Analysis on non-smooth domains

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Abstract

A central theme in potential theory is understanding the extent to which the geometry of a domain influences the boundary regularity of solutions to divergence form elliptic operators. On regular domains (in Wiener's sense) one can associate to such operators a family of probability measures indexed by the points in the domain. All measures in this family are mutually absolutely continuous (in fact they are A_∞ weights with respect to one another). One refers to any one of them as the elliptic measure. To address the question of boundary regularity of the solutions of these operators one studies the properties of the corresponding elliptic measure. This has lead to the development of harmonic analysis techniques on non-smooth domains. This is achieved by combining ideas from classical harmonic analysis with techniques from geometric measure theory.

In this mini-course we will discuss the Dirichlet problem on several types of non-smooth domains (e.g. Reifenberg flat domains, chord arc domains, chord arc domains with small constant). We will discuss to extent to which the geometry of the domain determines the properties of the elliptic measure. We will also discuss the converse problem namely, the degree to which the regularity of the elliptic measure determines the geometry of the domain.