$\mathcal{C}^{1,\alpha}$ REIFENBERG THEOREMS FOR SETS AND MEASURES

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We provide geometric sufficient conditions for Reifenberg flat sets with holes in $\mathbb{R}^n$ to be parametrized by a $\mathcal{C}^{1,\alpha}$ map. The conditions use a Jones type square function and all statements are quantitative in that the Hölder and Lipschitz constants of the parametrizations depend on such a function. We use these results to prove sufficient conditions for higher order rectifiability of sets and measures in $\mathbb{R}^n$. Key tools for the proof come from Guy David and Tatiana Toro's parametrization of Reifenberg flat sets (with holes) in the Hölder and Lipschitz categories.