

NO-DIMENSION VERSIONS OF CLASSICAL THEOREMS OF COMBINATORIAL CONVEXITY IN BANACH SPACES

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Basic theorems in combinatorial and convex geometry such as Carathéodory's, Helly's and Tverberg's state different combinatorial properties of convex sets in \mathbb{R}^d . Their statements depend on the dimension d (these theorems can be used to characterize the dimension). The idea behind a “no-dimension” or an approximate version of the well-known theorems is to make them independent of the dimension. However, it comes at some cost – the approximation error. Such results are useful for different applications (for example, for computing Nash equilibria and for densest bipartite subgraph problem). Moreover, different problems on approximation of operators can be reformulated in the language of no-dimension theorems. We will discuss no-dimension versions of Carathéodory's, Tverberg's theorems together with their applications. Based on papers:

1. Ivanov, G. Approximate Carathéodory's Theorem in Uniformly Smooth Banach Spaces. *Discrete Comput Geom* **66**, 273–280 (2021). <https://doi.org/10.1007/s00454-019-00130-w>
2. Ivanov, G. (2021), No-dimension Tverberg's theorem and its corollaries in Banach spaces of type p . *Bull. London Math. Soc.*, **53**, 631–641. <https://doi.org/10.1112/blms.12449>