

ON THE PTOLEMY CONSTANT OF SOME CONCRETE BANACH SPACES

ZHAN-FEI ZUO

Abstract. In this paper, we firstly consider the relations involving the Ptolemy constant of the norms $\|\cdot\|_\psi$ and $\|\cdot\|_\phi$, where the convex functions ψ and ϕ are comparable. Secondly, we determine this constant when norm is a mean of two norms. Finally, the constant was calculated for some concrete Banach spaces.

Mathematics subject classification (2010): Primary 46B20, Secondary 46B25.

Keywords and phrases: The Ptolemy constant, Absolute normalized norm, Convex function.

REFERENCES

- [1] J. ALONSO AND P. MARTIN, *A counterexample for a conjecture of G. Zbăganu about the Neumann-Jordan constant*, Rev. Roum. Math. Pures Appl. **51**, (2006), 135–141.
- [2] F. BONSALL AND J. DUNCAN, *Numerical Ranges II.*, London Mathematical Society Lecture Notes Series, **10**, Cambridge Univ. Press, New York, 1973.
- [3] J. GAO AND K. S. LAU, *On two classes Banach spaces with uniform normal structure*, Studia Math. **99** (1991), 41–56.
- [4] T. IKEDA AND M. KATO, *Notes on von Neumann-Jordan and James constants for absolute norms on \mathbb{R}^2* , Mediterr. J. Math. **11** (2014), 633–642.
- [5] A. JIMÉNEZ-MELADO, E. LLORENS-FUSTER AND S. SAEJUNG, *The von Newman-Jordan constant, weak orthogonality and normal structure in Banach spaces*, Proc. Am. Math. Soc. **134** (2006), 355–364.
- [6] N. KALTON AND I. VERBITSKY, *Nonlinear equations and weighted norm inequalities*, Trans. Amer. Math. Soc. **351** (1999), 3441–3497.
- [7] M. KATO AND Y. TAKAHASHI, *On the von Neumann-Jordan constant for Banach spaces*, Proc. Amer. Math. Soc. **125** (1997), 1055–1062.
- [8] M. KATO AND L. MALIGRANDA, *On James and von Neumann-Jordan constants of Lorentz sequence spaces*, J. Math. Anal. Appl. **258** (2001), 457–465.
- [9] M. KATO, L. MALIGRANDA AND Y. TAKAHASHI, *On James and Jordan-von Neumann constants and normal structure coefficient of Banach spaces*, Studia Math. **144** (2001), 275–295.
- [10] E. LLORENS-FUSTER, E. MAZCUÑÁN-NAVARRO AND S. REICH, *The Ptolemy and Zbăganu constants of normed spaces*, Nonlinear Analysis **72** (2010), 3984–3993.
- [11] L. MALIGRANDA AND L. E. PERSSON, *Generalized duality of some Banach function spaces*, Indag. Math. **51** (1989), 323–338.
- [12] K. MITANI AND K. SAITO, *The James constant of absolute norms on \mathbb{R}^2* , J. Nonlinear Convex Anal. **4** (2003), 399–410.
- [13] H. MIZUGUCHI AND K. SAITO, *Some geometric constants of absolute normalized norms on \mathbb{R}^2* , Ann. Funct. Anal. **2** (2011), 22–33.
- [14] H. MIZUGUCHI AND K. SAITO, *On the upper bound of some geometric constants of absolute normalized norms on \mathbb{R}^2* , Mediterr. J. Math. **13** (2016), 309–322.
- [15] H. L. NIKOLOVA AND L. E. PERSSON, *Some properties of X^p spaces*, in: J. Musielak, H. Hudzik, R. Urbanski (eds.), Function spaces, Teubner-Texte zur Mathematik **120** (1991), 174–185.
- [16] L. PERSSON (Eds.), *Some elementary inequalities in connection with X^p spaces*, Constructive theory of functions, Publishing House of the Bulgarian Academy of Sciences, (1988), 367–376.
- [17] Y. PINCHOVER, *Maximum and anti-maximum principles and eigenfunctions estimates via perturbation theory of positive solutions of elliptic equations*, Math. Ann. **314** (1999), 555–590.

- [18] Y. PINCHOVER, S. REICH AND I. SHAFRIR, *The Ptolemy constant of a normed space*, Amer. Math. Monthly. **108** (2001), 475–476.
- [19] S. SAEJUNG, *On James and von Neumann-Jordan constants and sufficient conditions for the fixed point property*, J. Math. Anal. Appl. **323** (2006), 1018–1024.
- [20] K. SAITO, M. KATO AND Y. TAKAHASHI, *Von Neumann-Jordan constant of absolute normalized norms on C^2* , J. Math. Anal. Appl. **244** (2000), 515–532.
- [21] R. TANAKA, *Tingley's problem on symmetric absolute normalized norms on R^2* , Acta Math. Sin. **30** (2014), 1324–1340.
- [22] Z. ZUO AND Y. CUI, *Some modulus and normal structure in Banach space*, Journal of Inequalities and Applications **2009** (2009), Article ID 676373.
- [23] Z. ZUO, *The Ptolemy constant of absolute normalized norms on R^2* , Journal of Inequalities and Applications **2012** (2012), 107.
- [24] Z. ZUO, *A reconsideration on the Ptolemy Constant of absolute normalized norms*, Acta Mathematica Sinica (Chinese Series) **58** (2015), 337–344.
- [25] Z. ZUO AND C. TANG, *Jordan-von Neumann type constant and fixed points for multivalued nonexpansive mappings*, Journal of Mathematical Inequalities. **10** (2016), 649–657.