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ON ACCRETIVE MULTIVALUED MAPPINGS

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Let X be a real normed linear space, X^* its dual, \langle , \rangle the pairing between X and X^* , J a duality mapping from X into 2^{X^*} defined by $J(u) = \{u^* \in X^* : \langle u^*, u \rangle = \|u\|^2, \|u^*\| = \|u\|\}$, $u \in X$.

Recall that a multivalued mapping $A: X \rightarrow 2^X$ is said to be: (i) accretive on $D(A) = \{u \in X : A(u) \neq \emptyset\}$ if for each $u, v \in D(A)$ and each $x \in A(u)$ and $y \in A(v)$ there exists an element $x^* \in J(u-v)$ such that $\langle x-y, x^* \rangle \geq 0$; (ii) maximal accretive on $D(A)$, if A is accretive on $D(A)$ and its graph $G(A) = \{(u, x) \in X \times X : u \in D(A), x \in A(u)\}$ is not properly contained in the graph of any other accretive mapping defined on $D(A)$.

Theorem. Let X be a reflexive Fréchet smooth Banach space, $A: X \rightarrow 2^X$ a multivalued maximal accretive mapping such that $\text{int } D(A) \neq \emptyset$. Then A is single-valued and norm-to-norm upper semicontinuous on a dense G_δ subset of $\text{int } D(A)$.

In comparison with maximal monotone operators (see for instance [1], [2], [3]), the single-valuedness and the continuity properties of maximal accretive mappings ([4]) deeply rely on the structure of Banach spaces.

References:

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