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Convexity of Suns in Tangent Directions

A direction d is called a tangent direction to the unit sphere S if the conditions $s \in S$ and $\mathrm{aff}(s + d)$ is a tangent line to the sphere S at s imply that $\mathrm{aff}(s + d)$ is a one-sided tangent to the sphere S, i.e., it is the limit of secant lines at the point s. A set M is called convex with respect to a direction d if $[x, y] \subset M$ whenever $x, y \in M$, $(y - x) \parallel d$. It is shown that in an arbitrary normed space an arbitrary sun (in particular, a boundedly compact Chebyshev set) is convex with respect to any tangent direction of the unit sphere.

Keywords: Sun, Chebyshev set, directional convexity.

MSC: 41A65, 52A05