

Inequalities for Riesz transforms on \mathbb{R}^d

Adam Osękowski

Faculty of Mathematics, Informatics and Mechanics, University of Warsaw,
Poland

ados@mimuw.edu.pl

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Riesz transforms are fundamental examples of Calderón-Zygmund singular integral operators, given by the principal value integrals

$$R_j f(x) = \frac{\Gamma\left(\frac{d+1}{2}\right)}{\pi^{(d+1)/2}} \text{p.v.} \int_{\mathbb{R}^d} \frac{x_j - y_j}{|x - y|^{d+1}} f(y) dy$$

for $j = 1, 2, \dots, d$. There has been a considerable interest in finding the exact values (or at least good approximations) of various norms of these objects and other closely related operators. In the study of such problems, the arguments coming from the boundary of probability theory and harmonic analysis have turned out to be extremely useful and effective. The purpose of the talk is to present a survey of results in this direction. In particular, it will include sharp L^p , weak-type (p, p) and LlogL estimates for Riesz transforms and related operators.