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Continuity and Selections of the Intersection Operator Applied to Nonconvex Sets

For a convex body C in a Banach space E we consider the class $\mathcal{S}(C)$ of closed sets $A \subset E$ satisfying the support condition with respect to C . If C is a ball with radius r , then $\mathcal{S}(C)$ is exactly the class of uniformly r -prox-regular sets. We prove that the intersection operator $(A, C) \mapsto A \cap C$ is uniformly Hausdorff continuous and has a uniformly continuous selection on the family of pairs (A, C) such that C is closed and uniformly convex, $rA \in \mathcal{S}(C)$ with $r \in (0, 1)$, and $A \cap C \neq \emptyset$. We also deduce some new sufficient condition for affirmative solution of the splitting problem for selections.

Keywords: Support condition, weak convexity, proximal regularity, quasiball, multifunction, selection.

MSC: 41A50, 41A65, 52A21