σ-ideals generated by hyperplanes of Banach spaces

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A hyperplane of a Banach space is a closed one-codimensional subspace. Hyperplanes are nowhere dense and so, no countable collection of hyperplanes can cover the entire space. Given a Banach space we consider the σ-ideal of all of its subsets which are covered by countably many hyperplanes and investigate its standard cardinal characteristics i.e. the additivity, the covering number, the uniformity, the cofinality. We completely determine their values for separable Banach spaces in ZFC, and for all nonseparable Banach spaces under additional assumptions such as GCH or MM. We also find an application of our results to the topic of overcomplete sets in Banach spaces.

References

[1] D. Głodkowski, P. Koszmider, *On coverings of Banach spaces and their subsets by hyperplanes.* Proc. Amer. Math. Soc. 150 (2021), no. 2, 817–831.