

Conference of groups, rings and group rings

West Kobe Mathematics Seminar

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Kobe Economics and Business Campus, University of Hyogo

Abstracts

An application of SR-graphs to group algebras of non-noetherian groups

Tsunekazu Nishinaka

We define what we call an SR-graph and an SR-cycle. The class of SR-graphs is a subclass of the class of two-edge coloured graphs, in whose paper an SR-cycle is called an alternating cycle, studied by J. Grossman and R. Häggkvist in early 1980s. In this talk, we introduce an application of the SR-graph theory to studying group algebras. In particular, combining it with Formanek's method, which was used to prove primitivity of group algebras of free products of groups by Formanek, we can see the primitivity of group algebras of non-noetherian groups.

A growth dichotomy for group algebras of free abelian by infinite cyclic groups

Christopher Briggs

Growth in groups was introduced by Milnor in 1968. The growth of a group is closely related to the growth of its associated group algebra over a field of characteristic zero. We recall some major historical results on growth in groups, then focus on Gromov's concept of uniform exponential growth. We strengthen a result of Alperin by proving the group algebra of a free abelian by infinite cyclic group over a field of characteristic zero is of polynomially bounded or uniform exponential growth.

On representations of association schemes

Masayoshi Yoshikawa

Association schemes are a generalization of finite groups. One can naturally define an algebra over the complex number field from any association scheme. This algebra is called the adjacency algebra of the association scheme. If we consider a finite group as an association scheme, its adjacency algebra is equal to the group algebra of the original group. Thus, we will consider generalizing some results of representation theory of finite groups to representation theory of association schemes.

Recently, higher Frobenius-Schur indicators and higher indicators have been studied in finite group theory and Hopf algebra theory. In this talk, we will investigate higher indicators of association schemes. Especially, we will discuss association schemes all higher indicators of which are integers.

Whitehead's algorithm and the structure of free groups

Brent Solie

Let $F(X)$ be a free group of finite rank. A *segment splitting* of $F(X)$ is a decomposition $F(X) \cong H \amalg_{\mathbb{Z}} K$ where $H, K \leq F(X)$. Subgroups of $F(X)$ conjugate to H and K are called *vertex subgroups* after their characterization in terms of the free action of $F(X)$ on an infinite combinatorial tree. We discuss a combinatorial algorithm for identifying finitely generated subgroups of $F(X)$ which lie in a vertex group of some segment splitting of $F(X)$.

On quasi-separable extensions of noncommutative rings

Hiroaki Komatsu

The concept of a separable extension of fields were extended by several ways. The separability are closely related to derivations. In fact, a ring extension B/A is separable if and only if all A -derivations of B to B -bimodules are inner. In 1961 a quasi-separable extension of commutative rings was introduced by Nakai, which was defined by derivations. In this talk quasi-separable extensions are characterized by high order centers of bimodules. We also show some results on weakly quasi-separable extensions introduced by Hamaguchi and Nakajima in 2013.

Semigroup rings over semiprime ring semigroup

Hisaya Tsutsui

Let R be a ring, and let S be a semigroup. The semigroup ring $R[S]$ simultaneously encodes the semigroup structure of S and the ring structure resulting in an object of great utility in various areas of both ring theory and group theory. The interplay between the structures of R , S , and $R[S]$ is a topic with a long mathematical history full of fascinating results. In this talk, we discuss semiprimeness and related properties of semigroup rings over a particular class of semigroups: those semigroups which arise as the multiplicative semigroup of a ring.