

On the Diameters of Oriented Matroids

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Abstract

Motivated by the famous open question of the complexity of the *simplex method* and of the *criss-cross method*, we investigate the diameter of the cocircuit graph of an oriented matroid. An important special case is that of *realizable* oriented matroids where this project just considers the graph of the hyperplane arrangement.

The *diameter* of \mathcal{M} is defined as the largest distance between two vertices on $G_{\mathcal{M}}$. We denote by $\Delta(n, r)$ the length of the largest diameter on the graphs corresponding to $G_{\mathcal{M}}$ over all oriented matroid $\mathcal{M} = (E, \mathcal{C}^*)$ with $|E| = n$ and rank r . I will present a quadratic bound for all oriented matroids, and some other improved bounds for special families of oriented matroids. Joint work with Ilan Adler (Berkeley), Jesús A. De Loera (Davis), and Steve Klee (Seattle).