

Sharp Estimates of Oscillatory Singular Integrals with Rough Kernels

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Abstract : In this paper, we establish sharp bounds for oscillatory singular integrals with an arbitrary real polynomial phase P . Our kernels are allowed to be rough both on the unit sphere and in the radial direction. We show that the bounds grow no faster than $\log(\deg(P))$, which is optimal and was first obtained by Parissis and Papadimitrakis for kernels without any radial roughness. Our results substantially improve many previously known results. Among key ingredients of our methods are an $L^1 \rightarrow L^2$ sharp estimate and using extrapolation.

Keywords : oscillatory singular integral, rough kernel, singular integral, orlicz spaces, block spaces, extrapolation, L^p boundedness

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