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Rough Oscillatory Singular Integrals on R^n

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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. Among key ingredients of our methods are an $L^1 \to L^2$ estimate and extrapolation.

Keywords : oscillatory singular integral, rough kernel, singular integral, Orlicz spaces, Block spaces, extrapolation, L^{p} boundedness
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