

February 5, 2023

To the Evaluation Committee:

I am writing to you a favorable external review of the Habilitation Thesis of Dr. Dušan Pokorný.

Checking the originality with Turnitin showed mainly overlap with the existing papers of the author, so the thesis can be considered his original work.

The thesis contains 5 papers and an introduction with the summary of the five papers. One of the papers appeared in the very prestigious *Advances in Mathematics*, which already shows high quality. Three of the papers appeared in strong journals: in *Mathematische Nachrichten*, *Journal of Mathematical Analysis and Applications* and in *Commentationes Mathematicae Universitatis Carolinae*. The last one is a submitted paper, which is available at arXiv. The first two papers have three authors, the next two have two and the last one has a single author.

All five papers, and so the whole dissertation as well, are about the so called WDC sets, which are the weakly regular sublevel sets of differences of convex functions.

In the first paper of the thesis (Fu-Pokorný-Rataj, *Adv. Math.*, 2017) the kinematic formulas of Federer are extended from sets of positive reach to the much more general WDC sets. To get this result first they proved a stronger version of a theorem by Ewald, Larman and Rogers about the directions of line segments on the boundary of a convex set. I find this result very interesting in itself.

The second paper (Pokorný-Rataj-Zajicek, *Math. Nachr.*, 2019) is about the geometric structure of the WDC sets. They prove that the boundary of locally WDC sets can be locally covered by DC hypersurfaces. They also characterize locally WDC sets inside some classes of sets.

In the third paper (Pokorný-Zajicek, *J. Math. Anal. Appl.*, 2020) the authors prove that if  $f$  is the difference of two convex real functions then the distance from the graph of  $f$  as a function on the plane is the difference of two convex functions defined on the plane. The motivation comes from the theory of WDC sets and this result is applied in the fourth paper (Pokorný-Zajicek, *Comment. Math. Univ. Carolin.*, to appear) in which among others they prove that in the plane locally WDC sets are WDC and that compact WDC subsets of the plane form a Borel subset of the space of all nonempty compact subsets of the plane with the Hausdorff metric.

The fifth paper (Pokorný, arXiv, 2019) extends the theory further to the class  $\mathcal{U}_{WDC}$  of finite unions of WDC sets with some extra conditions. The author

proves that compact  $\mathcal{U}_{WDC}$  sets admit a normal cycle and a local kinematic formula holds. In the plane he also gives a geometric characterization of compact  $\mathcal{U}_{WDC}$  sets.

In summary, the thesis shows mastery of multiple areas of analysis and geometry like integral geometry and metric geometry and that Dr. Pokorný can be expected to continue successful mathematical research at an internationally substantial level. I recommend without hesitation accepting his Habilitation Thesis.



Tamás Keleti

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