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Boundary value problems for elliptic operators with real non-symmetric coefficients

Abstract: Sharp estimates for the solutions to elliptic PDEs in L^∞ in terms of the corresponding norm of the boundary data follow directly from the maximum principle. It holds on arbitrary domains for all (real) second order divergence form elliptic operators $-div A \nabla$. The well-posedness of boundary problems in L^p , $p < \infty$, is a far more intricate and challenging question, even in a half-space. In particular, it is known that some smoothness of A in t , the transversal direction to the boundary, is needed.

In the present work we establish the well-posedness in L^p of the Dirichlet problem for all divergence form elliptic equations with real (possibly non-symmetric) coefficients independent on the transversal direction to the boundary. Equivalently, we show that for all such operators the L -harmonic measure is A^∞ with respect to the Lebesgue measure on the boundary. Previous results in this direction were restricted to the symmetric or to the lower dimensional case.

This is joint work with S. Hofmann, C. Kenig, and J. Pipher.