

第 6 回広島整数論集会

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広島大学理学部 B 棟 B 707

アブストラクト

田中 立志 (九州大学)

“On an extended derivation relation for multiple zeta values”

Recently, M. Kaneko predicted that a generalization of certain derivation operators would give a new class of relations among multiple zeta values. The aim of this talk is to give a proof of the conjecture by reducing it to a class of relations for multiple zeta values studied by G. Kawashima.

鈴木 正俊 (立教大学)

「楕円曲線の L 関数の零点に関連するある級数の正値性について」 (“On a positivity property of certain series related to zeros of L -functions of elliptic curves”)

The subject of this talk is the boundary term of Fesenko’s two-dimensional zeta integrals. It is known that the boundary term is the Laplace transform of certain function $h(x)$, and the positivity property of the fourth log derivative of $h(x)$ near $x = 0$ is closely related to the Riemann hypothesis for the Hasse-Weil L -functions of elliptic curves. At first, we show that the function $h(x)$ has an infinite series expansion consisting of K-Bessel functions, in the case of the rational number field. Using this expansion, we investigate analytic properties of the fourth log derivative of $h(x)$ near $x = 0$.

長谷川 泰子 (東京大学)

“Symmetric square L -function associated to imaginary quadratic fields”

We produce a new integral representation of symmetric square L -function associated to an elliptic modular form with a lifting to imaginary quadratic fields. Specifically, we construct a kernel function using real analytic Cohen-Eisenstein series. The Laurent expansion of it gives a formula of a special value of the symmetric square L -function.

北山 秀隆 (大阪大学)

“Explicit construction of generic polynomials”

We study constructive aspects of the inverse Galois problem, especially “generic polynomials”. One of the most effective ways for explicit construction of them is to solve “Noether’s problem”. In this lecture, after introduction to generic polynomials and Noether’s problem, we will consider them for finite subgroups of $GL(4, \mathbb{Q})$.

原田 新也 (九州大学)

“Smallness of fundamental groups for arithmetic schemes (joint work with Toshiro Hiranouchi)”

We will prove the smallness of the fundamental groups of arithmetic schemes. This result is a generalization of the Hermite-Minkowski theorem for higher-dimensional

schemes. We also refer to the case of varieties over finite fields. As an application, we obtain a certain finiteness result on mod p representations of fundamental groups with restricted ramification.

富山 恭敬 (九州大学)

“On deformations of extraordinary Galois representations”

Deformation theory of extraordinary Galois representations has been studied by S. Ohtani. For instance, mod p Galois representations associated with modular forms which have companion forms are such representations. In this talk, I give a result on the structure of the universal extraordinary deformation ring.

津野 祐司 (中央大学)

\mathbb{F}_p 代数の上の finite flat group scheme の変形の例 (“Deformations of finite flat group schemes over an \mathbb{F}_p -algebra”)

Let A be an \mathbb{F}_p -algebra and $\mu \in A$. Then $N = \text{Ker}[F - \mu I : \mathbb{G}_{a,A} \rightarrow \mathbb{G}_{a,A}]$ is a finite flat group scheme over A . Moreover, if $\mu = 1$, then N is isomorphic to Z/pZ ; if $\mu = 0$, then N is isomorphic to α_p . It would be interesting to study the Cartier dual of N and to generalize the Kummer sequence. In this talk, we explain some related results.

阿部 知行 (東京大学)

“Comparison between Swan conductors and characteristic cycles”

In this talk, we define the Swan conductors for unit-root overconvergent F -isocrystals, and prove some fundamental properties. We use the theory of arithmetic D -modules due to Berthleot to define them. We also compare our Swan conductors and Swan conductors defined by Kazuya Kato and Takeshi Saito in some cases under the assumption of the strong form of resolution of singularities. As a corollary, the integrality conjecture of Kato-Saito Swan conductors will follow under the assumption of the resolution of singularities.

酒井 祐貴子 (早稲田大学)

“On Poncelet’s theorem and algebraic curves which have real multiplication with application to $GL(2)$ -conjecture”

Our chief interest is to find as many examples as possible of algebraic curves which satisfy $GL(2)$ -conjecture. This is achieved by constructing hyperelliptic curves over \mathbb{Q} whose Jacobian varieties have real multiplications defined over \mathbb{Q} . Mestre gave some examples of such curves using Poncelet’s n -gon on conics and its relation to points of order n of elliptic curves. Our main purpose is to construct curves with real multiplication by using elementary geometry on \mathbb{P}^2 without elliptic curves. We shall give an elementary and explicit description of the hyperelliptic curve X as a double cover of a conic D and an algebraic correspondence on X which lifted from Poncelet type correspondence on D . The case $n = 5$ leads to the reconstruction of Mestre’s curve. We will also discuss the case $n = 4$, which leads to curves with real multiplication by square-root of 2. Examples of algebraic curves which satisfy $GL(2)$ -conjecture are found among such families.

橋本 康史 (九州大学)

「リーマン面に関する length spectrum の重複度の分布」 (“Distributions of multiplicities in length spectra for Riemann surfaces”)

For a given manifold, the length spectrum is the set of lengths of primitive closed

geodesics in the manifold. In this talk, I give estimates of the multiplicities in the length spectra for Riemann surfaces with constant negative curvatures by using Selberg's zeta functions and the prime geodesic theorems.

長谷川 武博 (早稲田大学)

“Towers of function fields over finite fields and the Gaussian hypergeometric functions”

A tower of function fields of the finite field \mathbb{F}_{q^2} is a sequence $F_0 \subseteq F_1 \subseteq F_2 \subseteq \cdots$ of function fields F_i/\mathbb{F}_{q^2} satisfying some conditions. The tower is said to be asymptotically optimal if the limit $\lim_{i \rightarrow \infty} N(F_i)/g(F_i)$ is equal to $q - 1$, which is an upper bound of this limit. The asymptotically optimal towers are related to elliptic modular curves, Shimura modular curves and Drinfeld modular curves. In this talk, we construct asymptotically optimal towers that are related to the elliptic modular curves $X_0(4^n)$ and $X_0(3^n)$ by using the Gaussian hypergeometric functions.

望月 哲史 (東洋大学)

“Weight on finitely generated modules over regular local rings”

In this lecture, we will treat several problems in commutative algebra at the same time. For example, one of them is vanishing conjecture for Chow homology groups of regular local rings. The conjecture has been interpreted as a generalization of the classical result that ideal class groups of uniquely factorization domains vanish and various results about it have been already obtained by many researchers. The approaches to it have been heavily depended on the Noether normalization theorem and the structure theorem for smooth algebras over regular local rings and so the existence of a base is indispensable to these methods. A main theme in this lecture is introducing concepts - that are based on a philosophy of absolute motives - of weight on perfect modules and of pure modules. Utilizing the concepts, I would like to clarify logical connection among the problems and served as a new breakthrough leading to the development of them.

佐藤 孝和 (東京工業大)

「楕円曲線暗号の最近の話題について」 (“On some topics on recent advances on elliptic curve cryptography”)

Elliptic curves cryptography was proposed in 1984 and now it is used in real world cryptographic applications. There were many advances in the area. Some of them are of mathematical and some of them are of technological. Unless they are integrated, elliptic curve cryptosystems do not work properly. We survey what is asked for mathematical community in further deployment of elliptic curve cryptography.

Marc-Hubert Nicole (東京大学, JSPS)

“The Ribet exact sequence for quaternionic Shimura varieties”

Ribet's exact sequence is a geometric Jacquet-Langlands correspondence between p -adically uniformized Shimura curves and modular curves, which had a striking application to Galois representations and was a key part of the proof of Fermat's Last Theorem. We shall first explain how to generalize its basic ingredients to some higher dimensional Shimura varieties by using the weight spectral sequence and p -adic uniformization, and secondly, we will present explicit computations for quaternionic Shimura varieties of arbitrary dimension, thanks to previous works

of Rapoport, Zink and Reimann.

安福 悠 (Brown University)

“Vojta’s conjecture for repeated blow-ups of \mathbb{P}^2 ”

Corvaja and Zannier proved an inequality for gcd of polynomials of S -units, verifying a case of the integral Vojta’s conjecture for a single blow-up of \mathbb{P}^2 . Using some geometric arguments and local height computations, we will generalize this result to any sequence of blow-ups starting from \mathbb{P}^2 .

小野寺 一浩 (慶應義塾大学)

「多重三角函数の挙動について」 (“Behavior of multiple sine functions”)

It is conjectured that the r -ple sine function has exactly r extremal values in the fundamental domain, and that the maximal (minimal) values are greater (less) than one. The conjectures are true when $r = 1, 2, 3, 4$, but they are unsolved in the other cases. In this talk, I would like to introduce a new strategy to solve them and give some new results.

中村 隆 (名古屋大学)

“The existence and non-existence of joint value approximation and joint universality for several types of zeta functions”

In this talk, we define joint value approximation for several types of zeta functions. And we obtain theorems and examples of existence of joint value approximation. Next, by using their joint value approximation, we show that generalized Barnes zeta functions, including the Riemann zeta function and Dirichlet L -functions, have almost periodicity of positive density and self-similarity in the complex plane. Finally, we obtain theorems and examples of non-existence of joint value approximation. Moreover we show examples which satisfy joint value approximation but do not satisfy joint universality.

谷口 隆 (東京大学)

「3次代数の判別式を数える Dirichlet 級数について」 (“On Dirichlet series counting discriminants of cubic algebras”)

Let k be a number field and O its ring of integers. Let us consider the Dirichlet series counting discriminants of rank 3 projective O -algebras. At present it seems to be difficult to study such Dirichlet series for general rank n algebras. However for the case of rank 3 the Dirichlet series turns out to be the zeta function of prehomogeneous vector space of binary cubic forms and hence we can study in detail analytic properties such as analytic continuation, functional equation or residual formulas. In this talk I will explain these results, and also present the density theorems on distributions of those discriminants. These are generalizations of Takuro Shintani’s result over the rational number field to over a general number field.