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Abstract



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Random diagonal transformations of convex bodies

Joint with Felix Nagel

The family of convex bodies obtained from a given centred convex body K by applying rotation and scaling and taking Minkowski sums is called the Minkowski class generated by K . In this talk we replace rotations with transformations of K by diagonal matrices u . The obtained family of convex bodies can be described as expectations of random sets ξK , where $\xi \in \mathbb{R}^d$ determines the diagonal elements of the matrix transforming K . If K is a segment with end-points $\pm(1, \dots, 1)$, one obtains the family of zonoids.

It is shown that the diagonal Minkowski class is dense if and only if the equality of expectations $\mathbf{E}(\xi K) = \mathbf{E}(\eta K)$ for two integrable random vectors ξ and η implies the zonoid equivalence of ξ and η , that is, $\mathbf{E}|\langle \xi, u \rangle| = \mathbf{E}|\langle \eta, u \rangle|$ for all u . In this case, K is called D-universal. Conditions ensuring the D-universality of K are provided. It is shown that expectations of diagonally scaled ℓ_p -balls naturally arise in relation to totally skewed strictly stable laws in Euclidean space.