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NON-AVERAGING SETS, DIMENSION AND POROSITY

A set of points is called non-averaging if the set does not contain the arithmetic average of any two of its points. The Cantor ternary set almost has this property. In fact, if the end points of contiguous intervals of the Cantor set are deleted, the remaining set does have this property. Several traditional ways of constructing perfect sets will not yield a set which is non-averaging unless it has Hausdorff dimension no larger than that of the Cantor set; i.e., log 2/log 3. The analogous conjecture to this effect for number theory was made by Erdos and Turam in [1]. However, Leo Moser [3] showed that this conjecture was false by producing a sequence of natural numbers which are very dense and yet non-averaging. The principal behind Moser's construction is modified in the paper [2] which forms the basis for this talk to produce a non-averaging subset of [0,1] which is large in the sense that it is of Hausdorff dimension 1. It is also shown that at the same time such a set can be small in the sense that each of its points is a point of porosity one.

1. P. Erdos and P. Turam, On Some Sequences of Integers, Proc. Lond. Math. Soc. (2) II (1936) 261-264.

2. J. Foran, Non-averaging sets, dimension and porosity, (submitted).

3. L. Moser, On non-averaging sets of integers, Can. Jour. Math (1953) 245-252.