Public Abstract

First Name:Ryan

Middle Name:Joseph

Last Name:Alvarado

Adviser's First Name:Marius

Adviser's Last Name:Mitrea

Co-Adviser's First Name:

Co-Adviser's Last Name:

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The present thesis consists of two main parts which address problems at the interface of Harmonic Analysis, Geometric Analysis, and Partial Differential Equations. In the first part, we focus on ability to extend functions defined on a subset of an ambient space, which satisfy a certain smoothness property, to the entire space with preservation of regularity. Under minimal geometrical conditions on the ambient space, we are able to provide the construction of a linear extension operator capable of preserving smoothness.

In the second part, we characterize various classes of domains in terms which are purely geometric. This, in turn, this allows us to investigate how the geometry of a given domain affects the nature of the solutions to various partial differential equations. More specifically, we discuss a sharp generalization of the Hopf-Oleinik Boundary Point Principle which is used to obtain a sharp version of Hopf's Strong Maximum Principle.