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Universal sets for pinned distances

An important problem in geometric measure theory is bounding the size of pinned distance sets $\Delta_x Y = \{|x - y| : y \in Y\}$. We discuss recent work on this problem in the plane which shows that, as long as the pin x satisfies certain properties, the pinned distance set of Y at x will be as large as possible. In particular we show that any compact AD-regular set X of dimension more than 1 has the property we call universality: for any Borel Y, there is an x in X such that the pinned distance set of Y at x has maximum Hausdorff dimension, i.e. $\min\{1, \dim_H(Y)\}$. We will also discuss improved bounds when no regularity assumption is made on the pin set. This is based on joint work with Don Stull.