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THE ELLIPTIC MEASURE IN ROUGH DOMAINS

The theory of Differential Equations in regular domains is now fairly known and is even taught at an undergraduate level. But what happens if we try to solve equations in more general domains, which are possibly rough or irregular? And how does the roughness of the domain affect those solutions?

In this text we will show some of the more renowned results in this area which, though more complicated than their classical analogues, end up showing us that elliptic differential equations can in fact be solved in really general domains and with really general boundary conditions, too. Moreover, we will describe these solutions in terms of the elliptic measure and the Green function. We will also deal with the problem of knowing whether, in this general setting, the solutions actually attain the boundary values, and in which sense they do. Lastly, we will gather lots of the previous tools to prove a very recent result which establishes a relationship between the regularity of a domain (in this case described by the A_∞ property of its elliptic measure) and the regularity of solutions of elliptic equations in that domain (analysing some estimates related with Carleson measures).