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On Gromov's conjecture for uniform contractions

Let $\mathbb{E}^d$ denote the d-dimensional Euclidean space. The r-ball body generated by a given set in $\mathbb{E}^d$ is the intersection of balls of radius r centered at the points of the given set. In this talk we prove the following Blaschke-Santalo-type inequalities for r-ball bodies: for all $1 \leq k \leq d$ and for any set of given volume in $\mathbb{E}^d$ the k-th intrinsic volume of the r-ball body generated by the set becomes maximal if the set is a ball. As an application we prove the following. Gromov's conjecture (1987) states that if the centers of a family of N congruent balls in $\mathbb{E}^d$ is contracted, then the volume of the intersection does not decrease. A uniform contraction is a contraction where all the pairwise distances in the first set of centers are larger than all the pairwise distances in the second set of centers, that is, when the pairwise distances of the two sets are separated by some positive real number. The author and M. Naszodi [Discrete Comput. Geom. (2018), 1-14] proved Gromov's conjecture as well as its extension to intrinsic volumes for all uniform contractions in $\mathbb{E}^d$, $d > 1$ under the condition that $N \geq \left(1+\sqrt{2}\right)^d$. We give a short proof of this result using the Blaschke-Santalo-type inequalities of r-ball bodies and improve it for $d \geq 42$.