The 55th KPPY Combinatorics Seminar

Organized by S.Bang, M.Hirasaka, T.Jensen, J.Koolen and M.Siggers

March 23, 2013

Date

March 23, 2013

Place

Science Building 1, Room 319,
Department of Mathematics in Yeungnam University

Program

11:00–11:50, Ken-ichi Shinoda (Sophia University)
Gauss sums on finite reductive groups and character sums

12:00–, Lunch

13:30–14:20, Boram Park (KIAS)
The hypercompetition number of a hypergraph

14:30–15:20, Ferenc Szollosi (Tohoku University)
Large set of equiangular lines in real Euclidean spaces

15:40–16:30, Yasushi Gomi (Sophia University)
q-Analogue of Gauss sums on the symmetric groups

16:40–17:30, Jack Koolen (POSTECH)
On m-walk-regular graphs, a generalization of distance-regular graphs

18:00–, Dinner

Available Devices for Presentation

We encourage speakers to give a classical styled talk with chalk and blackboard. However, a beam projector is equipped at Room 319.

Speaker Ken-ichi Shinoda (Sophia University)
Title Gauss sums on finite reductive groups and character sums
Abstract There are many known relations among character sums, such as Gauss sums, Kloosterman sums and unitary Kloosterman sums. We show how those relations are related with the Gauss sum on finite reductive groups.

Speaker Boram Park (KIAS)
Title The hypercompetition number of a hypergraph
Abstract The competition hypergraph $CH(D)$ of a digraph D is a hypergraph that has the same vertex set as D and $e \subseteq V(D)$ is a hyperedge if e contains at least 2 elements and e coincides the in-neighborhood of some vertex v in the digraph D. For any hypergraph H, H with sufficiently many isolated vertices is the competition hypergraph of an acyclic digraph. The hypercompetition number $hk(H)$ of a hypergraph H is defined to be the smallest number of such isolated vertices. In this talk, we investigate the problem of computing the hypercompetition number of a hypergraph. As a main result, we present an elimination procedure for the hypercompetition number, which is analogous to the elimination procedure of Kim and Roberts (1993) for the competition number arising in the study of competition graphs.

Speaker Ferenc Szollosi (Tohoku University)
Title Large set of equiangular lines in real Euclidean spaces
Abstract The following concept was introduced by van Lint and Seidel in 1965: a set of lines, represented by the unit vectors $v_1, v_2, \ldots, v_k \in \mathbb{R}^d$ is called equiangular, if there exists a constant c, such that $|\langle v_i, v_j \rangle| = c$ for all $1 \leq i < j \leq k$. In this talk we present an overview of this topic and give a new general lower bound for the maximum number of equiangular lines in $\mathbb{R}^d$.

Speaker Yasushi Gomi (Sophia University)
Title q-Analogue of Gauss sums on the symmetric groups
Abstract As a generalization of the classical Gauss sum, a Gauss sum on a finite group is defined. Gomi-Meda-Shinoda determined the values for complex reflection groups $G(m, r, n)$. In this talk, we discuss q-analogue of Gauss sums on the symmetric groups.

Speaker Jack Koolen (POSTECH)
Title On m-walk-regular graphs, a generalization of distance-regular graphs
Abstract Our main motivation to study m-walk-regular graphs is to understand the difference between m-walk-regular graphs and distance-regular graphs. We will show that many results on distance-regular graphs can be generalized to 2-walk-regular graphs. We also give many examples of m-walk-

regular graphs which are not distance-regular. But we also show that some results on distance-regular graphs are not true for 2-walk-regular graphs.