MATROIDAL SUBDIVISIONS, DRESSIANS AND TROPICAL GRASSMANNIANS

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JOINT WORK WITH MICHAEL JOSWIG

Abstract. The Grassmannian is the vanishing locus of the Plücker ideal $I_{d,n}$ and the moduli space of all $d$-dimensional linear subspaces in $n$-space over some field. The points on the Grassmannian are called Plücker vectors. The tropical variety of an ideal $I$ is the subfan of the Gröbnerfan of $I$, consisting of all term orderings $w \in \mathbb{R}^{\binom{n}{2}}$ such that the corresponding initial ideal $I_w$ does not contain a monomial. The tropical Grassmannian can be seen as a subfan of the secondary fan of the hypersimplex. A tropical Plücker vector subdivides the hypersimplex into matroid polytopes. The fan of all vectors that induce matroid subdivisions on the hypersimplex is called the Dressian. It is the intersection of the tropicalization of all 3-term Plücker relations.

In my talk I will give a brief introduction into the topic of matroid polytopes and their subdivisions. I will characterize parts of the Dressian in terms of matroid properties which lead to an estimate for the dimension of the Dressian. Furthermore, I will present results for the tropical Grassmannian with parameters $d = 3$ and $n = 8$.

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