Best and random approximations with generalized disc–polygons

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In this contribution, we consider the asymptotic behaviour of the distance between a convex disc K with sufficiently smooth boundary, and its approximating n-gons, as the number of vertices tends to infinity. We consider two constructions: the best approximating inscribed n-gon of K is the one with maximal area; and a random inscribed n-gon of K is the convex hull of n i.i.d. random points chosen from the boundary of K. The asymptotic behaviour of the area deviation of K and the n-gon depend in both cases on the same, geometric limit. The best and random approximating n-gons can be similarly defined in the circumscribed case.

We generalize the existing results on linear and spindle convexity to the so-called L-convexity. In the case of inscribed L-polygons, we prove similar asymptotic formulae by generalizing the geometric limits. Then we introduce an L-convex duality, consider its properties, and use them to prove the formulae for the circumscribed cases.