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Some questions of stability in the reconstruction of plane convex bodies from projections.

(English) Zbl 0597.52001
Inverse Probl. 1, 87-97 (1985).

Let $\mathcal{K}$ be the class of all convex bodies in $\mathbb{R}^2$ and for H,K$\in \mathcal{K}$ let d(H,K) and θ (H,K) be the Hausdorff respectively Nicodym distance between H and K. The Nicodym distance is defined by $\theta(H,K) = m(H\Delta K)$, m being the Lebesgue measure on $\mathbb{R}^2$. The convex bodies H,K$\in \mathcal{K}$ are called ϵ-equichordal iff for any line r, the lengths of the segments $r \cap intH$, $r \cap intK$ differ by less than ϵ ($\epsilon > 0$).

The author gives the following two stability type results. 1) If H,K$\in \mathcal{K}$ are ϵ-equichordal then $\theta(H,K) < C\epsilon^2$, where C is an absolute constant < 14.2. In this case the above result is an improvement of a result due to *A. K. Louis* and (INVALID INPUT)F. Natterer [Proc. IEEE 71, 379-389 (1983)]. 2) If H,K$\in \mathcal{K}$ are ϵ-equichordal and $H \cap K \neq \emptyset$ then $d(H,K) < 3\epsilon$.

In the last section the author studies the convexity properties of the length of the chords of $K \in \mathcal{K}$.

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MSC:

52A10 Convex sets in 2 dimensions (including convex curves)
65N12 Stability and convergence of numerical methods for boundary value problems involving PDEs

Keywords:
reconstruction of plane convex bodies from projections; characteristic functions; stability; ϵ -equichordal

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