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Spaces of d.c. Mappings on Arbitrary Intervals

Let X be a Banach space. Using derivatives in the sense of vector distributions, we show that the space $DC([0,1],X)$ of all d.c. mappings from $[0,1]$ into X, in a natural norm, is isomorphic to the space $M_{bv}([0,1],X)$ of all vector measures with bounded variation. The same is proved for the space $BDC_b((0,\infty),X)$ of all bounded d.c. mappings with a bounded control function. The result for the space $DC([0,1],\mathbf{R})$ of all continuous d.c. functions was (essentially) proved by M. Zippin [The space of differences of convex functions on $[0,1]$, Serdica Math. J. 26 (2000) 331–352] by a quite different method. The space $BDC_b((0,\infty),\mathbf{R})$ consists of all differences of two bounded convex functions. Internal characterizations of its members were given by O. Böhme [On functions which are the difference of two bounded convex functions on $(0,\infty)$, Math. Nachr. 122 (1985) 45–58], but our characterization of its Banach structure is new.

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