

L_p -MIXED PROJECTION BODIES AND L_p -MIXED QUERMASSEINTEGRALS

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Abstract. In this paper, we research the L_p -mixed projection bodies by the L_p -mixed quermass-integrals. First, we give an equivalent conclusion of L_p -mixed projection bodies. Further, the Shephard type problem for the L_p -mixed projection bodies are shown.

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REFERENCES

- [1] E. D. BOLKER, *A class of convex bodies*, Trans. Amer. Math. Soc., **145** (1969), 323–345.
- [2] J. BOURGAIN AND J. LINDENSTRAUSS, *Projection bodies*, Geometric Aspects of Functional Analysis, Springer Lecture Notes in Math., **1317** (1988), p. 250–270.
- [3] N. S. BRANNEN, *Volumes of projection bodies*, Mathematika, **43** (1996), 255–264.
- [4] W. J. FIREY, *p -means of convex bodies*, Math. Scand., **10** (1962), 17–24.
- [5] R. J. GARDNER, *Geometric Tomography*, Cambridge Univ. Press, Cambridge, UK, 2nd edition, 2006.
- [6] P. R. GOODEY AND W. WEIL, *Zonoids and Generalizations*, Handbook of Convex Geometry, North-Holland, Amsterdam, 1993, pp. 1297–1326.
- [7] C. HABERL AND F. SCHUSTER, *General L_p affine isoperimetric inequalities*, J. Differential Geom., **83** (2009), 1: 1–26.
- [8] C. Q. HU, X. N. MA AND CH. L. SHEN, *On the Christoffel-Minkowski problem of Firey's p -sum*, Calc. Var. Partial Differential Equations, **21** (2004), 137–155.
- [9] G. S. LENG, C. J. ZHAO, B. W. HE AND X. Y. LI, *Inequalities for polars of mixed projection bodies*, Sci. China Ser. A, **47** (2004), 2: 175–186.
- [10] M. LUDWIG, *Projection bodies and valuations*, Adv. Math., **172** (2002), 158–168.
- [11] N. LUDWIG, *Minkowski valuations*, Trans. Amer. Math. Soc., **357** (2005), 4191–4213.
- [12] E. LUTWAK, *Mixed projection inequalities*, Trans. Amer. Math. Soc., **287** (1985), 91–106.
- [13] E. LUTWAK, *Volume of mixed bodies*, Trans. Amer. Math. Soc., **294** (1986), 487–500.
- [14] E. LUTWAK, *On quermassintegrals of mixed projection bodies*, Geom. Dedicata, **33** (1990), 51–58.
- [15] E. LUTWAK, *On a conjectured projection inequality of Petty*, Contemp. Math., **113** (1990), 171–181.
- [16] E. LUTWAK, *Inequalities for mixed projection bodies*, Amer. Math. Soc., **339** (1993), 901–916.
- [17] E. LUTWAK, *The Brunn-Minkowski-Firey theory I: mixed volumes and the Minkowski problem*, J. Differential Geom., **38** (1993), 131–150.
- [18] E. LUTWAK, D. YANG AND G. Y. ZHANG, *L_p affine isoperimetric inequalities*, J. Differential Geom., **56** (2000), 111–132.
- [19] S. J. LV AND G. S. LENG, *The L_p -curvature images of convex bodies and L_p -projection bodies*, Proc. Indian Acad. Sci. Math. Sci., **118** (2008), 413–424.
- [20] T. Y. MA AND W. D. WANG, *On the analog of Shephard problem for the L_p -projection body*, Math. Inequal. Appl., **14** (2011), 1: 181–192.
- [21] H. MARTINI, *Zur bestimmung konvexer polytope durch die inhalte ihrer projection*, Beiträge Zur Algebra und Geometrie, **18** (1984), 75–85.
- [22] S. MICHEAL, *Petty's projection inequality and Santaló's affine isoperimetric inequality*, Geom. Dedicata, **57** (1995), 285–295.

- [23] C. M. PETTY, *Projection bodies*, Proc. Coll. Convexity, Copenhagen, 1965, Københavns Univ. Math. Inst., 1967, pp. 234–241.
- [24] C. M. PETTY, *Isoperimetric problems*, Proc. Conf. Convexity and Combinatorial Geometry (Univ. Oklahoma, 1971), University of Oklahoma, 1972, pp. 26–41.
- [25] D. RYABOGIN AND A. ZVAVITCH, *The Fourier transform and Firey projections of convex bodies*, Indiana Univ. Math. Journal, **53** (2004), 667–682.
- [26] R. SCHNEIDER, *Geometric inequalities for Poisson processes of convex bodies and cylinders*, Results in Math., **11** (1987), 165–185.
- [27] R. SCHNEIDER, *Convex Bodies: The Brunn-Minkowski theory*, Cambridge Univ. Press, Cambridge, Second Expanded Edition, 2014.
- [28] W. D. WANG, F. H. LU AND G. S. LENG, *A type of monotonicity on the L_p centroid body and L_p projection body*, Math. Inequal. Appl., **8** (2005), 4: 735–742.
- [29] W. D. WANG AND G. S. LENG, *The Petty projection inequality for L_p -mixed projection bodies*, Acta Math. Sinica (English Series), **23** (2007), 8: 1485–1494.
- [30] W. D. WANG AND G. S. LENG, *Some affine isoperimetric inequalities associated with L_p -affine surface area*, Houston J. Math., **34** (2008), 2: 443–453.
- [31] W. D. WANG, G. S. LENG AND F. H. LU, *On Brunn-Minkowski inequality for the quermassintegrals and dual quermassintegrals of L_p -projection body*, Chinese Journal of Contemporary Mathematics, **29** (2008), 2: 165–176.
- [32] W. D. WANG AND G. S. LENG, *On the L_p -versions of the Petty's conjectured projection inequality and applications*, Taiwan J. Math., **12** (2008), 5: 1067–1086.
- [33] W. D. WANG AND X. Y. WAN, *Shephard type problems for general L_p -projection bodies*, Taiwan J. Math., **16** (2012), 5: 1749–1762.
- [34] G. Y. ZHANG, *Restricted chord projection and affine inequalities*, Geom. Dedicata, **39** (1991), 213–222.