The 68th KPPY Combinatorics Seminar

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

Feb 28, 2015

Building 607, Room 208,

Department of Mathematics in Pusan National University

Program

11:00 - 11:50 **Koji Tasaka** POSTECH
Multiple zeta values and L-values of modular forms

12:00 **Lunch**

1:40 -2:30 **Kazuki Seto** Shimane University
A convergence theorem of the Picard iteration with multiple fixed points

2:40 -3:30 **JiYoon Jung** NIMS
Weighted pattern avoidance of a fixed length

4:00 - 4:50 **Zhi Qiao** University of Science and Technology of China
On 2-walk-regular graphs close to distance-regular graphs

5:00 - 5:50 **Thomas Hudson** POSTECH
Recursive, determinantal and Pfaffian formulas for Schubert classes in K-theory and algebra

6:30 - 8:30 **Banquet**

Abstracts

Koji Tasaka

Multiple zeta values and L-values of modular forms

We will be interested in a common study of multiple zeta values, which are multivariate generalizations of the values of the Riemann zeta function at positive integers, and the special values of L-functions of modular forms at integers on the critical stripe.

Kazuki Seto

A convergence theorem of the Picard iteration with multiple fixed points

We give a sufficient condition for a self-mapping T on X which has multiple fixed points satisfying the Picard iteration $\{T^n x\}$ converges to a fixed point of T for every starting point in a subset of X.

JiYoon Jung

Weighted pattern avoidance of a fixed length

We extend the notion of consecutive pattern avoidance to considering sums over all permutations where each term is a product of weights depending on each consecutive pattern of a fixed length. We study the problem of finding the asymptotics of these sums. Our technique is to extend the spectral method of Ehrenborg, Kitaev and Perry. When the weight depends on the descent pattern we show how to find the equation determining the spectrum. We give two length 4 applications, and we show that the error term in the asymptotic expression for a weighted pattern of length 3 is the smallest possible.

Zhi Qiao

On 2-walk-regular graphs close to distance-regular graphs

Let Γ be a graph with exactly $d+1$ distinct eigenvalues. If Γ is $(d-1)$-walk-regular, then it is distance-regular. If Γ is bipartite and $(d-2)$-walk-regular, then it is distance-regular. Du et al. gave an infinite family of bipartite 2-arc-transitive graphs with exactly 6 distinct eigenvalues and $c_2 = \frac{k-1}{2}$, which are

not distance-regular. 2-walk-regular graphs with $c_2 > \frac{k}{2}$ are distance-regular graphs. Koolen and Park studied distance-regular graphs with the number of vertices $v \leq \alpha k$ and distance-regular graphs with $c_2 > \frac{k}{3}$, where k is the valency and α is a fixed real number. The family of Du et al. shows that we may expect more examples for 2-walk-regular graphs. We generalize these results to 2-walk-regular graphs and show that 2-walk-regular graphs with $c_2 \geq \frac{2k}{5}$ generate association schemes with 5 classes. This is a joint work with Jack Koolen and Jongyook Park.

Thomas Hudson

Recursive, determinantal and Pfaffian formulas for Schubert classes in K-theory and algebra

Historically the first instance of Schubert calculus took place with the study of the cohomology of the Grassmannian, one of the main achievements of which is represented by the combinatorial description of the structure constants, obtained via the Littlewood-Richardson rule. Schubert calculus can be generalized in at least two different directions, either by modifying the geometric object of study or by changing the functor applied to it. The aim of this talk is to present some recent developments in the description of Schubert classes in these generalized settings, each of which opens the way for the computation of the associated structure constants.