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L^p-Improving Properties for Measures on $\mathbb{R}^{4}$ Supported on Homogeneous Surfaces in Some Non Elliptic Cases

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Abstract:

In this paper we study convolution operators T_μ with measures μ in $\mathbb{R}^4$ of the form $\mu(E) = \int_B \chi_E(x, \varphi(x))\,dx$, where B is the unit ball of $\mathbb{R}^2$, and φ is a homogeneous polynomial function. If $\inf_{h\in S^1} |\det(d_x^2\varphi(h,.))|$ vanishes only on a finite union of lines, we prove that T_μ is bounded from L^p into L^q if $\left(\frac{1}{p}, \frac{1}{q}\right)$ belongs to certain explicitly described trapezoidal region.