

Report on Thesis “Vector-valued integral representation” by Jakub Rondoš

This is an opponent report to the dissertation thesis of J. Rondoš, supervised by J. Spurný, which was submitted for defense at Charles University, Prague.

This work consists of two chapters: The first chapter has two sub-chapters and the second chapter has five sub-chapters. More precisely, we have:

Chapter 1. Maximum principles for convex functions

- 1.1. On fragmented convex functions
- 1.2. Maximum principle for abstract convex functions

Chapter 2. Isomorphic Banach-Stone type theorems for subspaces of continuous functions

- 2.1. Isomorphisms of spaces of affine continuous complex functions
- 2.2. Small-bound isomorphisms of functions spaces.
- 2.3. Isomorphisms of subspaces vector-valued continuous functions
- 2.4. An Amir-Cambern theorem for subspaces of Banach lattice-valued continuous functions
- 2.5. On the Banach-Mazur distance between continuous functions spaces with scattered boundaries

Each of these seven sub-chapters corresponds to an paper. The first six papers are already published in a Journal and the last one is at arXiv. More specifically:

The first two papers (1.1 and 1.2) study the properties of fragmented convex functions, mainly the so-called maximum principle. The first paper deals with convex functions defined on compact convex subsets of locally convex spaces, the second one with the abstract convex functions defined on general compact Hausdorff spaces. These papers were published in 2020. Namely:

- 1.1. J. Rondoš and J. Spurný, A characterization of simplicial spaces by an extension property. *Bull. Pol. Acad. Sci. Math.* 68 (2020), 1, 8995.
- 1.2. J. Rondoš and J. Spurný, On fragmented convex functions. *J. Math. Anal. Appl.* 484 (2020), 2, 123757, 14 pages.

The next four papers (2.1, 2.2, 2.3 and 2.4) present results in the spirit of the well-known Banach-Stone theorem in the area of subspaces of continuous functions.

The first of those four papers deals with the spaces of affine continuous complex functions on compact convex sets. The second paper extends the results of the first one to the context of general subspaces of continuous functions defined on locally compact spaces. The other two papers further extend the previous results to the case of Banach space-valued and Banach lattice-valued functions, respectively.

2.1. J. Rondoš and J. Spurný, Isomorphisms of spaces of affine continuous complex functions. *Math. Scand.* 125 (2019), 2, 270290.

2.2. J. Rondoš and J. Spurný, Isomorphisms of subspaces of vector-valued continuous functions. *Acta Math. Hungar.* <https://doi.org/10.1007/s10474-020-01107-5>.

2.3. J. Rondoš and J. Spurný, Small-bound isomorphisms of function spaces, *J. Aust. Math. Soc.* (First published online 2020), doi:10.1017/S1446788720000129.

2.4. J. Rondoš and J. Spurný, An Amir-Cambern theorem for subspaces of Banach lattice-valued continuous functions. *Banach J. Math. Anal.* 15 (2021), 2, 30.

The last paper (2.5) is devoted to the study of the Banach-Mazur distance between subspaces of vector-valued continuous functions that have scattered boundaries. This paper can be found at

2.5. J. Rondoš. On the Banach-Mazur distance between continuous function spaces with scattered boundaries. arXiv:2012.00334

Since the first six papers are already published, I only read the last one and I think everything is correct. Moreover, the dissertation thesis is well written. The content of it presents interesting and new results as is well indicated in it or in each one of the seven papers above mentioned. It is also presented a good history of previous results that motivate and justify the research done by J. Rondoš. For these reasons, in my opinion, this thesis MUST BE APPROVED.

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