

Extremal Problems for Convex Polygons

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Abstract

Consider a convex polygon V_n with n sides, perimeter P_n , diameter D_n , area A_n , sum of distances between vertices S_n and width W_n . Minimizing or maximizing any of these quantities while fixing another defines ten pairs of extremal polygon problems (one of which usually has a trivial solution or no solution at all). We survey research on these problems, which uses geometrical reasoning increasingly complemented by global optimization methods. Numerous open problems are mentioned, as well as series of test problems for global optimization and nonlinear programming codes.

Joint work with Pierre Hansen and Frédéric Messine.