

A connection between the convexity and the double-layer potential

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Let Ω be a simply connected domain in the complex plane, and let $\phi : \mathbb{D} \rightarrow \Omega$ be a conformal mapping from the open unit disk \mathbb{D} onto Ω . It is well known that Ω is convex if and only if

$$\Re \left(\frac{z\phi''(z)}{\phi'(z)} \right) \geq -1, \quad z \in \mathbb{D}.$$

We show that this relation is, in fact, inherited by a single Blaschke factor, and that when considering the family of all finite Blaschke products, entirely new intrinsic properties of ϕ are revealed.

This is an ongoing research with T. Ransford, Oliver Roth and Annika Moucha.