Florian, August
On the intersection of a pyramid and a ball. (English) Zbl 1218.52009
Aequationes Math. 77, No. 1-2, 147-170 (2009).

The aim of the paper is to prove a theorem about the volume of the intersection between a pyramid and a ball, that is necessary to complete the proof of a previous result of the author referring to the edge curvature of a convex polyhedron [see Monatsh. Math. 60, 288–297 (1956; Zbl 0073.17402)]. Let Q be a convex n-sided pyramid contained in the unit ball S and having the apex at the center of S. Let $\overline{Q}$ be the corresponding n-sided pyramid based on a regular n-gon with its vertices on the boundary of S, such as the radial projections of the bases of Q and $\overline{Q}$ have the same area. The ball $K(\rho)$ is supposed to have the same center as S. Let V denote the volume of a set.

The main result is: "Let $K(\rho)$ be the ball with radius $\rho \in (0,1]$ and center O^*. Then $V(Q \cap K(\rho)) \leq V(\overline{Q} \cap K(\rho))$, for any $\rho \in (0,1]$. Let d be the minimum distance of O^* from the base points of Q. If $Q \neq \overline{Q}$ and $\rho > d$, then the inequality strictly holds."

Reviewer: Gabriela Cristescu (Arad)

MSC:

52A40 Inequalities and extremum problems involving convexity in convex geometry
52B10 Three-dimensional polytopes

Keywords:

convex polyhedron; edge-curvature; inradius; volume; pyramid; ball

Full Text: DOI