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Maximality of Sums of Monotone Operators

We say a multifunction $T\colon X \mapsto 2^{X^*}$ is *monotone* provided that for any $x, y \in X$, and $x^* \in T(x)$, $y^* \in T(y)$,

$$\langle y - x, y^* - x^* \rangle \geq 0,$$

and that T is *maximal monotone* if its graph is not properly included in any other monotone graph. The *convex subdifferential* in Banach space and a *skew linear matrix* are the canonical examples of maximal monotone multifunctions. Maximal monotone operators play an important role in functional analysis, optimization and partial differential equation theory, with applications in subjects such as mathematical economics and robust control. In this talk, based on [1], I shall show how—based largely on a long-neglected observation of Fitzpatrick —the originally quite complex theory of monotone operators can be almost entirely reduced to convex analysis. I shall also highlight various long standing open questions which these new techniques offer new access to.

References

[1] J. M. Borwein, *Maximal Monotonicity via Convex Analysis.* J. Convex Analysis (Special issue in memory of Simon Fitzpatrick) **13** (June 2006). [D-drive Preprint 281].