第41回変換群論シンポジウム アブストラクト

11月13日

枡田 幹也 (大阪市立大学)

タイトル: トーリック折り紙多様体のコホモロジー

アブストラクト: トーリック折り紙多様体は，超曲面に沿っての退化を許した閉2形式をもち，シンプレクティックトーリック多様体を拡張した概念である．よく知られているように，シンプレクティックトーリック多様体の族とDelzant多面体と呼ばれる族の間に1対1の対応がある．最近，Cannas da Silva-Guillemin-Piresは，この1対1の対応を拡張し，トーリック折り紙多様体の族と折り紙テンプレート（ある条件をみたすDelzant多面体の集まり）の族との間に1対1の対応があることを示した．したがって，トーリック折り紙多様体のすべての幾何学的情報は対応する折り紙テンプレートに収納されているが，折り紙テンプレートからどのように読み取れるか完全には分かっていない．この講演では，Anton Ayzenberg, Seonjeong Park and Haozhi Zengとの共同研究に基づいて，トーリック折り紙多様体のコホモロジーについて述べる．

森本 雅治 (岡山大学)

タイトル: Topological equivalence relations on representation spaces

アブストラクト: Let G be a finite group. There are interesting topological equivalence relations $\sim_r$ in the family of real G-representation spaces of finite dimension, e.g. topological similarity $\sim_t$, homotopy equivalence $\sim_h$ (in the sense of tom Dieck), Smith equivalence $\sim_{Sm}$. Let $RO_r(G)$ be the subset of $RO(G)$ consisting of all $x = [V] - [W]$ such that $V \sim_r W$. We discuss classical results and new results on $RO_r(G)$.

山口 耕平 (電気通信大学)

タイトル: ある toric variety への正則写像の空間に関する Atiyah-Jones 型問題について

アブストラクト: After G. Segal proved the homology stability result for the space of the holomorphic maps from the Riemann sphere into a complex projective space in 1979, many topologists considered the similar problem for the space of holomorphic maps from the Riemann sphere into several projective varieties X (e.g. complex Grassmann manifold, flag manifoldc etc). In particular, M. Guest considered this type problem for the case of compact smooth toric variety in 1998. In this talk, the author considers this problem for the case of non-compact smooth toric variety. This talk is based on the joint work with A. Kozlowski (University of Warsaw).

11 月 14 日

黒木 慎太郎 (東大数理)

タイトル: GKM 多様体上のトーラス作用の拡張について

アブストラクト: GKM 多様体とは $2m$ 次元の多様体で n 次元のトーラスが(効果的に)作用し、その 1 次元以下の軌道空間がグラフの構造をもつ物の事を言う(このグラフにトーラス作用の情報でラベルを付けたものを GKM グラフと言う)。今、定義より n は m 以下になる。この講演では、以下の二つの問題に対して、それぞれ組み合わせ論的な不変量を GKM グラフの上に定義することで解く。(1) $n = m$ の場合に、いつトーラス作用がより大きなコンパクトリー群の作用になるか?(2) n 次元のトーラス作用がより大きな次元のトーラス作用へ拡張する場合はいつか((1) は枡田幹也氏との共同研究である)

角 俊雄 (九州大学)

タイトル: Construction of gap modules

アブストラクト: Let G be a finite group. A gap G-module W is a finite dimensional real one satisfying two conditions:

1. $\dim W^L = 0$ for any subgroup L of G with prime power index
2. $\dim W^P > 2 \dim W^H$ for any subgroups P of prime power order and $H > P$ of G

By using this module, we can controll stably the gap among the dimensions of the fixed point sets by suitable subgroups of G and then change the G-action so that the fixed point set by G is reformed as we want, for example, the number of fixed points is decreased or increased. Thus it is important to decide which groups are gap groups. In this talk, we would like to introduce construction of gap modules.

原田 芽ぐみ (McMaster University & 大阪市立大学)

タイトル: Newton-Okounkov bodies, representation theory, and Bott-Samelson varieties

アブストラクト: The theory of Newton-Okounkov bodies is a far-reaching generalization of the theory of toric varieties. In particular, it can associate to any complex projective variety X a convex body (which is a rational polytope in many cases) of dimension equal to the complex dimension of X; in the case when X is a toric variety, the convex body is exactly the usual Newton polytope. Moreover, in a recent paper, Kaveh showed that the string polytopes in geometric representation theory are special cases of Newton-Okounkov bodies associated to flag varieties G/B. Hence the theory of Newton-Okounkov bodies is naturally related to many interesting questions in representation theory and Schubert calculus. The Bott-Samelson varieties give resolutions of singularities of Schubert varieties and are central in the study of the geometry of G/B. I will give an overview of this subject in relation to Newton-Okounkov bodies and discuss some recent and ongoing work, as well as some open questions.

Krzysztof Pawalowski (Adam Mickiewicz University)

タイトル: Transformation groups and Hsiangs' conviction after 46 years

アブストラクト: In 1968, Wu-Chung Hsiang and Wu-Yi Hsiang have expressed a conviction that reads as follows.

"Due to the existence of natural linear group actions on Euclidean spaces, disks and spheres, it is quite fair to say that they are the best testing spaces in the study of differentiable transformation groups... We share the prevailing conviction that the study of differentiable group actions on these best testing spaces is probably still the most important topic in transformation groups."

Based on Hsiangs' conviction, we survey a number of result in the theory of transformation groups that have been obtained during the past 46 years and we conjecture new results that should confirm the importance of understanding differentiable group actions on Euclidean spaces, disks and spheres, as well as projective spaces.

Marek Kaluba (Adam Mickiewicz University)

タイトル: Group actions on a class of 7-manifolds

アブストラクト: It is believed that a manifold "chosen at random" would have very few symmetries. In 1976 Raymond and Schultz asked for specific examples of simply-connected asymmetric manifolds, i.e. manifolds upon every compact group action is trivial. Examples of manifold models of $K(\pi, 1)$'s soon were found to be asymmetric by Borel and others, however the first simply connected manifold was proved to be (almost) asymmetric by Puppe nearly 20 years later. He showed an infinite family $\mathcal{M}_{As}$ of simply connected 6-manifolds with no non-trivial orientation preserving group actions.

In this talk we will ask questions about symmetries of manifolds of the form $M \times S^n$ for $M \in \mathcal{M}_{As}$. We will prove that for $n = 2$ and G-cyclic, there are infinitely many exotic G-actions (i.e. actions not coming from the action on the sphere in the second factor). However in the case of $M \times S^1$ we will show that free actions of finite odd order cyclic groups or the circle are always standard (by rotation on the S^1-factor). This is a joint research with Zbigniew Blaszczyk.

南 範彦 (名古屋工業大学)
タイトル: TBA
アブストラクト:

November 15

矢ヶ崎 達彦 (京都工芸繊維大学)

タイトル: Homeomorphism groups of non-compact surfaces endowed with the Whitney topology

アブストラクト: We study topological type of the homeomorphism group $H(M)$ of any non-compact connected surface M endowed with the Whitney topology and show that the identity connected component $H_0(M)$ of $H(M)$ is homeomorphic to the product of l_2 and R^∞. A survey of the following paper:

- T.Banakh, K.Mine, K.Sakai, T.Yagasaki, *On homeomorphism groups of non-compact surfaces, endowed with the Whitney topology*, Topology Appl., 164 (2014) 170–181.

長崎生光 (京都府立医科大学)
タイトル: On bi-isovariantly equivalent representations
アブストラクト: isovariant Borsuk-Ulam 定理の応用として，compact Lie 群 G の表現空間 V と W の間に双方向に isovariant map が存在するとき V と W の次元関数が等しくなることを示す。 G がアーベル群のときはこの逆もいえる．一方，G が 2 面体群のときは逆が成り立たない実 2 次元表現の例があることを紹介する。(これらは牛瀧文宏氏との共同研究の一部です.)

Taras Panov (Moscow State University)

タイトル: On the rational formality of toric spaces and polyhedral products

アブストラクト: Several important toric spaces, such as toric and quasitoric manifolds, moment-angle complexes and their partial quotients admit homotopy theoretical decomposition into homotopy colimits of diagrams over the face category $cat(K)$ of a simplicial complex K. A general construction of this sort is the polyhedral power X^K of a space X.

We establish formality (in the sense of rational homotopy theory) of the polyhedral power X^K with formal X, as well as formality of (quasi) toric manifolds and some torus manifolds. This contrasts the situation with moment-angle complexes $Z_K = (D^2, S^1)^K$, which are not formal in general.

呂 志 (復旦大学)

タイトル: Equivariant unitary bordism and equivariant cohomology Chern numbers

アブストラクト: Let G be a torus. In this talk, using the universal toric genus and the Kronecker pairing of bordism and cobordism, we show that the integral equivariant cohomology Chern numbers completely determine the equivariant geometric unitary bordism classes of closed unitary G-manifolds, which gives an affirmative answer to the conjecture posed by Guillemin–Ginzburg—Karshon in [1, Remark H.5, §3, Appendix H] . As a further application, we also obtain a satisfactory solution of [1, Question (A), §1.1, Appendix H] on unitary Hamiltonian G-manifolds. In particular, our approach can also be applied to the study of $(\mathbb{Z}_2)^k$-equivariant unoriented bordism, and without the use of Boardman map, it can still work out the classical result of tom Dieck [2], which states that the $(\mathbb{Z}_2)^k$-equivariant unoriented bordism class of a smooth closed $(\mathbb{Z}_2)^k$-manifold is determined by its $(\mathbb{Z}_2)^k$-equivariant Stiefel–Whitney numbers. In addition, we also show the equivalence of integral equivariant cohomology Chern numbers and equivariant K-theoretic Chern numbers for determining the equivariant unitary bordism classes of closed unitary G-manifolds by using the developed equivariant Riemann–Roch relation of Atiyah–Hirzebruch type, which implies that, in a different way, we may induce another classical result of tom Dieck, saying that equivariant K-theoretic Chern numbers completely determine the equivariant geometric unitary bordism classes of closed unitary G-manifolds. This is a joint work with Wei Wang.

1. V. Guillemin, V. Ginzburg and Y. Karshon, *Moment maps, cobordisms, and Hamiltonian group actions.* Appendix J by Maxim Braverman. Mathematical Surveys and Monographs, **98**. American Mathematical Society, Providence, RI, 2002.

2. T. tom Dieck, *Characteristic numbers of G-manifolds. I.* Invent. Math. **13** (1971), 213–224.