

Conics in Normed Planes

ÁKOS G. HORVÁTH, HORST MARTINI

*Department of Geometry, Budapest University of Technology and Economics,
1521 Budapest, Hungary, ghorvath@math.bme.hu*

*Faculty of Mathematics, Chemnitz University of Technology, 09107 Chemnitz, Germany,
martini@mathematik.tu-chemnitz.de*

Presented by Pier L. Papini

Received February 10, 2011

Abstract: In a unified way, we study the generalized analogues of conics for normed planes by using the following natural approach: It is well known that there are different metrical definitions of conics in the Euclidean plane. We investigate how these definitions extend to normed planes, and we show that in this more general framework these different definitions yield, in almost all cases, different classes of curves.

Key words: Birkhoff orthogonality, conics, ellipses, hyperbolas, Minkowski plane, normed plane, parabolas.

AMS *Subject Class.* (2010): 46B20, 52A10, 52A21, 53A04.

REFERENCES

- [1] J. ALONSO, C. BENITEZ, Orthogonality in normed linear spaces: a survey. Part I. Main properties, *Extracta Math.* **3** (1) (1988), 1–15.
- [2] J. ALONSO, C. BENITEZ, Orthogonality in normed linear spaces: a survey. Part II. Relations between main orthogonalities, *Extracta Math.* **4** (3) (1989), 121–131.
- [3] V. BOLTYANSKI, H. MARTINI, P.S. SOLTAN, “Excursions into Combinatorial Geometry”, Universitext, Springer-Verlag, Berlin, 1997.
- [4] G.D. CHAKERIAN, M.A. GHANDEHARI, The Fermat problem in Minkowski spaces, *Geom. Dedicata* **17** (3) (1985), 227–238.
- [5] M.A. GHANDEHARI, Heron’s problem in the Minkowski plane, Technical Report **306**, Math. Dept., University of Texas at Arlington, 76019, U.S.A., 1997.
- [6] C. GROS, T.K. STREMPPEL, Topologie verallgemeinerter Kegelschnitte, *Math. Semesterber.* **44** (2) (1997), 139–151.
- [7] C. GROS, T.K. STREMPPEL, On generalizations of conics and on a generalization of the Fermat-Torricelli problem, *Amer. Math. Monthly* **105** (8) (1998), 732–743.
- [8] Á.G. HORVÁTH, On bisectors in Minkowski normed spaces, *Acta Math. Hungar.* **89** (3) (2000), 233–246.

- [9] Á.G. HORVÁTH, H. MARTINI, Bounded representation and radial projections of bisectors in normed spaces, *Rocky Mountain J. Math.*, to appear.
- [10] V.R. KAYA, Z. AKCA, I. GÜNALTILI, M. ÖCZAN, General equation for taxicab conics and their classification, *Mitt. Math. Ges. Hamburg* **19** (2000), 135–148.
- [11] H. MARTINI, K.J. SWANEPOEL, G. WEISS, The geometry of Minkowski spaces - a survey. Part I, *Exposition. Math.* **19** (2) (2001), 97–142.
- [12] H. MARTINI, K.J. SWANEPOEL, The geometry of Minkowski spaces - a survey. Part II, *Exposition. Math.* **22** (2) (2004), 93–144.
- [13] L. TAMÁSSY, K. BÉLTEKY, On the coincidence of two kinds of ellipses in Minkowskian spaces and in Finsler planes, *Publ. Math. Debrecen* **31** (3-4) (1984), 157–161.
- [14] S. WU, D. JI, J. ALONSO, Metric ellipses in Minkowski planes, *Extracta Math.* **20** (3) (2005), 273–280.