

The 27th PNU–POSTECH Algebraic Combinatorics Workshop

Organized by M.Hirasaka and J.Koolen

August 2, 2008

Date

August 2, 2008

Place

Room 404, Department of Mathematics in POSTECH

Program

11:00–11:50, Soon–Yi Kang (POSTECH)

Combinatorial proofs of reciprocity theorems of Ramanujan and their number theoretic interpretations.

14:00–14:50, Kyoung–tark Kim (PNU),

A remark on p -covalenced association scheme

15:00–15:50, Jong Yook Park (POSTECH)

On a class of distance regular graph with diameter three.

16:10–17:00, Woo Sun Lee (POSTECH)

On a certain class of completely regular codes.

17:10–18:00, Reza Sharafadini (PNU)

On coherent algebras with only two irreducible characters

18:30–21:00, Dinner (free of charge)

Available Devices for Presentation

We strongly encourage speakers to give a classical styled talk with chalk and blackboard. However, a beam projector is equipped at room 404.

Speaker: Soon-Yi Kang (POSTECH)

Title: Combinatorial proofs of reciprocity theorems of Ramanujan and their number theoretic interpretations.

Abstract: Two years ago in the same seminar, we presented a generalization of Ramanujan's reciprocity theorem of a certain type of q -series using various transformation and summation formulas in the theory of the basic hypergeometric series. This time, we revisit the reciprocity theorems and reveal their number theoretic and combinatorial properties that have been found for the last two years.

Speaker: Kyoung-tark Kim (PNU),

Title: A remark on p -covalenced association scheme

Abstract: Let (X, S) be an association scheme and p a prime. We introduce the definition of p -covalency of (X, S) and examine closely the properties about p -covalenced association scheme. Also we talk about some problems concerning p -covalency and commutativity of schemes.

Speaker: Jong Yook Park (POSTECH)

Title: On a class of distance regular graph with diameter three.

Abstract: For a distance regular graph with diameter three the second largest eigenvalue λ_1 satisfies $\lambda_1 > \min\{\frac{a + a_2^2 + 4k}{2}, a_3\}$. In this talk we study the distance regular graphs with diameter three where equality holds in this inequality. This is joint work with Jack Koolen (POSTECH).

Speaker: Woo Sun Lee (POSTECH)

Title: On a certain class of completely regular codes.

Abstract: Let Γ be a distance-regular graph with vertex set V and diameter D . Let C be a subset of V and $C_i = \{x \text{ in } V \mid d(x, C) = i\}$. If $r = \max\{i \mid C_i\}$ is covering radius of C , then

$(C) = \{C_0 = C, C_1, \dots, C_r, C\}$ is called a distance partition of V with

respect to C . A code C is completely regular if distance partition (C) is equitable, that is, for all i and j , the number of neighbors a vertex in C_i has in C_j is independent of the choice of vertex in C_i . Define the dual degree

set $S(C)$ of C as $S(C) = \{j \mid (a_j) \neq 0 \text{ and } 1 \leq j \leq D\}$ where a is the

inner distribution of C and a^Q is its MacWilliams transform. We call a completely regular code C arithmetic when its dual degree set

$S(C) = \{t, 2t, \dots, (r+1)t, t\}$ for some positive integer t . In this talk we will study completely regular codes from an algebraic view point and will give

some characterizations for arithmetic codes.

Speaker: Reza Sharafadini (PNU),

Title: On coherent algebras with only two irreducible characters

Abstract: It is easy to see that coherent algebras with only one irreducible character are trivial (i.e., they are the full matrix algebras). In this project we aim to characterize coherent algebras with only two irreducible characters. It is known that homogeneous coherent algebras (i.e., Adjacency algebra of association schemes over the complex field) with only two irreducible characters are of dimension 2. But we consider a general coherent algebra with only two irreducible characters and we prove that its homogeneous components are of dimension at most 2 and conclude that if its fibers are not singleton, then it is half-homogenous (i.e., the cardinality of its fibers is constant). In our work we use the fact that, for a general coherent algebra, we can embed the set of irreducible representations of each homogeneous component to the set of irreducible representations of itself.