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Characterization of compactness in the space of functions of bounded variation

As far as we know the only one characterization of compactness in the space of functions of bounded variation in the sense of Jordan is given in Dunford and Schwartz's celebrated monograph [2] (Exercise IV.13.48) – however, in our opinion, it is not too useful from the point of view of applications.

In this talk we are going to present a new compactness criterion for subsets of the Banach space of functions of bounded variation in the sense of Jordan (briefly: $BV(I)$, where I is a compact interval of \mathbb{R}), which seems to be more comfortable from that point of view. It is based on the notion of an equivariated subset of that space. We also present how one can use that notion to define a quasimeasure of noncompactness in the space $BV(I)$.

Finally, we will focus on new general compactness criteria in normed spaces from the paper [4], which are based the notion of an equinormed set using a suitable family of semi-norms which satisfy some natural conditions.

The results presented in this talk come from the papers [3] and [4]. One can also see the paper [5] for new such type results in Lipschitz spaces. Moreover, we refer the reader interested in applications of BV type spaces to the recently published monograph [1].

References.

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- [2] N. Dunford, J.T. Schwartz, *Linear operators: general theory*, Pure and Applied Mathematics, Interscience Publishers, 1958.
- [3] D. Bugajewski, J. Gulgowski, *On the characterization of compactness in the space of functions of bounded variation in the sense of Jordan*, J. Math. Anal. Appl. **484**, No. 2, Article ID 123752, 17 p. (2020).
- [4] J. Gulgowski, P. Kasprzak, P. Maćkowiak, *Compactness in normed spaces: a unified approach through semi-norms*, submitted.
- [5] J. Gulgowski, P. Kasprzak, P. Maćkowiak, *Compactness in Lipschitz spaces and around*, submitted.