
The aim of this work is to develop, in parallel, some foundational aspects of elliptic PDEs and geometric measure theory. The main example driving the investigation is the linear Dirichlet problem for the Poisson equation, with right hand side an arbitrary finite Borel measure. This is analyzed from various angles, while developing along the way a number of fundamental tools from both fields. Topics include Sobolev techniques (in particular, traces), regularity theory, comparison methods, balayage method, capacities, strong approximation of measures, critical embedding, extremal solutions, Schrödinger operators, and Thomas-Fermi equation, among others. The various parts of the book are largely independent, so it is easily possible to select material for courses of varying focus. The text also includes a limited number of exercises with solutions, as well as appendices on Sobolev capacities and Hausdorff measure. This is a very well-designed, original, and carefully written approach to topics of great current interest.

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