The 45th KNU-PNU-POSTECH Combinatorics Seminar

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

May 7, 2011

Date

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Place

Mathematics Science Building Room 404, POSTECH

Program

11:15–12:05, Elena Konstatinova (Yeungnam Umiversity)
Algebraic representation of cycles in the Pancake graphs

12:15–14:00, Lunch break

14:00–14:50,Sung-soo Pyo (Kyungpuk National University)
Extension of a Hermitian Matrix Preserving Eigenvalues

15:00–15:50, Maeng Sang Park (Pusan National University)
The braid-like presentation of knotted arcs with singular points and its markov moves

16:10–17:00, Sho Suda (Tohoku University, Sendai, Japan)
Skew two-graphs, switching of tournaments and complex equiangular lines.

17:10–18:00,Yoshio Sano (National Institute of Informatics, Tokyo, Japan)
On the configulation algebra associated with colored graphs

Available Devices for Presentation

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

Speaker: Elena Konstatinova (Yeungnam University)
Title: Certain expansion of Eulerian polynomials via continued fractions
Abstract: It was proved in [Paral. Comput. 21 (1995) 923–936; Proc. 23rd Workshop on Comb. Math. Comput. Theory, 2006, 85–92] that a cycle C_l of length l, where $6 \leq l \leq n!$, can be embedded in the Pancake graph $P_n, n \geq 3$, that is the Cayley graph on the symmetric group with the generating set of all prefix–reversals. In this talk we discuss the algebraic characterization of small cycles in the graph via products of generating elements. In particular, we give the explicit description of cycles of length $6, 7, 8, 9$ by means of canonical forms as well as the explicit number of these cycles in the graph. We also talk about independent cycles in the graph. A general case and open questions are discussed.

Speaker: Sung-soo Pyo (Kyungpuk National University)
Title: Extension of a Hermitian Matrix Preserving Eigenvalues
Abstract: For an $n \times n$ Hermitian matrix A and a positive integer k, a k-step extension $\hat{A}$ of A is an $(n+k) \times (n+k)$ Hermitian matrix obtained from A by concatenating k rows and k columns. That is,

$$\hat{A} = \begin{bmatrix} A & A_{12} \\ A_{12}^T & B \end{bmatrix}$$

where A_{12} is an $n \times k$ matrix and B is an $k \times k$ Hermitian matrix. We denote the spectrum of A by $\sigma(A)$. In this paper, for any proper subset $\{\lambda_{j1}, \lambda_{j2}, \cdots, \lambda_{jk}\}$ of $\sigma(A)$, we explicitly show the existence of 1-step extension $\hat{A}$ of A whose spectrum contains all λ_{ji}'s. Moreover, we show that there exists a 2-step extension of A whose spectrum contains all eigenvalues of A.

Speaker: Maeng Sang Park (Pusan National University)
Title: The braid-like presentation of knotted arcs with singular points and its markov moves.
Abstract: In this work we introduce a knitted n-arcs with singular points and its braid presentation. Then construct some moves on the diagram of this braid presentation preserving the isotopy type as like the Markov moves in the knot theory and we will show they can be applied to spatial cubic graphs with singular points. And we will introduce a topological invariant called the floor number for a knitted n-arcs with singular points.

Speaker: Sho Suda (Tohoku University, Sendai, Japan)
Title: Skew two-graphs, switching of tournaments and complex equiangular lines.
Abstract: Two-graphs and switching of graphs and real equiangular lines have been studied. In 1995, Moorhouse defined skew two-graph and studied a relation with switching of tournaments. Moreover he studied on regularity of skew two-graph and characterize it in terms with skew conference matrix. In this talk, we consider a relation between complex equiangular lines and tournaments, and study some concept on complex equiangular lines corresponding to regularity. Flag enumerations of matroid base polytopes

Speaker: Yoshio Sano (National Institute of Informatics, Tokyo, Japan)
Title: On the configulation algebra associated with colored graphs
Abstract: This talk is based on the paper [Limit elements in the configulation algebra for a cancellative monoid, *Publ. RIMS Kyoto Univ.*, **46** (2010) pp. 37–113] by Kyoji Saito. Let G be a finite color set and let q be a nonnegative integer. A (G,q)-*configulation* is an isomorphism class $[\mathbb{S}]$ of a finite G-edge-colored graph such that the valency of each vertex is at most q. Let $\mathrm{Conf} = \mathrm{Conf}^{G,q}$ denote the set of all (G,q)-configulations. The free abelian group $\mathbb{Z}\cdot\mathrm{Conf}$ generated by Conf naturally become an algebra by using a semigroup structure on Conf defined by $[\mathbb{S}]\cdot[\mathbb{T}] = [\mathbb{S}\sqcup\mathbb{T}]$, where $\sqcup$ denotes the disjoint union. For $n\geq 0$, let $\mathcal{I}_n$ be the ideal of $\mathbb{Z}\cdot\mathrm{Conf}$ generated by $\{[\mathbb{S}]\in\mathrm{Conf} \mid \sharp V(\mathbb{S})\geq n\}$. Then the completion $\mathbb{Z}[[\mathrm{Conf}]] := \varprojlim(\mathbb{Z}\cdot\mathrm{Conf})/\mathcal{I}_n$ is called the *(completed) configulation algebra*. We discuss several structures on the configulation algebra.