each of the pseudo-Riemannian symmetric R -space associated with a non-degenerate Jordan triple system and a real form of an effective simple irreducible pseudo-Hermitian symmetric space can be realized as a para-real form of an effective semisimple para-Hermitian symmetric space of hyperbolic orbit type.

- 6 大野 走馬 (早大理工) Nearly parallel G_2 多様体上のキリングスピノールの無限小変形 15
 Soma Ohno (Waseda Univ.) Infinitesimal deformations of Killing spinors on nearly parallel G_2 manifolds

概要 Manifolds admitting Killing spinors are Einstein manifolds. Thus, a deformation of a Killing spinor entails a deformation of Einstein metrics. In this time, we study infinitesimal deformations of Killing spinors on nearly parallel G_2 manifolds. Furthermore, since there is a one-to-one correspondence between nearly parallel G_2 structures and Killing spinors on 7-dimensional spin manifolds, our results imply that we investigate an infinitesimal deformation of nearly parallel G_2 structures. Applying the same technique, we identify that the space of the Rarita–Schwinger fields coincides with a subspace of the eigenspace of the Laplacian.

- 7 坂根 由昌 (阪大情報*) $SU(N)$ 上の naturally reductive でないアインシュタイン計量について 15
 Yusuke Sakane (Osaka Univ.*) On non-naturally reductive Einstein metrics on $SU(N)$

概要 We discuss non-naturally reductive Einstein metrics on special unitary group $SU(k_1 + (p-1)k)$ via the generalized flag manifold $SU(k_1 + (p-1)k)/S(U(k_1) \times \underbrace{U(k) \times \cdots \times U(k)}_{p-1})$. We show that, if $k_1 > k$ and $p \geq 3$, there exist at least two such Einstein metrics.

14:15~16:15

- 8 軸丸 芳揮 (九大IMI) 建築曲面設計における吊り下げ曲面について 15
 Yoshiaki Jikumaru (Kyushu Univ.) Geometry of hanging membranes in architectural surface design

概要 A hanging chain (catenary) is a naturally generated curve by its weight, and a reversed hanging chain resists gravity with pure compression stress states. In the architectural field, an analogy for the surface case is known as hanging membranes, however, no effective formulation applicable to the membrane structure is known. In this presentation, we introduce a mathematical formulation of the hanging membranes compatible with the mechanics of the membrane structure, variational characterization, shape generation by appropriate discretization, and structural analysis of hanging membranes in the architectural surface design. This study is based on the joint work with Prof. Yohei Yokosuka (Kagoshima University).

- 9 金田 伸 (広島大先進理工) 向き付け不可能な極大曲面とその特異点について 15
 Shin Kaneda (Hiroshima Univ.) Nonorientable maximal surfaces and their singular points

概要 We construct new nonorientable maximal surfaces and study their singular points.

- 10 秋山梨佳 (都立大理) Riemann 空間形内の Chern–Federer 部分多様体 15
 酒井高司 (都立大理)
 佐藤雄一郎
 (工学院大学学習支援センター・都立大理)
 Rika Akiyama (Tokyo Metro. Univ.) Chern–Federer submanifolds in Riemannian space forms
 Takashi Sakai (Tokyo Metro. Univ.)
 Yuichiro Sato
 (Kogakuin Univ./Tokyo Metro. Univ.)

概要 By using an idea of integral geometry, we define integral invariants of the second fundamental form of a map between Riemannian manifolds and construct an S^1 -family of energy functionals including the bienergy functional. In this talk, we introduce the Chern–Federer energy functional, whose Euler–Lagrange equation is a second-order partial differential equation. For an isometric immersion into a Riemannian space form, we give a necessary and sufficient condition to be a Chern–Federer map. Considering this condition, there is an obstruction for the domain manifold. In addition, we show some examples of Chern–Federer submanifolds in Riemannian space forms, where a Chern–Federer submanifold is the image of an isometric immersion which is a Chern–Federer map.

- 11 清原悠貴 (北大理) 3次元 Heisenberg 群の時間的曲面の極小性の特徴付け 15
 小林真平 (北大理)
 Hirotaka Kiyohara (Hokkaido Univ.) Characterization of minimality of timelike minimal surfaces in the three-
 Shimpei Kobayashi (Hokkaido Univ.) dimensional Heisenberg group

概要 It is known that the minimality of non-vertical surfaces in the three-dimensional Heisenberg group with the left-invariant Riemannian metric is characterized by the non-conformal harmonic maps into the hyperbolic plane, and then the minimality can be denoted by the integrable systems. We show that non-vertical timelike minimal surfaces in the three-dimensional Heisenberg group with the left-invariant Lorentzian metric are characterized by the non-conformal Lorentz harmonic maps into the de Sitter two-sphere.

- 12 赤嶺新太郎 (日大生物資源) Krust の定理の拡張と極小曲面の変形について 15
 藤野弘基 (名大高等研)
 Shintaro Akamine (Nihon Univ.) Extension of Krust theorem and deformations of minimal surfaces
 Hiroki Fujino (Nagoya Univ.)

概要 In the minimal surface theory, the Krust theorem asserts that if a minimal surface in the Euclidean 3-space is the graph of a function over a convex domain, then each surface of its associated family is also a graph. The same is true for maximal surfaces in the Minkowski 3-space. In this talk, we prove a Krust-type theorem for a deformation family including various important deformation of minimal and maximal surfaces such as the associated family and the Lopez–Ros deformation and the Calabi-type correspondence. We also prove another Krust-type theorem which does not assume the convexity assumption. The results are proved based on the recent progress of planar harmonic mapping theory.

- 13 Pham Hoang Ha (Hanoi National Univ.) 有限全曲率完備極小曲面のガウス写像の完全分岐値数について 15

川上 裕 (金沢大理工)

渡邊 元嗣 (高岡支援学校)

Pham Hoang Ha

(Hanoi National Univ.)

Yu Kawakami (Kanazawa Univ.)

Mototsugu Watanabe

(Takaoka special support school)

On the total weight of a number of totally ramified values of the Gauss map of a complete minimal surface with finite total curvature

概要 We give a new example of algebraic minimal surface whose Gauss map has two omitted values and one totally ramified value of order 2. Thus, the total weight of a number of totally ramified value of its Gauss map equals 2.5. Moreover, we study a more precise estimate for the total weight of a number of totally ramified value of the Gauss map of an algebraic minimal surface which has genus 0 in Euclidean 4-space.

16:30~17:30 特別講演

國分 雅敏 (東京電機大工) Flat fronts in hyperbolic three-space and related topics

Masatoshi Kokubu (Tokyo Denki Univ.) Flat fronts in hyperbolic three-space and related topics

概要 Recent works about flat fronts and related topics will be introduced after a brief overview. It is known that a complete flat surface immersed in hyperbolic 3-space H^3 is either a horosphere or a hyperbolic circular cylinder. However, if the condition is weakened so that surfaces are not necessarily immersed, then there are many ‘complete flat surfaces’, properly speaking, weakly complete flat fronts. The word ‘front’ comes from a wavefront which means a mapping which have a Legendrian lift to the projective cotangent bundle of the target space. In early 2000s, M. Umehara, K. Yamada and I started to study flat fronts. After that, W. Rossman and K. Saji joined and our research was advanced. There are still some interesting problems that I am working on.

9月14日(水) 第VI会場

10:10~10:25 2022年度日本数学会幾何学賞授賞式

10:30~11:30 2022年度日本数学会幾何学賞受賞特別講演 (トポロジー分科会と合同)

入江 博 (茨城大理工) 3次元対称凸体の Mahler 予想の解決

柴田 将敬 (名城大理工)

Hiroshi Iriyeh (Ibaraki Univ.)

A solution of Mahler’s conjecture of three dimensional symmetric convex bodies

Masataka Shibata (Meijo Univ.)

概要 We have proved Mahler’s conjecture concerning the volume product of three dimensional centrally symmetric convex bodies in \mathbb{R}^3 . In this talk, we give an outline of its proof and also provide its applications and recent developments.

13:15~14:15 2022年度日本数学会幾何学賞受賞特別講演 (トポロジー分科会と合同)

桑垣 樹 (京大理工) 層量子化の幾何と代数解析

Tatsuki Kuwagaki (Kyoto Univ.)

Geometry and algebraic analysis of sheaf quantization

概要 Sheaf quantization is a way of quantizing Lagrangian submanifolds. The concept is quite rich and useful to study symplectic geometry, algebraic analysis, and etc. In this talk, I will give an introduction to the concept.

9月15日(木) 第VI会場

9:30~11:45

- 14 五明 工 (名大多元数理) 有限グラフの第1固有値の最大化と Nadirashvili 型定理 15
納谷 信 (名大多元数理)
Takumi Gomyou (Nagoya Univ.) Maximization of the first eigenvalue of a finite graph and Nadirashvili-
Shin Nayatani (Nagoya Univ.) type theorem

概要 Given an edge-length parameter on a finite graph, we construct a vertex-weight and an edge-weight from it and define the corresponding graph Laplacian. We consider a maximization of the first nonzero eigenvalue of the graph Laplacian over all edge-length parameters subject to a normalization. We obtain a Nadirashvili-type theorem which describes the maximizing edge-length parameter in terms of the first eigenfunctions of the corresponding Laplacian.

- 15 永野 哲也 (長崎県立大) フィンスラー空間の非可逆測地線の乖離を測る量 15
Tetsuya Nagano (Univ. of Nagasaki) The study to quantify of the estrangement for non-reversible geodesics
in Finsler space

概要 The purpose of this article is to quantify the estrangement of non-reversible geodesics in Finsler space. In the paper [2], it is shown that the images of non-reversible geodesics which go to opposite direction are different from each other. Then the estrangement degree for the purpose of quantifying of the extent of branching for non-reversible geodesics are defined in this time. Finally, a proposition that if some conditions are satisfied, then the indicatrix on the tangent space of the point is closed is shown for the estrangement degree as the application.

- 16 辻 寛 (阪大理) Blaschke–Santaló 不等式と inverse Santaló 不等式への熱によるアプローチ 15
Hiroshi Tsuji (Osaka Univ.) Blaschke–Santaló inequality and inverse Santaló inequality via heat semi-
group

概要 We will discuss the Blaschke–Santaló inequality and inverse Santaló inequality which are well known in convex geometry. A key ingredient in our talk is the smoothing property of Ornstein–Uhlenbeck semigroup, namely Gaussian hypercontractivity. Our first result is to make a new connection between the Blaschke–Santaló inequality and the reverse hypercontractivity. In particular, we give a new proof of the Blaschke–Santaló inequality via an improvement of the reverse hypercontractivity. Our second result is to give the forward hypercontractivity with a special exponent, which is naturally motivated from our first result. As a corollary, it enables us to obtain some stability type estimate of the inverse Santaló inequality. This talk is based on a joint work with Neal Bez (Saitama University) and Shohei Nakamura (Osaka University).

- 17 浅香 猛 (東大数理) Earthquake theorem for cluster algebras of finite type 15
狩野 隼輔 (東北大RACMaS)
石橋 典 (東大理)
Takeru Asaka (Univ. of Tokyo) Earthquake theorem for cluster algebras of finite type
Shunsuke Kano (Tohoku Univ.)
Tsukasa Ishibashi (Tohoku Univ.)

概要 Earthquake maps give important flows on the Teichmüller spaces. We calculate earthquake maps in terms of shear coordinates, which are examples of cluster X-variables in the cluster algebra. In this talk, We define an analogue of earthquake maps for any cluster algebras of finite type and prove a similar result to the Thurston's earthquake theorem.

- 18 狩野隼輔 (東北大RACMaS) Asymptotic behavior of earthquake maps for cluster algebras of finite
 浅香猛 (東大数理) type 15
 石橋典 (東北大理)
 Shunsuke Kano (Tohoku Univ.) Asymptotic behavior of earthquake maps for cluster algebras of finite
 Takeru Asaka (Univ. of Tokyo) type
 Tsukasa Ishibashi (Tohoku Univ.)

概要 We defined an “earthquake map” for a cluster manifold of finite type as an analogue of the Thurston’s earthquake map for a closed surface. Moreover, we proved an analogue of the Thurston’s earthquake theorem for a cluster manifold of finite type, namely, we gave a homeomorphism between the tropicalized cluster manifold and the cluster manifold via the earthquake map. In this talk, we observe how the Fock–Goncharov fan, which lies in the tropicalized cluster manifold, behaves under the earthquake map. In particular, we discuss its asymptotic behavior in a certain sense.

- 19 バラルリホラモン Leaves of chaotic, compact foliated spaces 15
 (立命館大総合科学技術研究機構)
 野沢啓 (立命館大理工)
 J. A. Álvarez López
 (サンチアゴ・デ・コンポステラ大)
 C. Meniño (ビゴ大)
 Ramón Barral Lijó (Ritsumeikan Univ.) Leaves of chaotic, compact foliated spaces
 Hiraku Nozawa (Ritsumeikan Univ.)
 Jesús Antonio Álvarez López
 (Univ. of Santiago de Compostela)
 Carlos Meniño (Univ. de Vigo)

概要 The main topic of this talk will be the relation between chaotic dynamics in foliated spaces and the geometry of the leaves. A compact foliated space is chaotic if it has a dense leaf and the set of compact leaves is dense. We will study the metric, differentiable and topological realization of manifolds as dense leaves without holonomy in compact, chaotic foliated spaces.

- 20 児玉悠弥 (都立大理) Lodha–Moore 群の一般化について 15
 Yuya Kodama (Tokyo Metro. Univ.) A generalization of the Lodha–Moore group

概要 In this talk, I state the new group obtained by generalizing the Lodha–Moore group. The Lodha–Moore group is known as a nonamenable finitely presented group similar to the Thompson group F . Since the Lodha–Moore group is defined by using infinite binary words, it can be generalized into “ n -ary”. After I give a short definition of the Lodha–Moore group, I will state the definition of the generalized one and the results for “expected” properties.

14:15～16:15

- 21 伊敷喜斗 (理化学研RAP) 距離関数の空間の稠密部分集合について 15
 Yoshito Ishiki (RIKEN) On dense subsets in spaces of metrics

概要 In spaces of metrics, we investigate topological distributions of the doubling property, the uniform disconnectedness, and the uniform perfectness, which are the quasi-symmetrically invariant properties appearing in the David–Semmes theorem. We show that the set of all doubling metrics and the set of all uniformly disconnected metrics are dense in spaces of metrics on finite-dimensional and zero-dimensional compact metrizable spaces, respectively. Conversely, this denseness of the sets implies the finite-dimensionality, zero-dimensionality, and the compactness of metrizable spaces. We also determine the topological distribution of the set of all uniformly perfect metrics in the space of metrics on the Cantor set.

- 22 伊 敷 喜 斗 (理化学研 RAP) グロモフ・ハウスドルフ距離の分岐測地線 15
 Yoshito Ishiki (RIKEN) Branching geodesics of the Gromov–Hausdorff distance

概要 We first evaluate topological distributions of the sets of all doubling spaces, all uniformly disconnected spaces, and all uniformly perfect spaces in the space of all isometry classes of compact metric spaces equipped with the Gromov–Hausdorff distance. We then construct branching geodesics of the Gromov–Hausdorff distance continuously parameterized by the Hilbert cube, passing through or avoiding sets of all spaces satisfying some of the three properties shown above, and passing through the sets of all infinite-dimensional spaces and the set of all Cantor metric spaces. From our results, we observe that the sets explained above are geodesic spaces and infinite-dimensional.

- 23 伊 敷 喜 斗 (理化学研 RAP) フラクタル次元とヒルベルト立方体のグロモフ・ハウスドルフ空間への
 位相的埋め込み 15
 Yoshito Ishiki (RIKEN) Fractal dimensions and topological embeddings of the Hilbert cube into
 the Gromov–Hausdorff space

概要 We show that for all four non-negative real numbers, there exists a Cantor ultrametric space whose Hausdorff dimension, packing dimension, upper box dimension, and Assouad dimension are equal to given four numbers, respectively. By constructing topological embeddings of the Hilbert cube into the Gromov–Hausdorff space, we prove that the set of all compact metric spaces possessing prescribed topological dimension, Hausdorff dimension, packing dimension, upper box dimension, and Assouad dimension, and the set of all compact ultrametric spaces are path-connected and have infinite topological dimension. This observation on ultrametrics provides another proof of Qiu’s theorem stating that the ratio of the Archimedean and non-Archimedean Gromov–Hausdorff distances is unbounded.

- 24 只 野 誉 (山 口 大 理) Boju–Funar type theorems via m -Bakry–Émery Ricci curvature with
 $m \leq 1$ 15
 Homare Tadano (Yamaguchi Univ.) Boju–Funar type theorems via m -Bakry–Émery Ricci curvature with
 $m \leq 1$

概要 We establish some Boju–Funar type compactness criteria for complete Riemannian manifolds by assuming that the m -Bakry–Émery Ricci curvature with $m \leq 1$ tends slowly to zero as the distance from a fixed point goes to infinity. Our results largely improve previous Boju–Funar type compactness criteria for complete Riemannian manifolds via m -Bakry–Émery Ricci curvature established by the author. The key ingredient is a modification of the second variation formula in terms of the m -Bakry–Émery Ricci curvature with $m \leq 1$.

- 25 只 野 誉 (山 口 大 理) Bonnet–Myers type theorems via m -Bakry–Émery Ricci curvature with
 ε -range 15
 Homare Tadano (Yamaguchi Univ.) Bonnet–Myers type theorems via m -Bakry–Émery Ricci curvature with
 ε -range

概要 Inspired by recent works by Y. Lu, E. Minguzzi, and S. Ohta and by K. Kuwae and Y. Sakurai, we give various compactness criteria for complete Riemannian manifolds via m -Bakry–Émery Ricci curvature with ε -range. Our results generalize a Bonnet–Myers type theorem by Y. Lu, E. Minguzzi, and S. Ohta as well as an Ambrose type theorem by K. Kuwae and Y. Sakurai via m -Bakry–Émery Ricci curvature with ε -range. The key ingredients in proving our results are Riccati inequalities obtained from Bochner–Weitzenböck formulas via m -Bakry–Émery Ricci curvature with ε -range.

- 26 深谷友宏 (都立大理) Busemann 空間の位相的分解 15
Tomohiro Fukaya (Tokyo Metro. Univ.) A topological product decomposition of Busemann space

概要 We show that a Busemann space X which is covered by parallel bi-infinite geodesics is homeomorphic to a product of another Busemann space Y and the real line. We also show that a semi-simple isometry on X preserving the foliation by parallel geodesics canonically induces a semi-simple isometry on Y .

16:30~17:30 特別講演

- 近藤剛史 (鹿児島大理) CAT(0) 空間に対する Coxeter 群の非線形スペクトルギャップ
Takefumi Kondo (Kagoshima Univ.) Nonlinear spectral gaps of Coxeter groups with respect to CAT(0) spaces

概要 Nonlinear spectral gap is an invariant defined for a pair of a finite graph and a metric space and plays important roles in geometric group theory and metric geometry. Pansu calculated the exact values of nonlinear spectral gaps of cycles and generalized triangles with respect to CAT(0) spaces by applying the Wirtinger inequalities for finite cyclic groups proved by Gromov. However, no example of exact calculation was known other than Pansu's results.

In this talk, we discuss variants of the Wirtinger inequalities for finite irreducible Coxeter groups and its application to calculations of nonlinear spectral gaps of Coxeter groups. This contains a nonlinear analogue of computations of spectral gaps of Coxeter groups by Kassabov and Ivriissimtzis–Peyerimhoff.

This is a joint work with Tetsu Toyoda and Takato Uehara.

9月16日(金) 第VI会場

9:30~12:00

- 27 南 範彦 (名工大) 単線織性と有理連結性を補完する階層構造のコホモロジー的特徴付け .. 15
Norihiro Minami Cohomological characterization of the hierarchical structures interpolating the uniruledness and the rationally connectedness
(Nagoya Inst. of Tech.)

概要 For a complex projective manifold, Bouchsom–Demailly–Paun–Peternell (J. Algebraic Geom. 2013) characterized its uniruledness by the non pseudoeffectiveness of its canonical divisor. Furthermore, Campana–Demailly–Peternell (London Math. Soc. Lecture Note ser., 417, 2015) gave a cohomological characterization of rationally-connectedness. In this talk, I shall report these characterizations can be interpolated to give some cohomological characterization of the hierarchical structures interpolating the uniruledness and the rationally connectedness.

- 28 土井 護 b 自明な標準束をもつ単純正規交叉複素曲面の微分幾何学的大域スムージングの応用について 15
四ッ谷直仁 (香川大教育) Mamoru Doi On applications of differential geometric global smoothings of simple normal crossing complex surfaces with trivial canonical bundle
Naoto Yotsutani (Kagawa Univ.)

概要 Let X be a simple normal crossing compact complex surface with trivial canonical bundle which includes at most triple intersections. In our recent article [DY22], we have proved that if X is d -semistable, then there exists a family of smoothings in a differential geometric sense. As an important application, we shall provide several examples of d -semistable simple normal crossing complex surfaces with trivial canonical bundle including triple points, which are smoothable to $K3$ surfaces.

- 29 四ッ谷直仁 (香川大教育) Diffeomorphism classes of the doubling Calabi–Yau threefolds 15
Naoto Yotsutani (Kagawa Univ.) Diffeomorphism classes of the doubling Calabi–Yau threefolds

概要 In our previous work (New York J. Math. **20** (2014) 1–33), we have constructed Calabi–Yau 3-folds by a differential-geometric gluing method using Fano 3-folds with their smooth anticanonical $K3$ divisors, which are called the *doubling Calabi–Yau 3-folds*. In this talk, we show that any two of the doubling Calabi–Yau 3-folds with Picard number 2 are not diffeomorphic to each other when the underlying Fano 3-folds are distinct.

- 30 松坂公暉 (北大理) Period integrals and intersection numbers of moduli space of quasimaps
秦泉寺雅夫 (岡山大自然) in the case of Calabi–Yau hypersurface in CP^{N-1} 15
Koki Matsuzaka (Hokkaido Univ.) Period integrals and intersection numbers of moduli space of quasimaps
Masao Jinzenji (Okayama Univ.) in the case of Calabi–Yau hypersurface in CP^{N-1}

概要 In mirror symmetry, period integrals are used in the computation of genus 0 Gromov–Witten invariants. Jinzenji introduced moduli space of quasimaps instead of moduli space of stable maps, and intersection numbers of it. In the case of Calabi–Yau Hypersurface in CP^{N-1} , Jinzenji also showed that there are some relations between intersection numbers $w(\mathcal{O}_{h^a}\mathcal{O}_{h^b})_{0,d}$ of moduli space of quasimaps $\widehat{M}p_{0,2}(N,d)$ and corresponding Gromov–Witten invariants $\langle \mathcal{O}_{h^a}\mathcal{O}_{h^b} \rangle_{0,d}$. In this talk, we derived the expressions of period integrals and Givental’s I function as generating function of intersection numbers of $\widehat{M}p_{0,2}(N,d)$.

- 31 渡邊祐太 (東大数理) 特異エルミート計量を伴う正則ベクトル束に対する Bogomolov–Sommese
型消滅定理 15
Yuta Watanabe (Univ. of Tokyo) Bogomolov–Sommese type vanishing theorem for holomorphic vector
bundles equipped with positive singular Hermitian metrics

概要 We introduce the Bogomolov–Sommese type vanishing theorem involving multiplier ideal sheaves for big line bundles. We define a dual Nakano semi-positivity of singular Hermitian metrics with L^2 -estimates and obtain the vanishing theorem which is a generalization of the Bogomolov–Sommese type vanishing theorem to holomorphic vector bundles.

- 32 川村昌也 (香川高専) 疑負曲率を持つコンパクト概エルミート多様体と概エルミート曲率流 . . 15
Masaya Kawamura Compact almost Hermitian manifolds with quasi-negative curvature and
(Kagawa Nat. Coll. of Tech.) the almost Hermitian curvature flow

概要 In this talk, we introduce a result that the non-positivity of the first Chern–Ricci curvature can be preserved along the almost Hermitian curvature flow, if the initial almost Hermitian metric has the Griffiths non-positive Chern curvature. We have shown that as an application, if additionally the first Chern–Ricci curvature of the initial metric is negative at some point, then the almost complex structure of a compact non-quasi-Kähler almost Hermitian manifold equipped with such a metric cannot be integrable.

- 33 田内大渡 (九大 I M I) Existence of a conjugate point in the incompressible Euler flow on a
米田剛 (一橋大経済) three-dimensional ellipsoid 15
 L. A. Lichtenfelz (Wake Forest Univ.)
Taito Tauchi (Kyushu Univ.) Existence of a conjugate point in the incompressible Euler flow on a
Tsuyoshi Yoneda (Hitotsubashi Univ.) three-dimensional ellipsoid
 Leandro A. Lichtenfelz
 (Wake Forest Univ.)

概要 The existence of a conjugate point on the volume-preserving diffeomorphism group of a compact Riemannian manifold M is related to the Lagrangian stability of a solution of the incompressible Euler equation on M . The Misiołek curvature is a reasonable criterion for the existence of a conjugate point on the volume-preserving diffeomorphism group corresponding to a stationary solution of the incompressible Euler equation. In this talk, we introduce a class of stationary solutions on an arbitrary Riemannian manifold whose behavior is nice with respect to the Misiołek curvature and give a positivity result of the Misiołek curvature for solutions belonging to this class. Moreover, we also show the existence of a conjugate point in the three-dimensional ellipsoid case as its corollary.

- 34 浅野知紘 (金沢大理工) 層の導来インターリーブング距離の完備性と C^0 シンプレクティック幾何
池祐一 (東大情報理工) 15
Tomohiro Asano (Kanazawa Univ.) Completeness of derived interleaving distances for sheaves and C^0 sym-
Yuichi Ike (Univ. of Tokyo) plectic geometry

概要 We show the completeness of a derived category of sheaves with respect to the interleaving distance and construct a sheaf quantization of a Hamiltonian homeomorphism. We also develop Lusternik–Schnirelmann theory in the microlocal theory of sheaves. With these new tools, we prove an Arnold-type theorem for the image of the zero-section under a Hamiltonian homeomorphism.

14:15~16:30

- 35 佐古彰史 (東京理大理) 量子化全体の圏を用いた逆問題へのアプローチ 15
 Akifumi Sako (Tokyo Univ. of Sci.) Category of quantizations and its application to inverse problem

概要 We introduce a category composed of all quantizations of all Poisson algebras. By the category, we can treat in a unified way the various quantizations for all Poisson algebras and develop a new classical limit formulation. This formulation proposes a new method for the inverse problem, that is, the problem of finding the classical limit from a quantized space. Equivalence of quantizations is defined by using this category, and the conditions under which the two quantizations are equivalent are investigated. Two types of classical limits are defined as the limits in the context of category theory, and they are determined by giving a sequence of objects. Using these classical limits, we discuss the inverse problem of determining the classical limit from some noncommutative Lie algebra. We present a method to obtain this classical limit from the principle of least action by using matrix regularization.

- 36 鹿俣尚志 (東京理大理) Φ_2^3 有限行列模型における多点相関関数の厳密解 15
佐古彰史 (東京理大理)
Naoyuki Kanomata Exact solution of the multipoint correlation function in the Φ_2^3 finite
 (Tokyo Univ. of Sci.) matrix model
 Akifumi Sako (Tokyo Univ. of Sci.)

概要 We find the exact solutions of the Φ_2^3 finite matrix model (Grosse–Wulkenhaar model). In the Φ_2^3 finite matrix model, multipoint correlation functions are expressed as $G_{|a_1^1 \dots a_{N_1}^1| \dots |a_1^B \dots a_{N_B}^B|}$. It is known that any $G_{|a_1^1 \dots a_{N_1}^1| \dots |a_1^B \dots a_{N_B}^B|}$ can be expressed using $G_{|a^1| \dots |a^n|}$ type n -point functions. Thus we focus on rigorous calculations of $G_{|a^1| \dots |a^n|}$. The formula for $G_{|a^1| \dots |a^n|}$ is obtained, and it is achieved by using the partition function $\mathcal{Z}[J]$ calculated by the Harish-Chandra–Itzykson–Zuber integral.

- 37 池田 憲明 (立命館大理工) Homotopy momentum sections on pre-multisymplectic manifold 15
廣田 祐士 (麻布大獣医)
Noriaki Ikeda (Ritsumeikan Univ.) Homotopy momentum sections on pre-multisymplectic manifold
Yuji Hirota (Azabu Univ.)

概要 We introduce a notion of a homotopy momentum section on a Lie algebroid over a pre-multisymplectic manifold. A homotopy momentum section is a generalization of the momentum map with a Lie group action and the momentum section on a pre-symplectic manifold, and is also a generalization of the homotopy momentum map on a multisymplectic manifold.

- 38 濱中 翔太 全スカラー曲率に対する C^0, C^1 極限定理 15
(三菱電機先端技術総合研)
Shota Hamanaka C^0, C^1 limit theorems for total scalar curvatures
(Mitsubishi Electric Corp. Adv. Tech. R&D Center)

概要 We give some C^0 or C^1 limit theorems for total scalar curvatures. More precisely, we show that the lower bound of the total scalar curvatures on a closed manifold is preserved under the C^0 or C^1 convergence of the Riemannian metrics under some assumptions. Moreover, we give some counterexamples to the above theorems on an open manifold.

- 39 藤井 知輝 (東京理大理) 逆平均曲率流のグラフトランスレーティングソリトンと等径関数 15
Tomoki Fujii (Tokyo Univ. of Sci.) Graphical translating solitons for the inverse mean curvature flow and isoparametric functions

概要 In this talk, we consider a translating soliton for the inverse mean curvature flow given as the graph of a function over some domain of a Riemannian manifold whose level sets give isoparametric foliation. The translating soliton is the graph of a function which is a composition of an isoparametric function and a solution of a certain ordinary differential equation. In particular, in case where the Riemannian manifold is the sphere, we classify the shape of such translating solitons.

- 40 國川 慶太 (宇都宮大教育) Super Ricci flow に沿った Bamler–Zhang 型熱核評価 15
櫻井 陽平 (埼玉大理工)
Keita Kunikawa (Utsunomiya Univ.) Gaussian heat kernel estimates of Bamler–Zhang type along super Ricci
Yohei Sakurai (Saitama Univ.) flow

概要 Bamler–Zhang have developed geometric analysis on Ricci flow with scalar curvature bound. A part of their work can be extended to more general geometric flows. In this talk, we show Gaussian heat kernel estimates of Bamler–Zhang type along super Ricci flow with non-negative differential quantity.

- 41 近藤 慶 (岡山大理) リプシッツ関数に関するレーブの球面定理 15
Kei Kondo (Okayama Univ.) Reeb’s sphere theorem for Lipschitz functions

概要 We show the Reeb sphere theorem for Lipschitz functions, i.e., if a closed Riemannian manifold admits a Lipschitz function with exactly two singular points in the sense of Clarke, then the manifold is homeomorphic to the sphere.

函数論

9月13日(火) 第VIII会場

9:30~12:00

- 1 植木 誠一郎 (横浜国大工) 解析的 Besov 型 Bergman–Orlicz 空間の等距離写像 15
 Sei-Ichiro Ueki (Yokohama Nat. Univ.) Isometries of analytic Besov-type Bergman–Orlicz spaces

概要 We consider isometries of the analytic Besov-type Bergman–Orlicz space on the open unit disk. We describe the form of linear isometries of this space. Furthermore, we give the characterization for a subjective multiplicative isometry.

- 2 米田 力生 (金沢人間社会) 調和なシンボルを持つベルグマン空間上の可逆なテーパーリッツ作用素 .. 15
 Rikio Yoneda (Kanazawa Univ.) Invertibility of Toeplitz operators on the Bergman spaces with harmonic symbols

概要 We give the sufficient conditions ensuring the invertibility of Toeplitz operators on the Bergman spaces with harmonic symbols.

- 3 深作 亮也 (九大数理) 効率的な一変数留数計算アルゴリズム 15
 田島 慎一 (新潟大*)
 Ryoya Fukasaku (Kyushu Univ.) Efficient algorithms for computing univariate residues
 Shinichi Tajima (Niigata Univ.*)

概要 We introduce a new algorithm for computing univariate residues, which is based on the theories of local cohomology classes and differential operators. In addition, we compare the algorithm with existing algorithms.

- 4 綾野 孝則 (阪公大数学研) テレスコピック曲線のシグマ関数のべき級数展開の Hurwitz 整性 15
 Takanori Ayano (Osaka Metro. Univ.) Hurwitz integrality of the power series expansion of the sigma function for the telescopic curves

概要 The elliptic sigma function, which is defined and studied by Weierstrass, is generalized to the multivariable sigma functions associated with the higher genus curves. The coefficients of the power series expansion of the sigma function around the origin are included in the ring generated by the coefficients of the defining equations of an algebraic curve over the rationals. From this algebraic property, when a curve degenerates to a singular curve, the sigma function has a limit. Y. Onishi proved more precise property, i.e., the Hurwitz integrality of the power series expansion of the sigma function for the (n, s) curves. In this talk, we will generalize this result to the telescopic curves, which contain the (n, s) curves as special cases.

- 5 M. S. Alam (Univ. of Barishal) 一般化モジュラー方程式の解の幾何的導出について 15
 須川 敏幸 (東北大情報)
 Md Shafiqul Alam (Univ. of Barishal) On geometric deduction of the solutions to generalized modular equations
 Toshiyuki Sugawa (Tohoku Univ.)

概要 Ramanujan presented without proof many remarkable formulae for the solutions to generalized modular equations. Much later, proofs of the formulae were provided by making use of highly nontrivial identities for theta series and hypergeometric functions. We offer a geometric approach to the proof of those formulae. We emphasize that our proofs are geometric and independent of such identities.

- 6 小森洋平 (早大教育) Angle parameters for hyperelliptic Riemann surfaces 10
 Yohei Komori (Waseda Univ.) Angle parameters for hyperelliptic Riemann surfaces

概要 We show that any hyperelliptic Riemann surface can be parametrized by means of $4g-2$ angles between simple closed geodesics.

- 7 松田 凌 (京大理) \mathbb{Z} 作用を持つ Riemann 面の Teichüller 空間の測地線の構成について ... 15
 Ryo Matsuda (Kyoto Univ.) Geodesics on the Teichmüller space of a Riemann surface with \mathbb{Z} action

概要 Let R be a Riemann surface of infinite analytic type. We give sufficient conditions for extremality of Beltrami coefficients on R . Next, we apply these results to a discussion of geodesics in Teichmüller spaces. In particular, we explain a construction of a Beltrami coefficient μ_0 in $\text{Teich}(\mathbb{C} \setminus \mathbb{Z})$ satisfying the following conditions: $|\mu_0|(z) = \|\mu_0\|$ (a.e. z) and there exists a family of geodesics $\{\gamma_\lambda\}_{\lambda \in D}$ from $[0]$ to $[\mu_0]$ with complex analytic parameter, where D is an open set in l^∞ . This means that we cannot exclude condition $|\mu_0|(z) = \|\mu_0\|$, which is one of the necessary and sufficient conditions for the unique existence of a geodesic given by Earle–Kra–Krushkal’.

- 8 正井秀俊 (東工大理) 4点穴あき球面のタイヒミュラー測地線に沿った複素変形 15
 グレグマックシェーン
 (Inst. Fourier)

Hidetoshi Masai (Tokyo Tech) Deformation of complex structures on 4 punctured sphere along a Teichmüller geodesic
Greg McShane (Inst. Fourier)

概要 Some pictures and movies of complex structures on the 4 punctured sphere, and the mathematics behind them will be presented.

- 9 松崎克彦 (早大教育) Chordal Loewner chains and Teichmüller spaces on the half-plane 15
 Huaying Wei
 (Jiangsu Normal Univ.)

Katsuhiko Matsuzaki (Waseda Univ.) Chordal Loewner chains and Teichmüller spaces on the half-plane
 Huaying Wei (Jiangsu Normal Univ.)

概要 We consider a univalent analytic function f on the half-plane satisfying the condition that the supremum norm of its (pre-)Schwarzian derivative vanishes on the boundary. Under certain extra assumptions on f , we show that there exists a chordal Loewner chain initiated from f until some finite time, and this Loewner chain defines a quasiconformal extension of f over the boundary such that its complex dilatation is given explicitly in terms of the (pre-)Schwarzian derivative in some neighborhood of the boundary. As an application of this quasiconformal extension, we complete the characterization of an element of the VMO-Teichmüller space on the half-plane using the vanishing Carleson measure condition induced by the (pre-)Schwarzian derivative.

14:15~15:15

- 10 堀口俊二 Extended Mandelbrot sets of $f(z) = (z^m + c)^n$ 15
 Shunji Horiguchi Extended Mandelbrot sets of $f(z) = (z^m + c)^n$

概要 In section 1, we extend the Mandelbrot set $M(2,c,1)$ of $f(z)=z^2+c$ to $M(m,c,n)$ of $g(z)=(z^{**m+c})^{**n}$, and show that the extend Mandelbrot is connected,closed set. Nest we show that the outlines of $M(m,c,n)$ related to $M(1,c,mn)$ are same. In section 2, we give definitions of fractals. In section 3, we give 6 examples of extended Mandelbrot sets which are fractals.

- 11 渡邊天鵬 (京大 理) On the stochastic bifurcations regarding random iterations of polynomials of the form $z^2 + c_n$ 15
 Takayuki Watanabe (Kyoto Univ.) On the stochastic bifurcations regarding random iterations of polynomials of the form $z^2 + c_n$

概要 In this talk, we consider random iterations of polynomial maps $z^2 + c_n$ where c_n are complex-valued independent random variables following the uniform distribution on the closed disk with center c and radius r . The aim of this paper is twofold. First, we investigate the bifurcation of our proposed random iterations and give quantitative estimates of bifurcation parameters. Second, we apply the estimates to the (dis)connectedness of random Julia sets. In particular, we prove that for the central parameter $c = -1$, almost every random Julia set is totally disconnected with much smaller radial parameters r than expected.

- 12 奥山裕介 (京都工繊大基盤) Uniform perfectness in non-archimedean dynamics 15
 Yūsuke Okuyama (Kyoto Inst. Tech.) Uniform perfectness in non-archimedean dynamics

概要 The notion of uniform perfectness of subsets in \mathbb{C} (or \mathbb{P}^1) plays an important role in complex analysis, complex dynamics, and (complex) potential theory. In this talk, we will introduce a non-archimedean counterpart to this important notion, and give a few applications of it in non-archimedean dynamics and potential theory on the Berkovich projective line.

- 13 奥山裕介 (京都工繊大基盤) Reduction, quantization, and degeneration in non-archimedean and complex dynamics 15
 Yūsuke Okuyama (Kyoto Inst. Tech.) Reduction, quantization, and degeneration in non-archimedean and complex dynamics

概要 For a family of (complex) rational functions on \mathbb{P}^1 of degree $d > 1$ holomorphically parametrized by \mathbb{D}^* and meromorphically parametrized by \mathbb{D} , when this family degenerates at the puncture $t = 0$ for \mathbb{D}^* , the family of the equilibrium measures of each rational functions converges weakly as $t \rightarrow 0$. In this talk, we will complement a key computation in the proof of the above DeMarco–Faber’s degenerating limit theorem, which is in terms of reduction and quantization of non-archimedean dynamics on the Berkovich projective line.

15:30~16:30 特別講演

藤 解 和 也 (金 沢 大 理 工) 値分布論からの Stothers–Mason の定理再訪

Kazuya Tohge (Kanazawa Univ.) Revisiting the Stothers–Mason theorem with Nevanlinna

概要 By the Stothers–Mason theorem we mean the *abc* inequality for complex polynomials stating: *three relatively prime and non-constant polynomials a , b and c satisfy the relation $a + b = c$ only if each of their degree is at most the number of distinct roots of the product abc minus one.* It is well known that this estimate is sharp with many examples and applies to polynomial or rational solutions of Fermat-type equations as for Davavenport’s theorem, naturally. One can bring Picard’s Little Theorem over to the observation of $a + b = c$ so that some of the known generalizations of the Stothers–Mason theorem are stated in Nevanlinna’s value distribution theory of meromorphic functions on the complex plane. Then it is obvious that Wronskian plays an essential role in order to count the number of distinct roots of the *abc*. In this talk, we change this way of counting and see that another type of *abc* inequalities is available with another operation than differentiation. In other words, we introduce a new radical based on a judgment of multiple roots in a different angle. When one observes the multiplicity as the repletion number of roots with a fixed stride, the operation is, of course, the shift or difference operator. We give the *abc* inequality in this setting and apply it for the corresponding Fermat or Davavenport type estimates as well as for some known generalizations of the Stothers–Mason theorem. All those discussions proceed in parallel to the usual differential setting where Casoratian replaces Wronskian as a matter of course. Some of their extremal solutions can be exchanged in some translation rule. But we have found no indication of a possible geometric approach in the difference setting, yet. Hence this talk is all about complex functions of one variable and not about integers but a very naïve experiment. This is based on a joint work with K. Ishizaki, R. Korhonen, and N. Li.

9月14日(水) 第VIII会場

9:30~12:00

- 14 八 木 拓 己 (京 大 人 間 環 境) 半放物固定点を持つ2次エノン写像の摂動 15

Takumi Yagi (Kyoto Univ.) Perturbations of quadratic Hénon maps with a semi-parabolic fixed point

概要 We consider a family of dissipative quadratic complex Hénon maps $H_{a,t}$ with $a \in \mathbb{D}_\delta$ and $t \in [0, 1]$, where $\delta > 0$. Suppose that $H_{a,t}$ has a fixed point $\mathbf{q}_{a,t} \in \mathbb{C}^2$, depending continuously on a and t , with one eigenvalue λ_t such that $\lambda_t \rightarrow \lambda = \exp(2\pi ip/q)$, $(p, q) \in \mathbb{Z} \times \mathbb{N}$ as $t \rightarrow 0$. Let λ_t/λ be expressed by $\exp(L_t + i\theta_t)$ and $\theta_t \rightarrow 0$ as $t \rightarrow 0$. We prove that the Julia sets J and J^+ depend continuously on t if $\theta_t^2/L_t \log(|\theta_t/L_t|) \rightarrow 0$ as $t \rightarrow 0$. We see that $H_{a,t}$ is hyperbolic if $\theta_t = O(L_t)$ and $L_t \neq 0$. Moreover, $\{H_{a,t}\}$ is J -stable if $\theta_t = O(L_t)$ and $L_t \geq 0$.

- 15 小 川 智 史 (阪 公 大 理)
- S^1
- 束の構造を持つあるレビ平坦面周りの線形化 15

Satoshi Ogawa (Osaka Metro. Univ.) Linearization along a certain Levi-flat hypersurface with a S^1 -bundle structure

概要 We pose a normal form of transition functions along some Levi-flat hypersurfaces obtained by suspension. By focusing on methods in circle dynamics and linearization theorems, we give a sufficient condition to obtain a normal form as a geometrical analogue of Arnol’d’s linearization theorem.

- 16 本田 竜 広 (専修大商) Composition operators from the α -Bloch space into the β -Bloch space
濱田 英 隆 (九州産大理工) in several complex variables 15
Tatsuhiko Honda (Senshu Univ.) Composition operators from the α -Bloch space into the β -Bloch space
Hidetaka Hamada in several complex variables
(Kyushu Sangyo Univ.)

概要 In this talk, we first give a necessary and sufficient condition for the composition operator C_φ from the α -Bloch space into the β -Bloch space to be bounded. Next, we discuss a necessary condition for C_φ to be compact.

- 17 野口 潤 次 郎 (東大*・東工大*) On analytic Ax-Schanuel — I 10
Junjiro Noguchi On analytic Ax-Schanuel — I
(Univ. of Tokyo*/Tokyo Tech*)

概要 We give another proof of analytic Ax-Schanuel theorem for semi-abelian varieties by means of Nevanlinna theory. It was motivated by Schanuel's Conjecture, which implies the algebraic independence of e and π as a special case. The Ax-Schanuel Theorem is a formal functional version of Schanuel's Conjecture and was proved by Ax 1971 by making use of Kolchin's differential algebra. Here we give another proof of the analytic Ax-Schanuel Theorem by means of the Log Bloch-Ochiai Theorem and some estimate of integrals of log-differentials.

- 18 野口 潤 次 郎 (東大*・東工大*) On analytic Ax-Schanuel — II 15
Junjiro Noguchi On analytic Ax-Schanuel — II
(Univ. of Tokyo*/Tokyo Tech*)

概要 The purpose is to explore Nevanlinna theory of the entire curve $\widehat{\exp}f := (\exp f, f) : \mathbf{C} \rightarrow A \times \text{Lie}(A)$ associated with an entire curve $f : \mathbf{C} \rightarrow \text{Lie}(A)$, where A is a semi-abelian variety. In particular, we prove a *2nd Main Theorem* for $\widehat{\exp}f$ and its k -jet lifts with truncated counting functions at level one. We give some applications to a problem of a type raised by S. Lang and the unicity. The results clarify a relationship between the problems of Ax-Schanuel type and Nevanlinna theory.

- 19 松本 佳彦 (阪大理工) CR Killing 作用素と Bernstein-Gelfand-Gelfand 構成 15
Yoshihiko Matsumoto (Osaka Univ.) CR Killing operator and the Bernstein-Gelfand-Gelfand construction

概要 What we call the CR Killing operator D on a contact manifold (M, H) equipped with a compatible almost CR structure J (also known as a strictly pseudoconvex partially integrable almost CR manifold) is the linear differential operator describing trivial deformations of J . We report our recent finding that D can also be found as the first operator in the so-called Bernstein-Gelfand-Gelfand sequence. More precisely, D is the first BGG operator induced by a modified tractor connection introduced by Čap, not by the normal tractor connection, of the adjoint tractor bundle.

- 20 松本 和子 (東京理大理工) C^2 -写像に対する Hartogs の正則性定理と q -convex function に対する最大値の原理 15
Kazuko Matsumoto Hartogs' analyticity theorem for C^2 -mappings and maximum principle
(Tokyo Univ. of Sci.) for q -convex functions

概要 In this talk, we show that a C^2 -mapping from an open subset in \mathbb{C}^q to \mathbb{C}^k is holomorphic if its graph is pseudoconcave of order q . This is an extension of Hartogs' analyticity theorem. The proof is given using the characterization of pseudoconcave sets of order q by local maximum principle for q -convex functions.

- 21 I. D. Platis (Univ. of Crete) ハイゼンベルク群のケーラー錐について 15
 孫 立 杰 (山口大創成)
 Ioannis D. Platis (Univ. of Crete) On the Kähler cone of the Heisenberg group
 Lijie Sun (Yamaguchi Univ.)

概要 We review the Sasakian structure of the Heisenberg group and the Kähler structure of its Kähler cone. The latter provides the horospherical model of the complex hyperbolic plane, which is known as Siegel domain. We study the geometric properties of the Kähler manifolds, such as its curvature, geodesics. The Kähler manifolds and the complex hyperbolic plane are neither biholomorphic nor isometric; however, we prove that there exist subbundles of their respective $(1,0)$ tangent spaces such that the horospherical tangent map is a holomorphic isometry when restricted to those subbundles. This is a joint work with Ioannis D. Platis.

- 22 大 沢 健 夫 (名大多元数理)b Existence theorems on complex manifolds which are complete at infinity 15
 Takeo Ohsawa (Nagoya Univ.) Existence theorems on complex manifolds which are complete at infinity

概要 A complex manifold is said to be complete Kähler at infinity if it admits a complete metric whose fundamental form is closed outside a compact subset. A large amount of locally pseudoconvex domains have this property. It is expected that basic existence theorems on strongly pseudoconvex manifolds for coherent analytic sheaves have natural generalizations for locally free sheaves with appropriate curvature conditions on such manifolds. Affirmative results in this direction will be shown.

13:30~14:30 特別講演

- 田 島 慎 一 (新 潟 大*) 特異点の複素解析, 代数解析とアルゴリズム
 Shinichi Tajima (Niigata Univ.*) Complex and algebraic analysis of singularities, and algorithms

概要 We consider complex analytic properties of singularities. In this talk, we show that the use of local cohomology and Grothendieck local duality allow us to construct a new approach for studying singularities. As applications, we present several algorithms for computing complex analytic invariants of singularities. We study in particular non-isolated hypersurface singularities. By using Gröbner basis on Poincaré–Birkhoff–Witt algebra, we give a method for computing b-functions and holonomic D-modules associated to non-isolated hypersurface singularities. We study the structure of holonomic D-modules and give some applications to singularity theory.

函数方程式論

9月13日(火) 第II会場

9:45~12:00

- 1 塚本一郎 (東洋大理工) $x'' = \pm e^{\alpha\lambda t} x^{1+\alpha}$ の直線に漸近する解の解析的表示 10
 Ichiro Tsukamoto (Toyo Univ.) On asymptotically linear solutions of $x'' = \pm e^{\alpha\lambda t} x^{1+\alpha}$

概要 As already known, the differential equations denoted in the title have solutions asymptotic to linear functions as t tends to $-\infty$. In this talk, we get the asymptotic expansions of these in terms of Hukuhara's theory of a Briot–Bouquet differential equation.

- 2 安達駿弥 (熊本大自然) 2階 Fuchs 型微分方程式のモノドロミー不変 Hermite 形式 10
 Shunya Adachi (Kumamoto Univ.) Monodromy invariant Hermitian forms for second order Fuchsian differential equations

概要 In our previous work, we characterized the conditions for the monodromy of second order Fuchsian differential equations with four singularities to have an invariant Hermitian form. In this talk, we relax the assumption regarding the number of singularities. Namely, we consider the existence of monodromy invariant Hermitian form when the number of singularities is arbitrary. As a result, we give a criterion for the existence of monodromy invariant Hermitian forms in terms of monodromy variety.

- 3 間野修平 (統計数理研) コーダルグラフが定める行列が導く GKZ 超幾何多項式の特異値における
 高山信毅 (神戸大理) 和公式について 10
 Shuhei Mano (Inst. of Stat. Math.) A sum formula of GKZ-hypergeometric polynomials with matrices associated with chordal graphs at specific values
 Nobuki Takayama (Kobe Univ.)

概要 The graphical toric model is an important and interesting model in statistics. The normalizing constant of the probability function is a multi-variable polynomial and satisfies a GKZ hypergeometric holonomic system. Sundberg (1975) obtained a closed form expression of the special value of the polynomial when the graph is chordal. He derived it by using a factorization of the probability measure. From the GKZ point of view, the polynomial has an Euler type integral representation. We will give a proof for the formula by the integral representation.

- 4 佐々木真二 (芝浦工大建築) 二重変わり点における WKB 解析的変換の Borel 総和可能性 10
 Shinji Sasaki (Shibaura Inst. of Tech.) Borel summability of WKB-theoretic transformation near a double turning point

概要 We consider the one-dimensional stationary Schrödinger equation with a double turning point. Near the double turning point, the equation is WKB-theoretically transformed to the canonical equation (the degenerate Weber equation). Following the result of Kamimoto–Koike (2011) near a simple turning point, we give Borel summability of the transformation near a double turning point, so that we obtain the connection formula from the canonical equation via the transformation.

- 5 青木貴史 (近畿大*) Exact WKB analysis for the Pearcey system with a large parameter
 鈴木貴雄 (近畿大理工) 10
 内田匠風 (近畿大理工)
 Takashi Aoki (Kinki Univ.*) Exact WKB analysis for the Pearcey system with a large parameter
 Takao Suzuki (Kinki Univ.)
 Shofu Uchida (Kinki Univ.)

概要 The Pearcey system is an extension of the Airy equation for multi variables. In this talk, we show that the Borel transform of WKB solutions for the Pearcey system can be written as linear combinations of algebraic functions.

- 6 吉野正史 (広島大理) Movable singular point of solution of some Hamiltonian system 10
 Masafumi Yoshino (Hiroshima Univ.) Movable singular point of solution of some Hamiltonian system

概要 In this talk we study the solution of the Hamiltonian system with two movable singular points. We solve the Hamiltonian system by transforming it to a certain simpler Hamiltonian system by virtue of the homology equation and the global Borel summability method for PDEs.

- 7 石橋和葵 (広島商船高専) 比例微分制御を利用した減衰付き線形微分方程式の非振動定理 10
 Kazuki Ishibashi A nonoscillation theorem for damped linear differential equations with
 (Hiroshima Nat. Coll. of Maritime Tech.) a proportional derivative controller

概要 The proportional derivative controller of a differential operator is commonly referred to as the conformable derivative. In this talk, we present a nonoscillation theorem for damped linear differential equations with a differential operator using the conformable derivative of control theory. The proof of the nonoscillation theorem utilizes the Riccati inequality corresponding to the equation considered.

- 8 小川原弘士 2階線形 q 差分方程式の解の微分超越性 10
 (熊本大数理学総合教育センター)
 Hiroshi Ogawara (Kumamoto Univ.) Differential transcendence of solutions for second order linear q difference equations

概要 We investigate differential transcendence of solutions for second order linear q difference equations based on a criterion of Nishioka.

- 9 橋詰雅斗 (広島大理) Moser–Trudinger 不等式のべき乗近似 10
 猪奥倫左 (東北大理工)
 Masato Hashizume (Hiroshima Univ.) A power type approximation of the Moser–Trudinger inequality
 Norisuke Ioku (Tohoku Univ.)

概要 The Moser–Trudinger inequality is considered to be a limiting case of the Sobolev inequality in the framework of Orlicz spaces. However, the Moser–Trudinger inequality is not obtained via a direct limiting procedure. In this talk, we consider a Sobolev type inequality and some properties of the inequality. In particular, we show that the Carleson–Chang limit on the Moser–Trudinger inequality is derived by the limiting procedure for the concentration level of the Sobolev type inequality.

- 10 宇佐美広介 (岐阜大工) 摂動された半分線形常微分方程式の解の存在と漸近挙動について 10
 内藤学 (愛媛大*)
 Hiroyuki Usami (Gifu Univ.) On the existence and asymptotic behavior of solutions of perturbed
 Manabu Naito (Ehime Univ.*) half-linear ordinary differential equations

概要 Perturbed half-linear ordinary differential equations are considered near the infinity. When the perturbed term is identically zero, every nontrivial solutions of the equation behaves like exponential functions near the infinity. We show that, if the perturbed term is small enough, every nontrivial solution of the equation still behaves like exponential functions.

14:15~16:45

- 11 柴田徹太郎 (広島大先進理工) Oscillatory bifurcation problems for ODEs with logarithmic nonlinearity
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 Tetsutaro Shibata (Hiroshima Univ.) Oscillatory bifurcation problems for ODEs with logarithmic nonlinearity

概要 We consider the asymptotic behavior of the bifurcation curve of nonlinear ODEs with logarithmic and oscillatory terms. It is well known that the bifurcation curve λ is a continuous function of the maximum norm $\alpha = \|u_\lambda\|_\infty$ of the solution u_λ corresponding to λ . Moreover, it is parameterized by α such as $\lambda = \lambda(\alpha)$. Our goal is to obtain the asymptotic formula for $\sqrt{\lambda(\alpha)}$ as $\alpha \rightarrow \infty$.

- 12 森竜樹 (武蔵野大工) Secondary bifurcation and the direction of bifurcation of stationary so-
 田崎創平 (北大理) lutions to a phase field model 10
 辻川亨 (宮崎大*)
 四ツ谷晶二 (龍谷大*)
 Tatsuki Mori (Musashino Univ.) Secondary bifurcation and the direction of bifurcation of stationary so-
 Sohei Tasaki (Hokkaido Univ.) lutions to a phase field model
 Tohru Tsujikawa (Univ. of Miyazaki*)
 Shoji Yotsutani (Ryukoku Univ.*)

概要 We are concerned with bifurcation diagrams of stationary solutions to a phase field model proposed by Fix and followed by Caginalp. We obtained all global bifurcation diagrams of stationary solutions, which include the secondary bifurcation from odd symmetric solutions. In this talk, we clarify the direction of bifurcation after the secondary bifurcation. The direction of bifurcation is crucial for investigating the stability/instability of solutions.

- 13 梶木屋龍治 劣線形 Moore–Nehari 方程式の解の分岐 10
 (大阪電通大共通教育機構)
 Ryuji Kajikiya Bifurcation of solutions for the sublinear Moore–Nehari differential equation
 (Osaka Electro-Comm. Univ.) tion

概要 We study the bifurcation of symmetric nodal solutions for the sublinear Moore–Nehari equation. Here we call a solution symmetric if it is even or odd. For a nonnegative integer n , we call a solution n -nodal if it has exactly n zeros in $(-1, 1)$. We denote the unique n -nodal symmetric solution by $u_n(x, \lambda)$. We prove that if n is even, $u_n(x, \lambda)$ does not bifurcate, however if n is odd, it bifurcates at a certain point and a bifurcation branch consists of asymmetric solutions.

- 14 長田 祐輝 (都立大理) 3波相互作用をもつ非線形シュレディンガー方程式系に対する特異摂動問題 10

Yuki Osada (Tokyo Metro. Univ.) A singular perturbation problem for a nonlinear Schrödinger system with three wave interaction

概要 In this talk, we consider the locations of spikes of ground states for the following nonlinear Schrödinger system with three wave interaction

$$\begin{cases} -\varepsilon^2 \Delta u_1 + V_1(x)u_1 = |u_1|^{p-1}u_1 + \gamma u_2 u_3 & \text{in } \mathbb{R}^N, \\ -\varepsilon^2 \Delta u_2 + V_2(x)u_2 = |u_2|^{p-1}u_2 + \gamma u_1 u_3 & \text{in } \mathbb{R}^N, \\ -\varepsilon^2 \Delta u_3 + V_3(x)u_3 = |u_3|^{p-1}u_3 + \gamma u_1 u_2 & \text{in } \mathbb{R}^N \end{cases}$$

as $\varepsilon \rightarrow +0$, where $N \leq 5$, $2 \leq p < 2^* - 1$, $2^* = \infty$ ($N \leq 2$), $2^* = 2N/(N-2)$ ($N \geq 3$), $\varepsilon, \gamma > 0$. More precisely, we define a function ρ , where the spikes are trapped at the minimum points of $\rho(V_1(x), V_2(x), V_3(x))$ under certain conditions.

- 15 田中 敏 (東北大理) Existence and multiplicity of positive solutions to the scalar-field equation on large annuli in the 3-sphere 10
渡辺宏太郎 (防衛大) 塩路直樹 (横浜国大工)

Satoshi Tanaka (Tohoku Univ.) Existence and multiplicity of positive solutions to the scalar-field equation on large annuli in the 3-sphere

Kotaro Watanabe

(Nat. Defense Acad. of Japan)

Naoki Shioji (Yokohama Nat. Univ.)

概要 A Dirichlet problem for the scalar-field equation on an annular domain in the unit 3-sphere is considered. The existence and multiplicity of positive solutions are shown.

- 16 内藤雄基 (広島大理) Singular solutions for semilinear elliptic equations with general supercritical growth 10
宮本安人 (東大数理)

Yuki Naito (Hiroshima Univ.) Singular solutions for semilinear elliptic equations with general supercritical growth
Yasuhito Miyamoto (Univ. of Tokyo)

概要 A positive radial singular solution for $\Delta u + f(u) = 0$ with a general supercritical growth is constructed. An exact asymptotic expansion as well as its uniqueness in the space of radial functions are also established. These results can be applied to the bifurcation problem $\Delta u + \lambda f(u) = 0$ on a ball. Our method can treat a wide class of nonlinearities in a unified way, e.g., $u^p \log u$, $\exp(u^p)$ and $\exp(\cdots \exp(u) \cdots)$ as well as u^p and e^u . Main technical tools are intrinsic transformations for semilinear elliptic equations and ODE techniques.

- 17 井上 順平 (早大理工) ロジスティック方程式のディリクレ問題における最適棲息分布 10

Jumpei Inoue (Waseda Univ.) On the optimal habitat profile for the Dirichlet problem of a logistic equation

概要 This talk is concerned with the stationary problem for a diffusive logistic equation with the homogeneous Dirichlet boundary condition. Relating to the corresponding Neumann problem, Wei-Ming Ni proposed a question as follows: Maximizing the ratio of the total masses of species to resources. For this question, Bai, He and Li showed that the supremum of the ratio is 3 in the one dimensional case, and the speaker and Kuto showed that the supremum is infinity in the multi-dimensional ball. In this talk, we show the same results still hold true for the Dirichlet problem.

- 18 北野修平 (早大理工) 完全非線形積分方程式における $W^{\sigma,p}$ 評価 10
 Shuhei Kitano (Waseda Univ.) $W^{\sigma,p}$ a priori estimates for fully nonlinear integral equations

概要 In this talk, we discuss $W^{\sigma,p}$ estimates for a class of fully nonlinear integral equations of order σ , which are analogues of $W^{2,p}$ estimates by Caffarelli. We also obtain ABP maximum principles, which are improvements of estimates proved by Guillen and Schwab, depending only on L^p norms of inhomogeneous terms.

- 19 北野修平 (早大理工) 非有界非斉次項を伴う完全非線形積分方程式における ABP 最大値原理 10
 Shuhei Kitano (Waseda Univ.) ABP maximum principles for fully nonlinear integral equations with unbounded inhomogeneous terms

概要 ABP maximum principles for integral equations have been investigated by Caffarelli–Silvestre and Guillen–Schwab, but strictly depends on the boundness of inhomogeneous terms. We present an improved ABP maximum principle when the order of equation is close to 2, by using a new iteration method.

- 20 藤田安啓 (富山大理) Hamilton–Jacobi flow と初期値の至る所微分不可能性 10
 山口範和 (富山大教育)
 A. Siconolfi
 (Sapienza Univ. di Roma)

Yasuhiro Fujita (Univ. of Toyama) Hamilton–Jacobi flows and nowhere differentiability of initial data
 Norikazu Yamaguchi (Univ. of Toyama)
 Antonio Siconolfi
 (Sapienza Univ. di Roma)

概要 In this talk, we report that nowhere differentiability of initial data can be derived from specific assumptions on the Hamilton–Jacobi flow issued from these data. This is a sort of inverse problem. The results of this talk can be seen in an electronic version of *Mathematische Annalen*, <https://doi.org/10.1007/s00208-021-02353-w>, Open Access.

- 21 鈴木 貴 (阪大 M M D S) 領域変動に関する固有値の微分可能性 5
 Takashi Suzuki (Osaka Univ.) Differentiability of eigenvalues concerning domain perturbations

概要 We show the first and the second differentiability of the eigenvalues of Laplacian concerning general perturbation of Lipschitz domains provided with mixed boundary conditions, particularly, for multiple eigenvalues. This property is valid if the order of eigenvalues is changed and the derivatives are characterized by the other eigenvalues on finite dimensional spaces. Joint work with Takuya Tsuchiya.

17:00~18:00 特別講演

- 山川大亮 (東京理大理) モノドロミー保存変形の幾何学と対称性
 Daisuke Yamakawa
 (Tokyo Univ. of Sci.) Geometry and symmetry of isomonodromic deformations

概要 Isomonodromic deformations are some nice deformations of linear ordinary differential equations with meromorphic coefficients and are governed by nonlinear differential equations, called the isomonodromy equations. The most famous examples of isomonodromy equations are the Painlevé equations. I will give an overview of some topics on isomonodromic deformations relating to the algebraic and symplectic geometry.

9月14日(水) 第II会場

9:45~12:00

- 22 廣瀬和也(北大理) A dynamical approach to lower gradient estimates for viscosity solutions
 浜向直(北大理) of Hamilton–Jacobi equations 10
 Kazuya Hirose (Hokkaido Univ.) A dynamical approach to lower gradient estimates for viscosity solutions
 Nao Hamamuki (Hokkaido Univ.) of Hamilton–Jacobi equations

概要 In this talk, we present a new approach to deriving lower bounds for gradients of a viscosity solution to a Hamilton–Jacobi equation when the Hamiltonian is convex. For the proof, we study solutions to the approximate Hamiltonian systems. Moreover, we compare our results with the previous work by O. Ley (2001). We show that our results give better and optimal estimates in several senses.

- 23 三栖邦康(北大理) 平均曲率流方程式の障害物問題の解の漸近挙動 —ゲーム理論的アプローチ— 10
 Kuniyasu Misu (Hokkaido Univ.) A game-theoretic approach to the asymptotic behavior of solutions to an obstacle problem for the mean curvature flow equation

概要 We consider the asymptotic behavior of solutions to an obstacle problem for the mean curvature flow equation by using a game-theoretic approximation, which we extend from that of Kohn and Serfaty (2006). We prove that moving curves governed by the mean curvature flow converge in time to the boundary of the convex hull of obstacles under some assumptions on the initial curves and obstacles. In these proofs, we utilize the properties of the game trajectories given by very elementary game strategies.

- 24 森龍之介(明大MIMS) 移流項付き一般化平均曲率流に対する強解について 10
 富松瑛太(東工大理)
 利根川吉廣(東工大理)
 Ryunosuke Mori (Meiji Univ.) On a strong solution to a generalized mean curvature flow with a transport term in the sense of Brakke’s formulation
 Eita Tomimatsu (Tokyo Tech)
 Yoshihiro Tonegawa (Tokyo Tech)

概要 Suppose that a family of k -dimensional surfaces in \mathbb{R}^n evolves by the generalized mean curvature flow with a given transport vector u in the sense of Brakke’s formulation of velocity. When the flow is locally close to a time-dependent k -dimensional plane in a weak sense of measure in space-time, it is represented as a graph of a $C^{1,\alpha}$ function over the plane. On the other hand, it is not known if the graph satisfies the corresponding PDE pointwise in general. For this problem, when $k = n - 1$ and the distributional time derivative of the graph is a signed Radon measure, it is proved that the graph satisfies the PDE pointwise. An application to a short-time existence theorem for a surface evolution problem is given.

- 25 高棹圭介 任意の空間次元における体積保存平均曲率流方程式の弱解の存在について 10
 (京大理・京大白眉センター)
 Keisuke Takasao Existence of weak solution to volume preserving mean curvature flow in all dimensions
 (Kyoto Univ./Kyoto Univ.)

概要 We consider the weak solution to the volume preserving mean curvature flow. In 2016, Mugnai, Seis, and Spadaro proved the existence of the weak solution (flat flow) by the minimizing movement scheme. In addition, they also showed that the flat flow is the distributional solution under the reasonable assumption for the convergence of the approximate solution. In this talk, we prove the existence of the weak solution called L^2 -flow via the phase field method without the assumption. We also show that the weak solution is the distributional solution for a short time, under an assumption for initial data.

- 26 伊藤 涼 (神奈川大理) 反応拡散方程式の非有界な進行波解 10
 二宮 広和 (明大総合数理)
 Ryo Ito (Kanagawa Univ.) Unbounded traveling wave solutions for reaction-diffusion equations
 Hirokazu Ninomiya (Meiji Univ.)

概要 We discuss the existence of unbounded traveling wave solutions for one dimensional reaction-diffusion equations with several type of nonlinearities. It is well known that in the monostable nonlinearity case there exist traveling wave solutions connecting two zero points. The idea of this study is varying the one zero point. We consider the question: what happens when one of the zero point goes to infinity? The purpose of this study is to construct a theory of unbounded traveling wave solutions and to reconsider the classical theory of traveling wave solutions from new viewpoint introduced in this study.

- 27 市田 優 (明大理工) 相空間のコンパクト化に基づくある走化性方程式系の球対称定常解 10
 Yu Ichida (Meiji Univ.) Radially symmetric stationary solutions for certain chemotaxis systems based on compactification in phase space

概要 This talk reports results on the existence, shapes, and asymptotic behavior of positive radially symmetric stationary solutions for several models (the simplest parabolic-elliptic Keller–Segel model and the simplest attraction-repulsion chemotaxis system) of chemotaxis in higher dimensions, using a method that combines classical results from the continuous dynamical systems theory and Poincaré–Lyapunov compactification. The key to the discussion is to derive a scalar equation by using a transformation on the averaged mass for the equation satisfied by the radially symmetric stationary solution and to investigate the infinity dynamics as geometric information for the two-dimensional ordinary differential equations derived from it.

- 28 井上 順平 (早大理工) Full cross-diffusion limit in the stationary SKT model with Dirichlet
 久藤 衡介 (早大理工) boundary conditions 10
 佐藤 誉 (早大理工)
 Jumpei Inoue (Waseda Univ.) Full cross-diffusion limit in the stationary SKT model with Dirichlet
 Kousuke Kuto (Waseda Univ.) boundary conditions
 Homare Sato (Waseda Univ.)

概要 This talk is concerned with positive steady-states of the Shigesada–Kawasaki–Teramoto model with homogeneous Dirichlet boundary conditions. A main result reveals that the asymptotic behavior of positive steady-states as both cross-diffusion terms tend to infinity can be classified into two types. Furthermore, each type is characterized by the limiting system. Concerning one of two limiting systems, we obtain the global bifurcation structure.

- 29 塚本 悠暉 (明大研究・知財) ある反応拡散近似の収束性について 10
 Yuki Tsukamoto (Meiji Univ.) A convergence of reaction-diffusion approximation

概要 We consider a singular limit problem called the fast reaction limit. This problem has been studied extensively when the reaction terms of each component are the same function in a two-component system. However, it is not fully understood how solutions behave in problems with different reaction terms. In this talk, we will consider the problem where the reaction term is represented by a power term. We proved that the initial interface instantly vanishes and the function converges to a function satisfying the heat equation.

- 30 石井裕太 (茨城工高専) Y 字グラフにおける Gierer–Meinhardt モデルの多重ピーク解の存在と安定性について 10

Yuta Ishii (Ibaraki Nat. Coll. of Tech.) The existence and stability of multi-peak solutions to the Gierer–Meinhardt model on Y -shaped metric graph

概要 In this talk, we consider the existence and the stability of two-peak solutions to the Gierer–Meinhardt model with heterogeneity in front of nonlinear terms on Y -shaped metric graphs. In particular, we explain that the location, amplitude, and stability of spikes are decided by the interaction of the heterogeneity function with the geometry of the graph, represented by the associated Green’s function. Also, to investigate the effect of the geometry of the graph in details, we consider the non-heterogeneity function case, comparing the corresponding previous works of the one-dimensional interval case.

- 31 石井裕太 (茨城工高専) スターグラフにおける Schnakenberg モデルの多重ピーク解の存在と安定性について 10

Yuta Ishii (Ibaraki Nat. Coll. of Tech.) The existence and stability of multi-peak solutions to the Schnakenberg model on star shaped metric graph

概要 In this talk, we explain the results on the existence and the stability of N -peak solutions to the Schnakenberg model with heterogeneity in front of nonlinear terms on star shaped metric graphs. The location, amplitude, and stability of spikes are decided by the effects of the heterogeneity function and the geometry of the graph represented by the associated Green’s function. Also, by considering non-heterogeneity function case, we describe the effects of the geometry of a star graph on N -peak solution in details. Moreover, we give the classification of the lengths of segments in the case that spikes are arranged on segments one by one.

13:30~14:30 特別講演

柴田将敬 (名城大理工) H^1 臨界項を持つ準線形楕円型方程式の正值解の漸近挙動

Masataka Shibata (Meiji Univ.) Asymptotic behavior of positive solutions for a class of quasilinear elliptic equations with H^1 -critical growth

概要 We consider a quasilinear elliptic equation $-\Delta u - \kappa u \Delta(u^2) = u^p - u$ in \mathbb{R}^N , where $N \geq 3$, $p > 1$, $\kappa > 0$. The equation appears in the study of standing waves of a modified Schrödinger equation. In this talk, we focus on the case of $p + 1 = 2^*$ (H^1 -critical case) and discuss the asymptotic behavior of positive solutions.

9月15日(木) 第II会場

9:45~12:00

- 32 池田幸太 (明大総合数理) 樟脳粒の集団運動における一様流の安定性解析 10

Kota Ikeda (Meiji Univ.) Stability analysis of a uniform flow in a mathematical model of camphor boats

概要 Various collective motions of camphor boats, called jamming, clustering, and swarming state observed in a one-dimensional circuit, have been studied. It is expected that the center manifold theories proposed in previous works are useful for the analysis of the collective motion of camphor boats. In my previous work, we have developed a new theory for a system with Dirac’s delta functions in L^2 -framework. In this talk, we will examine the stability analysis in the reduced system and numerically show that the uniform flow can be destabilized even if the length of the circuit is large.

- 33 兼子裕大 (日本女大理) Positive bistable 項を伴う反応拡散方程式の自由境界問題に対する球対称
松澤寛 (神奈川大理) 解の漸近挙動 10
山田義雄 (早大理工)
Yuki Kaneko (Japan Women's Univ.) Asymptotic behaviors of radially symmetric solutions for a free bound-
Hiroshi Matsuzawa (Kanagawa Univ.) ary problem of a reaction-diffusion equation with positive bistable non-
Yoshio Yamada (Waseda Univ.) linearity

概要 We consider a free boundary problem for a reaction-diffusion equation with positive bistable non-linearity under a radially symmetric environment. This problem may be applied to model the spreading of biological species, where unknown functions are population density and spreading front of the species. In this talk, we will classify the asymptotic behaviors of solutions into four cases: Big spreading, Small spreading, Transition and Vanishing, and give some sufficient conditions for each dynamical behavior. We will also discuss the spreading speed of the free boundary.

- 34 水上雅昭 (京都教育大) Occurrence of blow-up phenomena by chemotactic effects in a two-
田中悠也 (東京理大理) species chemotaxis-competition model 10
横田智巳 (東京理大理)
Masaaki Mizukami Occurrence of blow-up phenomena by chemotactic effects in a two-
(Kyoto Univ. of Edu.) species chemotaxis-competition model
Yuya Tanaka (Tokyo Univ. of Sci.)
Tomomi Yokota (Tokyo Univ. of Sci.)

概要 This talk deals with occurrence of blow-up phenomena in a diffusive Lotka–Volterra competition model with chemotaxis. In 2012 Tello–Winkler (Nonlinearity; 2012: 25; 1413–1425) proposed a diffusive Lotka–Volterra competition model having chemotaxis terms. As to this model, boundedness of solutions was obtained under conditions that chemotactic effect is small by e.g. Tello–Winkler (2012) and Mizukami (Math. Methods Appl. Sci.; 2018; 41; 234–249). However, blow-up of solutions has not been derived yet. The purpose of this talk is to discuss whether solutions blow up.

- 35 F. Salin (東北大理) Existence of energy solutions to fractional nonlinear diffusion equations
赤木剛朗 (東北大理) posed on bounded domains 10
Florian Salin (Tohoku Univ.) Existence of energy solutions to fractional nonlinear diffusion equations
Goro Akagi (Tohoku Univ.) posed on bounded domains

概要 This talk is concerned with existence and uniqueness of energy solutions to the Cauchy–Dirichlet problem posed on bounded domains for nonlinear diffusion equations involving the so-called restricted fractional Laplacians.

- 36 オーヘーダヒ (東北大理) 表面準地衡方程式の解の最適な減衰評価 10
岩淵司 (東北大理)
Dáithí Ó hAodha (Tohoku Univ.) The optimal decay estimate of solutions to the surface quasi-geostrophic
Tsukasa Iwabuchi (Tohoku Univ.) equation

概要 We construct a linear approximation of the solution to the Surface Quasi-Geostrophic Equation in two-dimensional Euclidean space, and obtain a convergence rate, in the Lebesgue norm, between the solution and this approximation with respect to time. We also demonstrate that the nonlinear term of the solution is bounded sharply by the same function of time.

- 37 岩 瀨 司 (東 北 大 理) Semigroups generated by fractional Laplacian and Sobolev spaces on
R. Farwig
(ダルムシュタット工科大) arbitrary domains 10
- Tsukasa Iwabuchi (Tohoku Univ.) Semigroups generated by fractional Laplacian and Sobolev spaces on
Reinhard Farwig (TU Darmstadt) arbitrary domains

概要 We show several estimates of the semigroup generated by the fractional Dirichlet Laplacian on an arbitrary domain of \mathbb{R}^d . We also describe a procedure to introduce Sobolev spaces associated with the Dirichlet Laplacian.

- 38 上 村 豊 (東京海洋大*)^b エネルギー依存逆散乱と爆発ソリトン 10
Yutaka Kamimura
(Tokyo Univ. of Marine Sci. and Tech.*) Energy dependent inverse scattering and exploding soliton

概要 An inverse scattering method is established for finding soliton solutions of a hierarchy generalising the KdV hierarchy. The soliton solutions become generically exploding solitons.

- 39 山 崎 陽 平 (九 大 数 理) Center stable manifold for ground states of nonlinear Schrödinger equa-
前 田 昌 也 (千 葉 大 理) tions with internal modes 10
Yohei Yamazaki (Kyushu Univ.) Center stable manifold for ground states of nonlinear Schrödinger equa-
Masaya Maeda (Chiba Univ.) tions with internal modes

概要 We study the dynamics of solutions of nonlinear Schrödinger equation near unstable ground states. The existence of the local center stable manifold around ground states and the asymptotic stability for the solutions on the manifold is proved. The novelty of our result is that we allow the existence of internal modes.

- 40 木 下 智 晴 (早 大 理 工) Infinitely many solutions for nonlinear Schrödinger equations under
Berestycki–Lions condition 10
Tomoharu Kinoshita (Waseda Univ.) Infinitely many solutions for nonlinear Schrödinger equations under
Berestycki–Lions condition

概要 In this talk, we study the existence and multiplicity of solutions of the nonlinear Schrödinger equations under Berestycki–Lions condition. For this purpose, we apply a new deformation lemma argument under a new version of the Palais–Smale condition.

- 41 林 雅 行 (京 大 理) Traveling waves for a nonlinear Schrödinger system with quadratic in-
深 谷 法 良 (東京理大理) teraction 10
戌 亥 隆 恭
(阪大理・プリティッシュコロロンビア大)
Masayuki Hayashi (Kyoto Univ.) Traveling waves for a nonlinear Schrödinger system with quadratic in-
Noriyoshi Fukaya (Tokyo Univ. of Sci.) teraction
Takahisa Inui
(Osaka Univ./Univ. of British Columbia)

概要 We study traveling wave solutions for a system of nonlinear Schrödinger equations with quadratic interaction. For the non mass-resonance case, the system has no specific symmetry such as Galilean or pseudo-conformal symmetry, which is of particular interest. We construct traveling wave solutions by variational methods, and also show global existence for oscillating large data as an application.

14:15~16:45

- 42 加藤 勲 (京大 理) Ill-posedness for the half wave Schrödinger equation 10
 Isao Kato (Kyoto Univ.) Ill-posedness for the half wave Schrödinger equation

概要 We study the Cauchy problem for the half wave Schrödinger equation introduced by Xu (2017). There are some well-posedness results for the equation, however there is no ill-posedness result. We focus on the scale critical space and obtain the ill-posedness in the super-critical or the critical space under certain condition. The proof in the super-critical space is based on the argument established by Christ, Colliander and Tao (2003). For the critical space, we use the standing wave solution, which was proved the existence by Bahri, Ibrahim and Kikuchi (2021).

- 43 中橋 涉 (東京理大理) Non-smoothness of the fundamental solutions of Schrödinger equations
 加藤 圭一 (東京理大理) in three dimensions with super-quadratic potential 10
 Wataru Nakahashi (Tokyo Univ. of Sci.) Non-smoothness of the fundamental solutions of Schrödinger equations
 Keiichi Kato (Tokyo Univ. of Sci.) in three dimensions with super-quadratic potential

概要 We consider non-smoothness of the fundamental solution for the initial value problem of the Schrödinger equations with super-quadratic scalar potential. One dimensional case was studied by K. Yajima (1996). The purpose of this talk is to show the case which spatial dimension is three and scalar potential is radical.

- 44 松井 直己 (東京理大理) Minimal-mass blow-up solutions for inhomogeneous nonlinear Schrödinger
 equations with potentials 10
 Naoki Matsui (Tokyo Univ. of Sci.) Minimal-mass blow-up solutions for inhomogeneous nonlinear Schrödinger
 equations with potentials

概要 It is known that all the subcritical mass solutions of the nonlinear Schrödinger equation with L^2 -critical power-type nonlinear terms and small perturbation terms are bounded time global solutions. On the other hand, in the critical mass case, blow-up solutions may exist. In this talk, I treat an equation with the power-type nonlinear terms with inhomogeneity and a potential including a growing one as a smaller perturbation term, and state that there exists a critical mass blow-up solution for this equation.

- 45 佐川 侑司 (千葉工大工) Upper and lower L^2 -decay bounds for a class of derivative nonlinear
 Chunhua Li (Yanbian Univ.) Schrödinger equations 10
 西井 良徳 (東京理大理)
 砂川 秀明 (阪公大理)
 Yuji Sagawa (Chiba Inst. of Tech.) Upper and lower L^2 -decay bounds for a class of derivative nonlinear
 Chunhua Li (Yanbian Univ.) Schrödinger equations
 Yoshinori Nishii (Tokyo Univ. of Sci.)
 Hideaki Sunagawa
 (Osaka Metro. Univ.)

概要 We consider the initial value problem for cubic derivative nonlinear Schroedinger equations possessing weakly dissipative structure in one space dimension. We show that the small data solution decays like $O(-1/4 \text{ power of } (\log t))$ in L^2 as t tends to infinity. Furthermore, we find that this L^2 -decay rate is optimal by giving a lower estimate of the same order.

- 46 佐藤拓也 (東北大理) 北直泰 (熊本大先端) Optimal L^2 -decay of solutions to dissipative nonlinear Schrödinger equations with a critical cubic nonlinearity 10
Takuya Sato (Tohoku Univ.) Optimal L^2 -decay of solutions to dissipative nonlinear Schrödinger equations with a critical cubic nonlinearity
Naoyasu Kita (Kumamoto Univ.) Optimal L^2 -decay of solutions to dissipative nonlinear Schrödinger equations with a critical cubic nonlinearity

概要 We consider the optimality of L^2 -decay of solutions to the Cauchy problem of dissipative nonlinear Schrödinger equations with a long-range nonlinearity. We show that the L^2 -norms of any global solutions do not decay more rapidly than $(\log t)^{-1/2}$, and we also prove that there exists a solution decaying just at the rate of $(\log t)^{-1/2}$ in L^2 . This talk is based on the joint work with Professor Naoyasu Kita (Kumamoto University).

- 47 平良晃一 (立命館大理工) Strichartz estimates for Schrödinger equations with slowly decreasing potentials in dimension two 10
Kouichi Taira (Ritsumeikan Univ.) Strichartz estimates for Schrödinger equations with slowly decreasing potentials in dimension two

概要 In this talk, we introduce a result on the Strichartz estimates for Schrödinger equations with slowly decreasing potentials in dimension two. It is a generalization of a recent result by Mizutani. Ingredients of the proof are Kato's perturbation method, resolvent estimates near zero energy and Hardy's inequality.

- 48 鈴木敏行 (神奈川大工) Nonlinear Schrödinger equations with some singular electromagnetic potentials of the critical scaling 10
Toshiyuki Suzuki (Kanagawa Univ.) Nonlinear Schrödinger equations with some singular electromagnetic potentials of the critical scaling

概要 We consider the Cauchy problems for nonlinear Schrödinger equations with the singular electromagnetic field. Here the electric potential V and the magnetic potential A satisfy $V(\mu x) = \mu^{-2}V(x)$, $A(\mu x) = \mu^{-1}A(x)$, and $x \cdot A(x) = 0$. The main result is the unique existence of the solution to the semilinear problems under the condition that $P := (-i\nabla + A)^2 + A$ is nonnegative and selfadjoint in the sense of Friedrichs extension.

- 49 宮崎隼人 (香川大教育) 川本昌紀 (愛媛大理工) 時間減衰する調和振動子を持つ臨界斉次型非線形シュレディンガー方程式における長距離散乱について 10
Hayato Miyazaki (Kagawa Univ.) Long-range scattering for a critical homogeneous type nonlinear Schrödinger equation with time-decaying harmonic potentials
Masaki Kawamoto (Ehime Univ.) Long-range scattering for a critical homogeneous type nonlinear Schrödinger equation with time-decaying harmonic potentials

概要 We consider the final state problem for a homogeneous type nonlinear Schrödinger equation with time-decaying harmonic potential. The nonlinearity has the critical order and is not necessarily the form of a polynomial. In the case of the gauge-invariant nonlinearity, Kawamoto proves that the equation admits a nontrivial solution that behaves like a free solution with a logarithmic phase correction. In this talk, we extend his result into the case with the general homogeneous nonlinearity by the technique due to the Fourier series expansion introduced by Masaki and Miyazaki. To prove the main result, we develop a factorization identity for the propagator and require a little stronger decay condition for the Fourier coefficients arising from the harmonic potential.

- 50 A. H. Ardila (Univ. Federal de Minas Gerais) Global dynamics of mass-energy threshold for NLS with an inverse-power potential 10
 浜野大 (早大理工)
 池田正弘 (理化学研 AIP・慶大理工)
 Alex Hernandez Ardila (Univ. Federal de Minas Gerais) Global dynamics of mass-energy threshold for NLS with an inverse-power potential
 Masaru Hamano (Waseda Univ.)
 Masahiro Ikeda (RIKEN/Keio Univ.)

概要 In this talk, we treat a nonlinear Schrödinger equation with an inverse-power potential. In particular, we consider global dynamics of mass-energy threshold for the equation. Here, mass-energy threshold implies solutions, whom the product of its mass and energy is equal to that of the ground state to a nonlinear Schrödinger equation without the potential. We prove that if a virial functional of initial data is positive, then the solution scatters and if a virial functional of initial data is negative and “the initial data is radial or has finite variance”, then the solution blow-up in finite time.

- 51 水谷治哉 (阪大理工) 1次元4階 Schrödinger 作用素に対する波動作用素の L^p 有界性 10
 Zijun Wan (華中師範大)
 Xiaohua Yao (華中師範大)
 Haruya Mizutani (Osaka Univ.) The L^p -boundedness of wave operators for fourth-order Schrödinger operators in one space dimension
 Zijun Wan (Central China Normal Univ.)
 Xiaohua Yao (Central China Normal Univ.)

概要 Some recent progress on the L^p -boundedness properties of the wave operators for fourth-order Schrödinger operators in one space dimension will be discussed. For instance, we will provide some conditions on the potential and spectrum of the Hamiltonian such that the wave operators are bounded on the weighted L^p spaces for any non-endpoint p and of weighted weak-type (1,1) with general even Muckenhoupt weights.

- 52 中里亮介 (早大理工)b Hall 効果を考慮した量子プラズマ MHD モデルの時間大域適切性と時間減衰評価について 10
 Ryosuke Nakasato (Waseda Univ.) Global well-posedness and time-decay of solutions for the compressible quantum MHD model with Hall effect

概要 We consider the initial value problem for the compressible quantum MHD system with Hall effect in the whole space \mathbb{R}^3 . Because the quantum MHD system is equipped with the correction term similar to the Korteweg stress tensor, the solution of its problem is expected to satisfy some good properties, for instance, the L^1 -maximal regularity of the density. In this talk, we shall state the existence of global-in-time solutions in a critical L^p framework and L^p - $L^{p/2}$ type decay estimates for global solutions.

17:00~18:00 特別講演

- 菊池 弘明 (津田塾大学芸) 空間3次元における二重べき非線形シュレディンガー方程式の基底状態
 Hiroaki Kikuchi (Tsuda Coll.) Ground state of double power nonlinear Schrödinger equations in three space dimensions

概要 In this talk, we consider minimization problem related to the double power nonlinear Schrödinger equations involving the Sobolev critical exponent in three space dimensions. In four and higher space dimensions, it is known that for any frequency and any power of the subcritical nonlinearity, there exists a ground state. In contrast to those cases, when the space dimension is three and the subcritical power is three or less, we can show that there exists a threshold frequency, above which no ground state exists, and below which the ground state exists. If time permits, I will also explain about several properties of the ground state and global dynamics of solutions to the nonlinear Schrödinger equations. Main part of this talk is based on a joint work with Takafumi Akahori (Shizuoka Univ.), Slim Ibrahim (Univ. of Victoria) and Hayato Nawa (Meiji Univ.).

9月16日(金) 第II会場

9:45~12:00

- 53 森 直文 (東京海洋大海洋資源環境) Decay property for symmetric hyperbolic system with memory-type diffusion 10
 岡田 真理 (山口大創成)
 川島 秀一 (早大理工)
 Naofumi Mori (Tokyo Univ. of Marine Sci. and Tech.) Decay property for symmetric hyperbolic system with memory-type diffusion
 Mari Okada (Yamaguchi Univ.)
 Shuichi Kawashima (Waseda Univ.)

概要 We consider the decay property for symmetric hyperbolic systems with memory-type diffusion. Under the structural condition (called Craftsmanship condition) we prove that the system is uniformly dissipative and the solutions satisfy the corresponding decay property. Our proof is based on a technical energy method in the Fourier space which makes use of the properties of strongly positive definite kernels.

- 54 森 直文 (東京海洋大海洋資源環境) Decay property for symmetric hyperbolic system with memory-type relaxation 10
 岡田 真理 (山口大創成)
 川島 秀一 (早大理工)
 Naofumi Mori (Tokyo Univ. of Marine Sci. and Tech.) Decay property for symmetric hyperbolic system with memory-type relaxation
 Mari Okada (Yamaguchi Univ.)
 Shuichi Kawashima (Waseda Univ.)

概要 We consider the decay property for a symmetric hyperbolic system with memory-type relaxation. We assume that the memory kernel is a strongly positive definite kernel and prove that the system has the decay property of regularity-loss type. Our proof is based on a technical energy method in the Fourier space which makes use of the structural condition (called Craftsmanship condition or Condition (K)) and the modified properties of strongly positive definite kernels.

- 55 北村 駿介 (東北大理) 空間 1 次元における特性方向による重み付き微分型半線形波動方程式の古典解 10
 Shunsuke Kitamura (Tohoku Univ.) Semilinear wave equations of derivative type with characteristic weights in one space dimension

概要 In this talk, we discuss about the initial value problems for semilinear wave equations of derivative type with characteristic weights in one space dimension. The lifespan estimates of classical solutions are quite different from those for nonlinearity of unknown functions itself in the almost global existence case by interaction of characteristic weights.

- 56 佐々木多希子 (武蔵野大工・東北大理) 異なる伝播速度をもつ半線形波動方程式系の爆発曲線の特異性について 10
 Takiko Sasaki Singularity of a blow-up curve for systems of semilinear wave equations
 (Musashino Univ./Tohoku Univ.) with different propagation speeds

概要 In this talk, we consider a blow-up curve for systems of semilinear wave equations with different propagation speeds in one space dimension. The blow-up curve has been studied from the view point of its differentiability and singularity. In 2012, Merle and Zaag considered a single wave equation and showed that there are cases that its blow-up curve is not differentiable if the sign of the solution changes. They also showed that the blow-up curve near the singular point is characterized by the propagation speed. However, it is not known that the blow-up curve for systems of semilinear wave equations with different propagation speeds has a singular point or not. In this talk, we show that the blow-up curve has a singular point under suitable initial conditions.

- 57 若杉 勇太 (広島大先進理工) Asymptotic expansion of solutions to the wave equation with space-
 側島 基宏 (東京理大理工) dependent damping 10
 Yuta Wakasugi (Hiroshima Univ.) Asymptotic expansion of solutions to the wave equation with space-
 Motohiro Sobajima dependent damping
 (Tokyo Univ. of Sci.)

概要 We study the large time behavior of solutions to the wave equation with space-dependent damping in an exterior domain. We show that if the damping is effective, then the solution is asymptotically expanded in terms of solutions of corresponding parabolic equations. The main idea to obtain the asymptotic expansion is the decomposition of the solution of the damped wave equation into the solution of the corresponding parabolic problem and the time derivative of the solution of the damped wave equation with certain inhomogeneous term and initial data.

- 58 谷口 晃一 (東北大 AIMR) On global existence and asymptotic behavior for nonlinear damped wave
 池田 正弘 equations on measure spaces 10
 (理化学研 AIP・慶大理工)
 若杉 勇太 (広島大先進理工)
 Koichi Taniguchi (Tohoku Univ.) On global existence and asymptotic behavior for nonlinear damped wave
 Masahiro Ikeda (RIKEN/Keio Univ.) equations on measure spaces
 Yuta Wakasugi (Hiroshima Univ.)

概要 This talk is concerned with the nonlinear damped wave equation on a measure space with a self-adjoint operator, instead of the standard Laplace operator. Under a certain decay estimate on the corresponding heat semigroup, we establish the linear estimates which generalize the so-called Matsumura estimates, and prove the small data global existence and asymptotic behavior of solutions to the damped wave equation based on the linear estimates. Our approach is based on a direct spectral analysis analogous to the Fourier analysis.

- 59 石垣 祐輔 (東工大理) Asymptotic stability of stationary solutions to outflow problem for compressible viscoelastic system 10
上田 好寛 (神戸大海事)
Yusuke Ishigaki (Tokyo Tech) Asymptotic stability of stationary solutions to outflow problem for compressible viscoelastic system
Yoshihiro Ueda (Kobe Univ.)

概要 This talk is concerned with the stability of stationary solutions to the outflow problem for compressible viscoelastic system in the one-dimensional half space. We classify the existence of stationary solutions by determining suitable conditions for several parameters, such as the Mach number and propagation speed of elastic wave. We next establish the stability result and convergence rate toward the stationary solutions under the small initial perturbation.

- 60 上田 好寛 (神戸大海事) Memory effects on the stability of viscoelastic Timoshenko systems ... 10
M. A. Jorge Silva
(State Univ. of Londrina)
Yoshihiro Ueda (Kobe Univ.) Memory effects on the stability of viscoelastic Timoshenko systems
Marcio Antonio Jorge Silva
(State Univ. of Londrina)

概要 In this talk, we investigate new classes of viscoelastic Timoshenko–Ehrenfest systems under the presence of full or partial memory effects in one-dimensional whole space. Our achievements rely on recent approaches to the theory of dissipative structure for systems of partial differential equations by featuring optimal pointwise estimates in the Fourier space and explicit energy decay rates depending on the viscoelastic damping coupling.

- 61 福田 一貴 (信州大工) BBM–Burgers 方程式の初期値問題の解の漸近挙動 10
池田 正弘
(理化学研 AIP・慶大理工)
Ikki Fukuda (Shinshu Univ.) Asymptotic behavior of solutions to the Cauchy problem for the BBM–Burgers equation
Masahiro Ikeda (RIKEN/Keio Univ.)

概要 In this talk, we consider the asymptotic behavior of the solutions to the Cauchy problem for the BBM–Burgers equation. We prove that the solution to this problem converges to the self-similar solution to the Burgers equation. Moreover, we construct the appropriate second asymptotic profiles of the solutions depending on the initial data. Based on that discussion, we investigate the effect of the initial data on the asymptotic behavior of the solutions, and derive the optimal asymptotic rate to the self-similar solution. Especially, the main novelty of this study is that the second asymptotic profiles of the solutions with slowly decaying data, whose case has not been studied, are obtained.

- 62 大縄 将史 (東京海洋大海洋環境) 摩擦の影響を受ける河川流の漸近安定性 10
鈴木 政尋 (名工大工)
Masashi Ohnawa Asymptotic stability of river flows subject to friction
(Tokyo Univ. of Marine Sci. and Tech.)
Masahiro Suzuki (Nagoya Inst. of Tech.)

概要 We consider stationary flows around weirs in rivers modeled by one-dimensional shallow water equation with friction. Waters enter weirs at subcritical states, and are accelerated beyond critical states flowing down weirs, and return to subcritical states discontinuously due to the gentle slope downstream of weirs. We focus on the discontinuous transition from supercritical states to subcritical states, and claim the asymptotic stability of the stationary shock wave whatever large the strength of the shock or the gradient of the bed elevation may be.

14:15~16:45

- 63 牧野 哲 (山口 大*) 回転する地球大気の運動方程式 10
Tetu Makino (Yamaguchi Univ.*) On the equation of motion of the rotating atmosphere of the Earth

概要 Even the simplest model of motions of the atmosphere of the Earth has not yet been analyzed in mathematically rigorous manner. We present few fundamental properties of the solutions governed by the compressible Euler equations.

- 64 濱本 直樹 (阪公大理) 退化構造を伴う不確定性原理不等式のソレノイダル場に対する高次元拡張について 10
Naoki Hamamoto (Osaka Metro. Univ.) Higher-dimensional extension of uncertainty principle inequality with a degenerate structure for solenoidal fields

概要 We show the functional inequality $\int_{\mathbb{R}^N} |\nabla \mathbf{u}|^2 dx \int_{\mathbb{R}^N} |\mathbf{x} \times \mathbf{u}|^2 dx \geq C_N \left(\int_{\mathbb{R}^N} |\mathbf{u}|^2 dx \right)^2$ for vector fields \mathbf{u} under the condition $\operatorname{div} \mathbf{u} = 0$. This is a degenerated version of Heisenberg's uncertainty principle inequality for vector fields, here the sharp constant number C_N can be positive and computable by considering \mathbf{u} in the class of solenoidal fields.

- 65 鶴見 裕之 (京大理) Existence of the 2D stationary Navier–Stokes flow on the whole plane
前川 泰則 (京大理) around a radial flow 10
Hiroyuki Tsurumi (Kyoto Univ.) Existence of the 2D stationary Navier–Stokes flow on the whole plane
Yasunori Maekawa (Kyoto Univ.) around a radial flow

概要 We consider the stationary Navier–Stokes equations on the whole plane \mathbb{R}^2 . We show that for a given small and smooth external force around a radial flow, there exists a classical solution decaying like $|x|^{-1}$. In our result, it is not necessary to impose any symmetric conditions on external forces.

- 66 鈴木 政尋 (名工大) Vlasov–Poisson 方程式の定常解 10
高山 正宏 (慶大理工)
Masahiro Suzuki (Nagoya Inst. of Tech.) Stationary solutions of the Vlasov–Poisson system
Masahiro Takayama (Keio Univ.)

概要 The purpose of this talk is to mathematically investigate the formation of a plasma sheath, and to analyze the Bohm criteria which are required for the formation. Bohm derived originally the (hydrodynamic) Bohm criterion from the Euler–Poisson system. Boyd and Thompson proposed the (kinetic) Bohm criterion from kinetic point of view, and then Riemann derived it from the Vlasov–Poisson system. We study the solvability of boundary value problems of the Vlasov–Poisson system. On the process, we see that the kinetic Bohm criterion is a necessary condition for the solvability. Furthermore, the hydrodynamic criterion can be derived from the kinetic criterion. It is of great interest to find the relation between the solutions of the Vlasov–Poisson and Euler–Poisson systems. To clarify the relation, we also investigate the delta mass limit of solutions of the Vlasov–Poisson system.

- 67 米田 慧司 (九大数理) Global solutions for the rotating magnetohydrodynamics system in the
高田 了 (東大数理) scaling critical Sobolev space 10
Keiji Yoneda (Kyushu Univ.) Global solutions for the rotating magnetohydrodynamics system in the
Ryo Takada (Univ. of Tokyo) scaling critical Sobolev space

概要 We consider the initial value problem for the incompressible magnetohydrodynamics system with the Coriolis force in the 3D whole space. We prove the global in time existence and the uniqueness of solutions for large initial data in the scaling critical Sobolev space when the speed of rotation is sufficiently high. In order to control the large magnetic fields, we introduce a modified linear solution for the velocity, and show its smallness in a suitable space-time norm by means of the dispersive effect of the Coriolis force.

- 68 青木基記 (東北大理) A sufficient condition for the energy conservation law of compressible
岩渕司 (東北大理) Navier–Stokes equations 10
Motofumi Aoki (Tohoku Univ.) A sufficient condition for the energy conservation law of compressible
Iwabuchi Tsukasa (Tohoku Univ.) Navier–Stokes equations

概要 We consider the energy conservation law for two and three-dimensional compressible Navier–Stokes equations. We study a sufficient condition for the density, velocity and pressure such that a weak solution of the full system of compressible Navier–Stokes equations conserves the total energy which is constructed by the kinetic energy, the elastic potential and the heat contribution. Moreover, we generalize the result of the energy conservation law for the motion of the ideal gas.

- 69 武内太貴 (早大理工) On the local well-posedness and inviscid limits for the Keller–Segel–
 Navier–Stokes system 10
Taiki Takeuchi (Waseda Univ.) On the local well-posedness and inviscid limits for the Keller–Segel–
 Navier–Stokes system

概要 We consider the Cauchy problem for the Keller–Segel–Navier–Stokes system of parabolic-elliptic type in \mathbb{R}^N , $N \geq 3$. We show the local well-posedness for the system with initial data in Sobolev spaces, where the solutions are uniformly bounded with respect to the viscosity. In addition, we also obtain inviscid limits of the above system. The proof is mainly based on the a priori estimates independent of the viscosity combined with the method of Kato–Lai (1984) and the commutator estimate of Kato–Ponce (1988).

- 70 大石健太 (早大理工) 非有界領域における Navier–Stokes 方程式の自由境界問題の時間大域適
柴田良弘 (早大理工) 切性と解の減衰について 10
Kenta Oishi (Waseda Univ.) On the global well-posedness and decay for a free boundary problem of
Yoshihiro Shibata (Waseda Univ.) the Navier–Stokes equation in unbounded domains

概要 A free boundary problem for the incompressible Navier–Stokes equations in unbounded domains is considered. We obtain a sufficient condition for the L_p - L_q decay estimate of the Stokes semigroup to prove the global well-posedness of the problem. This result improves the result in exterior domains by Shibata when $N \geq 4$, where N stands for the dimension of the space. The novelty is that the compactness of the boundary is not needed. We also develop the global well-posedness in the half space with $N \geq 3$. This is a joint work with Professor Yoshihiro Shibata (Waseda University).

- 71 渡邊圭市 (早大理工) Stability of stationary solutions to a free boundary problem of the
 Navier–Stokes equations 10
Keiichi Watanabe (Waseda Univ.) Stability of stationary solutions to a free boundary problem of the
 Navier–Stokes equations

概要 We consider the stability of the equilibrium figure of uniformly rotating viscous incompressible fluid in \mathbb{R}^3 with surface tension, where the equilibrium figure is rotationally symmetric about a certain axis. It is proved that this stability result can be characterized by the positivity of the second variation of the energy functional associated with the equation that determines an equilibrium figure, provided that initial data are close to an equilibrium state. The solution converges exponentially to an equilibrium. The proof is inspired by a series of papers due to Shibata, but a new orthogonal condition is introduced in order to show the exponential stability of an associated analytic C_0 -semigroup. If a value of initial angular momentum is small, the steady-state is determined uniquely.

- 72 藤井幹大 (九大数理) Compressible Navier–Stokes–Coriolis system in critical Besov spaces · · 10
 渡邊圭市 (早大理工)
 Mikihiro Fujii (Kyushu Univ.) Compressible Navier–Stokes–Coriolis system in critical Besov spaces
 Keiichi Watanabe (Waseda Univ.)

概要 We consider the three dimensional compressible Navier–Stokes equations with the Coriolis force and prove the long-time existence of a unique strong solution. More precisely, we show that for any $0 < T < \infty$ and arbitrary large initial data in the scaling critical Besov spaces, the solution uniquely exists on $[0, T]$ provided that the Rossby and Mach numbers are sufficiently small. To the best of our knowledge, our result is the first contribution to the well-posedness of the compressible Navier–Stokes–Coriolis system in the whole space \mathbb{R}^3 . The key ingredient of our analysis is to establish the dispersive estimates despite a complicated structure of the linearized system due to the anisotropy of the Coriolis force.

- 73 梶原直人 (岐阜大工) Maximal regularity for the Stokes equations with various boundary conditions · · · · · 10
 Naoto Kajiwara (Gifu Univ.) Maximal regularity for the Stokes equations with various boundary conditions

概要 It is known that resolvent estimates and maximal regularity are important topics for linear parabolic evolution equations. We prove these estimates for the Stokes equations with various boundary conditions in a unite way. The method is applied for Dirichlet, Neumann and Robin boundary although the talk is presented only main ideas. The basis is to obtain a suitable form of the solution. Then we use a useful sufficient condition to use Fourier multiplier theorem and L_q - L_q -boundedness in the half space. Since the symbols are R-bounded for λ , we can get maximal regularity at the same time.

17:00~18:00 特別講演

- 寺澤祐高 (名大多元数理) 二層流の非局所拡散界面モデルの弱解およびその局所漸近
 Yutaka Terasawa (Nagoya Univ.) Weak solutions of nonlocal diffuse interface model for two-phase flows and those local asymptotics

概要 We talk on existence of weak solutions for local and nonlocal diffuse interface models for two-phase flows and nonlocal-to-local asymptotics of them, some of which are the speaker's recent results. The talk is based on joint works with Helmut Abels (Regensburg Univ., Germany). Diffuse interface models for two-phase flows describe the behavior of a mixture of two kinds of fluids such as water and oil. The fluids are macroscopically immiscible, but the model takes a partial mixing on a small length scale measured by a small parameter into account. A classical diffuse interface model treating fluids with the same densities and different viscosities is due to Hohenberg and Halperin (1977). More recently, a model treating fluids with different densities were introduced by Abels, Garcke and Gruen (2012). This is a coupled system of the Navier–Stokes equations and the Cahn–Hilliard equations. If the chemical potential contains a elliptic operator acting on a order parameter, which is a concentration difference of two fluids, it is called a local model and if the chemical potential contains a nonlocal operator, it is called a nonlocal model. Frigeri (2015) proved the existence of weak solutions for some nonlocal diffuse interface model with different densities. We review his result and method of proof. We next explain the speaker's result with Abels (2020) on existence of weak solution for another nonlocal diffuse interface model containing some kind of fractional Laplacian. We moreover explain the speaker's recent result with Abels (2022) on convergence of weak solutions for the nonlocal model with a small parameter to weak solutions for the local model when the small parameter tends to zero. The proof is based on a corresponding result in the case of a single Cahn–Hilliard equation by Davoli, Scarpa and Trussardi (2021).

実函数論

9月15日(木) 第VIII会場

9:30~11:30

- 1 水口 洋 康 (関西大システム理工) ある幾何学的定数の下限値について 15
 Hiroyasu Mizuguchi (Kansai Univ.) On the lower bound of a geometric constant in normed linear space

概要 To describe the geometry of normed space, many geometric constants have been investigated. Among them, there are two geometric constants related to Minkowski ellipses. Here we study the lower bound of one of them. We also consider Birkhoff orthogonality. This generalized orthogonality is not symmetric in general. A two-dimensional normed plane in which Birkhoff orthogonality is symmetric is called Radon plane. An inequality had shown in Radon planes will be proved in general spaces.

- 2 青山 耕 治 (千葉大社会) 吸引点と擬非拡大拡張 15
 Koji Aoyama (Chiba Univ.) A quasinonexpansive extension of a mapping with an attractive point

概要 We show that, under appropriate conditions, there exists a quasinonexpansive extension of a mapping with an attractive point in the sense of Takahashi and Takeuchi (2011) such that the fixed point set of the extension equals the attractive point set of the given mapping. Then using the quasinonexpansive extension, we establish some convergence theorems for approximating attractive points of a generalized hybrid mapping in the sense of Kocourek, Takahashi, and Yao (2010).

- 3 木村 泰 紀 (東 邦 大 理) 完備測地距離空間における不動点近似法の比較 15
 Yasunori Kimura (Toho Univ.) Comparison of approximation methods of fixed points for a complete geodesic space

概要 In this talk, we compare several types of approximation methods of a fixed point of a mapping defined on a complete geodesic space. In particular, one can see that some projection methods are related to those generated by convex combinations. We also show a new approximation method convergent to a fixed point of a mapping defined on a complete geodesic space.

- 4 河 邊 淳 (信 州 大 工) Choquet 積分が定める Lorentz 空間の完備性 15
 山 田 直 貴
 Jun Kawabe (Shinshu Univ.) The completeness of the Lorentz spaces defined by the Choquet integral
 Naoki Yamada

概要 In this talk, the Choquet–Lorentz spaces are defined for a nonadditive measure μ and the completeness of the spaces is investigated. A new characteristic of nonadditive measures, called property (C), is introduced to establish the Cauchy criterion for convergence in μ -measure of measurable functions. This criterion and a suitable convergence theorem of the Choquet integral provide instruments for showing the completeness of the Choquet–Lorentz spaces.

- 5 齋 藤 洋 樹 (日 大 理 工) Choquet integrals, Hausdorff content and sparse operator 15
 田 中 仁 (筑波技術大)
 Hiroki Saito (Nihon Univ.) Choquet integrals, Hausdorff content and sparse operator
 Hitoshi Tanaka
 (Tsukuba Univ. of Tech.)

概要 In this talk, we show that the sparse operators are not weak $(1, 1)$ on the Choquet space with the Hausdorff content. In view of this result, we define a variant of the Orlicz–Morrey–Choquet space, and prove that the sparse operator maps Choquet space to the Orlicz–Morrey–Choquet space.

- 6 齋藤洋樹 (日大理工) A note on embedding inequalities for weighted Sobolev and Besov space 15
 Hiroki Saito (Nihon Univ.) A note on embedding inequalities for weighted Sobolev and Besov space

概要 In this talk, we establish two embedding inequalities for the weighted Sobolev space and the weighted homogeneous endpoint Besov space by using the weighted Hausdorff capacity. To do this, we shall determine the dual spaces of weighted Choquet and weighted homogeneous Besov spaces.

14:15~16:20

- 7 岡本潤 (京大ASHBi) On a singular limit of the Kobayashi–Warren–Carter energy 15
 Jun Okamoto (Kyoto Univ.) On a singular limit of the Kobayashi–Warren–Carter energy

概要 We consider the singular limit problem of a single-well Modica–Mortola energy and the Kobayashi–Warren–Carter energy. In this study, we introduce a finer topology of sliced graph convergence of functions into the function space and derive the singular limit of a single-well Modica–Mortola energy and the Kobayashi–Warren–Carter energy energies in the sense of Gamma-convergence. The energy functional obtained as this singular limit is also shown to have the remarkable property of a minimizing function that is concave concerning the strength of jumps of a function.

- 8 筒井容平 (京大理) Rearrangements, medians and their maximal functions 15
 Youhei Tsutsui (Kyoto Univ.) Rearrangements, medians and their maximal functions

概要 We give an exact expression of the set of all medians with non-increasing rearrangements. After that, we consider fractional maximal functions with rearrangements and medians instead of integral averages, and discuss their boundedness on Lorentz spaces.

- 9 川澄亮太 (中大理工) Pointwise multipliers on Orlicz–Morrey spaces of the second kind 15
 Ryota Kawasumi (Chuo Univ.) Pointwise multipliers on Orlicz–Morrey spaces of the second kind

概要 In this talk we give the characterization of pointwise multipliers on Orlicz–Morrey spaces of the second kind. Orlicz–Morrey spaces of the second kind was first studied by Sawano, Sugano and Tanaka in 2012 and are difference from Orlicz–Morrey spaces of the first kind which was first studied by Nakai in 2004. To do this we first prove a generalized Hölder’s inequality for the Orlicz–Morrey spaces of the second kind. Next, to characterize the pointwise multipliers, we use the fact that all pointwise multipliers from a Orlicz–Morrey space of the second kind to another Orlicz–Morrey space of the second kind are bounded operators.

- 10 宮崎洋一 (日大歯) BMO ノルムを含む対数型 Sobolev 不等式の改良 15
 Yoichi Miyazaki (Nihon Univ.) Improvement of the logarithmic Sobolev inequalities with BMO norm

概要 In this talk we show that the inequalities

$$\|f\|_{L_\infty} \leq C \left\{ 1 + \|f\|_{BMO} \log^+ (\|f\|_{L_p} + \|(-\Delta)^{s/2} f\|_{L_q}) \right\},$$

$$\|f\|_{L_\infty} \leq C \left\{ 1 + \|f\|_{L_p} + \|f\|_{BMO} \log^+ \|(-\Delta)^{s/2} f\|_{L_q} \right\}$$

hold if $f \in L_p(\mathbb{R}^n)$ and $(-\Delta)^{s/2} f \in L_q(\mathbb{R}^n)$ for $1 \leq p < \infty$, $1 < q < \infty$ and $n/q < s < \infty$. These inequalities improve the results obtained by Kozono–Taniuchi (2000) and Kozono–Wadade (2008). The proof is based on Muramatu’s integral formula.

- 11 至田直人(阪大 理) Boundedness of bilinear pseudo-differential operators with $BS_{0,0}^m$ symbols on Sobolev spaces 15
 Naoto Shida (Osaka Univ.) Boundedness of bilinear pseudo-differential operators with $BS_{0,0}^m$ symbols on Sobolev spaces

概要 We consider bilinear pseudo-differential operators with symbols in the bilinear Hörmander classes $S_{0,0}$. In particular, we discuss the boundedness of these operators on Sobolev spaces by using symbolic calculus and some boundedness results for bilinear pseudo-differential operators with symbols in more general classes than the bilinear Hörmander classes on Lebesgue spaces. In contrast to the linear case, we need some restrictions on the exponents of Sobolev spaces to assure the boundedness, and we also discuss the necessity of these restrictions.

- 12 原 宇信(北大 情報) 特異楕円型問題と Sobolev 型の埋め込みについて 15
 Takanobu Hara (Hokkaido Univ.) On singular elliptic problems and Sobolev type embeddings

概要 We discuss model semilinear elliptic equations of the type $-\operatorname{div}(A(x)\nabla u) = fu^{-\lambda}$ in Ω , where Ω is a bounded domain in \mathbf{R}^N , $A \in L^\infty(\Omega)^{N \times N}$ is a coercive matrix, $0 < \lambda \leq 1$ and f is a nonnegative Radon measure on Ω . We consider various properties of positive $H_0^1(\Omega)$ -solutions in relation to the corresponding Sobolev type embedding.

16:40~17:40 特別講演

- 飯田 毅士(福島工高専) L^p 空間と Morrey 空間上の Orlicz 極大作用素について
 Takeshi Iida Orlicz maximal operators on L^p and Morrey spaces
 (Fukushima Nat. Coll. of Tech.)

概要 In this talk, we deal with boundedness for Orlicz maximal operators and Orlicz-fractional maximal operators on L^p spaces and Morrey spaces. Next, we define and classify Orlicz–Morrey spaces into three kinds. Then, we study the boundedness of the Orlicz maximal operator and the Orlicz-fractional maximal operator on the second kind of the Orlicz–Morrey space, which we plan to focus our study on the second kind of the Orlicz–Morrey space.

9月16日(金) 第VIII会場

9:30~11:50

- 13 赤川佳穂(岐阜工高専) ある完全塑性モデルの閾値関数のなめらかさについて 15
 加納理成(高知大教育)
 深尾 武史(京都教育大)
 Yoshiho Akagawa Time-dependence of the threshold function in a perfect plasticity model
 (Gifu Nat. Coll. of Tech.)
 Risei Kano (Kochi Univ.)
 Fukao Takeshi (Kyoto Univ. of Edu.)

概要 This paper discusses the time-dependence of the threshold function in the perfect plasticity model. In physical terms, it is natural that the threshold function depends on some unknown variable. Therefore, it is meaningful to discuss the well-posedness under the weaker assumption of time-dependence.

- 14 千代祐太朗 (東京理大理) Stabilization in a quasilinear attraction-repulsion chemotaxis system:
 横田智巳 (東京理大理) balanced case 15
 Yutaro Chiyo (Tokyo Univ. of Sci.) Stabilization in a quasilinear attraction-repulsion chemotaxis system:
 Tomomi Yokota (Tokyo Univ. of Sci.) balanced case

概要 This talk deals with global existence, boundedness and stabilization in a quasilinear parabolic-elliptic-elliptic attraction-repulsion chemotaxis system. Boundedness and blow-up in this system have been classified by the sizes of the effects of the attraction and repulsion (Z. Angew. Math. Phys.; 2022; 73; Paper No. 61). More precisely, in the case that the effect of the attraction is stronger than the one of the repulsion, boundedness has been shown. Also, in the opposite case, blow-up has been obtained. However, the case that the effects of the attraction and repulsion are balanced has been excluded. The purpose of this talk is to prove boundedness and stabilization in the balanced case.

- 15 小杉千春 (日本女大理) 圧縮性弾性体の伸縮運動を表す初期値境界値問題の時間無限大における
 愛木豊彦 (日本女大理) 解の挙動について 15
 Chiharu Kosugi (Japan Women's Univ.) A large time behavior of solutions to initial and boundary value prob-
 Toyohiko Aiki (Japan Women's Univ.) lems for compressible elastic curves

概要 We talk about a large time behavior of the solutions to the initial and boundary value problem for the beam equation with the viscosity term and the nonlinear stress function having a singularity. We have already shown the existence and uniqueness of weak solutions. Moreover, thanks to the estimate of lower bounds for the strain, we also proved the existence of strong solutions. In this talk, for a solution u , we prove that the ω -limit of the orbit $\{u(t)|t \geq 0\}$ is not empty and included in the set of steady solutions. Also, we give an example in which the solutions of the steady problem are not uniquely determined.

- 16 久保田翔大 (神奈川大工) 結晶粒界運動を記述する KWC システムに対する時間周期解 15
 白川 健 (千葉大教育)
 Shodai Kubota (Kanagawa Univ.) Periodic solutions for KWC type systems of grain boundary motions
 Ken Shirakawa (Chiba Univ.)

概要 In this talk, we consider the periodic solutions for the parabolic PDE systems, denoted by (S). Each system (S) is associated with the phase-field model of grain boundary motion, proposed by [Kobayashi et al.; Phys. D, 140 (2000), 141–150]. Under suitable assumptions, the existence of the periodic solution to the system (S) will be reported as the main theorem of this talk.

- 17 香川溪一郎 (早大理工) Existence of solutions for initial value problem of viscous Cahn–Hilliard
 大谷光春 (早大*) equation with dynamic boundary condition 15
 Keiichiro Kagawa (Waseda Univ.) Existence of solutions for initial value problem of viscous Cahn–Hilliard
 Ôtani Mitsuharu (Waseda Univ.*) equation with dynamic boundary condition

概要 In 2011, Goldstein, Miranville, and Schimperna proposed the Cahn–Hilliard model with dynamic boundary condition (GMS model). In 2015, Colli and Fukao showed the existence of the solutions to the initial value problem of the GMS model. They considered the nonlinear terms appearing in the interior and surface equations as the sum of the monotone term and the global Lipschitz term and assume that the condition (A) where the interior monotone term is controlled by the surface monotone term holds. In this talk, we focus on the existence of solutions to the initial value problem with viscous terms. We extend the global Lipschitz term to apply to a wider class of nonlinear functions and assume that the restriction (A) or the growth rate on the inner monotone term holds.

- 18 喜多航佑 (早大理工) Existence and nonexistence of global solutions to nonlinear diffusion equations on a bounded domain 15
大谷光春 (早大理工)
Kosuke Kita (Waseda Univ.) Existence and nonexistence of global solutions to nonlinear diffusion equations on a bounded domain
Mitsuharu Ôtani (Waseda Univ.)

概要 This talk is devoted to studying the existence and nonexistence of global solutions to nonlinear diffusion equations with nonlinear boundary conditions. In the whole space, it is well known that the critical Fujita exponent exists, which gives the threshold that divides the existence of global solutions. On the other hand, there is no such a critical exponent in the case of a bounded domain. However, we show that the threshold phenomenon, controlled according to boundary conditions, can occur in a bounded domain.

- 19 黒田隆徳 (早大理工) Existence and non-existence of stationary solutions of the complex Ginzburg–Landau equations 15
大谷光春 (早大理工)
T. Cazenave (Sorbonne Univ.)
Takanori Kuroda (Waseda Univ.) Existence and non-existence of stationary solutions of the complex Ginzburg–Landau equations
Mitsuharu Ôtani (Waseda Univ.)
Thierry Cazenave (Sorbonne Univ.)

概要 In this talk, we study the stationary problem for the complex Ginzburg–Landau equations (CGL) on bounded domain Ω :

$$-(\lambda + i\alpha)\Delta u - (\kappa + i\beta)|u|^{q-2}u = 0, \quad u|_{\partial\Omega} = 0,$$

where $q > 2$, $\lambda, \kappa > 0$ and $\alpha, \beta \in \mathbb{R}$. Since multiplying (CGL) by u , we may prove the non-existence of weak nontrivial solutions when $\alpha/\lambda \neq \beta/\kappa$, we consider the case where $\alpha/\lambda = \beta/\kappa$. Our results can be formulated as follows: when $N = 1$, then there exists no non-constant phase classical solution; when $N \geq 2$ and let q be Sobolev sub-critical, then there exists a non-constant phase solution for some domains; when $N \geq 2$ and let q be Sobolev critical or super-critical, then there exists no nontrivial classical solution including constant phase solutions on star-shaped domains.

- 20 来間俊介 (東京理大理) Convergence of a singular nonlocal phase field system of conserved type 15
Shunsuke Kurima (Tokyo Univ. of Sci.) Convergence of a singular nonlocal phase field system of conserved type

概要 This talk deals with convergence of a singular nonlocal phase field system of conserved type. Colli–K. (2020) have proved existence of solutions to a singular phase field system of conserved type. On the other hand, Davoli–Scarpa–Trussardi (2021) have studied nonlocal-to-local convergence of Cahn–Hilliard equations. In this talk we focus on nonlocal-to-local convergence of singular nonlocal phase field systems of conserved type.

14:15~16:20

- 21 池田 正弘 (理化学研 AIP・慶大理工) Heat equation on the hypergraph containing vertices with given data 15
 内田 俊 (大分大理工)
 深尾 武史 (京都教育大)
 Masahiro Ikeda (RIKEN/Keio Univ.) Heat equation on the hypergraph containing vertices with given data
 Shun Uchida (Oita Univ.)
 Takeshi Fukao (Kyoto Univ. of Edu.)

概要 Hypergraph G is the triplet consisting of a finite set V , a family $E \subset 2^V$, and $w : E \rightarrow (0, \infty)$. We are concerned with an ODE governed by some nonlinear set-valued operator defined on \mathbb{R}^V , which is called “hypergraph Laplacian”. This ODE can be interpreted as a model of “heat” diffusion in the network represented by hypergraph. In this talk, we consider the case where the heat at some vertices of the hypergraph is given, and discuss the existence of solution and the continuous dependence of solution on given data.

- 22 熊崎 耕太 (長崎大教育) 多孔質媒体内の拡散物質の浸透を表すある自由境界問題の解の時間大域的挙動 15
 Kota Kumazaki (Nagasaki Univ.) Large time behavior of a solution to a free boundary problem describing the penetration of diffusant into rubber

概要 In this talk, we consider a one-dimensional free boundary problem describing the penetration of diffusant into rubber. In this problem, the free boundary represents the front of the diffusant region and its growth rate is given by an ordinary differential equation including the effect of breaking the growth of the diffusant region. In the previous result, we showed the existence and uniqueness of a local solution to our problem. In this talk, we discuss the existence and uniqueness of a global solution to the problem and the large-time behavior of a solution as time goes to infinity.

- 23 渡邊 紘 (大分大理工) 放物型・双曲型単独保存則のエントロピー解に対する時間減衰評価 15
 Hiroshi Watanabe (Oita Univ.) Decay estimates for entropy solutions to scalar parabolic-hyperbolic conservation laws

概要 We consider one-dimensional Cauchy problems (CP) for scalar parabolic-hyperbolic conservation laws. The equation has both properties of hyperbolic equations and those of parabolic equations. Accordingly, it is difficult to investigate the regularity and the behavior of solutions to (CP). In this talk, we prove decay estimates for entropy solutions to (CP). To see this, we modify Oleinik type entropy estimates for them.

- 24 黒田 紘敏 (北大理) 全空間における4階の全変動流方程式の球対称解 15
 M. Łasica (Polish Acad. of Sci.・東大数理)
 儀我 美一 (東大数理)
 Hirotoshi Kuroda (Hokkaido Univ.) Radial solutions to the fourth-order total variation flow in \mathbb{R}^n
 Michał Łasica (Polish Acad. of Sci./Univ. of Tokyo)
 Yoshikazu Giga (Univ. of Tokyo)

概要 In this talk we consider the fourth-order total variation flow equation in \mathbb{R}^n . We characterize the solution in terms of what is called the Cahn–Hoffman vector field, based on a duality argument, and introduce a notion of calibrability of a set in our fourth-order setting. This notion is related to whether a characteristic function preserves its form throughout the evolution. It turns out that all balls are calibrable. However, unlike in the second-order total variation flow, the outside of a ball is calibrable if and only if $n \neq 2$. If $n \neq 2$, all annuli are calibrable, while in the case $n = 2$, if an annulus is too thick, it is not calibrable.

- 25 深尾 武史 (京都教育大) 前方後方動的境界条件を持つ Cahn–Hilliard 方程式に対する粘性消滅法
P. Colli
(Univ. degli Studi di Pavia)
L. Scarpa
(Politecnico di Milano)
Takeshi Fukao (Kyoto Univ. of Edu.) The Cahn–Hilliard equation with forward-backward dynamic boundary
Pierluigi Colli condition via vanishing viscosity
(Univ. degli Studi di Pavia)
Luca Scarpa (Politecnico di Milano)

概要 An asymptotic analysis for a system with equation and dynamic boundary condition of Cahn–Hilliard type is carried out as the coefficient of the surface diffusion acting on the phase variable tends to 0, thus obtaining a forward-backward dynamic boundary condition at the limit. This is done in a very general setting, with nonlinear terms admitting maximal monotone graphs both in the bulk and on the boundary. The two graphs are related by a growth condition, with the boundary graph that dominates the other one. It turns out that in the limiting procedure the solution of the problem loses some regularity and the limit equation has to be properly interpreted in the sense of a subdifferential inclusion. However, the limit problem is still well-posed since a continuous dependence estimate can be proved.

- 26 白川 健 (千葉大教育) Optimal inner-heat controls of Warren–Kobayashi–Lobkovsky–Carter
久保田翔大 (神奈川大工) type systems under higher dimensional settings 15
Ken Shirakawa (Chiba Univ.) Optimal inner-heat controls of Warren–Kobayashi–Lobkovsky–Carter
Shodai Kubota (Kanagawa Univ.) type systems under higher dimensional settings

概要 In this talk, we deal with the optimal control problem motivated by grain boundary motion in 2 or 3 dimensional space. In this light, the regularized version of the phase-field model, proposed by [Warren et al.; Acta Materialia, 51 (2003), 6035–6058], is adopted as the corresponding state system. Under suitable assumptions, the well-posedness of state system, and the existence and necessary condition for the optimal control will be presented as the main results of this talk.

- 27 山崎 教昭 (神奈川大工) Singular optimal control problems for doubly nonlinear evolution inclu-
劍持 信幸 (千葉大*) sions with quasi-variational structure 15
白川 健 (千葉大教育)
Noriaki Yamazaki (Kanagawa Univ.) Singular optimal control problems for doubly nonlinear evolution inclu-
Nobuyuki Kenmochi (Chiba Univ.*) sions with quasi-variational structure
Ken shirakawa (Chiba Univ.)

概要 In this talk we consider singular optimal control problems for abstract doubly quasi-variational evolution inclusions governed by time-dependent subdifferentials with the unknown-dependent constraints. Then, we show the existence of optimal control for our problems. Also, we apply our abstract results to quasi-variational inequalities with time-dependent gradient constraints.

16:40~17:40 特別講演

水上 雅 昭 (京 都 教 育 大) ある chemotaxis-consumption 系の解の存在と挙動について

Masaaki Mizukami Global existence and asymptotic behavior in some chemotaxis-consumption
(Kyoto Univ. of Edu.) system

概要 In the study of the chemotaxis systems asymptotic behavior of solutions is one of the important themes; mainly it is shown that solutions converge to constant steady states in the previous works. For example, Tao–Winkler (2012) considered a chemotaxis-consumption system, and derived that solutions of the problem converge to constant steady states. However, this result does not describe some pattern formation of species suggested by Tuval et.al. (2005). Here one of the reasons is the boundary condition for the oxygen in the problem; in the previous works the boundary conditions is the Neumann boundary condition, even though that suggested in Tuval et, al. is a Robin-type boundary conditions. Thus, this talk considers a chemotaxis-consumption system under realistic boundary conditions for the oxygen. The purpose of this talk is to show that solutions of the problem converge to non-constant steady states.

函数解析学

9月13日(火) 第I会場

10:00~11:45

- 1 岩田 順敬 (関西大化学生命工) 2次および3次の非線形性に由来する非線形半群の生成 15
 Yoritaka Iwata (Kansai Univ.) Generation of nonlinear semigroup associated with second or third order
 nonlinearity

概要 Nonlinear abstract evolution equations in a Banach space X :

$$\frac{du(t)}{dt} = A_2(t)(u(t) + \bar{u})(u(t) - \bar{u}),$$

$$\frac{du(t)}{dt} = A_3(t)u(t)(u(t) + \bar{u})(u(t) - \bar{u})$$

are systematically studied by the logarithmic representation of operators. In conclusion representations for the nonlinear semigroup are obtained.

- 2 佐々木 格 (信州大理) A general theory of diagonalization by Bogoliubov transformations ... 15
 Itaru Sasaki (Shinshu Univ.) A general theory of diagonalization by Bogoliubov transformations

概要 It is believed that quantum field models whose interactions are quadratic can be diagonalized by Bogoliubov transformations. However, in many cases, the construction of the Bogoliubov transformation was complicated. Here we construct Bogoliubov transformations that explicitly diagonalize a wide class of quadratic Hamiltonians. For relativistic particles, the resulting one-particle Hamiltonians turn out to be the square root of non-relativistic Schrodinger operators with trace class perturbation.

- 3 川本 昌紀 (愛媛大理工) 臨界係数を持つ時間減衰調和振動子に対する波動作用素の存在・非存在
 石田 敦英 (東京理大教養) について 15
 Masaki Kawamoto (Ehime Univ.) Existence and nonexistence of wave operators for critical time-decaying
 Atsuhide Ishida (Tokyo Univ. of Sci.) harmonic oscillator

概要 The critical time-decaying harmonic oscillator decelerate a quantum particle but whose probability of the position growth like $t^{1/2} \log t$. Because of its log growth term, the threshold of the decay order of the potential, in order to exist the wave operators, can not be characterized only by the polynomial decay rate. Hence we give the log-weight in x to the potential and the characterize the threshold using growth order of log-weight.

- 4 廣島 文生 (九大数理) 1次元調和振動子に付随した時間作用素の行列表現 15
 寺西 功哲 (北大理)
 Fumio Hiroshima (Kyushu Univ.) Matrix representation of time operators of 1D harmonic oscillator
 Noriaki Teranishi (Hokkaido Univ.)

概要 A time operator of the one-dimensional harmonic oscillator is rigorously constructed in the sense of sesqui-linear form, and the continuous limit of the time operator is shown. Finally a matrix representation of the time operator and its analytic continuation are given.

- 5 寺西功哲(北大理) 調和振動子における phase 作用素の一般化 15
 廣島文生(九大数理)
 Noriaki Teranishi (Hokkaido Univ.) A generalization of the phase operator
 Fumio Hiroshima (Kyushu Univ.)

概要 We study about time operators of the quantum harmonic oscillator H . It is known that H is unitary equivalent to the number operator $N + 1/2$ on $\ell^2(\mathbb{N})$. We construct time operators of N and show that a relation between the phase operator and Galapon's time operator.

- 6 P. Exner Continuum limit of the lattice quantum graph Hamiltonian 15
 (Czech Tech. Univ./Czech Acad. of Sci.)
 中村周(学習院大理)
 只野之英(東京理大理)
 Pavel Exner Continuum limit of the lattice quantum graph Hamiltonian
 (Czech Tech. Univ./Czech Acad. of Sci.)
 Shu Nakamura (Gakushuin Univ.)
 Yukihide Tadano (Tokyo Univ. of Sci.)

概要 We consider a continuum limit problem of quantum graph Hamiltonians, that is, Schrödinger operators defined on metric graphs. We show that the quantum graph Hamiltonian on the ν -dimensional square lattice $\ell\mathbb{Z}^\nu$ with its mesh size ℓ converges as the continuum limit ($\ell \rightarrow 0$) to the corresponding Schrödinger operator on \mathbb{R}^ν in the sense of norm resolvent convergence.

14:15~15:15 特別講演

- 梅田陽子(城西大理) A unified family of P_J -hierarchies ($J=I,II,IV,34$) with a large parameter
 Youko Umeta (Josai Univ.) A unified family of P_J -hierarchies ($J=I,II,IV,34$) with a large parameter

概要 The exact WKB analysis is a very effective method in studying both linear and non-linear differential equations which contain a large parameter in an appropriate way. We study the common structures between P_J -hierarchies($J=I,II,IV,34$) with a large parameter from a view point of the exact WKB analysis. The first part is the result concerning the Stokes geometry for a unified family of P_J -hierarchies($J=I,II,IV,34$) with a large parameter. We study the relation between the Stokes geometry of the system of non-linear ordinary differential equations and that of its underlying Lax pair. In the second part, we construct instanton-type solutions with sufficiently many free parameters which can describe the Stokes phenomenon of the Borel sum of a 0-parameter solution.

9月14日(水) 第I会場

9:30~12:00

- 7 伊師英之(阪公大理) 色付き等質グラフからの等質錐の構成 15
 Hideyuki Ishi (Osaka Metro. Univ.) Construction of homogeneous cones from colored homogeneous graphs

概要 We show that the cone of positive definite symmetric matrices of a specific form defined from an undirected simple graph satisfying certain conditions and a subgroup of the automorphism group of the graph is a homogeneous cone. In this way, we can construct many examples of homogeneous cones. We mention some applications of integral formulas over the homogeneous cone to mathematical statistics. This is joint work with Piotr Graczyk (University of Angers) and Bartosz Kolodziejek (Warsaw University of Technology).

- 8 中島 秀斗 (統計数理研) Sub-Hankel 行列式に付随する概均質ベクトル空間の b -関数と不変微分作用素について 15

Hideto Nakashima (Inst. of Stat. Math.) On b -functions and invariant differential operators of prehomogeneous vector spaces associated with sub-Hankel determinants

概要 In this talk, we give an explicit formula of Capelli-type identity of invariant differential operators on a prehomogeneous vector space associated with sub-Hankel determinants. Moreover, an explicit formula of multivariate b -functions with respect to relatively invariant functions is also given.

- 9 西山 享 (青学大理工) 二重旗多様体上の Steinberg 理論と RSK 対応 15
L. Fresse

(IECL, Univ. Lorraine)

Kyo Nishiyama (Aoyama Gakuin Univ.) Steinberg theory for double flag varieties and RSK correspondence
Lucas Fresse (IECL, Univ. Lorraine)

概要 Let G be a connected reductive algebraic group, and K its symmetric subgroup. By the double flag variety of G/K , we mean a product of flag varieties of G and K . For a double flag variety associated with the symmetric space of type AIII, we establish two kinds of generalized Steinberg maps, which sends conormal bundles of K -orbits to nilpotent K -orbits in the Lie algebra of K and in the tangent space of the symmetric space respectively. We described the Steinberg maps combinatorially, which generalize the classical RSK correspondence for permutations.

- 10 西山 享 (青学大理工) 二重旗多様体上の軌道空間へのヘッケ環の作用 15
L. Fresse

(IECL, Univ. Lorraine)

Kyo Nishiyama (Aoyama Gakuin Univ.) Action of a Hecke algebra on the space of orbits on a double flag variety
Lucas Fresse (IECL, Univ. Lorraine)

概要 Consider a connected reductive algebraic group G and its symmetric subgroup K . Let $\mathfrak{X} = K/B_K \times G/P$ be a double flag variety of finite type, where B_K is a Borel subgroup of K , and P a parabolic subgroup of G . A general argument shows that the orbit space $\mathbb{C}\mathfrak{X}/K$ inherits a natural action of the Hecke algebra $\mathcal{H} = \mathcal{H}(K, B_K)$ of double cosets via convolutions. However, to find out the explicit structure of the Hecke module is a quite different problem. We will clarify the explicit action of \mathcal{H} on $\mathbb{C}\mathfrak{X}/K$ in combinatorial way using graphs for the double flag variety of type AIII.

- 11 笹木 集夢 (東海大理) Invariant measures on non-symmetric reductive spherical homogeneous spaces of rank-one type 15

Atsumu Sasaki (Tokai Univ.) Invariant measures on non-symmetric reductive spherical homogeneous spaces of rank-one type

概要 We give a description of invariant measures on non-symmetric reductive spherical homogeneous spaces of rank-one type. For this, we revisit a Cartan decomposition for a spherical homogeneous space and consider the set of restricted roots associated to this decomposition. The idea of our description of invariant measures is similar to that for semisimple symmetric spaces.

- 12 甘中一輝 (理化学研) \flat 3次元コンパクト反ド・ジッター多様体の安定固有値の重複度 15
Kazuki Kannaka (RIKEN) Multiplicities of stable eigenvalues on compact anti-de Sitter 3-manifolds

概要 A Lorentzian manifold has an intrinsic second-order differential operator called the Laplacian as in a Riemannian manifold. However, the Laplacian is no longer an elliptic but a hyperbolic differential operator, and there are non-smooth eigenfunctions in general.

A Lorentzian manifold with negative constant sectional curvature is called an anti-de Sitter manifold, and especially in the 3-dimensional case, its rich deformation theory is known to exist. In this talk, I will discuss quantitative results on the behavior of multiplicities of eigenvalues of the Laplacian in the 3-dimensional case when deforming anti-de Sitter structures.

- 13 田森宥好 (北大理) On the existence of a nonzero linear period 15
Hiroyoshi Tamori (Hokkaido Univ.) On the existence of a nonzero linear period

概要 Let D be a quaternion algebra over \mathbb{R} , $G = GL_n(D)$ and $H = GL_n(\mathbb{C})$ regarded as a subgroup of G . For a character χ on \mathbb{C}^\times , we say that an irreducible representation π of G is χ_H -distinguished if $\text{Hom}_H(\pi, \chi \circ \det_H) \neq 0$. We compute the root number of a χ_H -distinguished representation π twisted by the representation induced from χ , and prove an Archimedean analogue of the conjecture by Prasad and Takloo-Bighash. The proof is based on the analysis of the contribution of H -orbits in a flag manifold of G on the Schwartz homology of principal series representations. Moreover, we prove that the Schwartz homology $H_*(H, \pi)$ is finite-dimensional for a general reductive symmetric pair (G, H) and a Casselman-Wallach representation of G . This is a joint work with Miyu Suzuki (Kanazawa Univ.).

- 14 C. Reyes-Bustos Shifted non-commutative harmonic oscillators 15
(NTT基礎数学研究センタ)

若山正人

(NTT基礎数学研究センタ・九大*)

Cid Reyes-Bustos

Shifted non-commutative harmonic oscillators

(NTT Inst. for Funda. Math.)

Masato Wakayama

(NTT Inst. for Funda. Math./Kyushu Univ.*)

概要 The non-commutative harmonic oscillator (NCHO) is a generalization of the quantum harmonic oscillator that is related with the physical model called the quantum Rabi model via a confluence process on their respective ODE pictures. A generalization of the QRM, called the asymmetric QRM, has a rich structure in its hidden symmetry including a far-reaching conjecture relating its spectrum with algebraic geometry. In this talk we define a generalization of the the NCHO, called the η -shifted NCHO, related to the AQRM via a confluence process and give its basic properties. In addition we show how the finite eigenvalues of the η -NCHO converge to the degenerate eigenvalues of the AQRM via the confluence process.

13:15~14:15 特別講演

跡部 発 (北大理) \flat Local newforms for unramified odd unitary groups

Hiraku Atobe (Hokkaido Univ.) Local newforms for unramified odd unitary groups

概要 In this talk, we introduce a family of compact open subgroups of unramified odd unitary groups over a p -adic field, and explain that for any irreducible generic representation, the subspaces fixed by these compact subgroups give a specific vector called a *local newform*, which is uniquely determined up to a scalar multiple. This is an analogue of a well-known result of Jacquet–Piatetskii–Shapiro–Shalika for the case of general linear groups. For the proof, we establish the fundamental lemma for our compact groups. This is a joint work with Masao Oi in Kyoto University and Seidai Yasuda in Hokkaido University.

9月15日(木) 第I会場

9:30~12:00

- 15 古市 茂 (日大文理) 対数平均に関連した不等式について 15
Shigeru Furuichi (Nihon Univ.) On inequalities related to logarithmic mean

概要 After reviewing the ordering among some weighted means including the weighted logarithmic mean, we state some operator inequalities related to logarithmic mean. We also give some inequalities for the nested means. In addition, we show the natural generalization of Zou–Jiang with weighted mean. Finally, considering the geometric bridge between the arithmetic mean and the geometric mean, we study some unitarily invariant norm inequalities.

- 16 瀬尾 祐貴 (大阪教育大教育) Karcher 幾何平均と正規化行列式について 15
平松 空 (泉大津高)
Yuki Seo (Osaka Kyoiku Univ.) Karcher mean and normalized determinant
Sora Hiramatsu
(Osaka Prefectural Izumiohtsu High School)

概要 As a natural generalization of the Fuglede–Kadison determinant, there is an attempt to extend the concept of the determinant to vector states. In this talk, we present the normalized determinant for a state on a von Neumann algebra, and by virtue of the Specht ratio, we show a variant of determinant identity of Karcher mean for the normalized determinant of positive invertible operators on a separable Hilbert space.

- 17 内山 充 Symmetric matrix means 15
(島根大*・立命館大総合科学技術研究機構)
Mitsuru Uchiyama Symmetric matrix means
(Shimane Univ.* / Ritsumeikan Univ.)

概要 Let A and B be linearly independent positive definite matrices and σ a symmetric operator mean but the arithmetic mean. We show that $A\sigma B$ is a linear combination of A and B if and only if $A^{-1}B$ has just two different eigenvalues. Moreover, we get similar results for three-variable symmetric means.

- 18 宇田川陽一 (立命館大理工) Stability of \mathcal{AN} -property for the induced Aluthge transformations ... 15
大坂博幸 (立命館大理工)
山崎丈明 (東洋大理工)
G. Ramesh (Indian Inst. Tech.)
Yoichi Udagawa (Ritsumeikan Univ.) Stability of \mathcal{AN} -property for the induced Aluthge transformations
Hiroyuki Osaka (Ritsumeikan Univ.)
Takeaki Yamazaki (Toyo Univ.)
Gola Ramesh (Indian Inst. Tech.)

概要 Let H be a Hilbert space. An operator $T \in \mathcal{B}(H)$ is $\mathcal{AN}(H)$ -operator if and only if there exists a unit vector $x \in \mathcal{B}(H)$ such that $\|T|_M x\| = \|T|_M\|$ for any closed subspace $M \subseteq H$. In this talk, we shall discuss stability of \mathcal{AN} -property. Especially, we shall introduce that if $T \in \mathcal{AN}(H)$, then the induced Aluthge transformation of $T \in \overline{\mathcal{AN}(H)}$. Moreover, we shall consider the iteration of mean transformation.

- 19 大坂博幸 (立命館大理工) On a subclass of norm attaining operators 15
 G. Ramesh
 (Indian Inst. of Tech. Hyderabad)
 Hiroyuki Osaka (Ritsumeikan Univ.) On a subclass of norm attaining operators
 Golla Ramesh
 (Indian Inst. of Tech. Hyderabad)

概要 A bounded linear operator $T : H_1 \rightarrow H_2$, where H_1, H_2 are Hilbert spaces, is said to be norm attaining if there exists a unit vector $x \in H$ such that $\|Tx\| = \|T\|$ and absolutely norm attaining (or \mathcal{AN} -operator) if $T|_M : M \rightarrow H_2$ is norm attaining for every closed subspace M of H . Let \mathcal{R}_T denote the set of all reducing subspaces of T . Define $\beta(H) := \{T \in \mathcal{B}(H) : T|_M : M \rightarrow M \text{ is norm attaining } \forall M \in \mathcal{R}_T\}$. In this talk we present a structure theorem for operators in $\beta(H)$.

- 20 羽鳥理 (新潟大*) The complex Mazur–Ulam property for extremely C -regular spaces ... 15
 Osamu Hatori (Niigata Univ.*) The complex Mazur–Ulam property for extremely C -regular spaces

概要 We exhibit a sufficient condition for the complex Mazur–Ulam property. In particular, we show that a uniformly closed extremely C -regular space has the complex Mazur–Ulam property.

- 21 大井志穂 (新潟大理) C^* 環に値をとるリップシツツ環上の Jordan $*$ 準同型写像 15
 Shiho Oi (Niigata Univ.) Jordan $*$ -homomorphisms on Banach algebras of vector-valued Lipschitz maps

概要 In this talk, we consider Jordan $*$ -homomorphisms on Banach $*$ -algebras of all Lipschitz maps from a compact metric space into a unital C^* -algebra. We show that every Jordan $*$ -homomorphism on the space is represented as a weighted composition operator by using the irreducible representations of a unital C^* -algebra. Our results generalize previous works on algebra $*$ -homomorphisms on the space of all Lipschitz maps from a compact metric space into a unital C^* -algebra.

- 22 森迪也 (理化学研THEMS) Lattice isomorphisms between projection lattices of von Neumann algebras 15
 Michiya Mori (RIKEN) Lattice isomorphisms between projection lattices of von Neumann algebras

概要 Let M, N be von Neumann algebras, and $\mathcal{P}(M), \mathcal{P}(N)$ their projection lattices. I will explain that every lattice isomorphism from $\mathcal{P}(M)$ onto $\mathcal{P}(N)$ can be described by means of a ring isomorphism between the algebras of locally measurable operators if M has no direct summands of type I_1 and I_2 . If M has no finite type I direct summands, then every ring isomorphism between the algebras of locally measurable operators of M and N is similar to a real $*$ -isomorphism.

14:15~16:00

- 23 井上寛 (九州産大経済) An unbounded generalization of Tomita's observable algebras 15
 Hiroshi Inoue (Kyushu Sangyo Univ.) An unbounded generalization of Tomita's observable algebras

概要 In this talk I shall introduce the basic theory of Tomita's observable algebras and build the basic theory of unbounded Tomita's observable algebras which are related to unbounded operator algebras, especially unbounded Tomita-Takesaki theory, operator algebras on Krein spaces, studies of positive linear functionals on $*$ -algebras and so on.

- 24 磯野 優介 (京大数理研) Pointwise inner automorphisms of almost periodic factors 15
 Yusuke Isono (Kyoto Univ.) Pointwise inner automorphisms of almost periodic factors

概要 We prove that a large class of nonamenable almost periodic type III₁ factors M , including all McDuff factors that tensorially absorb the Araki–Woods factor R_∞ of type III₁ and all free Araki–Woods factors, satisfy Haagerup–Størmer’s conjecture (1988): any pointwise inner automorphism of M is the composition of an inner and a modular automorphism. This is joint work with C. Houdayer.

- 25 武石 拓也 (京大工織大基盤) Constructing number field isomorphisms from $*$ -isomorphisms of certain
 C. Bruce (Univ. Glasgow) crossed product C^* -algebras 15
 Takuya Takeishi (Kyoto Inst. Tech.) Constructing number field isomorphisms from $*$ -isomorphisms of certain
 Christopher Bruce (Univ. Glasgow) crossed product C^* -algebras

概要 We prove that the class of crossed product C^* -algebras associated with the action of the multiplicative group of a number field on its ring of finite adeles is rigid in the following explicit sense: Given any $*$ -isomorphism between two such C^* -algebras, we construct an isomorphism between the underlying number fields. As an application, we prove an analogue of the Neukirch–Uchida theorem using topological full groups, which gives a new class of discrete groups associated with number fields whose abstract isomorphism class completely characterises the number field.

- 26 吉田 啓佑 (北大教育推進機構) Non-commutative topological entropy for some Exel–Laca algebras ... 15
 Keisuke Yoshida (Hokkaido Univ.) Non-commutative topological entropy for some Exel–Laca algebras

概要 In this talk, I will discuss non-commutative entropy for the canonical ucp (unital completely positive) maps on Exel–Laca algebras associated to some infinite 0-1 matrices. In the first half of the talk, I show that one can define the canonical ucp maps on Exel–Laca algebras associated to some infinite 0-1 matrices. In particular, we see that we have the canonical ucp map on the Exel–Laca algebras associated with the renewal shift. In the last half of the talk, I show an evaluation of the non-commutative entropy for the canonical ucp map on the Exel–Laca algebras associated with the renewal shift.

- 27 梶原 毅 (岡山大環境理工) 自己相似写像の直積に付随する C^* 環のコア 15
 綿谷 安男 (九大*)
 Tsuyoshi Kajiwara (Okayama Univ.) Cores of the C^* -algebras associated with self-similar maps
 Yasuo Watatani (Kyushu Univ.*)

概要 In this talk, we report that the products of self-similar sets which satisfies simple condition are contained in the class where we can do matrix representation, analysis of the restriction of model traces to the finite core, and the structure of primitive ideals of the cores.

- 28 綿谷 安男 (九大*) C^* 環の間の非線型正写像と行列環上の非線形トレースと majorization 理論 15
 渚 勝
 (千葉大理・立命館大理工)
 Yasuo Watatani (Kyushu Univ.*) Non-linear positive maps on C^* -algebras, non-linear traces on matrix
 Masaru Nagisa algebras and majorization theory
 (Chiba Univ./Ritsumeikan Univ.)

概要 We study non-linear monotone positive maps on C^* -algebras. In this talk we consider non-linear and non-commutative integration theory. Choquet integrals and Sugeno integrals are studied as non-linear integrals in non-additive measure theory. We introduce non-linear traces of Choquet type and Sugeno type on matrix algebras and characterize these non-linear traces of Choquet type and Sugeno type by partial additivity called comonotonic additivity and comonotonic F-additivity respectively. We study a close relation among non-linear traces of Choquet type, majorization and unitarily invariant norms and 2-positivity.

16:15~17:15 特別講演鈴木悠平 (北大理) \flat 非可換従順作用

Yuhei Suzuki (Hokkaido Univ.) Non-commutative amenable actions

概要 Recently amenability of C^* -dynamical systems attracted much attention. This is a consequence of my discovery of amenable actions on simple C^* -algebras. The characterizations/formulations of amenability of C^* -dynamical systems had been unclear for a long time (> 30 years?), but Ozawa and I recently settled it. This allows us to give a functorial construction of amenable actions on Kirchberg algebras. A recent highlight on this subject may be my observation that amenability of actions is the genuine ingredient for the classification of C^* -dynamical systems. In particular, interestingly, the well-known dichotomy in von Neumann algebra theory (Ocneanu, Jones, Popa, Brothier–Vaes etc) fails in the C^* -algebra realm. Notably an ultimate classification theorem was recently established by Gabe–Szabo in the purely infinite case. Partly joint work with Ozawa. If time permits, I also explain my latest work, which gives amenable actions on tracial simple C^* -algebras. This example clarifies/motivates an ultimate goal in classification theory of C^* -algebras.

統計数学

9月13日(火) 第III会場

9:30~11:50

- 1 河本野恵(北大理) Spread-out limit of the critical points for lattice trees and lattice animals in dimensions $d > 8$ 15
 Noe Kawamoto (Hokkaido Univ.) Spread-out limit of the critical points for lattice trees and lattice animals in dimensions $d > 8$

概要 A spread-out lattice animal(LA) is a finite connected set of edges in $\{\{x, y\} \subset \mathbb{Z}^d : 0 < \|x - y\| \leq L\}$. A lattice tree(LT) is a LA with no loops. Both models are the statistical-mechanical models for branched polymers. Let χ_p be the susceptibility which is a sum of the generating function of LT or LA containing the origin and x , with fugacity $p/|\Lambda|$, where $|\Lambda|$ is the degree of a vertex. There exists the critical point p_c of χ_p in the sense that χ_p diverges if p is bigger than p_c and χ_p is finite otherwise. As the previous research, Penrose (JSP, 77 (1994): 3-15) proved that $p_c = 1/e + O(L^{-2d/7} \log L)$ for both models for all $d \geq 1$. We show that $p_c = 1/e + CL^{-d} + O(L^{-d-1})$ for all $d > 8$, where the non-universal constant C has the random-walk representation. This talk is based on the joint research with Prof. Sakai at Hokkaido univ.

- 2 中川雄太(京大人間環境) ギブス点過程に関するランダムシュレディンガー作用素の状態密度 15
 Yuta Nakagawa (Kyoto Univ.) Density of states for random Schrödinger operators associated with Gibbs point processes

概要 We consider the Schrödinger operator for the field generated by a non-negative single-site potential and a realization of a point process. If the point process is a Poisson point process, it is known that the integrated density of states (IDS) for the Schrödinger operator decays exponentially near its spectral lower edge. In this talk, we consider a pairwise interaction Gibbs point process and compare the asymptotic behavior of the IDS with that of the case of a Poisson point process.

- 3 河備浩司(慶大経済) Stochastic quantization associated with the $\exp(\Phi)_2$ -quantum field model
 星野壮登(阪大基礎工) driven by the space-time white noise 15
 楠岡誠一郎(京大理)
 Hiroshi Kawabi (Keio Univ.) Stochastic quantization associated with the $\exp(\Phi)_2$ -quantum field model
 Masato Hoshino (Osaka Univ.) driven by the space-time white noise
 Seiichiro Kusuoka (Kyoto Univ.)

概要 We consider a quantum field model with exponential interactions on the two-dimensional torus, which is called the $\exp(\Phi)_2$ -quantum field model or Hoegh-Krohn's model. In this talk, we discuss the stochastic quantization of this model. Combining key properties of Gaussian multiplicative chaos with a method for singular SPDEs, we construct a unique time-global solution to the corresponding parabolic stochastic quantization equation in the full L^1 -regime $|\alpha| < \sqrt{8\pi}$ of the charge parameter α . We also identify the solution with an infinite dimensional diffusion process constructed by the Dirichlet form approach.

- 4 濱名裕治(筑波大数理物質) Square-root boundaries for Bessel processes 10
 Yuji Hamana (Univ. of Tsukuba) Square-root boundaries for Bessel processes

概要 We consider the hitting times of a Bessel process to a square-root boundary and obtain the explicit form of the distribution function of the hitting time by means of zeros of the confluent hypergeometric function with respect to the first parameter.

- 5 築島 瞬 (都立大理) On the weak convergence of conditioned Bessel bridges 15
 石谷 謙介 (都立大理)
 Shun Yanashima (Tokyo Metro. Univ.) On the weak convergence of conditioned Bessel bridges
 Kensuke Ishitani (Tokyo Metro. Univ.)

概要 The purpose of this presentation is to introduce the construction of a stochastic process called “ δ -dimensional Bessel house-moving” and its properties. δ -dimensional Bessel house-moving is a δ -dimensional Bessel process hitting a fixed point at $t = 1$ for the first time. We show that this process can be obtained as the weak limit of δ -dimensional Bessel bridges conditioned from above. Applying this weak convergence, we give the decomposition formula for its distribution and the Radon–Nikodym density for the distribution of the Bessel house-moving with respect to the one of the Bessel process. We also study sample path properties of the Bessel house-moving.

- 6 松本 裕行 (青学大理工) Laplacian and Brownian motion on positive definite matrices, revisited 15
 Hiroyuki Matsumoto Laplacian and Brownian motion on positive definite matrices, revisited
 (Aoyama Gakuin Univ.)

概要 We show explicit expression for the Laplace–Beltrami operator on the symmetric space of positive definite matrices by using the Iwasawa coordinate, and study the corresponding diffusion process and its largest and smallest eigenvalues.

- 7 笹谷 晃平 (京大数理研) Some relation between spectral dimension and Ahlfors regular conformal dimension of resistance metrics 15
 Kôhei Sasaya (Kyoto Univ.) Some relation between spectral dimension and Ahlfors regular conformal dimension of resistance metrics

概要 The spectral dimension d_S of a metric space is an exponent associated with the asymptotic behavior of the heat kernel of the standard Dirichlet form and Brownian motion on the space. The Ahlfors regular conformal dimension \dim_{AR} of the metric space is a quasisymmetric invariant, where quasisymmetry is a well-studied property of homeomorphisms between metric spaces. For (generalized) Sierpiński carpets or Sierpiński gaskets, Kigami showed that $\dim_{AR} \leq d_S < 2$ or $\dim_{AR} \geq d_S \geq 2$ holds, in 2020. In this lecture, we give an appropriate extension of this results to the framework of resistance forms. We also show that another simple extension, which is to be expected, does not hold in the framework in general.

- 8 梶野 直孝 (京大数理研) On singularity of energy measures for symmetric diffusions with full off-diagonal heat kernel estimates II: Some borderline examples 15
 Naotaka Kajino (Kyoto Univ.) On singularity of energy measures for symmetric diffusions with full off-diagonal heat kernel estimates II: Some borderline examples

概要 We present a concrete family of fractals, which we call the (*two-dimensional*) *thin scale irregular Sierpiński gaskets* and each of which is equipped with a canonical strongly local regular symmetric Dirichlet form. We prove that any fractal K in this family satisfies the full off-diagonal heat kernel estimates with respect to some space-time scale function Ψ_K and the singularity of the associated energy measures with respect to the canonical volume measure (uniform distribution) on K , and also that the decay rate of $r^{-2}\Psi_K(r)$ to 0 as $r \downarrow 0$ can be made arbitrarily slow by suitable choices of K . These results together support [Ann. Probab. 48 (2020), no. 6, 2920–2951, Conjecture 2.15] stating that the full off-diagonal heat kernel estimates with space-time scale function Ψ satisfying $\lim_{r \downarrow 0} r^{-2}\Psi(r) = 0$ imply the singularity of the energy measures.

14:15~15:15 2021年度(第20回)日本数学会解析学賞受賞特別講演

香取 眞理 (中 大 理 工) 多重シュラム・レヴナー発展とダイソンのブラウン運動模型

Makoto Katori (Chuo Univ.) Multiple Schramm–Loewner evolution and Dyson’s Brownian motion model

概要 Schramm–Loewner evolution (SLE) is a stochastic extension of the classical Loewner theory in complex analysis on a simply connected proper domain of \mathbb{C} such that the driving function of the Loewner chain of conformal maps is given by a one-dimensional stochastic process. Here we assume that the domain is the upper-half complex-plane \mathbb{H} and the driving process runs on \mathbb{R} . It was proved that the SLE driven by a time changed Brownian motion on \mathbb{R} , $(B_{\kappa t})_{t \geq 0}$, $\kappa > 0$, determines a one-parameter family of probability laws of a random continuous curve in $\overline{\mathbb{H}}$ connecting 0 and ∞ , and that this family, denoted by SLE_{κ} , $\kappa > 0$, covers all probability laws of such curves having the conformal invariance and the domain Markov property. In probability theory and statistical physics, the SLE_{κ} has been playing a central role in studying critical phenomena associated with continuous phase transitions and fractal geometries in two dimensions. Therefore, it is natural to generalize the SLE theory to describe random multiple curves in \mathbb{H} driven by an interacting particle system on \mathbb{R} . The problem is that the requirement of the conformal invariance and the domain Markov property is not sufficient to determine a ‘canonical’ family of multiple SLEs. Motivated by the recent work by Sheffield on the quantum gravity zipper and a series of papers by Miller and Sheffield on the imaginary geometry, we employ the coupling of Gaussian free fields (GFFs) and multiple SLEs. We show that a multiple SLE is correctly coupled with a certain GFF if and only if the driving particle system is given by Dyson’s Brownian motion model studied in random matrix theory. Dyson’s Brownian motion model is also a one-parameter ($\beta > 0$) family of one-dimensional log-gases. The coupling is achieved if and only if $\beta = 8/\kappa$. The present study on the GFF/multiple SLE coupling enables us to clarify the basic properties of the constructed multiple SLE (e.g., continuity of multiple SLE curves, ‘phase transitions’ at $\kappa = 4$ and 8). Moreover, we expect that a notion of conformal invariance of SLE will enrich the study of random matrix theory via the present results on the trinity of the GFF, the multiple SLE, and Dyson’s Brownian motion model. The present talk is based on a joint work with Shinji Koshida (Aalto University).

15:30~16:30 特別講演

長谷部 高広 (北 大 理 工) Loewner chains, Markov processes and non-commutative stochastic processes

Takahiro Hasebe (Hokkaido Univ.) Loewner chains, Markov processes and non-commutative stochastic processes

概要 The notion of Loewner chain is a one-parameter family of univalent holomorphic self-maps of a domain with certain properties. It played a key role in some problems on univalent functions, especially in the de Branges’ proof of Bieberbach’s conjecture in 1985. Loewner chains have found another application to the theory of SLE around 2000. Later, reverse evolution families (more general than Loewner chains) began to be used in free probability and then in monotone probability. More recently, (temporally inhomogeneous) branching processes are analyzed with the help of reverse evolution families. This talk summarizes recent work of the speaker concerning some of the above mentioned topics, in which additive processes, a certain class of Markov processes, branching processes and non-commutative stochastic processes are involved. One of the general purposes of this work is to make a dictionary between different fields or objects. For example, the Laplace exponents of a branching process form a reverse evolution family. Then some basic properties (e.g. having finite first moment) of the branching process can be translated into some basic properties of reverse evolution families that were formerly developed independently in complex analysis. The presentation will be based on joint work with Uwe Franz, Sebastian Schleihsinger, Ikkei Hotta, Pavel Gumenyuk and Jose-Luis Perez.

9月14日(水) 第III会場

9:30~11:30

- 9 平井 祐紀 (京大 理) Linear integral equations with additive noise in the pathwise Itô calculus 15

Yuki Hirai (Kyoto Univ.) Linear integral equations with additive noise in the pathwise Itô calculus

概要 The Itô–Föllmer calculus, pioneered by Föllmer (1981), is a deterministic counterpart of classical Itô’s stochastic calculus. In this talk, we treat linear integral equations with additive noise in the framework of the Itô–Föllmer calculus in Banach spaces. We interpret the term ‘noise’ as a càdlàg path that has quadratic variation along a sequence of partitions. We give a solution to such an equation by the variation of constants formula and study the regularity of the solution path using that representation. As an application, we consider a purely pathwise approach to the HJM term structure model of bond markets.

- 10 濱口 雄史 (阪大 基礎工) 線形確率ヴォルテラ積分方程式のカオス展開 15

Yushi Hamaguchi (Osaka Univ.) Chaos expansions for linear stochastic Volterra integral equations

概要 We consider a general class of linear stochastic Volterra integral equations with singular kernels. By means of the Wiener–Itô chaos expansion approach, we define suitable classes of stochastic Volterra kernels and introduce a new notion of the product for adapted L^2 -processes. Observing the algebraic properties of stochastic Volterra kernels, we obtain a variation of constants formula which gives an explicit expression for the Wiener–Itô chaos expansion of the solution to a general class of linear SVIEs.

- 11 中田 寿夫 (福岡教育大) 超重裾分布に関する大偏差 10

Toshio Nakata (Fukuoka Univ. of Edu.) Large deviations for super-heavy tailed distributions

概要 In this talk, we study large deviations for sums of independent and identically distributed random variables (random walks) with nonnegative *super-heavy tailed* distributions. While Hu and Nyrhinen (2004) gave results for heavy tailed distributions, our result is an improvement of one of theirs for super-heavy tailed ones. Moreover, we apply it to the *log-Pareto distribution* and the distribution for the *super-Petersburg game*.

- 12 小川 重義 (立命館大理工) 非因果的確率積分に対する平均値定理 10

Shigeyoshi Ogawa (Ritsumeikan Univ.) Mean value theorems for the noncausal stochastic integral

概要 In the classical calculus the statement called mean value theorem for the integral is well known. We are now concerned with the validity of a similar statement for the stochastic integrals. The aim of the talk is to show that we can establish mean value theorems as exact formulae when limited to the *noncausal stochastic integral* (also called *ogawa integral*) of the form $\int_a^b f(X_t) d_* W_t$, where W_t is Brownian motion and X_t an Itô process, causal or not. We also discuss the case of Itô integral $\int_a^b f(X_t) d_0 W_t$, moreover such a genuine noncausal case where the process X_t is noncausal. Whole discussions are developed in the framework of the noncausal stochastic calculus. hence for the related materials and basic facts we would refer to the monograph “Noncausal Stochastic Calculus” by Ogawa, S., (2017, Springer).

- 13 植田 優基 (北教大旭川) Regularity results on the class of Boolean selfdecomposable distributions
長谷部 高広 (北大理) 15
野場 啓 (統計数理研)
佐久間 紀佳 (名古屋市大理)
- Yuki Ueda (Hokkaido Univ. of Edu.) Regularity results on the class of Boolean selfdecomposable distributions
Takahiro Hasebe (Hokkaido Univ.)
Kei Noba (Inst. of Stat. Math.)
Noriyoshi Sakuma (Nagoya City Univ.)

概要 Khintchine introduced the class L of limit distributions of certain independent triangular arrays. This class contains the class of stable distributions as a subset. In 1937, Lévy characterized the class L as follows: A probability measure μ on \mathbb{R} is in the class L if and only if μ is selfdecomposable. In non-commutative probability theory, notions of independence of random variables are classified into five ones: tensor, free, Boolean, monotone and anti-monotone independence. The concept of selfdecomposability is also formulated for each notion of independence. In this talk, we focus on Boolean version of the class of selfdecomposable distributions and investigate general regularity results on the class of Boolean selfdecomposable distributions.

- 14 白 杵 峻 亮 (京大理) $\times a \times b$ 作用に関する経験測度とその irregular set 及びエントロピーとの
 関係について 15
Shunsuke Usuki (Kyoto Univ.) $\times a$ and $\times b$ empirical measures, the irregular set and entropy

概要 For integers a and $b \geq 2$ which are multiplicatively independent, let T_a and T_b be multiplication by a and b on \mathbb{R}/\mathbb{Z} . It is known that the only T_a, T_b -invariant and ergodic measure with positive entropy of T_a or T_b is the Lebesgue measure. In this talk, we consider the empirical measures with respect to T_a, T_b -action and show that the set of x such that the empirical measures of x do not converge to any measure has Hausdorff dimension 1 and the set of x such that the empirical measures accumulate to some invariant measure with small entropy has small Hausdorff dimension. Furthermore, we obtain some equidistribution result about the T_a, T_b -orbit of x in the complement of a set of Hausdorff dimension 0.

- 15 中 島 由 人 (京大理) 準正則連分数展開が定める無理数集合のハウスドルフ次元について 15
高 橋 博 樹 (慶大理工)
Yuto Nakajima (Kyoto Univ.) Hausdorff dimension of sets with restricted, slowly growing partial quo-
Hiroki Takahashi (Keio Univ.) tients in the semi-regular continued fraction

概要 We describe the Hausdorff dimension of sets of irrational numbers whose partial quotients in the semi-regular continued fraction expansion obey certain restrictions and growth conditions. To prove our results, we construct non-autonomous iterated function systems well-adapted to the given restrictions and growth conditions, and then apply the dimension theory developed by Rempe-Gillen and Urbański.

11:30~12:00 統計数学分科会総会

9月15日(木) 第III会場

9:30~12:00

- 16 藤 田 敏 治 (九工大工) 確率環境下における合流型決定過程について —再帰的解法に関する考察—
 15
Toshiharu Fujita On recursive methods for converging decision process in stochastic en-
 (Kyushu Inst. of Tech.) vironment

概要 The goal of this study is to solve the stochastic decision process models with a converging transition system. In this presentation, a simple example will be discussed and some recursive equations will be derived by using dynamic programming technique.

- 17 田中輝雄 (広島市大情報) 最適停止問題の預言者の不等式 —比の評価— 10
 Teruo Tanaka (Hiroshima City Univ.) Prophet inequalities for finite stage multiparameter optimal stopping problems

概要 We consider the optimal stopping problem for discrete time multiparameter stochastic processes. In the classical optimal stopping problems, the comparisons between the expected reward of a player with complete foresight and the expected reward of a player using nonanticipating stop rules, known as prophet inequalities, have been studied by many authors. We shall study the prophet inequalities for optimal stopping problems for finite stage multiparameter stochastic processes.

- 18 地 寄 頌 子 (大阪工大情報) Optimality of spanning bipartite block designs 10
 栗 木 進 二 (阪 府 大*)
 藤 原 良 (筑 波 大*)
 宮 本 暢 子 (東京理大理工)
 Shoko Chisaki (Osaka Inst. of Tech.) Optimality of spanning bipartite block designs
 Shinji Kuriki (Osaka Pref. Univ.*)
 Ryoh Fuji-Hara (Univ. of Tsukuba*)
 Nobuko Miyamoto (Tokyo Univ. of Sci.)

概要 It is usually to design an experiment using treatments and its blocks in the design of experiments. Consider a set of edges of a complete bipartite graph as a treatments set and suppose the treatments have a structure. Then, we proposed a spanning bipartite block design (SBBD) to achieve better estimation accuracy. In this talk, using an SBBD as a statistical model, we discuss the optimality of how small the variance of the estimator was. And we prove that the variances of all estimators are equal (variance balanced). We also show the goodness of SBBD by the simulation.

- 19 矢 萩 隆 哉 (東京理大理工) 多元分割表における周辺累積非同等モデルの一般化 15
 上 原 歩 夢 (東京理大理工)
 篠 田 覚 (横浜市大医)
 吉 本 拓 矢 (中外製薬)
 田 畑 耕 治 (東京理大理工)
 Ryuya Yahagi (Tokyo Univ. of Sci.) The generalization of marginal cumulative inhomogeneity model for
 Ayumu Uehara (Tokyo Univ. of Sci.) multi-way contingency tables
 Satoru Shinoda (Yokohama City Univ.)
 Takuya Yoshimoto
 (Chugai Pharmaceutical Co.)
 Kouji Tahata (Tokyo Univ. of Sci.)

概要 For multi-way contingency tables, Bhapkar and Darroch (1990) considered the marginal symmetry model for order h . Yoshimoto *et al.* (2020) proposed the marginal cumulative logistic model for order h as a model of an inhomogeneity for marginal cumulative probability for order h . This presentation proposes a generalized marginal cumulative inhomogeneity model for order h . It also gives the decomposition of the marginal symmetry model for order h into the generalized marginal cumulative inhomogeneity model for order h , the marginal moment equality model for order h and the marginal symmetry model for order $h - 1$.

- 20 佃 康 司 (九大数理) Pitman 分割の長さの漸近挙動について 15
 Koji Tsukuda (Kyushu Univ.) On the asymptotic behavior of the length of a Pitman partition

概要 The Pitman sampling formula is a multivariate discrete distribution with three parameters, and a Pitman partition is a random partition whose law is given by the Pitman sampling formula. This presentation discusses the asymptotic behavior of the length of a Pitman partition under a two-parameter asymptotic regime. In particular, convergence in probability is shown and evaluated.

- 21 宮田 庸一 (高崎経大経済) 正弦関数摂動分布族のある拡張について 15
塩濱 敬之 (南山大理工)
阿部 俊弘 (法政大経済)

Yoichi Miyata On an extension of the family of sine-skew circular distributions
 (Takasaki City Univ. of Econ.)
Takayuki Shiohama (Nanzan Univ.)
Toshihiro Abe (Hosei Univ.)

概要 The sine skewed circular distribution is a circular probability model that can be asymmetric in shape and that has the advantage that the sine and cosine moments can be written in explicit forms, and generation of random numbers can be easily implemented. In contrast, this distribution is difficult to be largely asymmetric near the modes of the distributions. In this talk, we use the framework of Ley and Verdebout to propose a new family of probability distributions, that can give stronger asymmetry around the mode than the sine skewed circular distribution. We also show that a subfamily of extended sine-skewed wrapped Cauchy distributions, and a subfamily of von Mises distributions are identifiable with respect to parameters.

- 22 赤間 陽二 (東北大理) A dichotomous behavior of Guttman–Kaiser criterion from equi-correlated
フスナキラティアティナ normal population 15
 (東北大理)

Yohji Akama (Tohoku Univ.) A dichotomous behavior of Guttman–Kaiser criterion from equi-correlated
Atina Husnaqilati (Tohoku Univ.) normal population

概要 In high-dimensional statistics, a famous *eigenvalue-greater-than-one rule (GK rule)* assesses the number of significant components/factors of inferences principal component analysis and exploratory factor analysis. Psychologists and simulation study report: if the dimension p is small, when a common correlation coefficient among the p variables is r , GK rule assessment is very small ($r > 0$), and $p/2$ ($r = 0$). For the sample size n , we establish this dichotomy for large p but small p/n and equi-correlated normal population, by proving: as $n, p \rightarrow \infty, p/n \rightarrow c > 0$, the spectral distribution of the sample correlation matrix goes to *Marčenko–Pastur distribution* scaled by $1 - r$

- 23 赤間 陽二 (東北大理) Shrinkage of eigenvalue distributions of sample correlation matrix formed
 from equi-correlated normal population 15

Yohji Akama (Tohoku Univ.) Shrinkage of eigenvalue distributions of sample correlation matrix formed
 from equi-correlated normal population

概要 From a p -dimensional normal population with all the correlation coefficient between variables being a fixed, nonnegative constant $r < 1$, we draw a sample of size n and form a sample correlation matrix R . Suppose $p, n \rightarrow \infty, p/n \rightarrow c > 0$. The eigenvalue distribution of R almost surely converges weakly to Marčenko–Pastur distribution $F_c(x/(1-r))$ of scale parameter $1-r$ and index c (A. and A. Husnaqilati, *A dichotomous behavior of Guttman–Kaiser criterion from equi-correlated normal population*, preprint, 2022). For the largest eigenvalue λ of R , we aim to prove λ/p converges to r almost surely, to explain a shrinkage phenomenon (Laloux et al. Random matrix theory and financial correlations, *Int. J. Theor. Appl. Finance*, 2000): the histogram of eigenvalues of a sample correlation matrix R of stock market fits the density of $F_{p/n}(x/(1-\lambda/p))$.

12:10~12:45 2021年度(第20回)・2022年度(第21回)日本数学会解析学賞授賞式

14:25~15:25 特別講演

伊 森 晋 平 (広島大先進理工) 高次元多変量線形回帰モデルにおける変数選択について
Shinpei Imori (Hiroshima Univ.) Variable selection in high-dimensional multivariate linear regression models

概要 Recently, there are advances in variable selection for high-dimensional multivariate linear regression models, where the dimension of response variables and the sample size are large. In this talk, we consider the asymptotic properties of variable selection procedures including model selection consistency (i.e., the selection probability of the true model goes to one with the sample size tending to infinity) and efficiency (i.e., a loss or risk function of the selected model is similar to that of the best model). The properties of variable selection procedures in high-dimensional situations are not always the same as those derived in low-dimension. We consider a situation that each response variable does not need to use the same explanatory variables. This condition yields more flexible variable selection frameworks.

15:45~16:45 特別講演

後 藤 佑 一 (九大数理) Integrated copula spectrum with applications to tests for time-reversibility and tail symmetry
Yuichi Goto (Kyushu Univ.) Integrated copula spectrum with applications to tests for time-reversibility and tail symmetry

概要 The spectral density plays a pivotal role in time series analysis. Since the classical spectral density is defined as the Fourier transform of autocovariance functions, it fails to capture the distributional features. To overcome this drawback, we consider the spectral density based on copula and show the weak convergence of integrated copula spectra. This result combined with the subsampling procedure enables us to construct uniform confidence bands, a test for time-reversibility, and a test for tail symmetry. This talk is based on joint work with T. Kley (Georg-August-Univ. Gottingen), R. Van Hecke (Ruhr-Univ. Bochum), S. Volgushev (Univ. of Toronto), H. Dette (Ruhr-Univ. Bochum), and M. Hallin (Univ. libre de Bruxelles).

9月16日(金) 第Ⅲ会場

9:30~12:00

24 種 市 信 裕 (北教大札幌) 漸近展開に基づく3-way分割表における条件付独立性検定統計量の改良
関 谷 祐 里 (北教大釧路) 15
外 山 淳 (数学利用研)

Nobuhiro Taneichi Improvement of the test statistics for conditional independence in 3-way contingency table based on asymptotic expansion
(Hokkaido Univ. of Edu.)
Yuri Sekiya (Hokkaido Univ. of Edu.)
Jun Toyama
(Inst. for Pract. Appl. of Math.)

概要 We derived an expression of asymptotic expansion for the distribution of test statistics based on fai-divergence which include power divergence family of statistics for conditional independence in 3-way $J \times K \times L$ contingency table. The expansion consists of continuous and discrete terms. Continuous terms mean terms of multivariate Edgeworth expansion. Using the continuous terms of the expansion, we constructed transformations that improve the speed of convergence to the chi-square asymptotic distribution of the test statistics. When the statistics are power divergence family of statistics as a special case, performance of the transformed statistics was investigated by Monte Carlo simulation.

- 25 米永航志朗 (北大経済) ウィッシュャート行列と正規ベクトルの積の高次モーメント 15
鈴川晶夫 (北大経済)
Koshiro Yonenaga (Hokkaido Univ.) Higher order moments of the product of a Wishart matrix and a normal
Akio Suzukawa (Hokkaido Univ.) vector

概要 In this report, we consider the distribution of the product of a Wishart matrix and a normal vector with uncommon covariance matrices. We provide the stochastic representation which reduces the computational burden for the generation of realizations of the product. Based on the stochastic representation of the product, the density function and higher order moments of the product are derived. In a numerical illustration, we investigate some properties of the distribution of the product; in particular, skewness and kurtosis are computed for various values of the parameters of the product. We further suggest the Edgeworth type expansions of the product, and we observe that the suggested approximations provide a good performance for moderately large degrees of freedom of a Wishart matrix.

- 26 八木文香 (東京理大理) Multivariate pairwise comparisons among mean vectors with monotone
瀬尾隆 (東京理大理) missing data 15
Ayaka Yagi (Tokyo Univ. of Sci.) Multivariate pairwise comparisons among mean vectors with monotone
Takashi Seo (Tokyo Univ. of Sci.) missing data

概要 We consider the approximate simultaneous confidence intervals for pairwise comparisons among mean vectors with monotone missing data. On the test for mean vectors, for example, Yagi and Seo (2017) and Yagi et al. (2018) discussed the simplified T^2 -type test statistic \tilde{T}^2 to test the equality of two mean vectors. Further, they proposed the approximate simultaneous confidence intervals for pairwise comparisons among mean vectors using the approximate upper percentile of the T_{\max}^2 -type test statistic based on \tilde{T}^2 . In this talk, we give the T_{\max}^2 -type statistic based on a partially modified \tilde{T}^2 and derive an approximate upper percentile for it. By using this approximate upper percentile, an approximate simultaneous confidence interval is given.

- 27 中山優吾 (京大情報) 高次元主成分分析における頑健性について 15
矢田和善 (筑波大数理物質)
青嶋誠 (筑波大数理物質)
Yugo Nakayama (Kyoto Univ.) Robustness in high-dimensional principal component analysis
Kazuyoshi Yata (Univ. of Tsukuba)
Makoto Aoshima (Univ. of Tsukuba)

概要 In this talk, we discuss the robustness of principal component analysis (PCA) for high-dimensional, low-sample-size (HDLSS) data. PCA has been studied extensively in the framework of HDLSS. It should be noted that conventional PCA is strongly influenced by outliers. On the other hand, Locantore et al. (1999, Test) and Visuri et al. (2000, JSPI) proposed robust PCA based on a spatial sign covariance matrix. The work of Zhou and Marron (2015, EJS) showed asymptotic properties of robust PCA in the HDLSS setting under Gaussian. In this talk, we evaluate both conventional PCA and robust PCA under non-Gaussian with some outliers and compare their performance using numerical simulations and microarray datasets.

- 28 栗木 哲 (統計数理研) 中心極限確率場に対する期待ミンコフスキー汎関数の漸近展開 15
 松原 隆彦
 (高エネルギー加速器研究機構)

Satoshi Kuriki (Inst. of Stat. Math.) Asymptotic expansion of the expected Minkowski functional for isotropic
 Takahiko Matsubara central limit random fields
 (High Energy Accelerator Res. Organ.)

概要 The Minkowski functionals, including the Euler characteristic statistics, are standard tools for morphological analysis in cosmology. Motivated by cosmological research, we examine the Minkowski functional of the excursion set for an isotropic central limit random field, the k -point correlation functions (k th order cumulants) of which have the same structure as that assumed in cosmic research. We derive the asymptotic expansions of the expected Euler characteristic density incorporating skewness and kurtosis, which is a building block of the Minkowski functional. The resulting formula reveals the types of non-Gaussianity that cannot be captured by the Minkowski functionals. As an example, we consider an isotropic chi-square random field, and confirm that the asymptotic expansion precisely approximates the true Euler characteristic density.

- 29 山田 隆行 (島根大総合理工) High-dimensional asymptotic expansion of the null distribution for testing complete independence of normal random variables 10
 Takayuki Yamada (Shimane Univ.) High-dimensional asymptotic expansion of the null distribution for testing complete independence of normal random variables

概要 Testing the null hypothesis that all elements of observation vector are independent has been studied. Schott (2005) proposed the testing statistic and gave the limiting null distribution under high-dimensional asymptotic framework that the sample size n and the dimensionality p go to infinity together while p/n converges to a positive constant. We give a one-term asymptotic expansion of the null distribution as $\min\{n, p\}$ tends toward infinity. In addition, we derive a correction of the critical point for Schott (2005)'s test based on this expansion. The finite sample size and dimensionality performance for attained significance level is evaluated in a simulation study and the results are compared to those of Schott (2005)'s test.

- 30 江頭 健斗 (筑波大数理物質) 階層的クラスタリングの高次元漸近的振舞い 15
 矢田 和善 (筑波大数理物質)
 青嶋 誠 (筑波大数理物質)

Kento Egashira (Univ. of Tsukuba) High-dimensional asymptotic behaviors of hierarchical clustering
 Kazuyoshi Yata (Univ. of Tsukuba)
 Makoto Aoshima (Univ. of Tsukuba)

概要 Three asymptotic behaviors of hierarchical clustering are investigated under several settings from moderate dimension to high-dimension, low-sample size (HDLSS). However, it is considered that conditions required are strict for HDLSS data. Given this background, this presentation focuses on HDLSS settings and we give the asymptotic properties of hierarchical clustering under practical settings. Lastly, numerical simulations are given and we discuss the performance of the hierarchical clustering for HDLSS data.

- 31 増田 弘毅 (九大数理・東大数理) BIC-type model selection for locally stable regression 15
 Hiroki Masuda BIC-type model selection for locally stable regression
 (Kyushu Univ./Univ. of Tokyo)

概要 We consider a class of non-ergodic dynamic regression models partially driven by a locally stable Levy process, specified by the characteristics: constant activity index, parametric trend coefficient, and parametric scale coefficient. Assuming that the process is observed at high frequency and the activity index is unknown, we derive the stochastic expansion of the marginal quasi-likelihood to formulate a Schwarz-type model selection of the trend and scale coefficients. The modeling is essentially based on the conditional stable quasi-likelihood function.

14:25~16:50

- 32 Yujie Xue (早大理工) A new generalized estimator for autoregressive coefficient which im-
谷口正信 (早大理工) proves MLE uniformly 10
Yujie Xue (Waseda Univ.) A new generalized estimator for autoregressive coefficient which im-
 Masanobu Taniguchi (Waseda Univ.) proves MLE uniformly

概要 For the first order autoregressive model, in Ochi (1983), a generalized estimator of the coefficient with two constants was introduced, which includes Daniels's estimator, least-squares estimator and Durbin's estimator. From Fujikoshi and Ochi (1984), compared with a third-order approximated estimator of maximum likelihood estimator, it was shown that approximated estimator of maximum likelihood estimator is better than Ochi's estimator in the third-order sense if we modify the both estimators to be third-order asymptotically median unbiased. In this paper, we propose a new estimator based on Ochi (1983) which improves the MLE uniformly in the sense of the third-order mean square error without bias-adjustments.

- 33 藤森 洸 (信州大経法) The Lasso-based principal component analysis for high-dimensional sta-
後藤 佑一 (九大数理) tionary time series 15
劉 言 (早大理工)
谷口正信 (早大理工)
Kou Fujimori (Shinshu Univ.) The Lasso-based principal component analysis for high-dimensional sta-
Yuichi Goto (Kyushu Univ.) tionary time series
Yan Liu (Waseda Univ.)
 Masanobu Taniguchi (Waseda Univ.)

概要 In this talk, we discuss the Lasso-based principal component analysis for high-dimensional stationary processes. This problem is motivated by the observation that the standard principal component analysis performs poorly when the dimension of the data is large with sparse eigenvector. We deal with stationary time series under suitable mixing conditions and establish the rate of convergence of the Lasso-type estimators of the first eigenvector. We also elucidate the theoretical rate for choosing the tuning parameter in the Lasso-type estimators. The performance of the sparse principal component analysis is demonstrated by numerical simulations.

- 34 劉 ト ウ (早大理工) Characterization of time series models by various divergences 10
 Yujie Xue (早大理工)
 谷口正信 (早大理工)
 Tong Liu (Waseda Univ.) Characterization of time series models by various divergences
 Yujie Xue (Waseda Univ.)
 Masanobu Taniguchi (Waseda Univ.)

概要 In this talk, we characterize representative time series models which best fit under the given constraints in the sense of maximizing three divergences. First, we show an another understanding of the characterization of the maximum entropy spectral distribution via Durbin–Levinson algorithm. Next, we characterize the spectral distribution which maximizes the minimum linear interpolation error, when autocovariances with finite number of lags of a stationary process are known. Lastly, when a finite number of generalized autocovariance values (Proietti & Lauti (2015)) are given, we show that the exponential model introduced by Bloomfield (1973) minimizes the divergence of the integral of power spectral measure.

- 35 明石郁哉 (東大経済) 多変量自己回帰モデルに対する一般化経験尤度法を用いた頑健な推測理論の構成 15
 Fumiya Akashi (Univ. of Tokyo) Robust statistical inference for vector autoregressive models by smoothed generalized empirical likelihood method

概要 In this talk, we develop the generalized empirical likelihood (GEL) method for vector autoregressive models. The models in this talk involve infinite variance processes, and the distribution of the error term is nonparametric. Motivated by a concept of the spatial median vector, we consider the spatial median regression-based moment function and its smoothed version. We also consider the weighted version of the moment function, and the proposed GEL estimator has asymptotic normality regardless of whether the model has finite or infinite variance. A feasible testing procedure for a possibly nonlinear restriction of the coefficients is proposed, and some simulation experiments illustrate the finite sample performance of the proposed methods.

- 36 劉 言 (早大理工) A minimum contrast estimation for spectral densities of multivariate time series 15
 Yan Liu (Waseda Univ.) A minimum contrast estimation for spectral densities of multivariate time series

概要 In this talk, we introduce a new class of minimum contrast estimators for spectral densities of multivariate time series. Previous studies have shown the efficiency of the Whittle estimator, which was originally designed for parameter estimation of Gaussian processes. It is thought of as a special form of the minimum contrast estimator in time series analysis. For univariate time series, the estimator has been generalized to several classes of minimum contrast estimators. However, the generalization was limited in the sense of univariate time series. We focused on the multivariate time series and introduce a new class of the minimum contrast estimators. We study asymptotic distributions of minimum contrast estimators. The asymptotic properties will be illustrated by our simulation studies.

- 37 仲北祥悟 (東大総合文化) 過剰パラメータを伴う線形時系列モデルと良性過適合 15
 今泉允聡 (東大総合文化)
 Shogo Nakakita (Univ. of Tokyo) Benign overfitting in overparameterized linear time series models
 Masaaki Imaizumi (Univ. of Tokyo)

概要 We consider a linear regression model with overparameterization, in which the number of features exceeds the sample size. When the model is with overparameterization and without regularization, there exist interpolators which fit all the training data and achieve zero training error. It is known that the excess risk of an interpolator can be convergent to zero if the eigenvalues of the covariance of the features decay moderately and the i.i.d. assumption for training data holds. We show that a similar result can hold even if the features and noises are dependent processes by showing upper bounds for the excess risk. We also examine how the dependence structures appear in those upper bounds.

- 38 前園宜彦 (中大理工) カーネル型確率点推定の平均二乗誤差について 10
 中村広大 (中大理工)
 Yoshihiko Maesono (Chuo Univ.) On mean squared error of kernel quantile estimator
 Koudai Nakamura (Chuo Univ.)

概要 In this talk we study asymptotic properties of quantile estimators which are based on the empirical distribution function and kernel type estimator. We show that the kernel quantile estimator has small mean squared error in many case.

- 39 柿沢佳秀 (北大経済) 非対称カーネルを用いた確率密度関数の微分推定について 15
 Yoshihide Kakizawa (Hokkaido Univ.) Asymmetric kernel density derivative estimation

概要 The usual approximation (near the origin $x = 0$) of a certain smooth function u as the convolution integral does not hold when $u(0) \neq 0$, and, even for the case $u(0) = 0$, the order of the approximation (near the origin $x = 0$) is slower when $u'(0) \neq 0$. For the data supported on $[0, \infty)$ or $[0, 1]$, this boundary bias problem is one of the interests. Instead of the location-scale kernel $k((x - \cdot)/h)/h$ (e.g. Rosenblatt), we focus on an application of an asymmetric kernel to solve the boundary bias problem. In this talk, we consider estimating the density derivative for the nonnegative data, using the asymmetric kernel method.

- 40 駒場 敦 (山梨大医) 2 標本 Kolmogorov–Smirnov 検定の拡張 15
 城野悠志 (山梨大医)
 中本和典 (山梨大医)
 Atsushi Komaba (Univ. of Yamanashi) An extension of the two-sample Kolmogorov–Smirnov test
 Hisashi Johno (Univ. of Yamanashi)
 Kazunori Nakamoto
 (Univ. of Yamanashi)

概要 Here we propose a new nonparametric framework for two-sample testing, named as the OVL- q ($q = 1, 2, \dots$). This can be regarded as a natural extension of the Smirnov test, which is equivalent to the OVL-1. We specifically focus on the OVL-2, implement its fast algorithm, and show its superiority over other statistical tests in some experiments. The system to perform the OVL-1 and OVL-2 developed here can be used on-line at <https://fiveseven-lambda.github.io/ovl-test>.

応用数学

9月13日(火) 第V会場

10:00~11:45

- 1 松本直己 (慶大 D M C) The minimum number of vertices of graphs containing two monochromatic triangles for any edge 2-coloring 15
山本真基 (成蹊大理工)
山崎将仁 (成蹊大理工)
Naoki Matsumoto (Keio Univ.) The minimum number of vertices of graphs containing two monochromatic triangles for any edge 2-coloring
Masaki Yamamoto (Seikei Univ.)
Masahito Yamazaki (Seikei Univ.)

概要 The simplest problem in graph theoretic Ramsey theory is to ask for the minimum number of vertices of complete graphs K_n such that there is one monochromatic triangle for any edge 2-coloring. It is well-known that the answer is six and so every graph with K_6 satisfies the same property. From this fact, it is natural to ask for a structure of graphs with such a property that does not contain K_6 , which was posed by Erdős and Hajnal. Graham answered this question by constructing a minimal graph with the condition, which is on eight vertices and called the Graham graph. In this talk, we introduce a generalization of this study focusing on the number of monochromatic triangles and our result about the minimum number of vertices of graphs containing two monochromatic triangles for any edge 2-coloring.

- 2 大野由美子 キヤタピラの achromatic number と pseudoachromatic number の差について 15
(横浜国大研究推進機構)
松本直己 (慶大 D M C)
Yumiko Ohno (Yokohama Nat. Univ.) The difference between the achromatic number and the pseudoachromatic number of caterpillars
Naoki Matsumoto (Keio Univ.)

概要 A *complete k -coloring* (resp., a *pseudocomplete k -coloring*) is a proper coloring (resp., a not necessarily proper coloring) such that each pair of colors appears on at least one edge. The *achromatic number* (resp., the *pseudoachromatic number*) of a graph G is the largest number k such that G has a complete k -coloring (resp., a pseudocomplete k -coloring).

Hedetniemi conjectured that the difference between the achromatic number and the pseudoachromatic number is at most 1 for every tree. A *caterpillar* is a tree such that the set of vertices of degree at least two induces a path. In this talk, we shall show that Hedetniemi's conjecture holds for a caterpillar satisfying certain conditions.

- 3 永並健吾 (成蹊大理工) Surface immersions and projective planar graphs 15
中本敦浩 (横浜国大環境情報)
小関健太 (横浜国大環境情報)
Kengo Enami (Seikei Univ.) Surface immersions and projective planar graphs
Atsuhiko Nakamoto
(Yokohama Nat. Univ.)
Kenta Ozeki (Yokohama Nat. Univ.)

概要 Let G and H be 4-regular graphs embedded on a surface F^2 . A pair of edges in G is *consecutive* if these edges induced a consecutive part of a facial walk. We say that G contains H as a *surface immersion* if H can be obtained from G by repeatedly splitting off pairs of consecutive edges. We prove that for any 4-regular graph H embedded on the projective plane, there exists an integer $N = N(H)$ such that every 4-regular graph of dual width at least N contains H as a surface immersion.

- 4 森田 英章 (室蘭工大工) グラフゼータ関数の伊原表示について 15
石川 彩香 (横浜国大理工)
 Hideaki Morita (Muroran Inst. of Tech.) On the Ihara expression for graphs zeta functions
 Ayaka Ishikawa (Yokohama Nat. Univ.)

概要 We consider a determinant expression of graph zeta functions, which is called the Ihara expression, for finite digraphs. Digraphs allow multi-arcs and multi-loops. We will see that graph zeta functions have the Ihara expression in the case where the inverse arc is given uniquely for each arc if it exists in this general setting.

- 5 石川 彩香 (横浜国大理工) 有向グラフの逆辺に関する注意 15
森田 英章 (室蘭工大工)
 Ayaka Ishikawa (Yokohama Nat. Univ.) A remark on inverse arcs in finite digraphs
 Hideaki Morita (Muroran Inst. of Tech.)

概要 We consider the Ihara expression of graph zeta functions for finite digraphs, which allow multi-arcs and multi-loops. The existence of Ihara expression depends on a way we assign the set of inverse arcs for each arc. In this talk, we will see an example of the way which does not appear in the classical cases.

- 6 佐藤 巖 (小山工高専) Generalized Grover/Zeta 対応 15
今野 紀雄 (横浜国大工)
小松 堯 (産業数理研究所Calc)
田村 駿也 (横浜国大理工)
 Iwao Sato (Oyama Nat. Coll. of Tech.) A generalized Grover/Zeta correspondence
 Norio Konno (Yokohama Nat. Univ.)
 Takashi Komatsu
 (Math. Res. Inst. Calc for Industry)
 Shunya Tamura (Yokohama Nat. Univ.)

概要 We introduce a generalized Grover matrix of a graph and present an explicit formula for its characteristic polynomial. Next, we define a zeta function and a generalized zeta function of a graph G with respect to its generalized Grover matrix and present explicit formulas for their zeta functions for a vertex-transitive graph. As applications, we express the limit on the generalized zeta functions of a family of finite vertex-transitive regular graphs by an integral. Furthermore, we give the limit on the generalized zeta functions of a family of finite tori as an integral expression.

14:15~15:25

- 7 小田切 真輔 (秀明大学校教師) 極大鎖多面体の面とガイド付き王冠構造 15
 Shinsuke Odagiri (Shumei Univ.) Faces of maximal chain polytopes and guided crown structure

概要 For a finite ordered set P , we define the maximal chain polyhedron $\mathcal{M}(P)$ as the convex hull of all the points in \mathbb{R}^P corresponding to maximal chains. Let \mathcal{C} be a set of maximal chains, and consider the convex hull of corresponding points in \mathbb{R}^P . We will show that the obtained polytope is a face of $\mathcal{M}(P)$ if and only if \mathcal{C} does not have an incomplete guided crown structure. Using this result, we calculate the dimension of the maximal chain polytope when $P = \mathbf{m} \times \mathbf{n}$.

- 8 奈良知恵 (明大 MIMS) 多面体的多様体の連続的平坦化: 可算無限個の折り目付 15
伊藤仁一 (桐山女学園大教育)
 E. Demaine (MIT)
Chie Nara (Meiji Univ.) Continuous flattening of all polyhedral manifolds using countably infinite creases
Jin-ichi Itoh (Sugiyama Jogakuen Univ.)
Erik Demaine (MIT)

概要 We report results by joint-work with Z. Abel, M. Demaine, J. Ku, and J. Lynch: any finite polyhedral manifold in 3D can be continuously flattened into 2D while preserving intrinsic distances and avoiding self-crossing, answering an open problem proposed in 2001, if we extend standard folding models to allow for countable infinite creases, and the area of the manifold that needs to support moving creases can be made arbitrary small.

- 9 神吉知博 (松江工高専) 指数型 extended Riordan array と統一スターリング数について 10
名倉誠 (大阪電通大基礎理工)
大谷信一 (関東学院大理工)
Tomohiro Kamiyoshi On exponential extended Riordan arrays and unified Stirling numbers
 (Matsue Coll. of Tech.)
Makoto Nagura
 (Osaka Electro-Comm. Univ.)
Otani Shin-ich (Kanto Gakuin Univ.)

概要 We propose the notion of extended Riordan array, permitted negative indices, of exponential type by using the Roman factorial. In this context, we will establish a fundamental theory of the unified Stirling numbers that were introduced by Hsu and Shiue. As a consequence, we give a luminous explanation for the reciprocity law among those numbers that was discovered by Choi, et al. and Maltenfort. Moreover, our methods reveal that some interesting numbers appear in a certain part of the exponential extended array, although the numbers in the area had been regarded as zero until now.

- 10 川端大輝 (阪府大理) On the achievement of the Griesmer bound 15
丸田辰哉 (阪公大理)
Daiki Kawabata (Osaka Pref. Univ.) On the achievement of the Griesmer bound
Tatsuya Maruta (Osaka Metro. Univ.)

概要 An $[n, k, d]_q$ code is a linear code of length n , dimension k and minimum weight d over the field of order q . The Griesmer bound gives a lower bound on the length n of an $[n, k, d]_q$ code. It is known that the Griesmer bound is attained for all sufficiently large d for fixed q and k . We pose a conjecture on the problem to find $D_{q,k}$, the largest value of d such that the Griesmer bound is not attained for fixed q and k . And we give some new results on the conjecture.

15:45~16:45 特別講演

早水 桃子 (早大理工) 進化の系統樹と系統ネットワークに関する組合せ論
 Momoko Hayamizu (Waseda Univ.) Combinatorics of phylogenetic trees and networks

概要 Since the time of Charles Darwin, phylogenetic trees have been widely used as a model of evolution to describe the branching history of how the various organisms on Earth arrived at the present day from their common ancestor. On the other hand, reconstructing phylogeny from biological data often requires the use of more general graphs called phylogenetic networks to represent both branching and merging. However, existing theorems and algorithms concerning phylogenetic trees do not work as they are for phylogenetic networks in general. Indeed, as the mathematical biologist Joel E. Cohen stressed in a 2004 essay, the paradigm shift from evolutionary trees to networks is regarded as one of the biological challenges that could stimulate, and benefit from, major innovations in mathematics. Particularly active in this direction are studies of combinatorics aimed at elucidating the mathematical and computational properties of phylogenetic networks. In this talk, in an attempt to introduce the field of combinatorial phylogenetics, I will present an overview of my research results on the structure of phylogenetic networks, together with related studies and some open problems.

9月14日(水) 第V会場

10:00~11:45

- 11 東谷章弘 (阪大情報) グラフのスイッチングと付随する単体的複体による (± 1) 歪多項式環の分類
上山健太 (弘前大教育) 類 15
 Akihiro Higashitani (Osaka Univ.) Classification of (± 1) -skew polynomial rings by switching of graphs and
 Kenta Ueyama (Hirosaki Univ.) its associated simplicial complexes

概要 Classifying skew polynomial rings is important in noncommutative algebraic geometry because a skew polynomial ring can be regarded as a noncommutative version of the homogeneous coordinate ring of the projective space. In this talk, we focus on (± 1) -skew polynomial rings. For this case, we prove that the classification of (± 1) -skew polynomial rings up to equivalence of their graded module categories can be completely done by using the switching of graphs and the simplicial complexes associated to switching equivalence classes.

- 12 辻栄周平 (北教大旭川) 強弦グラフの辺ラベルによる特徴づけ 15
 Tan Nhat Tran (Ruhr Univ. Bochum)
 Shuhei Tsujie (Hokkaido Univ. of Edu.) A characterization of strongly chordal graphs by edge-labeling
 Tan Nhat Tran (Ruhr Univ. Bochum)

概要 Stanley showed that a graphic arrangement is free if and only if the corresponding graph is chordal. The class of MAT-free arrangements is an important subclass of free arrangements. We proved that a graphic arrangement is MAT-free if and only if the corresponding graph is strongly chordal. To prove this we gave a characterization of strongly chordal graphs by edge-labeling.

- 13 尾白典文 (豊田工大工) テンソル積によって得られる有理整数剰余環上の符号に対する最小ユークリッド重み 15
松井一 (豊田工大工)
 Norifumi Ojiro (Toyota Tech. Inst.) Minimum Euclidean weights for codes over rational integer quotient
 Hajime Matsui (Toyota Tech. Inst.) rings via tensor products

概要 In this research, we explain that any \mathbb{Z}_m -code can be uniquely represented by a certain integer coefficient square matrix called a reduced generator matrix. Then we show that the Kronecker product of the reduced generator matrices G_i for \mathbb{Z}_{m_i} -code C_i of length l_i with $i = 1, 2$ is the reduced generator matrix for a $\mathbb{Z}_{m_1 m_2}$ -code C_3 of length $l_1 l_2$. As the main result, we give a theorem to calculate the minimum Euclidean weight of C_3 from those of C_1 and C_2 .

- 14 吉田 建一 ネットワークによる弾塑性のモデル化 15
 (お茶の水女大ソフトマター教育研究センター)
 児玉 大樹
 (東北大AIMR・理化学研iTHEMS)
 Ken'ichi Yoshida (Ochanomizu Univ.) A mathematical model of network elastoplasticity
 Hiroki Kodama
 (Tohoku Univ./RIKEN)

概要 A thermoplastic elastomer (TPE) is a polymeric material with rubber elasticity and is removable at high temperatures. In this talk, we present results of modeling the elastoplastic deformation of a TPE by using a network represented as a periodic graph. A TPE consists of a soft domain, which exhibits rubber elasticity, and hard domains, which act as cross-links. This structure can be represented as a graph. We introduce the tension tensor for a periodically realized graph, which induces the stress and the elasticity. The hard domains of a TPE are less robust than the cross-links of vulcanized rubber. We express this as local moves of a graph, which induce the plasticity in elongation.

- 15 齋藤 溪 (神奈川大工) 連続時間版 Szegedy walk のスペクトル解析 15
 瀬川 悦生 (横浜国大環境情報)
 Kei Saito (Kanagawa Univ.) Spectral analysis for continuous-time Szegedy walks
 Etsuo Segawa (Yokohama Nat. Univ.)

概要 The time evolution of continuous-time quantum walks are defined by the Schrödinger equations while that of discrete-time walks are defined by the product of coin and shift operators. Strauch (2006) gives a connection between continuous-time and discrete-time walks by taking a continuous limit for one-dimensional model. The methods in the paper are difficult to apply to graphs more complex than one-dimensional lattice. By defining split-step quantum walks on the graph, we have led to similar results for Szegedy walks on more general graphs, which we call continuous version of Szegedy walk. In this talk, we will report on the method to deriving such a continuous walk and the spectral analysis of its Hamiltonian.

- 16 寺田 知幸 パスグラフ上の Szegedy walk に対する確率測度 15
 (横浜国大理工・金沢工大)
 井手 勇介 (日大文理)
 今野 紀雄 (横浜国大工)
 Tomoyuki Terada Probability measure for the Szegedy walk on the path graph
 (Yokohama Nat. Univ./Kanazawa Inst. of Tech.)
 Yusuke Ide (Nihon Univ.)
 Norio Konno (Yokohama Nat. Univ.)

概要 In this talk, we consider a spectral analysis of the Szegedy walk on the path graph. Here, we have derived an explicit formula for the probability measure of the walker by using eigenvalues and eigenvectors of the Jacobi matrix related to the birth and death chain.

13:00~14:15

- 17 藤田 慎也 中心グラフの支配数に着目したグラフの分類について 10
 (横浜市大データサイエンス)
 Shinya Fujita (Yokohama City Univ.) Classification of graphs in terms of the domination number of central graphs

概要 For a graph G , the central graph $C(G)$ is the graph constructed from G by subdividing each edge of G with one vertex and also by adding an edge to every pair of non-adjacent vertices in G . In this talk, we give a new classification of graphs in terms of the domination number of central graphs.

- 18 安藤 清 (国立情報学研) Properly contractible edges and properly liftable vertices in a 4-connected graph 15

Kiyoshi Ando (Nat. Inst. of Informatics) Properly contractible edges and properly liftable vertices in a 4-connected graph

概要 We focus on the distribution of properly contractible edges and properly liftable vertices in a minimally 4-connected graph G . Let $E_c^*(G)$ and $\mathcal{L}^*(G)$ denote the set of properly 4-contractible edges of G and the set of properly $2k$ -liftable vertices of G , respectively.

Theorem 2 Let G be a minimally 4-connected graph. Then,

$$2|E_c^*(G)| + |\mathcal{L}^*(G)| \geq 3|U_{4K_1}(G)| + 2|U_{2K_1 \cup K_2}(G)| + \sum_{H \in \mathcal{A}'} |U_H(G)|.$$

where \mathcal{A}' is the set of graphs on four vertices with at least two edges whose maximum degree is less than 3, and $U_H(G) = \{x \in V_4(G) \mid G[N_G(x)] \cong H\}$.

- 19 斎藤 明 (日大文理) Secure domination in C_5 -free graphs 15
出川 慎悟 (日大文理)

Akira Saito (Nihon Univ.) Secure domination in C_5 -free graphs
Shingo Degawa (Nihon Univ.)

概要 A dominating set X in a graph G is said to be secure if for each $v \in V(G) - X$, there exists a vertex x in $N_G(v) \cap X$ such that $(X - \{x\}) \cup \{v\}$ is a dominating set. The order of a smallest secure dominating set is called a secure domination number and denoted by $\gamma_s(G)$. For a connected graph H , G is said to be H -free if G does not contain an induced subgraph isomorphic to H . In this talk, we report that every C_5 -free graph satisfies $\gamma_s(G) \leq \alpha(G)$, where $\alpha(G)$ is the independence number of G . This result unites and extends several known bounds of $\gamma_s(G)$ in terms of $\alpha(G)$.

- 20 斎藤 明 (日大文理) Relative length of triangle-free graphs 15
藤波 大弥 (総合研究大複合)

Akira Saito (Nihon Univ.) Relative length of triangle-free graphs
Hiroya Fijinami
(Grad. Univ. for Adv. Stud.)

概要 For a 2-connected graph G , the difference of the orders of a longest path and a longest cycle is called the relative length of G and denoted by $\text{diff}(G)$. In 2008, Paulusma and Yoshimoto proved that every 2-connected triangle-free graph G of order n with $\sigma_4(G) \geq n + 2$ satisfies $\text{diff}(G) \leq 1$, where $\sigma_4(G)$ is the minimum value of the sums of degrees of four independent vertices in G . We conjecture that every 2-connected triangle-free graph G of order n with $\sigma_4(G) \geq s$ satisfies $\text{diff}(G) \leq n + 3 - s$. The result by Paulusma and Yoshimoto corresponds to the case $s = n + 2$. We verify the conjecture for $s = n + 1$.

9月15日(木) 第V会場

9:30~12:00

- 21 江藤 徳宏 (東大数理) On a discrete scheme for the Mullins–Sekerka flow and its fine properties
 15

Tokuhiro Eto (Univ. of Tokyo) On a discrete scheme for the Mullins–Sekerka flow and its fine properties

概要 The Mullins–Sekerka problem is numerically solved by the charge simulation method at the first time. In this scheme, an evolving curve in the plane \mathbb{R}^2 is imitated by a regular polygon. An evolving law is discretized by the forward Euler method. An optimal rate between the time step and the number of vertices of the polygon is revealed by means of a careful calculation. A particular contribution of the study is to clarify the possibility to handle the case where an evolving interface touches the boundary of a container. To our best knowledge, there have been no researches to treat numerically the Mullins–Sekerka problem with boundary contact angle condition.

- 22 松井 一徳 (成蹊大理工) Navier–Stokes 方程式に対する rotation form と Lagrange–Galerkin 法 · 15
 Kazunori Matsui (Seikei Univ.) The rotation form and the Lagrange–Galerkin method for the Navier–Stokes equations

概要 The advection term in the Navier–Stokes equations can be written in several ways. One of them is the rotation form. The rotation form is easy to conserve the total kinetic energy when discretized. On the other hand, the Lagrange–Galerkin (LG) method is a powerful numerical method for flow problems because of its robustness for convection-dominated problems and symmetry of the resulting matrix. The LG method uses that the sum of the time derivative and advection terms is the material derivative. In this talk, we propose a LG scheme for the rotation form Navier–Stokes equations, where the nonlinear term is different from the advection term.

- 23 剣持 智哉 (名大工) Stokes 作用素の有限要素近似に対する L^p リゾルベント評価 15
 Tomoya Kemmochi (Nagoya Univ.) L^p -resolvent estimates for finite element approximation of the Stokes operator

概要 In this study, we consider finite element approximation of the Stokes resolvent problem. For parabolic problems, finite element approximation of a priori estimates, such as resolvent estimates, analyticity of semigroups, and maximal regularity, are well-studied. Moreover, these estimates are applied to error estimates for finite element methods to nonlinear problems. However, studies in this direction has not been developed for the Stokes case. As a starting point of the study, we present the L^p -resolvent estimate for the finite element approximation of the Stokes resolvent problem.

- 24 小山 大介 (電通大情報理工) 重調和問題に対する IP 法と HJ 法の間での事前差異評価 15
 Daisuke Koyama An a priori difference estimate between the IP method and the HJ
 (Univ. of Electro-Comm.) method for the biharmonic problem

概要 An interior penalty (IP) method for the biharmonic problem is studied. An a priori difference estimate between the IP method and the HJ method is derived. From the difference estimate and the a priori error estimate of the Herrmann–Johnson (HJ) method, an a priori error estimate of the IP method is obtained. It is shown that the error estimate of the IP method is the same as that of the HJ method by taking a penalty parameter of $O(1/h)$, where h is the mesh size parameter. Further it is shown that the number of iterations of a naive linear solver for the IP method is independent of the penalty parameter.

- 25 渡部 善隆 (九大情報基盤研究開発センター) 精度保証付き数値計算による Proudman–Johnson 方程式の定常解の存在別証 15
 Yoshitaka Watanabe (Kyushu Univ.) Another numerical verification proof of steady-state solutions for the Proudman–Johnson equation

概要 This talk presents a computer-assisted proof of the existence of steady-state solutions for the Proudman–Johnson equation which is a representative of the two-dimensional fluid flow. The proposed approach is based on an infinite-dimensional fixed-point theorem with interval arithmetic, and it is another proof by Miyaji–Okamoto (2019). Verification results show their validity.

- 26 藤原 宏志 (京大情報) Heat convections in the horizontal layer with non-uniform heat supply.
 西田 孝明 (京大情報*) Stommel model 15
 Hiroshi Fujiwara (Kyoto Univ.) Heat convections in the horizontal layer with non-uniform heat supply.
 Takaaki Nishida (Kyoto Univ.*) Stommel model

概要 Stommel (1950) considered a model of thermal convection in horizontally long liquid layer with non-uniform heat supply under gravity. He obtained approximate solutions by asymptotic expansion of the equations with respect to a dimension-less parameter and showed its picture of contour line of the stream function and isothermal line. It may be considered as a simplest model to indicate thermal effect on the ocean current. Here we have an existence theorem of stationary solutions for the model under some assumptions and obtain several figures of contour line of the stream function and isothermal line by numerical computations, which show the above meaning of the model. Some of the computations are out of the existence theorem.

- 27 坂上 貴之 (京大理) Quantized point vortex equilibria with a Liouville-type background vorticity on a curved torus 15
 V. S. Krishnamurthy (Indian Inst. of Tech. Hyderabad)
 Takashi Sakajo (Kyoto Univ.) Quantized point vortex equilibria with a Liouville-type background vorticity on a curved torus
 Vikas S. Krishnamurthy (Indian Inst. of Tech. Hyderabad)

概要 An analytic formula of solutions to a modified Liouville equation on a curved torus is presented. It yields point vortex equilibria with strengths quantized by 2π in a background smooth Liouville-type vorticity field, which is a model of quantized vortex crystals appearing superfluids and Bose–Einstein–Condensates (BEC). We show that appropriate choices of the loxodromic function in the solution lead to stationary vortex patterns with point vortices of identical strengths. We also find solutions continuously dependent on a parameter, such that the point vortices remain fixed whereas the smooth background vorticity changes with the parameter. We investigate how non-constant curvature and a handle structure of the torus affect the topological flow structures. This talk is based on joint work with Dr. V. S. Krishnamurthy at Indian Institute of Technology Hyderabad.

- 28 清水 雄貴 (東大数理) 三次元 Euler 流の渦伸長に対する幾何学的特徴づけ 15
 米田 剛 (一橋大経済)
 Yuuki Shimizu (Univ. of Tokyo) Locality of vortex stretching for the 3D Euler equations
 Tsuyoshi Yoneda (Hitotsubashi Univ.)

概要 We discuss what kind of large-scale stationary flow stretch small-scale vortex blob in alignment with straining direction in 3D incompressible Euler flow.

- 29 奥村真善美 (北大電子研) 塑性変形可能な基底膜モデルを用いた毛包のシリンダー構造の再現 15
 小林康明 (北大電子研)
 長山雅晴 (北大電子研)
 藤原裕展 (理化学研)
 安ヶ平祐介 (北大電子研)
 大野航太 (中大理工)
 Makoto Okumura (Hokkaido Univ.) Reproduction of the cylinder structure of hair follicles using a plastic
 Yasuaki Kobayashi (Hokkaido Univ.) deformable basement membrane model
 Masaharu Nagayama (Hokkaido Univ.)
 Hironobu Fujiwara (RIKEN)
 Yasugahira Yusuke (Hokkaido Univ.)
 Kota Ohno (Chuo Univ.)

概要 As an appendage of the skin, a hair follicle is the source of the hair. The hair follicle is crucial for maintaining the epidermis and hair tissue homeostasis and for repairing damaged tissue. We have been attempting to design a mathematical model that reproduces the cylinder structure of the hair follicle. Although we have reproduced the cylinder shape of the hair follicle to some extent in the mathematical model, there are still significant differences from the actual experimental results. Thus, we aim to reproduce the cylinder structure closer to the experimental results by improving the mathematical model. In this presentation, we present the results.

14:15~16:45

- 30 高橋淳一 (高知大理工) η 対称性を持つ非エルミート量子系における Rigged Hilbert 空間の構築
 大森祥輔 (早大理工) 10
 Junichi Takahashi (Kochi Univ.) Construction of Rigged Hilbert space for non-Hermitian quantum sys-
 Shosuke Ohmori (Waseda Univ.) tem with η symmetry

概要 Non-Hermitian quantum systems with η symmetry have been widely studied because of their interesting features. On the other hand, the rigged Hilbert space is a set of linear phase spaces introduced to justify the description of brackets in quantum mechanics and can be obtained by expanding the Hilbert space to incorporate superfunctions such as delta functions. It is known that ordinary Hermite quantum mechanics is formulated in this space, but it is unclear whether it can be a mathematical foundation space for systems that go beyond conventional quantum theory, such as non-Hermite quantum systems. In this talk, we show that RHS formulation is possible for η symmetric non-Hermitian quantum systems.

- 31 甲斐大貴 (阪市大理) Path-properties of jump-diffusion processes on Riemannian manifolds
 15
 Hiroataka Kai (Osaka City Univ.) Path-properties of jump-diffusion processes on Riemannian manifolds

概要 It is natural to construct Lévy processes on Riemannian manifolds and study their properties. We focus on the jump-diffusion process which is given by projecting the solution of the Marcus-type stochastic differential equation on the orthonormal frame bundle. The generator of the jump-diffusion process is similar to the one of the Lévy process on Euclidian space. In this talk, we will discuss irreducibility, transience and conservativeness. In order to grasp the behavior of the paths of the jump-diffusion process, we will introduce some nice upper and lower estimates.

32	岩上 聡 (アースライズカンパニー)	測位データと音響測深機データから水面下の地形を作成するための数理的 的手法の考察	15
	爲賀 雅彦 (アースライズカンパニー)		
	真田 将英 (アースライズカンパニー)		
	毛利 道明 (アースライズカンパニー)		
	岩上 義隆 (アースライズカンパニー)		
	岡本 尚己 (アースライズカンパニー)		
	光井 英視 (アースライズカンパニー)		
	近森 秀高 (岡山大環境生命)		
	神保 秀司 (岡山大)		
	渡辺 雅二 (岡山大*・岡山大環境生命)		
	Satoshi Iwakami (Earth Rise Company, Inc.)	Study of mathematical techniques for constructing underwater topog- raphy from positioning data and echo sounder data	
	Masahiko Tamega (Earth Rise Company, Inc.)		
	Masahide Sanada (Earth Rise Company, Inc.)		
	Michiaki Mohri (Earth Rise Company, Inc.)		
	Yoshitaka Iwakami (Earth Rise Company, Inc.)		
	Naoki Okamoto (Earth Rise Company, Inc.)		
	Eishi Mitsui (Earth Rise Company, Inc.)		
	Hidetaka Chikamori (Okayama Univ.)		
	Shuji Jimbo (Okayama Univ.)		
	Masaji Watanabe (Okayama Univ.*/Okayama Univ.)		

概要 Disastrous heavy rain events are expected to occur more frequently as climate change progresses, and it is important to update information on water areas such as rivers, reservoirs and coastal waters. This study focuses on construction of underwater topographic surfaces from positioning data and echo sounder data. Longitude and latitude components of ellipsoidal coordinates recorded by a GPS receiver are transformed to rectangular coordinates, and combined with vertical components including depth data recorded by an echo sounder unit. So generated underwater topographic data are introduced into construction of an underwater topographic surface which is defined as a piecewise linear function over a triangular mesh.

- 33 劉 恩 豪 (京 大 理) Curse of dimensionality in persistence diagrams 15
 井 元 佑 介 (京大高等研)
 平 岡 裕 章 (京大高等研)
 Enhao Liu (Kyoto Univ.) Curse of dimensionality in persistence diagrams
 Yusuke Imoto (Kyoto Univ.)
 Yasuaki Hiraoka (Kyoto Univ.)

概要 High dimension low sample size (HDLSS) data brings difficulties in statistical analysis. In this talk, we will first show the asymptotic behavior of persistence diagrams of high dimensional random data. As a result of the asymptotic behavior, we show the unreliability of using observed persistence diagrams in reality due to the presence of high dimensional noise, indicating the existence of curse of dimensionality (CoD) in persistence diagrams. Finally, we claim that simple application of principal component analysis (PCA) is not sufficient to completely eliminate the curse of dimensionality in persistence diagrams

- 34 岡 宏 枝 (龍谷大理工) Equilibria and their stability in networks with steep sigmoidal nonlinearities 15
 Hiroe Oka (Ryukoku Univ.) Equilibria and their stability in networks with steep sigmoidal nonlinearities

概要 Equilibria of continuous differential equation models of network dynamics is investigated. The motivation comes from gene regulatory networks where each directed edge represents either down- or up-regulation, and is modeled by a sigmoidal nonlinear function. We show that the existence and stability of equilibria of a sigmoidal system are determined by a combinatorial analysis of the limiting switching system with piecewise constant nonlinearities.

- 35 矢ヶ崎一幸 (京大情報) Some recent results on nonintegrability of dynamical systems 15
 Kazuyuki Yagasaki (Kyoto Univ.) Some recent results on nonintegrability of dynamical systems

概要 In this talk, we briefly review some recent results on nonintegrability of dynamical systems: Nearly integrable systems, time-periodic perturbations of single-degree-of-freedom Hamiltonian systems and the SEIR epidemic model. A generalized version due to Ayoul and Zung of the Morales–Ramis and Morales–Ramis–Simó theories were used to obtain these results. A perturbation approach was also used for the first two results.

- 36 矢ヶ崎一幸 (京大情報) Nonintegrability of three- and four-dimensional dynamical systems near degenerate equilibria 15
 Kazuyuki Yagasaki (Kyoto Univ.) Nonintegrability of three- and four-dimensional dynamical systems near degenerate equilibria

概要 In this talk, we review a recent result on nonintegrability of three- and four-dimensional dynamical systems near degenerate equilibria. We assume that the origin $x = 0$ is an equilibrium and the Jacobian matrix of the vector field at $x = 0$ has (I) a zero and pair of purely imaginary eigenvalues, $\lambda = 0, \pm i\omega$ ($\omega > 0$), in the three-dimensional case or (II) two pairs of purely imaginary eigenvalues, $\pm i\omega_j$ ($\omega_j > 0$), $j = 1, 2$, with $\omega_1/\omega_2 \notin \mathbb{Q}$ in the four-dimensional case. Our results also imply that three- and four-dimensional systems exhibiting fold-Hopf and double-Hopf bifurcations, respectively, are real-analytically nonintegrable in general.

- 37 梶原唯加 (京大情報) 平面 $2n$ 体問題の周期解における braid type 15
 金英子 (阪大全学教育推進機構)
 柴山允瑠 (京大情報)
 Yuika Kajihara (Kyoto Univ.) Braid types of periodic solutions in the planar $2n$ -body problem
 Eiko Kin (Osaka Univ.)
 Mitsuru Shibayama (Kyoto Univ.)

概要 Periodic solutions of the planar n -body problem determine braids through the trajectory of n bodies. According to the Nielsen–Thurston classification of surface automorphisms, braids fall into three types: periodic, reducible and pseudo-Anosov. In this talk, we give a way to classify periodic orbits in the planar $2n$ -body problem through braid types.

- 38 須田智晴 (慶大理工) Partial maps generated by flows 15
 Tomoharu Suda (Keio Univ.) Partial maps generated by flows

概要 The concept of the first-return map is fundamental in studying continuous-time dynamical systems. Such maps are usually not global and are defined only partially, reflecting the dynamics of the flow. A question here is whether we can use that partiality to our advantage. In this talk, we consider a generalization of the first-return map and discuss its applications to the description of dynamics and a reduction of hybrid systems to flows. This talk is based on arXiv:2205.03794 [math.DS].

17:00~18:00 特別講演

- 西口純矢 (東北大AIMR) 時間遅れがもたらす無限次元性と超越性
 Junya Nishiguchi (Tohoku Univ.) Infinite-dimensionality and transcendency brought by time-delay

概要 Time evolutionary systems and their mathematical models with a “time-lag” in causality are collectively called *time-delay systems*. A “time-lag” in such a time-delay system arises, for example, from the finiteness of the rate of transmission of information. One can observe various dynamic phenomena as time-delay systems. A *delay differential equation (DDE)*, which is a differential equation whose derivative $\dot{x}(t)$ of an unknown function $x = x(t)$ also depends on the past value of x , is a typical example of a time-delay system as a mathematical model. DDEs are similar in form to ordinary differential equations, however, these equations have infinite-dimensionality and transcendency as their characteristics. In the talk, we share previous studies of time-delay systems and discuss possible future directions from the viewpoint of theory and applications. For this purpose, the talk will be divided into two parts: 1. Overview of previous studies of time-delay systems, especially of mathematical studies of DDEs, 2. A recent study by the speaker including variation of constants formula for DDEs.

9月16日(金) 第V会場

9:30~12:00

- 39 渡辺樹 (早大理工) Application of Markov chain approximation method to nonlinear reaction-diffusion equation 15
 Itsuki Watanabe (Waseda Univ.) Application of Markov chain approximation method to nonlinear reaction-diffusion equation

概要 We consider the high density scaling limit of the stochastic model for nonlinear diffusion. The stochastic model can be constructed as a random walk on the discrete torus with a nonlinear diffusion rates. In this talk, we show that the deterministic limit of the stochastic model is governed by the nonlinear reaction-diffusion equation by showing the relative compactness and using the continuous mapping theorem.

- 40 江 夏 洋 一 (東京理大教養) 捕食時の種間協力を考慮した被食者-捕食者モデル 15
 M. Banerjee
 (Indian Inst. of Tech. Kanpur)
Yoichi Enatsu (Tokyo Univ. of Sci.) A prey-predator model describing hunting cooperation
 Malay Banerjee
 (Indian Inst. of Tech. Kanpur)

概要 In this talk, we consider the dynamics of a prey-predator model describing hunting cooperation. By focusing on coefficients for hunting cooperation and carrying capacity, we investigate the stability of a predator-free equilibrium and coexistence equilibria. In particular, for the case where the carrying capacity is small, we investigate the condition under which saddle-node bifurcation occurs when the model has two coexistence equilibria. Some of results are based on a joint work with Malay Banerjee (IIT Kanpur).

- 41 関 坂 歩 幹 (明大研究・知財) 外来種の侵入可能性を規定する固有値問題 15
 小 川 知 之 (明大総合数理)
Ayuki Sekisaka (Meiji Univ.) Eigenvalue problem defining the invasive potential of alien species
 Toshiyuki Ogawa (Meiji Univ.)

概要 In a competitive system, two species are competing with each other, and the question is whether an invasive alien species can invade. In this case, the problem of what kind of potentials the eigenvalues exist in the Sturm–Liouville type eigenvalue problem determines the above problem. In this talk, I will present results obtained for the Sturm–Liouville type eigenvalue problem by using a topological index called the Malov index to determine the shape of the potential and the existence of eigenvalues.

- 42 岩 崎 悟 (阪大情報) メトリックグラフ上の Allen–Cahn 方程式における安定定常解集合のパ
山口勇太郎 (阪大情報) ラメータ依存関係 15
Satoru Iwasaki (Osaka Univ.) Parameter dependence of stationary solutions of the Allen–Cahn equa-
Yutaro Yamaguchi (Osaka Univ.) tions in metric graphs

概要 We are concerned with stationary solutions of the Allen–Cahn equations in compact metric graphs. More precisely, we attempt to reveal a parameter dependence of sets of stationary solutions through an edge labelling problem. In this presentation, we present some numerical simulations for the Allen–Cahn equations in metric graphs and show that solutions of the edge labeling problem actually reveal the structures of stationary solutions of the Allen–Cahn equations.

- 43 関 坂 歩 幹 (明大研究・知財) シリンダー領域の反応拡散方程式のスペクトル問題と Evans 関数 15
山 本 宏 子 (理化学研 AIP)
Ayuki Sekisaka (Meiji Univ.) Evans function and spectral problem for a reaction-diffusion equation
Hiroko Yamamoto (RIKEN) in a cylindrical domain

概要 In this study, we consider the spectral problem for a reaction-diffusion equation of a traveling wave solution traveling in the cylindrical domain and construct the Evans function. For the boundary conditions, we consider the periodic and the Robin boundary conditions, respectively, and introduce the results obtained.

- 44 穴田 浩一 (早大高等学院) 曲線短縮問題に現れる準線形放物型偏微分方程式に対する爆発解の上からの評価について 15
石渡 哲哉
 (芝浦工大システム理工)
牛島 健夫 (東京理大理工)
Koichi Anada
 (Waseda Univ. Senior High School) Upper estimates for blow-up solutions of a quasi-linear parabolic equation in the curve shortening flow
Tetsuya Ishiwata
 (Shibaura Inst. of Tech.)
Takeo Ushijima (Tokyo Univ. of Sci.)

概要 We consider asymptotic behavior of blow-up solutions to a quasi-linear parabolic equation $u_t = u^\delta(u_{\theta\theta} + u)$ which appears in the classical curve-shortening flow of a closed cardioid-like immersed curve with a self-crossing point. It is known that this problem has type II blow-up solutions. In this talk, we provide upper estimates for blow-up rates of solutions for the case of $2 < \delta < 3$ and $\delta = 3$.

- 45 出原 浩史 (宮崎大工) 2成分反応拡散系のパターン形成: 一様周期解からの分岐を追う 15
小林 俊介 (京大理)
Hirofumi Izuwara (Univ. of Miyazaki) Pattern formation in 2-component reaction-diffusion systems
Shunsuke Kobayashi (Kyoto Univ.)

概要 We consider the pattern formation in 2-component reaction-diffusion systems. Introducing a specific parameter into the 2-component reaction-diffusion systems, the constant steady state is destabilized due to Hopf bifurcation, and spatially homogeneous periodic solutions appear. In this talk, we numerically treat a bifurcation problem from the spatially homogeneous periodic solutions.

- 46 長山 雅晴 (北大電子研) 自己駆動体運動に対する反応拡散系モデルについて 15
物部 治徳 (阪公大理)
榑原 航也 (岡山理大理)
中村 健一 (金沢大理工)
小林 康明 (北大電子研)
北畑 裕之 (千葉大理)
Masaharu Nagayama (Hokkaido Univ.) Reaction-diffusion model for the self-propelled body
Harunori Monobe (Osaka Metro. Univ.)
Koya Sakakibara
 (Okayama Univ. of Sci.)
Ken-Ici Nakamura (Kanazawa Univ.)
Yasuaki Kobayashi (Hokkaido Univ.)
Hiroyuki Kitahata (Chiba Univ.)

概要 A self-propelled system is a system that moves by having an action that deforms itself or by having an action that changes its own motion field. The motion of bacteria and cells, which are living systems, and the motion of camphor and pentanol droplets, which are non-living systems, are considered to belong to self-driven systems because they have internal mechanisms that generate motion. We developed a self-propelled system model based on the Allen–Cahn equation. We combined it with the equation for molecular surfactant concentration used in previous studies to construct a mathematical model that can handle self-propelled system motion with shape change. One feature of our mathematical model is that it can represent deforming self-propelled bodies such as droplets and solid self-propelled bodies such as camphor with a single parameter.

- 47 桑村 雅隆 (神戸大 発達) 細胞の極性化における polarity oscillations と wave-pinning について · 15
Masataka Kuwamura (Kobe Univ.) Oscillations and wave-pinning in cell polarity formation

概要 We consider reaction-diffusion systems with bistable nonlinearity and mass conservation, which are useful for understanding cell polarization. We show that a specific model proposed by [Otsuji et al, PLoS Comp. Biol. 3 (2007), e108] exhibits four different spatiotemporal patterns including two types of oscillatory patterns which can be regarded as cell polarity oscillations with the reversal and non-reversal of polarity, respectively. Moreover, we show the existence and stability of single transition layer in such reaction-diffusion systems under general assumptions by the singular perturbation theory. This result provides a condition for wave-pinning in cell polarity formation.

14:15~16:10

- 48 高橋 正 (甲南大 知能情報) 学習モデルを用いた現象分析 10
鷲野 朋広 (甲南大 自然)
Tadashi Takahashi (Konan Univ.) Analysis of phenomenon using a learning model
Tomohiro Washino (Konan Univ.)

概要 We consider an initial value of the statistic model and the dynamics of learning changing under the influence of a critical line in case the true distribution near the singular regions is realizable by the statistical model. Then over-fitting phenomena that a training loss decreases but a validation loss increases have been observed in case the true distribution on the singularity is realizable by the statistical model. We consider the phenomenon of dynamics on the learning loss surface using the theory of the learning model.

- 49 陳 鈺 涵 (神戸大 システム情報) ニューラルシンプレクティック形式と変分原理の両立性について 15
松原 崇 (阪大 基礎工)
谷口 隆 晴 (神戸大 システム情報)
Yuhan Chen (Kobe Univ.) Compatibility of the neural symplectic forms and the variational principle
Takashi Matsubara (Osaka Univ.)
Takaharu Yaguchi (Kobe Univ.)

概要 In recent years, research on deep learning techniques to formulate models from observed data of physical phenomena has been attracting attention. Neural symplectic forms learn the symplectic form from data using neural networks, thereby providing a method for learning Hamiltonian equations from data represented in general coordinate systems. However, there has been little research on discretization methods for simulation using those models. In this presentation, I will talk about a variational principle that leads to neural symplectic forms. Using this, a numerical method called variational integrator can be designed.

- 50 徐 百 歌 (神戸大システム情報) 一般化 Dissipative SymODEN の GENERIC 形式 15
 陳 鈺 涵 (神戸大システム情報)
 松 原 崇 (阪大基礎工)
 谷 口 隆 晴 (神戸大システム情報)
Baige Xu (Kobe Univ.) GENERIC formulation of generalized dissipative SymODEN
Yuhan Chen (Kobe Univ.)
 Takashi Matsubara (Osaka Univ.)
 Takaharu Yaguchi (Kobe Univ.)

概要 In recent years, methods for learning governing equations of physical phenomena using deep learning have been studied extensively. Therein Dissipative SymODEN is known as a deep learning model that learns the port-Hamiltonian dynamics with energy dissipation. On the other hand, the GENERIC formulation is a framework for describing non-equilibrium thermodynamic systems, including terms of two dynamics, reversible and irreversible. In this work, by rewriting the dissipative SymODEN models to GENERIC systems, we propose a deep neural GENERIC model for the port-Hamiltonian dynamics, thereby revealing the hidden GENERIC structure behind the data.

- 51 安 田 諒 子 (神戸大システム情報) 神経ネットワーク動画像からのモデリングの試み 15
 松 原 崇 (阪大基礎工)
 谷 口 隆 晴 (神戸大システム情報)
Ryoko Yasuda (Kobe Univ.) Learning differential equation models from neural activity images
 Takashi Matsubara (Osaka Univ.)
Takaharu Yaguchi (Kobe Univ.)

概要 Recently, methods for constructing differential equation models using neural networks have been attracting much attention. If such methods can be used to learn equations from images, it would be possible to construct models at a very low cost. Although research on such an approach has been performed, only simple problems have been considered. In this study, we apply such a technique to construct a model from a real data, i.e., images of a neural activity.

- 52 磯 部 伸 (東大数理) ODE-Net の変分的定式化とその解存在について 15
 Noboru Isobe (Univ. of Tokyo) On a variational formulation of ODE-Net and an existence result

概要 Deep learning has attracted much attention recently because of its interpretation as a variational problem with differential equations as constraints, or ODE-Net. On the other hand, the existence of a solution to the problem has been guaranteed only in impractical conditions. Therefore, we use the Benamou–Brenier formula to prove the existence of ODE-Nets under some reasonable assumptions.

- 53 長 瀬 准 平 (芝浦工大理工) 連続区分線型関数を活性化関数にもつ深層ニューラルネットワークモデル
 石 渡 哲 哉 (芝浦工大システム理工) の等価性 15
Jumpei Nagase (Shibaura Inst. of Tech.) Equivalence of deep neural network models with continuous piecewise
 Tetsuya Ishiwata linear functions as activation functions
 (Shibaura Inst. of Tech.)

概要 Deep learning is one of the leading machine learning methods in recent years. One of the major research issues in deep learning is the problem of model design, and since many models have been proposed experimentally, a systematic understanding of models is still insufficient. In this study, we focus on the activation function among the components of designing a model to interpret a certain model in a unified manner. Specifically, we show that there is no difference between the widely used ReLU activation function and similar piecewise linear functions in terms of expressive ability.

54	神野拓哉 (東大理)	Constructing a data-driven model of intraseasonal weather time-series	
	三浦裕亮 (東大理)	using machine learning	15
	中井拳吾 (東京海洋大学)		
	齊木吉隆 (一橋大経営管理)		
	末松環 (理化学研)		
	高須賀大輔 (海洋研究開発機構)		
	米田剛 (一橋大経済)		
	Takuya Jinno (Univ. of Tokyo)	Constructing a data-driven model of intraseasonal weather time-series	
	Hiroaki Miura (Univ. of Tokyo)	using machine learning	
	<u>Kengo Nakai</u>		
	(Tokyo Univ. of Marine Sci. and Tech.)		
	Yoshitaka Saiki (Hitotsubashi Univ.)		
	Tamaki Suematsu (RIKEN)		
	Daisuke Takasuka		
	(Japan Agency for Marine-Earth Sci. and Tech.)		
	Tsuyoshi Yoneda (Hitotsubashi Univ.)		

概要 By employing a reservoir computing, a machine learning technique, we construct a data-driven model for predicting time-series of an index of Madden–Julian oscillation (MJO). MJO has far reaching influence on the global weather and is recognized to be one of the most important sources of predictability in an extended-range weather forecast. Our model has the potential of predicting the MJO for one month. This successful modelling relies on the the creation of an appropriate training time-series which has relatively low dimensional deterministic structures by employing a newly created band-pass filter. The usage of the delay coordinate also contributes to the effective modeling.

16:25~17:25 特別講演

川原田茜 (京都教育大)	セル・オートマトンが生成するフラクタルの特徴付けについて
Akane Kawaharada	Characterization of fractals generated by cellular automata
(Kyoto Univ. of Edu.)	

概要 In this talk, we mainly study linear one-dimensional and two-dimensional elementary cellular automata that generate symmetrical spatio-temporal patterns. By observing self-similar structures, we count the number of nonzero states in the spatio-temporal patterns of cellular automata for each time step $n \in \mathbb{Z}_{\geq 0}$. This allows us to compute future activities more efficiently than simulating the entire spatio-temporal patterns. We also normalize the number of nonzero states of the patterns, take the limits, and give one-variable functions for the limit sets. We can obtain a one-variable function for each limit set and show that the resulting functions are singular functions, which are non-constant, are continuous everywhere, and have a zero derivative almost everywhere. For Rule 90, a one-dimensional elementary cellular automaton, and a two-dimensional elementary CA, we show that the resulting functions are Salem's singular function.

トポロジー

9月13日(火) 第VII会場

9:30~12:00

- 1 赤池 祐次 (呉工高専) Higson 型コンパクト化の完全性と剰余の連結性 10
友安 一夫 (都城工高専)
Yuji Akaike (Kure Nat. Coll. of Tech.) Perfectness of Higson type compactifications and connectedness of re-
Kazuo Tomoyasu mainders
(Miyakonojo Nat. Coll. of Tech.)

概要 We study perfectness of Higson type compactifications and give a necessary and sufficient condition that the subpower and the sublinear Higson compactification of locally connected proper metric space are perfect. Consequently, we show that the sublinear Higson corona of the half open interval with the usual metric is an indecomposable continuum.

- 2 越野 克久 (神奈川大工) Recognizing the topologies on spaces of metrics 15
Katsuhisa Koshino (Kanagawa Univ.) Recognizing the topologies on spaces of metrics

概要 Given a metrizable space X , let $PM(X)$, $M(X)$, $AM(X)$, and $EM(X)$ be the spaces consisting of continuous bounded pseudometrics, continuous bounded metrics, bounded admissible metrics, and admissible metrics that can be extended on the one-point compactification of X , which are regarded as subspaces in the space of real-valued continuous bounded functions on X^2 . In this talk, we shall investigate the topological types of $PM(X)$, $M(X)$ and $AM(X)$ endowed with the uniform convergence topology, and $EM(X)$ endowed with the compact-open topology.

- 3 井上 雅照 (岡山理大理) Morava K 理論の安定余作用素と形式群の自己同型群のファイバー積 .. 10
Masateru Inoue (Okayama Univ. of Sci.) The stable cooperations of Morava K-Theory and the fiber product of
automorphism groups of formal group laws

概要 The Hopf algebra $K(n)_*(K(n))$, the stable cooperations of n -th Morava K -theory at an odd prime, is well-known. Whereas the main part of $K(n)_*(K(n))$ corepresents the group-valued functor consisting of the automorphisms of a formal group law of height n , relations between the whole structure of $K(n)_*(K(n))$ and formal group laws have not been investigated well. Firstly, we constitute the fiber product of two natural transformations between the automorphism groups of formal group laws, and the corepresenting Hopf algebra C_* . Next, we construct a Hopf algebra homomorphism from C_* to $K(n)_*(K(n))$ via Boardman's stable comodule algebras. By Yagita's results and the algebra structure of $K(n)_*(K(n))$, we see that the homomorphism is an isomorphism.

- 4 松橋 英市 (島根大総理工) いくつかの分解可能連続体およびそれらの超空間 15
大島 慶之 (島根大自然)
Eiichi Matsuhashi (Shimane Univ.) Some decomposable continua and their hyperspaces
Yoshiyuki Oshima (Shimane Univ.)

概要 We show that every irreducible D^{**} -continuum is an arc. This gives the negative answer to [1, Question 2]. Also, we prove that being Wilder, being D , being D^* , and being D^{**} are Whitney properties.

- 5 栗林勝彦 (信州大理) Cartan calculi on the free loop spaces 15
 内藤貴仁 (日本工大共通教育)
 若月駿 (信州大理)
 山口俊博 (高知大教育)
 Katsuhiko Kuribayashi (Shinshu Univ.) Cartan calculi on the free loop spaces
 Takahito Naito (Nippon Inst. of Tech.)
 Shun Wakatsuki (Shinshu Univ.)
 Toshihiro Yamaguchi (Kochi Univ.)

概要 A typical example of a Cartan calculus is the Lie algebra representation of vector fields of a manifold on the derivation ring of the de Rham complex. In this talk, we investigate Cartan calculus on the Hochschild chain complex of DGAs. It is a Lie algebra representation of the André–Quillen cohomology of a CDGA on the endomorphism ring of the Hochschild homology in terms of the homotopy Cartan calculi in the sense of Fiorenza and Kowalzig. Moreover, the representation in the Cartan calculus is interpreted geometrically as a map from the real homotopy group of the monoid of self-homotopy equivalences to the derivation ring on the loop cohomology.

- 6 栗林勝彦 (信州大理) BV exactness and string brackets 15
 内藤貴仁 (日本工大共通教育)
 若月駿 (信州大理)
 山口俊博 (高知大教育)
 Katsuhiko Kuribayashi (Shinshu Univ.) BV exactness and string brackets
 Takahito Naito (Nippon Inst. of Tech.)
 Shun Wakatsuki (Shinshu Univ.)
 Toshihiro Yamaguchi (Kochi Univ.)

概要 The string bracket is a Lie bracket on the S^1 -equivariant homology of the free loop space of an oriented closed manifold, which is introduced by Chas and Sullivan. In this talk, we explain methods to compute them when the manifold is BV exact. This method can be applied to many examples, since any rationally formal space (or more generally a space admitting positive weights) is BV exact. We also give non-examples of BV exact spaces, which are found by a computer-assisted method.

- 7 浅尾泰彦 (福岡大理) Admissible maps and the cohomology of classifying spaces 10
 石黒賢士 (福岡大理)
 山縣真 (福岡大理)
 Yasuhiko Asao (Fukuoka Univ.) Admissible maps and the cohomology of classifying spaces
 Kenshi Ishiguro (Fukuoka Univ.)
 Makoto Yamagata (Fukuoka Univ.)

概要 The admissible map that determines a map between classifying spaces of connected compact Lie groups can be regarded as a matrix. We discuss the diagonalizability of such matrices as well as the triangularizability, particularly in the case of generalized cyclic matrices. Sometimes a high-dimensional behavior characterizes the induced homomorphism of the cohomology. We will generalize some previous results.

- 8 田邊真郷 (北大情報) Definable な亜群の滑層分割について 10
 Masato Tanabe (Hokkaido Univ.) Canonical stratification of definable groupoids

概要 We consider semialgebraic or subanalytic category, or more generally, o-minimal category over \mathbb{R} or \mathfrak{X} -category. These are examples of ‘tame topology.’ In this talk, we present a structure of a definable Lie groupoid and its orbit space in these categories. Our work is based on M. Shiota’s theory of \mathfrak{X} -category, and refine and generalize J. N. Mather and V. A. Vassiliev’s results on real algebraic group actions.

- 9 山本卓宏 (東京学大教育) 境界付き曲面上の安定写像のトポロジー 15
 Takahiro Yamamoto Topology of stable maps of surfaces with boundary into the plane
 (Tokyo Gakugei Univ.)

概要 A smooth map of a compact surface with boundary into the plane is called weakly admissible if it behaves locally like a stable map on a neighbourhood of the boundary. The notions of the half boundary winding number of a weakly admissible smooth map $M \rightarrow \mathbb{R}^2$ and weakly-admissibly homotopic among weakly admissible smooth maps $M \rightarrow \mathbb{R}^2$ are introduced. Then, we show that weakly admissible smooth maps f_0 and $f_1: M \rightarrow \mathbb{R}^2$ are weakly-admissibly homotopic if and only if the half boundary winding number of f_0 coincides with that of f_1 .

14:20~18:00

- 10 地引知栄 (東工大理) 左順序の構成とその性質について 15
 Chihaya Jibiki (Tokyo Tech) Constructions of left-orderings and investigating their properties

概要 I show new left orderings of an HNN extension and an countably-generated group. More precisely, these are left-orderings of Baumslag–Solitar groups and inductive limits of groups and investigate properties of them. Our construction is based on the fact that an HNN extension is a semidirect product of an inductive limit of amalgamated free products with \mathbb{Z} . The left ordering on the $BS(m, n)$ is neither Conradian nor isolated.

- 11 佐藤尚倫 (早大理工) On subgroups of Richard Thompson’s group F 15
 Takamichi Sato (Waseda Univ.) On subgroups of Richard Thompson’s group F

概要 The R. Thompson group F has a description as the group of piecewise linear homeomorphisms from the closed unit interval onto itself that are differentiable everywhere except at finitely many dyadic rational numbers and such that on the intervals of differentiability the derivatives are integer powers of 2. We give an algebraic characterization, as subgroups of F , of the stabilizers of finite sets of numbers in the interval $(0, 1)$ under the natural action of F on $(0, 1)$.

- 12 田 蔦 優 (北大理) サイクルグラフのマグニチュードホモロジーと Asao–Izumihara 複体の
 ホモトピー型 15
 Yu Tajima (Hokkaido Univ.) Magnitude homology of cycle graphs and the homotopy type of the
 Asao–Izumihara complexes

概要 The magnitude homology is defined by Hepworth and Willerton as a categorification of the magnitude (an invariant for metric spaces). Recently, Asao and Izumihara introduced CW complexes whose homology groups are isomorphic to direct summands of graph magnitude homology groups. We prove that the Asao–Izumihara complex is homotopy equivalent to a wedge of spheres (of various dimensions) for cycle graphs with $2m - 1$ ($m = 3, 4, \dots$) vertices.

- 13 田所勇樹 (木更津工高専) Minimal generating sets of groups of Kim–Manturov 10
 逆井卓也 (東大数理)
 田中心 (東京学大教育)
 Yuuki Tadokoro Minimal generating sets of groups of Kim–Manturov
 (Kisarazu Nat. Coll. of Tech.)
 Takuya Sakasai (Univ. of Tokyo)
 Kokoro Tanaka (Tokyo Gakugei Univ.)

概要 Kim and Manturov introduced a certain group derived from triangulations of a surface. Using a combinatorial group method, we give a minimal generating set of the group.

- 14 菅原 朔見 (北大 理) 超平面配置の \mathbb{Z} -局所係数コホモロジーと CDO 型定理 15
 Sakumi Sugawara (Hokkaido Univ.) \mathbb{Z} -local system cohomology of hyperplane arrangements and a CDO-type theorem

概要 For the complement of a complex hyperplane arrangement, a vanishing theorem of \mathbb{C} -local system cohomology is known, which is first proved by Cohen, Dimca, and Orlik. In this talk, we consider the \mathbb{Z} -local system cohomology for complexified real arrangements and prove a CDO-type theorem for \mathbb{Z} -local system cohomology. The method to calculate the cohomology is based on the minimality of arrangements and combinatorial descriptions of basis in terms of chambers.

- 15 吉永 正彦 (阪大 理) 20・12 面体配置と関連する二重被覆空間 15
 石橋 卓 (ARISE analytics)
 菅原 朔見 (北大 理)
 Masahiko Yoshinaga (Osaka Univ.) The icosidodecahedral arrangement and related double coverings
 Suguru Ishibashi (ARISE analytics)
 Sakumi Sugawara (Hokkaido Univ.)

概要 The icosidodecahedral arrangement is a plane arrangement in three dimensional space which is closely related to the icosidodecahedron. The icosidodecahedral arrangement has two peculiar properties. First, it provides the first example of arrangement such that the first homology of the Milnor fiber has torsion. Second, it breaks a conjecture by Papadima and Suciu concerning the first Betti number of the Milnor fiber. In this talk we will discuss the relationship between these two peculiar properties.

- 16 原子 秀一 (東大 数理) Computational results for the symplectic derivation Lie algebras 15
 Shuichi Harako (Univ. of Tokyo) Computational results for the symplectic derivation Lie algebras

概要 The Lie algebras consisting of symplectic derivations on certain algebras are called the symplectic derivation Lie algebras. We determine the second homology group of the certain Lie ideal of “the commutative world” of the symplectic Lie algebras in terms of symplectic modules.

- 17 Y. Eliashberg (Stanford Univ.) Stabilized convex symplectic manifolds are Weinstein 15
 小川 竜 (東海大理)
 吉安 徹 (京都教育大教育)
 Yakov Eliashberg (Stanford Univ.) Stabilized convex symplectic manifolds are Weinstein
 Noboru Ogawa (Tokai Univ.)
 Toru Yoshiyasu (Kyoto Univ. of Edu.)

概要 We show that a stabilized convex symplectic (also called Liouville) manifold with the homotopy type of a half dimensional CW-complex is symplectomorphic to a flexible Weinstein manifold.

- 18 林 晋 An index theorem for quarter-plane Toeplitz operators via extended symbols 15
 (JST さきがけ・東北大 AIMR)
 Shin Hayashi An index theorem for quarter-plane Toeplitz operators via extended symbols
 (JST PRESTO/Tohoku Univ.)

概要 We discuss index theory for some Toeplitz operators on a discrete quarter-plane (called quarter-plane Toeplitz operators). Duducava employed Gohberg–Krein theory for matrix factorizations and obtained an index formula in an analytic way. In this talk, we investigate his idea from a geometric point of view. We discuss Fredholm quarter-plane Toeplitz operators of two-variable rational matrix function symbols and show that their symbols defined originally on a two-dimensional torus can canonically be extended to some three-dimensional sphere. Their Fredholm indices are expressed as three-dimensional winding numbers of extended symbols.

- 19 A. Darby (Xi'an Jiaotong-Liverpool Univ.)
黒木 慎太郎 (岡山理大理)
Jongbaek Song (KIAS)
Alastair Darby (Xi'an Jiaotong-Liverpool Univ.)
Shintaro Kuroki (Okayama Univ. of Sci.)
Jongbaek Song (KIAS) Equivariant cohomology of torus orbifolds 15

概要 In this talk, we introduce the calculation of the integral equivariant cohomology, in terms of generators and relations, of locally standard torus orbifolds whose odd degree ordinary cohomology vanishes. This is joint work with Alastair Darby and Jongbaek Song.

- 20 田村 俊輔 (津山工高専) 低次元球面上の有限群の odd-Euler-characteristic action について 15
Shunsuke Tamura (Tsuyama Nat. Coll. of Tech.) On odd-Euler-characteristic actions of finite groups on low-dimensional spheres

概要 Let G be a finite group, M a smooth manifold with a smooth G -action and M^G the G -fixed-point set of the G -action on M . We call the G -action on M an odd-Euler-characteristic action (resp. a one-fixed-point action) if $\chi(M^G) \equiv 1 \pmod{2}$ (resp. $|M^G| = 1$). The existence of one-fixed-point actions of finite groups on low-dimensional spheres has been studied by various topologists. In this talk, we will discuss a necessary condition for the existence of odd-Euler-characteristic actions of finite groups on the sphere S^n of dimension $n \leq 6$.

9月14日(水) 第VI会場

10:10~10:25 2022年度日本数学会幾何学賞授賞式

10:30~11:30 2022年度日本数学会幾何学賞受賞特別講演 (幾何学分会と合同)

入江 博 (茨城大理) 3次元対称凸体の Mahler 予想の解決
柴田 将敬 (名城大理工)

Hiroshi Iriyeh (Ibaraki Univ.) A solution of Mahler's conjecture of three dimensional symmetric convex
Masataka Shibata (Meijo Univ.) bodies

概要 We have proved Mahler's conjecture concerning the volume product of three dimensional centrally symmetric convex bodies in \mathbb{R}^3 . In this talk, we give an outline of its proof and also provide its applications and recent developments.

13:15~14:15 2022年度日本数学会幾何学賞受賞特別講演 (幾何学分会と合同)

桑 垣 樹 (京大理) 層量子化の幾何と代数解析

Tatsuki Kuwagaki (Kyoto Univ.) Geometry and algebraic analysis of sheaf quantization

概要 Sheaf quantization is a way of quantizing Lagrangian submanifolds. The concept is quite rich and useful to study symplectic geometry, algebraic analysis, and etc. In this talk, I will give an introduction to the concept.

9月15日(木) 第VII会場

9:30~12:00

- 21 大森源城 (東京理大理工) Finite presentations for the balanced superelliptic mapping class groups
廣瀬進 (東京理大理工) 15
Genki Omori (Tokyo Univ. of Sci.) Finite presentations for the balanced superelliptic mapping class groups
Susumu Hirose (Tokyo Univ. of Sci.)

概要 The balanced superelliptic mapping class group is the normalizer of the transformation group of the balanced superelliptic covering space in the mapping class group of the total surface. We give finite presentations for the balanced superelliptic mapping class groups of closed surfaces, surfaces with one marked point, and surfaces with one boundary component. To give these presentations, we construct finite presentations for corresponding liftable mapping class groups in a different generating set from Ghaswala–Winarski’s presentation.

- 22 大森源城 (東京理大理工) The balanced superelliptic mapping class groups is generated by three elements 10
Genki Omori (Tokyo Univ. of Sci.) The balanced superelliptic mapping class groups is generated by three elements

概要 The balanced superelliptic mapping class group is the normalizer of the transformation group of the balanced superelliptic covering in the mapping class group of the total surface. We prove that the balanced superelliptic mapping class groups with either one marked point, one boundary component, or no marked points and boundary are generated by three elements. To prove this, we also show that its liftable mapping class groups are also generated by three elements. These generating sets are minimal except for several no marked points and boundary cases.

- 23 小林竜馬 (石川工高専) 向き付け不可能曲面の写像類群の4つの無限表示 15
Ryoma Kobayashi Four infinite presentations for the mapping class group of a non-orientable
(Ishikawa Nat. Coll. of Tech.) surface

概要 Omori and the speaker have given an infinite presentation for the mapping class group of a compact non-orientable surface. In this work, we give more simple four infinite presentations for this group.

- 24 小林竜馬 (石川工高専) 曲面の基本群の無限表示 10
Ryoma Kobayashi Infinite presentations for fundamental groups of surfaces
(Ishikawa Nat. Coll. of Tech.)

概要 For any finite type connected surface S , we give an infinite presentation of the fundamental group $\pi_1(S, *)$ of S based at an interior point $* \in S$ whose generators are represented by simple loops. When S is non-orientable, we also give an infinite presentation of the subgroup of $\pi_1(S, *)$ generated by elements which are represented by loops whose regular neighborhoods are annuli.

- 25 片山拓弥 (学習院大理) ブレイド群の曲面の写像類群へのバーチャル埋め込みについて 15
久野恵理香 (阪大理)
Takuya Katayama (Gakushuin Univ.) On virtual embeddings of braid groups into mapping class groups of
Erika Kuno (Osaka Univ.) surfaces

概要 We give a necessary and sufficient condition for embedding a finite index subgroup of Artin’s braid group into the mapping class group of a connected orientable surface.

- 26 久野雄介 (津田塾大学芸) ファットグラフ複体の Penner のコサイクルについて 10
竹澤花恵 (津田塾大学芸)
Yusuke Kuno (Tsuda Coll.) On Penner's cocycle on the fatgraph complex
Kae Takezawa (Tsuda Coll.)

概要 The fatgraph complex of an oriented surface is a combinatorial model for the Teichmüller space of the surface, and it can be used for studying the cohomology of the mapping class group. We consider a certain 1-cocycle on the fatgraph complex introduced by Penner, and we give an explicit cobounding 0-cochain for it.

- 27 野崎雄太 (広島大先進理工) A non-commutative Reidemeister–Turaev torsion of homology cylinders
佐藤正寿 (東京電機大未来) 15
鈴木正明 (明大総合数理)
Yuta Nozaki (Hiroshima Univ.) A non-commutative Reidemeister–Turaev torsion of homology cylinders
Masatoshi Sato (Tokyo Denki Univ.)
Masaaki Suzuki (Meiji Univ.)

概要 We compute the Reidemeister–Turaev torsion of homology cylinders which takes values in the K_1 -group of the I -adic completion of the group ring $\mathbb{Q}\pi_1\Sigma_{g,1}$, and prove that its reduction to $\widehat{\mathbb{Q}\pi_1\Sigma_{g,1}/I^{d+1}}$ is a finite-type invariant of degree d . We also show that the 1-loop part of the LMO functor and the Enomoto–Satoh trace are written by the leading term of our torsion.

- 28 辻俊輔 (明大研究・知財) いくつかのスケイン加群におけるデーン・ツイストの公式とその応用 .. 15
Shunsuke Tsuji (Meiji Univ.) Formulas for the actions of Dehn twists in some skein modules and their applications

概要 We give explicit formulas for the actions of the Dehn twists along simple closed curves in a compact connected oriented surface on the completions of some types of skein modules. Using them, we can define some “quantum” Johnson homomorphisms and some invariants for integral homology 3-spheres and homology cylinders.

14:20~15:20 特別講演

- C. Vespa Eilenberg Mac Lane polynomial functors and their applications
(Univ. of Strasbourg · JSPS)
Christine Vespa Eilenberg Mac Lane polynomial functors and their applications
(Univ. of Strasbourg/JSPS)

概要 In 1954, Eilenberg and Mac Lane introduced the notion of a polynomial functor as a generalization of additive functors. Fundamental results in representation theory and algebraic topology have been obtained using the polynomial functors. Polynomial functors are used both as a tool to measure the complexity of a functor and to study such functors. In this talk, I will give results on polynomial functors on finitely generated free groups and present some recent applications.

15:40~18:00

- 29 村上順 (早大理工) 結び目群の量子化について 10
Jun Murakami (Waseda Univ.) On quantization of knot groups

概要 By using the plat presentation of a knot, a quantization of the knot group is constructed. The main tool is the bottom tangle. The relations of the knot group is reformulated as relations of the algebra of bottom tangles, and the quantization of the knot group is defined as the quotient of the algebra with these relations.

- 30 中西康剛 (神戸大理) Differences of Conway polynomials for knots caused by a single pass
高木駿希 move 15
Yasutaka Nakanishi (Kobe Univ.) Differences of Conway polynomials for knots caused by a single pass
Shunki Takagi move

概要 In this talk, we will characterize Conway polynomials of knots which are transformed into the trivial knot by a single pass move.

- 31 秋田利之 (北大理) カンドルの associated group について 10
長谷川蒼 (北大理)
Toshiyuki Akita (Hokkaido Univ.) On the associated group of a quandle
Aoi Hasegawa (Hokkaido Univ.)

概要 The associated groups of quandles play an important role in understanding quandles themselves. In this talk, we give several explicit descriptions of structure of associated groups by introducing certain quotient groups of them.

- 32 水澤篤彦 (早大非常勤) Clasper を用いた 5 成分 link の link-homotopy 類の分類 15
小鳥居祐香 (広島大理・理化学研)
Atsuhiko Mizusawa (Waseda Univ.) A classification of 5-component link-homotopy classes through the clasper
Yuka Kotorii theory
(Hiroshima Univ./RIKEN)

概要 The link-homotopy classes of links are obtained from the link-homotopy classes of string links modulo the partial conjugations. Yasuhara and Meilhan gave a standard form of the link-homotopy classes of string links by using the claspers. In this talk, we calculate the actions of the partial conjugations for the 5-component link-homotopy classes of string links by using the clasper theory and give a new presentation of the link-homotopy classes of 5-component links.

- 33 沢辺俊 (早大理工) On the potential function of the colored Jones polynomial with arbitrary
colors 10
Shun Sawabe (Waseda Univ.) On the potential function of the colored Jones polynomial with arbitrary
colors

概要 In this study, we consider the potential function of the colored Jones polynomial for a link with arbitrary colors. This potential function has new parameters derived from the colors of the link. When we fix the new parameters, we can obtain a cone-manifold structure of the complement of a hyperbolic link from a saddle point of the potential function. Furthermore, when we regard the new parameters as variables, the derivatives with respect to the new parameters correspond to the completeness conditions. This correspondence implies that the saddle point of the potential function gives the complete hyperbolic structure to the link complement.

- 34 鈴木正明 (明大総合数理) Genera and crossing numbers of 2-bridge knots 10
A. T. Tran
(Univ. of Texas at Dallas)
Masaaki Suzuki (Meiji Univ.) Genera and crossing numbers of 2-bridge knots
Anh T. Tran (Univ. of Texas at Dallas)

概要 We determine the average genus of all the 2-bridge knots with a given crossing number. As a consequence, we obtain the oblique asymptote of this value as the crossing number grows.

- 35 北野晃朗 (創価大理工) Reidemeister torsion の代数的整数性について 10
 野崎雄太 (広島大先進理工)
 Teruaki Kitano (Soka Univ.) Algebraic integrality of Reidemeister torsion
 Yuta Nozaki (Hiroshima Univ.)

概要 For a 3-manifold M and an acyclic $SL(2, \mathbb{C})$ -representation ρ of its fundamental group, the Reidemeister torsion $\tau_\rho(M) \in \mathbb{C}$ is defined. If there are finitely many conjugacy classes of irreducible representations, then the Reidemeister torsions are known to be algebraic numbers. In this talk we report that any value of them is an algebraic integer for a Seifert fibered space under mild conditions, even though there are infinite conjugacy classes.

- 36 北野晃朗 (創価大理工) 結び目群の間の全射準同型写像と $SL(2; \mathbb{C})$ -指標多様体について 10
 Teruaki Kitano (Soka Univ.) Epimorphisms between knot groups and the $SL(2; \mathbb{C})$ -character variety

概要 In this talk we will study to how determine the knot by the $SL(2; \mathbb{C})$ -character variety. This includes some joint work with Michel Boileau, Steven Sivek, and Raphael Zentner.

- 37 高野暁弘 (東大数理) The Long–Moody construction and twisted Alexander invariants 15
 Akihiro Takano (Univ. of Tokyo) The Long–Moody construction and twisted Alexander invariants

概要 The Long–Moody construction is a method of constructing a new representation of the braid group from a representation of the semidirect product of the braid group and the free group. In this talk, we show that its matrix presentation is described by the Fox derivation, and also a relation with twisted Alexander invariants.

9月16日(金) 第VII会場

9:30~12:00

- 38 鎌田聖一 (阪大理工) ねじれ仮想結び目のねじれ交差彩色とその不変量について 10
 伊藤大貴 (KISTEM)
 Seiichi Kamada (Osaka Univ.) Twisted intersection colorings and invariants of twisted links
 Hiroki Ito (KISTEM)

概要 Twisted links are a generalization of classical links and virtual links. Here we introduce twisted intersection colorings of a diagram and construct invariants of a twisted link using such colorings. As an application, we show that there exist infinitely many pairs of twisted links such that for each pair the two twisted links are not equivalent but their double coverings are equivalent.

- 39 鎌田直子 (名古屋市大理) Virtual link diagram とその sublink diagram 10
 Naoko Kamada (Nagoya City Univ.) Virtual link diagrams and their sublink diagrams

概要 Jin and Lee proved the following: Suppose that D_1, \dots, D_n are link diagrams. Given a link L which is partitioned into sublinks L_1, \dots, L_n admitting diagrams D_1, \dots, D_n respectively, there is a diagram D of L whose restrictions to L_1, \dots, L_n are isotopic to D_1, \dots, D_n , respectively. In this talk we show that a similar result does hold for welded links and does not for virtual links.

- 40 和田康載 (神戸大理) 仮想結び目のねじれ数と $2k$ -移動 10
 Kodai Wada (Kobe Univ.) Writhes and $2k$ -moves for virtual knots

概要 In this talk, we show that if two virtual knots are related by a finite sequence of $2k$ -moves, then their n -writhes are congruent modulo k for any nonzero integer n . Moreover, we give a necessary and sufficient condition for two virtual knots to be equivalent up to $2k$ -moves and Ξ -moves in terms of their odd writhes.

- 41 境圭一 (信州大理) The Fox–Hatcher cycle and the Vassiliev invariants 15
 加納早貴
 Keiichi Sakai (Shinshu Univ.) The Fox–Hatcher cycle and the Vassiliev invariants
 Saki Kanou

概要 Configuration space integral produces cohomology classes of the space of long knots from graph cocycles, and it is known that, if the graphs are trivalent, then the corresponding cohomology classes are closely related to the Vassiliev invariants. We give a combinatorial formula for the evaluation of the cocycles coming from certain non-trivalent graphs over the Fox–Hatcher cycles of the space of framed long knots. As a corollary we see that some non-trivalent graphs also produce (possibly trivial) Vassiliev invariants.

- 42 安部哲哉 (立命館大理工) Ribbon concordance and the minimality of torus knots 15
 田神慶士 (広島修道大経済)
 Tetsuya Abe (Ritsumeikan Univ.) Ribbon concordance and the minimality of torus knots
 Keiji Tagami (Hiroshima Shudo Univ.)

概要 Agol proved that ribbon concordance forms a partial ordering on the set of knots in the 3-sphere. In this talk, we prove that a tight fibered knot, such as a torus knot, is minimal in the partially ordered set. This result gives a supporting evidence of the generalization of the slice-ribbon conjecture proposed by Daemi and Scaduto.

- 43 谷口雄大 (阪大理) カンドル 2-コサイクルから得られる曲面結び目の不変量の関係 15
 Yuta Taniguchi (Osaka Univ.) A relation between surface knot invariants obtained from a quandle 2-cocycle

概要 J. S. Carter, M. Saito and S. Satoh defined an invariant of oriented surface knots using a quandle 2-cocycle θ . In this talk, we relate the surface knot invariant using a quandle 2-cocycle θ to an f -twisted Alexander matrix, which was introduced by A. Ishii and K. Oshiro, using the Alexander pair associated with the quandle 2-cocycle θ . As an application, we determine the second quandle homology group of the knot quandle of 2-knots.

- 44 安田順平 (阪大理) Plat 指数における曲面絡み目の具体例について 15
 Jumpei Yasuda (Osaka Univ.) Computation of the plat index for surface-links

概要 A plat form for links is a presentation of a classical link using a braid. We can apply this presentation to surface-links, using a braided surface instead of a braid, and prove that every surface-link has a plat form presentation. Using plat form presentation for surface-links, the plat index is defined as a surface-link invariant, which is an analogy of the bridge index for links. In this talk, we consider a lower bounds of the plat index for a surface-link by using a symmetric quandle coloring. As an application, we give infinitely many surface-knots with the plat index m for any positive integer m .

- 45 磯島司 (東工大) 曲面結び目の自明な再接着により得られる trisection 15
 Tsukasa Isoshima (Tokyo Tech) Trisections obtained by trivially regluing surface-knots

概要 A (relative) trisection of a 4-manifold (with boundary) is a decomposition of the 4-manifold into three 4-dimensional 1-handlebodies. The complement of a surface-knot S has the standard decomposition according to a trisection T of a closed 4-manifold X , but it is never a relative trisection. Kim and Miller developed a new technique called a boundary-stabilization, so that the decomposition is a relative trisection. We study the difference between T and a new trisection of X obtained by boundary-stabilizing the complement of S when S is a P^2 -knot which is of Kinoshita type.

- 46 高橋夏野 (阪大情報) コルクの最小種数の相対トライセクション 15
 Natsuya Takahashi (Osaka Univ.) Minimal genus relative trisections of corks

概要 A relative trisection is a decomposition of a smooth 4-manifold with boundary into three 4-dimensional 1-handlebodies. In this talk, we show how to construct minimal genus relative trisections for infinitely many corks. As an application, we determine the minimal number of binding components of planar open book decompositions on the boundaries of these corks.

14:20~15:20 特別講演

- 佐藤進 (神戸大理) 2次元結び目の表の作成に向けて
 Shin Satoh (Kobe Univ.) Toward tabulation of 2-knots

概要 The crossing number $c(k)$ of a knot k in S^3 is the minimal number of crossings for all diagrams of k . It has been used to tabulate knots; in fact, $c(k) = 0$ holds if and only if k is the trivial knot, there is no knot of $c(k) = 1, 2$, $c(k) = 3$ holds if and only if k is the trefoil knot, and so on.

A 2-knot is a 2-dimensional sphere embedded in S^4 smoothly. It is presented by a diagram through a projection onto 3-space with a finite number of branch points and triple points. The minimal number of branch points for all diagrams of a 2-knot K is known to be equal to zero. The triple point number $t(K)$ of K is the minimal number of triple points for all diagrams of K . We would like to tabulate 2-knots by using the triple point number $t(K)$.

We have a great difference between the crossing number and the triple point number: There are infinitely many 2-knots of $t(K) = 0$ which are called ribbon. By introducing the notion of ribbon concordance, we can say that $t(K) = 0$ if and only if K is ribbon concordant to the trivial 2-knot. It is also known that there is no 2-knot of $t(K) = 1, 2, 3$. Our main theorem is that $t(K) = 4$ if and only if K is ribbon concordant to the 2-twist-spun trefoil knot. The aim of this talk is to review diagrammatic 2-knot theory and give a sketch of our theorem.

15:40~17:00

- 47 丹下基生 (筑波大数理物質) Pochette surgery of S^4 15
 鈴木龍正 (東工大)
 Motoo Tange (Univ. of Tsukuba) Pochette surgery of S^4
 Tatsumasa Suzuki (Tokyo Tech)

概要 Iwase and Matsumoto defined a pochette P , which is $S^1 \times D^3 \natural S^2 \times D^2$ and defined a surgery (it is called a pochette surgery) around an image $P \hookrightarrow M$ in a 4-manifold M . They gave a complete data to determine the diffeomorphism type of the surgery. We clarify the diffeomorphism type of pochette surgery for any embedding with trivial cord. As a result we prove that any pochette surgery for embedding with trivial core sphere gives M or a Gluck surgery. We also show that there exist embeddings $P \hookrightarrow S^4$ with non-trivial core sphere and non-trivial cord such that the pochette surgery gives S^4 .

- 48 児玉大樹 (東北大 AIMR・理化学研) b ある複素曲面特異点の Milnor 束から見出された S^5 から S^3 へのトーラスファイブレーション 15
粕谷直彦 (北大理)
三松佳彦 (中大理工)
森淳秀 (大阪歯大歯)

Hiroki Kodama (Tohoku Univ./RIKEN) Torus fibrations from S^5 to S^3 found from Milnor fibrations of certain complex surface singularities

Naohiko Kasuya (Hokkaido Univ.)

Yoshihiko Mitsumatsu (Chuo Univ.)

Atsuhide Mori (Osaka Dent. Univ.)

概要 We explain T_{pqr} cusp singularities and Milnor fibers F_θ of them. We construct a complex map g on a Milnor fiber F_θ so that it has $p + q + r$ critical points and the inverse images of regular values are tori T^2 . We also construct a deformation of the Milnor fiber so that all critical points become Lefschetz type.

- 49 三松佳彦 (中大理工) カusp特異点のミルナーファイバーのレフシェッツファイブレーション
粕谷直彦 (北大理) と K3 曲面の位相分解 15
児玉大樹 (東北大 AIMR・理化学研)
森淳秀 (大阪歯大歯)

Yoshihiko Mitsumatsu (Chuo Univ.) Lefschetz fibration of Milnor fibers of cusp singularities and topological decompositions of the K3 surface

Naohiko Kasuya (Hokkaido Univ.)

Hiroki Kodama

(Tohoku Univ./RIKEN)

Atsuhide Mori (Osaka Dent. Univ.)

概要 We explain that the K3 surface admits a smooth topological decomposition into the two Milnor fibers of T_{pqr} cusp singularities which are dual in the sense of the extended strange duality. Among such 10 decompositions, the pair T_{237} - T_{237} gives a particularly good decomposition.

- 50 三松佳彦 (中大理工) Lefschetz 的臨界点 15
粕谷直彦 (北大理)
森淳秀 (大阪歯大歯)

Yoshihiko Mitsumatsu (Chuo Univ.) Lefschetz-like critical points

Naohiko Kasuya (Hokkaido Univ.)

Atsuhide Mori (Osaka Dent. Univ.)

概要 We show the fact that the space of homogeneous quadratic maps from \mathbb{R}^4 to \mathbb{R}^2 for which the origin is the unique critical point has two path connected components, which has the following application. If the Hessian of a smooth map from a 4-manifold to a 2-manifold at a critical point P is of above type and belongs to the positive component, then the map is deformed in an arbitrary small neighborhood of P without creating new critical points so that P is a Lefschetz type critical point.

無限可積分系

9月13日(火) 第IX会場

9:30~12:00

- 1 土谷洋平(神奈川工大) Periodic ILW equation with discrete Laplacian のテータ関数解 10
 Yohei Tutiya (Kanagawa Inst. of Tech.) Theta function solutions for periodic ILW equation with discrete Laplacian

概要 It will be reported that periodic ILW equation with discrete Laplacian admits theta function solutions whose genera are greater than two. It will be achieved by conducting a special reduction for theta solutions for n -component KP equation that requires certain incommensurate relation among three points on compact Riemann surface.

- 2 長尾秀人(明石工高専) ある因子化された行列型ラックス形式 15
 Hidehito Nagao (Akashi Coll. of Tech.) A certain factorized matrix Lax form

概要 It is well known that the q -Painlevé system and its multivariable extension (called q -Garnier system) are given as a condition for the compatibility of the Lax pair (i.e. a set of a linear equation and its deformation equation). Recently, a factorized matrix Lax form for the q -Garnier system was obtained through a similarity reduction of the q -KP hierarchy. In this talk, we discuss an extension of the factorized matrix Lax form and its relation to other systems.

- 3 矢ヶ崎一幸(京大情報) Integrability of the two-dimensional Zakharov–Shabat systems by quadrature 15
 Kazuyuki Yagasaki (Kyoto Univ.) Integrability of the two-dimensional Zakharov–Shabat systems by quadrature

概要 In this talk we consider the two-dimensional Zakharov–Shabat (ZS) systems, which are linear systems of ordinary differential equations appearing in application of the inverse scattering transform (IST) to integrable partial differential equations (PDEs) such as the KdV equation, the nonlinear Schrödinger equation and so on. To obtain solutions to the initial value problems of these PDEs using the IST, we first have to solve the ZS systems. In particular, we show under some wide condition that if for any wave number they can be solved by quadrature, i.e., they are integrable in the meaning of differential Galois theory, then the potentials are reflectionless.

- 4 渋川元樹(神戸大理) A generalization of Zwegers' μ -function according to the q -Hermite–Weber difference equation 15
 土見怜史(神戸大理) Weber difference equation
 Genki Shibukawa (Kobe Univ.) A generalization of Zwegers' μ -function according to the q -Hermite–Tsuchimi Satoshi (Kobe Univ.) Weber difference equation

概要 We introduce a one parameter deformation of the Zwegers' μ -function as the image of q -Borel and q -Laplace transforms of a fundamental solution for the q -Hermite–Weber equation. We further give some formulas of our generalized μ -function, for example, forward and backward shift, translation, symmetry, a difference equation for the new parameter, and q -bilateral hypergeometric expressions. From one point of view, the continuous q -Hermite polynomials are some special cases of our μ -function, and the Zwegers' μ -function is regarded as a continuous q -Hermite polynomial of “minus degree”.

- 5 増田 哲 (青学大理工) 梶原-野海-山田系の付加的対称性 15
Tetsu Masuda (Aoyama Gakuin Univ.) Additional symmetry of Kajiwara–Noumi–Yamada systems

概要 We present a description of the additional symmetry of the discrete dynamical systems proposed by Kajiwara, Noumi and Yamada, which originally possess the extended affine Weyl group symmetry $\widetilde{W}(A_{m-1}^{(1)}) \times \widetilde{W}(A_{n-1}^{(1)})$.

- 6 新井由美 (お茶の水女大人間文化) On q -middle convolution and q -hypergeometric equations 15
Yumi Arai (Ochanomizu Univ.)
竹村剛一 (お茶の水女大基幹) On q -middle convolution and q -hypergeometric equations
Kouichi Takemura (Ochanomizu Univ.)

概要 We reformulate q -integral transformations associated with the q -middle convolution. We obtain q -integral representations of the variants of the q -hypergeometric equation by applying the q -middle convolution.

- 7 重富尚太 (九大数理) カライドサイクルの明示公式 15
梶原健司 (九大IM1)
Shota Shigetomi (Kyushu Univ.) An explicit formula of Kaleidocycle
Kenji Kajiwara (Kyushu Univ.)

概要 We construct an explicit formula of Kaleidocycle in terms of elliptic theta function.

- 8 西山雄太 (熊本大先端) 2被約 Schur 関数と Schur の Q -関数に関する予想について 15
Yuta Nishiyama (Kumamoto Univ.) On a conjecture on 2-reduced Schur functions and Schur's Q -functions

概要 Sato and Mori introduced some families of functions to state about behavior of the solutions of the KdV equation. Mizukawa, Nakajima and Yamada interpreted them as symmetric functions using 2-reduced Schur functions and Littlewood–Richardson coefficients. They also made a conjecture that these symmetric functions are equal to Schur's Q -functions up to a scalar. In this talk we prove the conjecture in a special case and give some consideration on the general case.

- 9 大山陽介 (徳島大理工) A q -analogue of the Euler–Poisson–Darboux equation 15
Yousuke Ohyama (Tokushima Univ.) A q -analogue of the Euler–Poisson–Darboux equation

概要 We study a q -analogue of the Euler–Poisson–Darboux equation, different from the q -EPD equation proposed by Koga and Nagatomo in 1995. We show our q -EPD equation has special solutions written by basic hypergeometric series.

14:15~15:15 特別講演

- 星野 歩 (広島工大工) 鉤型 C 型 Macdonald 多項式の明示公式と Pieri 型公式
Ayumu Hoshino (Hiroshima Inst. of Tech.) Macdonald polynomials of type C with hook-shape diagrams and Pieri type formula

概要 We obtained explicit forms of the Koornwinder polynomials with one-row and one-column diagrams by a series of our studies. In this lecture, we give explicit forms of the Macdonald polynomials of type C with hook-shape diagrams. Moreover, we present an explicit Pieri type formula for the Macdonald polynomials of type C with one-row, one-column and hook-shape diagrams.

9月14日(水) 第IX会場

9:30~10:50

- 10 武中 亮(阪公大理) $A_{2l}^{(2)}$ 型アフィンリー環とフェルミ公式…………… 15
 Ryo Takenaka (Osaka Metro. Univ.) Affine Lie algebras of type $A_{2l}^{(2)}$ and fermionic formulas

概要 Vertex algebraic construction of modules for the twisted affine Lie algebra $A_2^{(2)}$ was studied by Calinescu, Lepowsky and Milas. In this talk, we see that such construction will be true for higher rank cases, that is for twisted affine Lie algebras of type $A_{2l}^{(2)}$. As a consequence, we obtain some fermionic character formulas.

- 11 渡邊 英也(阪公大数学研) 有限型実階数1の ι 標準基底について…………… 15
 Hideya Watanabe (Osaka Metro. Univ.) On ι canonical bases of finite type of real rank one

概要 In 2010's, Huanchen Bao and Weiqiang Wang generalized the theory of canonical basis for quantum groups to that for ι quantum groups (also known as quantum symmetric pair coideal subalgebras). In this talk, we focus on the ι quantum groups of real rank one, and show that their canonical bases have a stability property. Then, we introduce possible applications to integrable system and combinatorial representation theory.

- 12 水野 勇磨(千葉大理) Mutations of blowups of toric surfaces and q -Painlevé systems…………… 15
 Yuma Mizuno (Chiba Univ.) Mutations of blowups of toric surfaces and q -Painlevé systems

概要 We provide a relation between the geometric framework for q -Painlevé equations and cluster Poisson varieties by using toric models of rational surfaces associated with q -Painlevé equations. We introduce the notion of seeds of q -Painlevé type by the negative semi-definiteness of symmetric bilinear forms associated with seeds, and classify the mutation equivalence classes of these seeds. This classification coincides with the classification of q -Painlevé equations given by Sakai.

- 13 白石 勇貴 ℓ -クロネッカー箆から構成されるフロベニウス多様体…………… 15
 (阪大インターナショナルカレッジ)
 高橋 篤史(阪大理)
 池田 暁志(城西大理)
 大谷 拓己(阪大理)
 Yuuki Shiraishi (Osaka Univ.) A Frobenius manifold for ℓ -Kronecker quiver
 Atsushi Takahashi (Osaka Univ.)
 Akishi Ikeda (Josai Univ.)
 Takumi Otani (Osaka Univ.)

概要 A Frobenius manifold is a complex manifold whose tangent bundle is a flat family of commutative Frobenius algebras satisfying certain conditions. In this talk, I will explain that a unique Frobenius manifold, whose intersection form coincides with the Cartan matrix of ℓ -Kronecker quiver $K(\ell)$, can be constructed from the invariant theory of the Weyl group associated to $K(\ell)$.

- 14 武田 渉(東京理大理) Schur Q型多重ゼータ関数の Pfaffian 表示…………… 15
 中筋 麻貴(上智大理工)
 Wataru Takeda (Tokyo Univ. of Sci.) Pfaffian expression of the Schur Q type multiple zeta functions
 Maki Nakasuji (Sophia Univ.)

概要 We introduce Schur P and Q type multiple zeta functions. These functions are defined as sums over combinatorial objects called shifted Young tableaux. We will show that the Schur Q type multiple zeta function has a pfaffian expression under an assumption on variables.

11:00~12:00 特別講演

高木 太一郎 (防衛大) 可積分セルオートマトンの幾何的リフトとその連続極限

Taichiro Takagi A geometric lifting of integrable cellular automata and its continuum
(Nat. Defense Acad. of Japan) limits

概要 I first explain a method to construct a family of discrete integrable systems with periodic boundary conditions, which can be regarded as a geometric lifting of a family of integrable cellular automata associated with affine type A crystals. By combining an unconventional usage of the matrices for defining the discrete periodic Toda chain with the Perron-Frobenius theorem, we give a definition of our systems. It is carried out on the space of real positive dependent variables, without regarding them to be written by subtraction-free rational functions of independent variables.

Next I present two types of systems of differential equations that can be derived from those discrete integrable systems. One is a kind of extended Lotka–Volterra systems, and the other seems to be generally new. Both equations have Lax representations associated with what are known as the loop elementary symmetric functions. I would like to talk about an example of the derivations of the continuous time Lax equations from a discrete time one, where a novel method of taking a continuum limit by assuming asymptotic behaviors of the eigenvalues of the Lax matrix in Puiseux series expansions is used.