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Existence and Regularity of a Capacitary Functions in a Minkowski Inspired Geometric Problem

Abstract: In the first part of this talk, given K a compact convex set with nonempty interior and u the A capacitary function of the complement of K, we introduce a measure μ_K (corresponding to u, A) with support in the unit sphere (denoted $\mathbf{S}^{n-1}$) of Euclidean n space $= \mathbf{R}^n$. Here $\nabla \cdot A(\nabla u) = 0$ weakly in the complement of K where $A : \mathbf{R}^n \setminus \{0\} \to \mathbf{R}^n$ is homogeneous of degree $p-1$ and satisfies p Laplacian type structure condtions for fixed $p, 1 < p < n$. Second given a finite positive Borel measure ν, defined on $\mathbf{S}^{n-1}$, with the property that (a) the support of ν is not contained in any great circle and (b) the centroid of ν is at the origin, we outline a proof that shows for certain A, there always exists K with $\nu = \mu_K$. Third, if $d\nu = g d\sigma$ where σ is surface area on $\mathbf{S}^{n-1}$, we discuss what regularity of g implies about regularity of ∂K when $\nu = \mu_K$.