Title: **On the Representation of Mutilated Sobolev Functions**

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Abstract:

We show that ridgelets, a system introduced in Candes (1999b), are optimal to represent smooth multivariate functions that may exhibit linear singularities. For instance, let $\{u \cdot x - b > 0\}$ be an arbitrary hyperplane and consider the singular function $f(x) = 1_{\{u \cdot x - b > 0\}} g(x)$, where g is compactly supported with finite Sobolev L_2 norm $\|g\|_{H^s}$. The ridgelet coefficient sequence of such an object is as sparse as if f were without singularity, allowing optimal partial reconstructions. For instance, the n-term approximation obtained by keeping the terms corresponding to the n largest coefficients in the ridgelet series achieves a rate of approximation of order $n^{-s/d}$; the presence of the singularity does not spoil the quality of the ridgelet approximation. This is unlike all systems currently in use and especially Fourier or wavelet representations.