

A POINCARÉ-TYPE INEQUALITY ON THE EUCLIDEAN UNIT SPHERE

AI-JUN LI, YINGYING LOU AND YURONG JI

Abstract. We consider the second variation for the volume of convex bodies associated with the L_p Minkowski-Firey combination and obtain a Poincaré-type inequality on the Euclidean unit sphere S^{n-1} .

Mathematics subject classification (2010): 52A20.

Keywords and phrases: Convex body, L_p -addition, Poincaré-type inequality.

REFERENCES

- [1] A. D. ALEKSANDROV, *Konvexe Polyeder*, Akademie-Verlag, Berlin (Russian original: 1950), 1958.
- [2] S. BOBKOV, *Isoperimetric and analytic inequalities for log-concave probability measures*, Ann. Probability **27** (1999), 1903–1921.
- [3] S. BOBKOV, M. LEDOUX, *From Brunn-Minkowski to Brascamp-Lieb and to logarithmic Sobolev inequalities*, Geom. Funct. Anal. **10** (2000), 1028–1052.
- [4] S. BOBKOV, M. LEDOUX, *Weighted Poincaré-type inequalities for cauchy and other convex measures*, Ann. Probability **37** (2009), 403–427.
- [5] S. BOBKOV, M. LEDOUX, *From Brunn-Minkowski to sharp Sobolev inequalities*, Ann. Mat. Pure Appl. **187** (2008), 369–384.
- [6] S. CAMPİ, P. GRONCHI, *The L_p -Busemann-Petty centroid inequality*, Adv. Math. **167** (2002), 128–141.
- [7] S. CAMPİ, P. GRONCHI, *On the reverse L_p -Busemann-Petty centroid inequality*, Mathematika **49** (2002), 1–11.
- [8] S.-Y. CHENG, S.-T. YAU, *On the regularity of the solutions of the n -dimensional Minkowski problem*, Comm. Pure Appl. Math. **29** (1976), 495–516.
- [9] A. COLESANTI, *Brunn-Minkowski inequalities for variational problems and related problems*, Adv. Math. **194** (2005), 105–140.
- [10] A. COLESANTI, *From the Brunn-Minkowski inequality to a class of Poincaré type inequalities*, Commun. Contemp. Math. **10** (2008), 765–772.
- [11] A. COLESANTI, E. SAORIN-GOMEZ, *Functional inequalities derived from The Brunn-Minkowski inequality for quermassintegrals*, J. Convex Anal. **17** (2010), 35–49.
- [12] A. COLESANTI, I. FRAGALÀ, *The first variation of the total mass of log-concave functions and related inequalities*, Adv. Math. **244** (2013), 708–749.
- [13] W. J. FIREY, *p -means of convex bodies*, Math. Scand., **10** (1962), 17–24.
- [14] R. J. GARDNER, *The Brunn-Minkowski inequality*, Bull. Amer. Math. Soc. (N.S.) **39** (2002), 355–405.
- [15] C. HABERL, *L_p intersection bodies*, Adv. Math. **217** (2008), 2599–2624.
- [16] C. HABERL, M. LUDWIG, *A characterization of L_p intersection bodies*, Int. Math. Res. Not. **17** (2006) Art. ID 10548, 29 pp.
- [17] C. HABERL, F. SCHUSTER, *General L_p affine isoperimetric inequalities*, J. Differential Geom. **83** (2009), 1–26.
- [18] C. HABERL, F. SCHUSTER, *Asymmetric affine L_p Sobolev inequalities*, J. Funct. Anal. **257** (2009), 641–658.
- [19] M. LUDWIG, *Projection bodies and valuations*, Adv. Math. **172** (2002), 158–168.
- [20] M. LUDWIG, *Minkowski valuations*, Trans. Amer. Math. Soc. **357** (2005), 4191–4213.
- [21] M. LUDWIG, *Intersection bodies and valuations*, Amer. J. Math. **128** (2006), 1409–1428.

- [22] E. LUTWAK, *The Brunn-Minkowski-Firey Theory I: Mixed volumes and the Minkowski Problem*, J. Differential Geom. **38** (1993), 131–150.
- [23] E. LUTWAK, *The Brunn-Minkowski-Firey Theory II*, Adv. Math. **118** (1996), 244–294.
- [24] E. LUTWAK, D. YANG, G. ZHANG, *L_p affine isoperimetric inequalities*, J. Differential Geom. **56** (2000), 111–132,
- [25] E. LUTWAK, D. YANG, G. ZHANG, *Sharp affine L_p Sobolev inequalities*, J. Differential Geom. **62** (2002), 17–38.
- [26] E. LUTWAK, D. YANG, G. ZHANG, *On the L_p -Minkowski problem*, Tran. Amer. Math. Soc. **356** (2004), 4359–4370.
- [27] E. LUTWAK, D. YANG, G. ZHANG, *Volume inequalities for subspaces of L_p* , J. Differential Geom. **68** (2004), 159–184.
- [28] E. LUTWAK, D. YANG, G. ZHANG, *L_p John ellipsoids*, Proc. London Math. Soc. **90** (2005), 497–520.
- [29] M. MEYER, E. WERNER, *On the p -affine surface area*, Adv. Math. **152** (2000), 288–313.
- [30] R. SCHNEIDER, *Convex bodies: the Brunn-Minkowski theory*, Encyclopedia of Mathematics and its Applications, Vol. **44**, Cambridge University Press, Cambridge, 2014.
- [31] E. WERNER, D.-P. YE, *New L_p affine isoperimetric inequalities*, Adv. Math. **218** (2008), 762–780.
- [32] G. ZHANG, *The affine Sobolev inequality*, J. Differential Geom. **53** (1999), 183–202.