

Systems of seminorms on spaces of operators and weak bounded approximation properties

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A classical result, essentially due to Grothendieck, says that the approximation property (AP) of a dual Banach space X^* is metric whenever X^* or X^{**} have the Radon–Nikodým property (RNP). A version of its proof by Oja deals with the *weak metric AP*.

The weak metric AP and its generalization, a *bounded AP for a Banach operator ideal*, were introduced by Lima, Lima, and Oja in order to investigate the gap between the AP of a dual Banach space and its metric version.

We observe that in many cases the equivalence of such bounded APs boils down to a certain equivalence of systems of seminorms defined on all spaces of bounded linear operators. Such a language seems to help in highlighting the cornerstones of the theory. In particular, it enables one to simplify the aforementioned Oja’s proof, eliminating the need to enter the original space X , and shows that the only essential part is Oja’s “RNP impact lemma”.