ICM 1998, Berlin, Aug. 18–27

Abstracts of Short Communications and Posters

Section:

13. Combinatorics

1991 MS Classification: 52,5

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Applications of the Cayley trick to triangulations of polytopes.

The *polyhedral Cayley trick* gives a bijection between *mixed polyhedral subdivisions* of the (d-dimensional) Minkowski sum of n d-polytopes and all polyhedral subdivisions of their *Cayley embedding* (which is $(n+d-1)$-dimensional). We use this to study subdivisions of high dimensional polytopes which can be expressed as Cayley embeddings of smaller dimensional ones:

- This gives a new proof of the Bohne-Dress theorem on zonotopal tilings based on regarding Lawrence polytopes as Cayley embeddings of segments.
- $\Delta_k \times \Delta_2$ is the Cayley embedding of $k+1$ equal triangles. Its triangulations thus correspond to lozenge tilings of a triangle of side $k+1$. This allows enumeration, visualization and proving flip-connectivity of such triangulations.
- We construct triangulations of d-cubes with assymptotically $d!\rho^d$ simplices, for $\rho = .836$. This improves on the previous smallest value of ρ and involves much simpler computations.