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*Curves and surfaces with constant nonlocal mean curvature*

**Abstract**

The talk will be concerned with hypersurfaces of $\mathbb{R}^N$ with constant nonlocal (or fractional) mean curvature. This is the equation associated to critical points of the fractional perimeter under a volume constraint. We first prove the nonlocal analogue of the Alexandrov result characterizing spheres as the only closed embedded hypersurfaces in $\mathbb{R}^N$ with constant mean curvature. Our second result establishes the existence of periodic cylinders in $\mathbb{R}^N$ with constant nonlocal mean curvature and bifurcating from a straight cylinder. These are Delaunay type cylinders in the nonlocal setting. Here we use a Lyapunov-Schmidt procedure for a quasilinear type fractional elliptic equation. Finally, we prove the existence of different types of periodic lattices made of near-spheres and having constant nonlocal mean curvature. (These are joint works with Mouhamed M. Fall, Joan Solà-Morales, and Tobias Weth)