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Abstract



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Random Sections of Regular Polytopes and Convex Cones

Joint with Zakhar Kabluchko and Dmitry Zaporozhets

Let P be an n -dimensional regular cross-polytope, simplex, or cube centred at the origin of \mathbb{R}^n . We consider convex cones of the form

$$C = \{\lambda x + \lambda e_{n+1} : \lambda \geq 0, x \in P\} \subset \mathbb{R}^{n+1},$$

where e_1, \dots, e_{n+1} is the standard basis of \mathbb{R}^{n+1} .

We shall derive explicit probabilistic expressions for the inner and outer solid angles and the intrinsic volumes of these cones. As a corollary, we shall derive a formula for the inner and outer solid angles of a regular crosspolytope.

The goal of the talk is to explain, how these cones are valuable tools in determining the expected number of faces of the intersection of a random linear subspace and a regular cross-polytope, cube or simplex.