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On the shadow problem

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Further, under m-dimensional planes we mean m-dimensional affine subspaces of the Euclidean space $\mathbb{R}^n$.

Definition. We say that the set $E \subset \mathbb{R}^n$ is *m-convex* with respect to the point $x \in \mathbb{R}^n \backslash E$ if there exists an m-dimensional plane L such that $x \in L$ and $L \cap E = \varnothing$.

For every set $E \subset \mathbb{R}^n$ we can consider the minimal m-convex set containing E and call it *m-convex hull* of a set E.

The shadow problem. What is the minimum number of mutually disjoint closed or open balls in the space $\mathbb{R}^n$ with centers on the sphere S^{n-1} and of radii smaller than the radius of the sphere with condition that the center of the sphere belongs to an 1-convex hull of the family of these balls?

Theorem. *Any set consisting of three balls of the same radius which do not intersect pairwise forms an 1-convex set in the three-dimensional Euclidean space $\mathbb{R}^3$.*

[1] Yu. B. Zelinskii, H. K. Dakhil, B. A. Klishchuk On weakly m-convex sets, *Reports of the NAS of Ukraine*, no. 4, (2017), P. 3–6 (in Ukrainian).