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Mean curvature flow of Reifenberg sets.

The mean curvature flow, the gradient flow of the area functional, is one of the most natural geometric flows to consider for embedded hyper-surfaces in $\mathbb{R}^{n+1}$. Classically, given a sufficiently smooth hyper-surface (for which both the area and its gradient are defined), there exists a unique flow starting from it that exists for some positive time. Moreover, the flow smooths the hyper-surface instantaneously. In the early 90s it was shown by Ecker and Huisken that the smoothness assumption can be weakened to the class of uniformly locally Lipschitz hyper-surfaces (for which the area is defined, but its gradient may not be). When $n > 1$, this is the least regular object for which the flow was known to exist.

In this talk, we will show the short time existence and uniqueness of smooth mean curvature flow in arbitrary dimension starting from (sufficiently flat) Reifenberg sets, a class which is general enough to include some fractals sets. When $n > 1$, this provides the first known example of instant smoothing, by mean curvature flow, of sets with Hausdorff dimension larger than n. (Received August 10, 2015)