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Abstracts

Some Irreducible Representations of the Braid Group

Irida Altman

In this paper we proved that the number of irreducible representations of the quotient group $\mathbf{B}_n/\langle\sigma_i^k\rangle$ of dimension lesser than n is equal to k^2, where $k \in \mathbb{N}$ $(k \neq 1)$. As a corollary it follows that for any given n, we can obtain $p(n) - 4$ irreducible representations of $\mathbf{B}_n$ of dimension greater than n directly from the irreducible representations of the symmetric group $\mathbf{S}_n$, where $p(n)$ denotes the number of partitionings of the natural number n.

Characteristic Classes and Chern-Weil Theory

Anand Deopurkar

We explore the construction of characteristic classes of vector bundles and principal G bundles by Chern-Weils method. We focus on the exceptional Lie group G_2 and compute its Weyl group $W(G_2)$ and the ring of invariant polynomials on $\mathfrak{g}_2$ under the adjoint action of G_2. We also briefly consider the second exceptional Lie group F_4 and compute its ring of invariants. We apply the results of this computation to the reduction problem.

Comparing Products of $\mathfrak{sl}_n$ Characters

Galyna Dobrovolska

We prove Lam-Postnikov-Pylyavskyy conjecture for $\mathfrak{sl}_3$ and show that in the case of $\mathfrak{sl}_3$ this conjecture provides necessary and sufficient condition for $\chi_\nu\chi_\rho >_\chi \chi_\lambda\chi_\mu$. We also study support containment version of Lam-Postnikov-Pylyavskyy conjecture for the general case of $\mathfrak{sl}_n$.

Networks, Surfaces, and Representability

Hyun Soo Kim

2-Bottom Schur Functions

Raju Krishnamoorthy

Given $\lambda \vdash n$ of rank k, define the j-bottom Schur function $\hat{s}_\lambda^j$ to be the sum of terms of degree $k, k+1, ..., k+j-1$ in the expansion of s_λ in terms of power sum symmetric functions p_λ where $\deg(p_\lambda) = l(\lambda)$. Stanley and Clifford showed that the set $\{\hat{s}_\nu^1 | rank(\nu) = l(\nu)\}$ is a basis for the vector space of 1-bottom Schur functions. They conjectured that $\{\hat{s}_\nu^2 | rank(\nu) + 1 \geq l(\nu)\}$ is a basis for the space of 2-bottom Schur functions. In this paper, we show that this set indeed spans the space of 2-bottom Schur functions. The linear independence of the elements of this set remains open.

Factoring Polynomials

Adriana Lopez

Three Dimensional Rook Theory

KangHao Lu

We generalize the combinatorial rook theory into 3 dimensions. Let r_k^T be the number of ways of putting k pairwise nonattacking roots in board T. We analyze rook numbers r_k^T and rook polynomials $R(T;x) = \sum_k r_k^T x^k$ in various boards T. We conjecture that the rook polynomial of any 3-dimensional Ferrers board has only real and nonpositive roots. We prove a special case of this conjectuere.

Two Simple Computations Proving the Futaki Invariant

Jason Priestley

Computing De Rham Intersection Cohomology Groups for Psuedomanifolds

Dale Winter

Sarelegi constructed a DeRham intersection cohomology theory for unfoldable psuedomanifolds. In this paper we define a new cohomology for certain special psuedomanifolds, and attempt, with limited success, to show that it is the same as the cohomology defined by Sarelegi.