

Optimal shapes with convexity constraint

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We will discuss some questions arising when optimizing shapes in the class of convex bodies. Since a convexity constraint provides compactness properties, it is generally easy to prove existence of optimal shapes in this class. On the other hand, the qualitative study of optimal shapes is hard, due to the difficulty of writing the Euler-Lagrange equation. Extracting information from optimality conditions is a serious issue. We will give some recent results concerning convex optimal shapes in two dimensions where it is possible to analytically write complete first and second order optimality conditions. We may deduce a description of a subclass of problems for which optimal shapes are always polygons, and another class for which no corner can appear at the boundary. Other situations surprising lead to $C^{1,1/2}$ -regularity at the junction between flat and strictly convex parts of the boundary.

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