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Nachdiplomvorlesung

Nonlinear aspects of Calderón-Zygmund theory

Abstract:

The classical Calderón-Zygmund theory deals with the optimal regularity properties of solutions to linear elliptic and parabolic equations. In particular, optimal integrability of solutions can be derived in terms of the assigned data. The classical approach in the linear case relies on the representation formulas via fundamental solutions and the analysis of the related singular integrals. On the other hand, the last years have witnessed the proof of a certain number of results leading to what can be called a nonlinear Calderon-Zygmund theory: the equations considered are indeed nonlinear and possibly degenerate. This is also intertwined with nonlinear potential theory, where pointwise estimates via linear and nonlinear potentials replace the use of fundamental solutions. The aim of the lectures is to give an overview of all these topics, in particular concentrating on more recent results concerning the possibility of deriving sharp potential estimates.

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