

WEAK NONCOMPACTNESS IN BANACH SEQUENCE SPACES AND ITS EXTRAPOLATION PROPERTIES

ANDRZEJ KRYCZKA

Abstract. Explicit formulae in selected Banach sequence spaces are established for the measure of weak noncompactness based on James' criteria. Estimates of the deviation from weak compactness are given for bounded linear operators extrapolated by the Jawerth-Milman Σ_p and Δ_p methods for $1 < p < \infty$.

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REFERENCES

- [1] R. R. AKHMEROV, M. I. KAMENSKII, A. S. POTAPOV, A. E. RODKINA, B. N. SADOVSKII, *Measures of noncompactness and condensing operators*, Birkhäuser Verlag, Basel 1992.
- [2] K. ASTALA, H.-O. TYLLI, *Seminorms related to weak compactness and to Tauberian operators*, Math. Proc. Camb. Phil. Soc. 107 (1990), 367–375.
- [3] J. BANAŚ, *Applications of measures of weak noncompactness and some classes of operators in the theory of functional equations in the Lebesgue space*, Nonlinear Anal. 30 (1997), 3283–3293.
- [4] J. BANAŚ, A. MARTINÓN, *Measures of weak noncompactness in Banach sequence spaces*, Portugal. Math. 52 (1995), 131–138.
- [5] C. BENNETT, R. SHARPLEY, *Interpolation of operators*, Academic Press 1988.
- [6] J. BERGH, J. LÖFSTRÖM, *Interpolation spaces*, An introduction, Springer-Verlag 1976.
- [7] F. COBOS, A. MANZANO, A. MARTÍNEZ, *Interpolation theory and measures related to operator ideals*, Quart. J. Math. Oxford Ser. (2) 50 (1999), 401–416.
- [8] F. S. DE BLASI, *On a property of the unit sphere in a Banach space*, Bull. Math. Soc. Sci. Math. R. S. Roumanie (N.S.) 21(69) (1977), 259–262.
- [9] D. EDMUND, H. TRIEBEL, *Logarithmic spaces and related trace problems*, Funct. Approx. Comment. Math. 26 (1998), 189–204.
- [10] M. FABIAN, P. HÁJEK, V. MONTESINOS, V. ZIZLER, *A quantitative version of Krein's theorem*, Rev. Mat. Iberoam. 21 (2005), 237–248.
- [11] A. S. GRANERO, P. HÁJEK, V. MONTESINOS, *Convexity and w^* -compactness in Banach spaces*, Math. Ann. 328 (2004), 625–631.
- [12] R. C. JAMES, *A non-reflexive Banach space isometric to its second conjugate*, Proc. Nat. Sci. U.S.A., 37 (1951), 174–177.
- [13] R. C. JAMES, *Weak compactness and reflexivity*, Israel J. Math., 2 (1964), 101–119.
- [14] B. JAWERTH, M. MILMAN, *Extrapolation theory with applications*, Mem. Amer. Math. Soc. 89 (1991), no. 440.
- [15] A. KRYCZKA, S. PRUS, *Measure of weak noncompactness under complex interpolation*, Studia Math. 147 (2001), 89–102.
- [16] A. KRYCZKA, S. PRUS, *Separated sequences in nonreflexive Banach spaces*, Proc. Amer. Math. Soc. 129 (2001), 155–163.
- [17] A. KRYCZKA, S. PRUS, M. SZCZEPANIĆ, *Measure of weak noncompactness and real interpolation of operators*, Bull. Austral. Math. Soc. 62 (2000), 389–401.

- [18] M. MILMAN, *Extrapolation and optimal decompositions with applications to analysis*, Lecture Notes in Mathematics, 1580, Springer-Verlag, 1994.
- [19] M. MILMAN, *A note on extrapolation theory*, J. Math. Anal. Appl. 282 (2003), 26–47.
- [20] H.-O. TYLLI, *Duality of the weak essential norm*, Proc. Amer. Math. Soc. 129 (2001), 1437–1443.
- [21] S. YANO, *Notes on Fourier analysis. XXIX. An extrapolation theorem*, J. Math. Soc. Japan 3 (1951), 296–305.
- [22] A. ZYGMUND, *Trigonometric series*, Cambridge University Press, London New York 1968.