Characterization of chord-arc domains via perturbation of elliptic operators

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Abstract

Let $\Omega \subset \mathbb{R}^{n+1}$, $n \geq 2$, be a 1-sided chord-arc domain, that is, a domain which satisfies interior Corkscrew and Harnack Chain conditions (these are respectively scale-invariant/quantitative versions of the openness and path-connectedness), and whose boundary $\partial\Omega$ is n-dimensional Ahlfors regular. In a recent result together with S. Hofmann and T. Toro we have shown that a for a reasonably good elliptic operator L, the A_∞ property of the associated harmonic measure implies that the domain is indeed a chord-arc domain, that is, it satisfies the exterior Corkscrew condition. The fact that in chord-arc domains the class of operators considered have A_∞ elliptic measures was shown by Kenig-Pipher. Hence, combining both results one gets a characterization of the exterior Corkscrew condition (which is geometrical/topological) in terms of the A_∞ property (which is analytical/PDE).

In this talk we will extend the class of good operators, allowing for instance non-smooth coefficients, using perturbation techniques, which extend previous work by Fefferman-Kenig-Pipher and Milakis-Pipher-Toro. More precisely, let L_0 and L be two real divergence form elliptic operators and let ω_{L_0}, ω_L be the associated elliptic measures. We show that if $\omega_{L_0} \in A_\infty(\sigma)$, where $\sigma = H^n|_{\partial\Omega}$, and L is a perturbation of L_0 (in the sense that discrepancy between L_0 and L satisfies certain Carleson measure condition), then $\omega_L \in A_\infty(\sigma)$.

Joint work with J. Cavero, S. Hofmann and T. Toro.