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Fourier Restriction Estimates to Mixed Homogeneous Surfaces

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Abstract:

Let a, b be real numbers such that $2 \leq a < b$, and let $\varphi : \mathbb{R}^2 \rightarrow \mathbb{R}$ a mixed homogeneous function. We consider polynomial functions φ and also functions of the type $\varphi(x_1, x_2) = A|x_1|^a + B|x_2|^b$. Let

$\Sigma = \{(x, \varphi(x)) : x \in B\}$ with the Lebesgue induced measure. For $f \in S(\mathbb{R}^3)$ and $x \in B$, let $(\mathcal{R}f)(x, \varphi(x)) = \widehat{f}(x, \varphi(x))$, where \widehat{f} denotes the usual Fourier transform.

For a large class of functions φ and for $1 \leq p < \frac{4}{3}$ we characterize, up to endpoints, the pairs (p, q) such that \mathcal{R} is a bounded operator from $L^p(\mathbb{R}^3)$ on $L^q(\Sigma)$. We also give some sharp $L^p \rightarrow L^2$ estimates.



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