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On Maximally q-Positive Sets

In his recent book *From Hahn-Banach to monotonicity* (Springer-Verlag, Berlin, 2008), S. Simons has introduced the notion of SSD space to provide an abstract algebraic framework for the study of monotonicity. Graphs of (maximal) monotone operators appear to be (maximally) q-positive sets in suitably defined SSD spaces. The richer concept of SSDB space involves also a Banach space structure. In this paper we prove that the analog of the Fitzpatrick function of a maximally q-positive subset M in a SSD space $(B, \lfloor \cdot, \cdot \rfloor)$ is the smallest convex representation of M. As a consequence of this result it follows that, in the case of a SSDB space, the conjugate with respect to the pairing $\lfloor \cdot, \cdot \rfloor$ of any convex representation of M provides a convex representation of M, too. We also give a new proof of a characterization of maximally q-positive subsets of SSDB spaces in terms of such special representations.