

早稲田大学整数論研究集会アブストラクト

3月16日(土)

諏訪 紀幸 (中央大学) / Noriyuki Suwa (Chuo University)

Kummer theory for algebraic tori and normal basis problem

We have a rich accumulation in the study on the Kummer theory for algebraic tori, due to Kida, Hashimoto, Rikuna and others. In this talk I explain a relation between the Kummer theory for algebraic tori and the normal basis problem. We adapt Serre's method to formulate the Kummer and Artin-Schreier-Witt theories by analysis of the group scheme representing the unit group of a group algebra.

佐藤 一樹 (東北大学) / Kazuki Sato (Tohoku University)

Hasse principle for the Chow groups of zero-cycles on quadric fibrations

We consider the global-to-local map for the Chow groups of zero-cycles on varieties over number fields. For a quadric fibration over a smooth projective curve, Parimala and Suresh proved that the global-to-local map (restricted to real places) is injective under a certain assumption if the dimension is 4 and over. In this talk, we give a sufficient condition for the injectivity of the global-to-local map in the case where the dimension is 2 or 3. This condition does not imply the injectivity of the global-to-local map restricted to real places, and we give an example of this.

北島 孝浩 (慶應義塾大学) / Takahiro Kitajima (Keio University)

On the orders of K-groups of ring of integers in the cyclotomic \mathbb{Z}_p -extensions of \mathbb{Q}

J. Coates raised a problem on the boundedness of the class numbers of intermediate fields of a $\widehat{\mathbb{Z}}$ -extension. In this talk, we consider the generalization of this problem on the ideal class groups to that on the torsion part of K-groups and investigate what happens for the torsion part of the K-groups of ring of integers. We especially study the orders of K_{2m-2} in the cyclotomic \mathbb{Z}_p -extension for each positive even number m and each prime number p . I will talk on the divisibility of the orders of K_{2m-2} of ring of integers in the cyclotomic \mathbb{Z}_p -extensions of \mathbb{Q} .

Cornelius Greither (Universität der Bundeswehr München)

Lower bounds for ranks of class groups coming from Tate sequences

Tate sequences are 4-term exact sequences which link an arithmetically defined Galois module (in this talk, a group of S-units) to an explicitly defined module, which can be thought of as an easy approximation of the arithmetic module. The extension class of a Tate sequence is a very subtle invariant which comes from class field theory and is hard to grasp. But fortunately we very often can extract information from a Tate sequence without knowing the extension class. This will be shown in two particular situations. For certain totally real fields K we will find lower bounds for the rank of the ell-part of $\text{Cl}(K)$, and for certain CM fields we will find lower bounds for the minus part of the ell-part of the class group. These results reprove and partly generalize earlier results by Cornell and Rosen, and by R. Kucera and the speaker. The methods are purely algebraic, involving a little cohomology.

高橋 浩樹 (広島大学) / Hiroki Takahashi (Hiroshima University)

The Iwasawa λ_l -invariants in cyclotomic \mathbb{Z}_p -extensions

For a \mathbb{Z}_p -extension K_∞ of a number field K , let K_n be the intermediate field such that $[K_n : K] = p^n$, and A_n the p -part of the ideal class group of K_n . Then there exist three invariants $\lambda_p, \mu_p \in \mathbb{Z}_{\geq 0}$ and $\nu_p \in \mathbb{Z}$ such that the order of A_n is $p^{\lambda_p n + \mu_p p^n + \nu_p}$ for all sufficiently

large n (Iwasawa's class number formula). For the cyclotomic \mathbb{Z}_p -extension of cyclotomic fields, although it was shown that μ_p is always zero by Ferrero-Washington, there are a lot of examples with $\lambda_p > 0$. On the other hand, for any prime number $l \neq p$, it was shown that the l -part of the class number in the cyclotomic \mathbb{Z}_p -extension is bounded above by Washington. It was also shown that λ_l is bounded above by Friedman. In a joint work with Ichimura (Ibaraki University) and Nakajima (Gakushuin University), we calculated $\lambda_l(K_n)$ for $l = 3$ and $K_n = \mathbb{Q}(\cos 2\pi/p^{n+1}, \zeta_3)$ in the range $p < 600$. I will explain the computation and some results: for all primes p with $5 \leq p < 600$ and all $n \geq 0$, $\lambda_3(K_n) = \lambda_3(K_0)$, $0 \leq \lambda_3^-(K_n) \leq 19360$, $\lambda_3^+(K_n) = 0$ and so on.

3月17日(日)

大野 泰生 (近畿大学) / Yasuo Ohno (Kinki University)

On a property of di-Bernoulli numbers

TBA

大西 良博 (山梨大学) / Yoshihiro Ônishi (University of Yamanashi)

Explicit realization of Coble's hypersurfaces in terms of multivariated \wp -functions

Coble's hypersurface is known as the cubic hypersurface in a natural projective space whose singular locus contains the Jacobian variety of a curve of genus two, or as the biquadratic hypersurface in a similar space whose locus contains the Kummer threefold of a curve of genus three.

This is a joint work with J.C. Eilbeck, J. Gibbons, and E. Previato.

I will present very explicit and universal-type equations of Coble's hypersurfaces by using multivariated \wp -functions. I will demonstrate the derivatives of our equation with respect not only to the defining variables but also the coefficients of equation of the curve give the defining equations of the Jacobian variety and the Kummer threefold. As a result, in genus two case, we see that the singular locus coincides with the Jacobian variety itself. For any genus three trigonal curve, the singular locus is very plausible to coincide with the Kummer threefold itself.

原 隆 (大阪大学) / Takashi Hara (Osaka University)

On Culler-Shalen theory for 3-manifolds and related topics

In topology—a research field where one pursues “shapes” of objects—, it goes without saying that the procedure ‘to decompose manifolds into simpler ones’ is indispensable. For 3-manifolds, in particular, the decomposition along essential surfaces plays an important role. Marc Culler and Peter Shalen established in 1983 a method to construct non-trivial essential surfaces contained in 3-manifolds in a systematic manner. There they effectively utilised highly algebraic devices; for instance, geometry of character varieties (moduli of 2-dimensional representations of fundamental groups), theory of trees established by Hyman Bass and Jean-Pierre Serre and so on. After brief review on classical Culler-Shalen theory, we present in this talk an extension of their theory to higher dimensional character varieties via Bruhat-Tits theory and (a trial of) an application to arithmetic topology à la Barry Mazur et Masanori Morishita. This is a joint work with Takahiro Kitayama (the University of Tokyo).

水澤 靖 (名古屋工業大学) / Yasushi Mizusawa (Nagoya Institute of Technology)

Iwasawa invariants of links and an analogue of Greenberg's conjecture

(門上晃久氏との共同研究)

Based on the analogy between knots and primes, J. Hillman, D. Matei and M. Morishita defined the Iwasawa invariants for cyclic branched covers of links with an analogue of Iwasawa's

class number formula. We consider the existence of covers of links with prescribed Iwasawa invariants. We also propose and consider a problem analogous to Greenberg's conjecture.

森下 昌紀 (九州大学) / Masanori Morishita (Kyushu University)

Johnson maps in non-Abelian Iwasawa theory

We shall introduce arithmetic analogues of Johnson maps in the context of non-abelian Iwasawa theory and give their cohomological interpretation.

3月18日(月)

若林 徳子 (九州産業大学) / Noriko Wakabayashi (Kyushu Sangyo University)

Sum formula for mod p multiple zeta values

The multiple zeta values, first considered by L. Euler, are a natural generalization of the values of the Riemann zeta function at positive integers. It is known that there are many Q -linear relations among the values. The "sum formula" is one of the most famous such relations. The mod p multiple zeta values, with p prime, have been investigated mainly by M. Hoffman and refined by D. Zagier. The main topic here is the "sum formula" for mod p multiple zeta values, which is conjectured by M. Kaneko and proved by S. Saito and the speaker.

山名 俊介 (九州大学) / Shunsuke Yamana (Kyushu University)

L-functions and theta correspondence for quaternionic unitary groups

For any irreducible cuspidal automorphic representation of quaternionic unitary groups, I will give a necessary and sufficient condition for its global theta lifting to be nonvanishing in terms of the analytic properties of the complete L-function and the occurrence in the local theta correspondence.

町出 智也 (近畿大学) / Tomoya Machide (Kinki University)

Quadruple zeta values and asymptotic properties of quadruple polylogarithms

Asymptotic expansions of multiple polylogarithms are written in terms of polynomials whose coefficients are multiple zeta values. In this talk, using asymptotic expansions and identities of quadruple polylogarithms, we give a parameterized sum formula of quadruple zeta values. As applications, we reprove the original sum formula and some weighted sum formulas.

成田 宏秋 (熊本大学) / Hiro-aki Narita (Kumamoto University)

Non-vanishing theta lifts to non-split forms of $GSp(2)$

In this talk we provide examples of non-vanishing theta lifts from an inner form $GSO^*(4)$ of the orthogonal group of degree four to automorphic forms on the inner forms $GSp(1,1)$ and $GSp^*(2)$ of the split symplectic group $GSp(2)$ of degree two, where $GSp(1,1)$ (respectively $GSp^*(2)$) denotes the non-split and non-compact inner form (respectively the compact inner form). For the case of $GSp(1,1)$ the method is to find non-vanishing Bessel periods (or Fourier coefficients) of the theta lifts. On the other hand, for the case of $GSp^*(2)$, we can reduce the problem to non-vanishing of elliptic theta series attached to some harmonic polynomials. For the latter we point out that such examples are given by Ibukiyama-Ihara (Math. Ann. 278). If time allows, we present an explicit formula for Bessel periods of the theta lifts to $GSp(1,1)$ in terms of the central L-values of some convolution type L-functions.