
Algebraic combinatorics II
(Chair/Président: **Jessica Striker** (North Dakota State University))

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Cohomology Developed Matrices - constructing weighing matrices from their automorphisms

Given an $m \times n$ matrix W with values in $\mu_n^+ = \{\exp(2ik\pi/n) | 0 \leq k \leq n-1\} \cup \{0\}$, we study its Hadamard Automorphism group. Our concern is as how to recover W from its absolute $|W|$ such that automorphisms of $|W|$ lift to those of W . The solution to this problem is governed by some spectral sequence. By applying algebraic methods we are able to construct new families of Hadamard and Weighing matrices. Our method generalizes the theory of cocyclic matrices.

AMALYA MIHNEA, Saint Thomas University

Patterns in Rosary Permutations

Given a string $Y = (Y[1], Y[2], Y[3], \dots, Y[n])$, we define its δ' -transformation as the difference string $\delta'Y = (Y[2]-Y[1], Y[3]-Y[2], \dots, Y[n]-Y[n-1], Y[1]-Y[n])$. We analyzed the distribution of the δ' -transformation applied to rosary permutations and we found recursive formulas and other results that help in understanding patterns in rosary permutations. Some formulas were connected with results for other sets of permutations.

TODD MULLEN, Dalhousie University

Chip-Firing And Polyominoes

Parallel Diffusion, a variant of chip-firing, was introduced in 2016 by Duffy et al. We will look at this process on complete graphs and count the number of unique chip distributions that can occur by relating them to polyominoes. This is joint work with Richard Nowakowski (Dalhousie) and Danielle Cox (MSVU).