

On the Banach-Saks property and convex hulls

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Abstract: Recall that a subset A of a Banach space X has the Banach-Saks property (BSP) when every sequence in A has a Cesaro-summable subsequence. We prove that this property is not closed under taking convex closures. More particularly, we construct a compact family \mathcal{F} of finite subsets of \mathbb{N} which is highly non spreading, and we prove that there is a subset of the Schreier-like space $X_{\mathcal{F}}$ whose convex closure is not. Our construction is inspired in a classical example of Erdős and Hajnal (1964) of certain double-indexed sequence of measurable sets. On the opposite direction, we prove that the (BSP) passes to convex closures of subsets of the classical Schreier-like spaces $X_{\mathcal{S}_\alpha}$.

This is a joint work with Cesar Ruiz-Bermejo (U. Complutense Madrid) and Pedro Tradacete (U. Carlos III Madrid)