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ON RELATIVE GEOMETRIC INEQUALITIES

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Abstract. Let E be a subset of a convex, open, bounded, planar set G. Let $P(E,G)$ be the relative perimeter of E (the length of the boundary of E contained in G). We obtain relative geometric inequalities comparing the relative perimeter of E with the relative diameter of E and with its relative inradius. We prove the existence of both extremal sets and maximizers for these inequalities and describe the geometric properties of them. We also give a characterization of planar convex sets of constant width in terms of the geometric constant corresponding to the relative diameter.

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REFERENCES

[1] A. CIANCHI, *On relative isoperimetric inequalities in the plane*, Boll. Unione Mat. Italiana, **7** 3-B (1989), 289–325.
[2] H. T. CROFT, K. J. FALCONER AND R. K. GUY, *Unsolved problems in Geometry*, Springer, Berlin, 1991.
[3] G. D. CHAKERIAN AND H. GROEMER, *Convex bodies of constant width*, in: *Convexity and its applications*, 49–96, eds P. M. Gruber and J. M. Wills, Birkhäuser, Basel, 1983.
[4] C. PERI, *On relative isoperimetric inequalities*, Conferenze del Seminario di Matematica dell'Università di Bari, **279**.
[5] A. ROSENTHAL AND O. SZASZ, *Eine Extremal Eigenschaft der Kurven Konstanter Breite*, Jber. Deutsch. Math.-Vereinig. **25** (1917), 278–282.

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