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Two Characterizations of Ellipsoidal Cones

We give two characterizations of cones over ellipsoids. Let C be a closed convex linear cone in a finite-dimensional real vector space. We show that C is a cone over an ellipsoid if and only if the affine span of $\partial C \cap \partial(a - C)$ has dimension $\dim(C) - 1$ for every point a in the relative interior of C. We also show that C is a cone over an ellipsoid if and only if every bounded section of C by an affine hyperplane is centrally symmetric.

Keywords: Ellipsoidal cone, centrally symmetric convex body.

MSC: 52A20, 53A07