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Algorithms of optimal set covering on the planar $\mathbb{R}^2$. (Russian. English summary)

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Summary: The problem of optimal covering of planar convex sets with a union of a given number $n$ of equal disks is studied. Criterion of optimality is a minimization of disks’ radius, which gives an opportunity to reduce the optimization problem to a construction of the best Chebyshev $n$-net of a convex set. Numerical methods based on dividing the set into Dirichlet zones and finding characteristic points are suggested and proved in the present paper. One of the main elements of the methods is a Chebyshev center calculation for a compact convex set. Stochastic algorithms for generating an initial position of the $n$-net points are presented. Modeling of some examples is computed and visualization of the constructed covering is realized.

MSC:

52C15 Packing and covering in 2 dimensions (aspects of discrete geometry)
49N99 Miscellaneous topics in calculus of variations and optimal control

Keywords:
disk covering; best Chebyshev net; Chebyshev center; Dirichlet zone; characteristic points; closed curve; optimal covering

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