
Enumerative combinatorics II
(Org: **Sergi Elizalde** (Dartmouth College, USA))

SYLVIE CORTEEL, CNRS Université Paris Diderot
Bounded Lecture Hall Tableaux

Lecture Hall partitions were introduced by Bousquet-Melou and Erickson as the inversion vectors of elements of the parabolic quotient \tilde{C}_n/C_n . In 2018, in collaboration with Jang Soo Kim, we showed that Lecture Hall partitions and compositions are the combinatorial interpretation of the coefficients of q -Jacobi polynomials. We then defined the Lecture Hall Tableaux that give the combinatorial interpretation of the expansion of multivariate q -Jacobi polynomials in the Schur basis. In this talk we study the bounded Lecture Hall tableaux of a given shape. This is ongoing work with Kim (SKKU), Greene (MSRI), Savage (NCSU), Keating (Berkeley) and Nicoletti (Berkeley).

ALEJANDRO MORALES, University of Massachusetts Amherst
Analogues of factorization problems of permutations in other groups

The study of factorizations in the symmetric group is related to combinatorial objects like graphs embedded on surfaces and non-crossing partitions. We consider analogues for complex reflections groups of certain factorization problems of permutations first studied by Jackson, Schaeffer, Vassilieva and Bernardi. Instead of counting factorizations of a long cycle given the number of cycles of each factor, we count factorizations of Coxeter elements by fixed space dimension of each factor. We show combinatorially that, as with permutations, the generating function counting these factorizations has nice coefficients after an appropriate change of basis. This is joint work with Joel Lewis.

MARC NOY, Universitat Politècnica de Catalunya
Counting labelled 4-regular planar graphs

We present the first combinatorial scheme for counting labelled 4-regular planar graphs through a complete recursive decomposition. As a byproduct, we also enumerate labelled 3-connected 4-regular planar graphs, and simple 4-regular rooted maps. (Joint work with Clément Requilé and Juanjo Rué.)

GRETA PANOVA, University of Pennsylvania / University of Southern California
Hook-length formulas for skew shapes

In 2014, Naruse announced a formula for skew shapes as a positive sum of products of hook-lengths using "excited diagrams" coming from Schubert calculus. We will show several combinatorial and algebraic proofs of this formula. Multivariate versions of the hook formula lead also to exact product formulas for certain skew SYTs and evaluations of Schubert polynomials. They are directly related to lozenge tilings with multivariate weights, which also appear to have interesting behavior in the limit. Joint work with A. Morales and I. Pak.

ANDREW RECHNITZER, University of British Columbia
Some cogrowth problems

The cogrowth series of a finite presentation is the generating function of all words in the generators that are equivalent to the identity. A result of Kouksov tells us that the cogrowth series is rational if and only if the group is finite. In light of that it is natural to ask "When is the cogrowth series algebraic?" It is conjectured that the cogrowth series is algebraic if and only if the group is virtually-free.

We give three infinite families of group presentations having non-algebraic cogrowth series. These groups are close to but not virtually-free and so support this conjecture.