

Ramanujan complexes and topological expanders

Alex Lubotzky

February, 11 2016

Expander graphs in general, and Ramanujan graphs, in particular, have played a major role in computer science in the last 4 decades and more recently also in pure math. In recent years a high dimensional theory of expanders is emerging. A notion of topological expanders was defined by Gromov who proved that the complete d -dimensional simplicial complexes are such. He raised the basic question of existence of such bounded degree complexes of dimension $d > 1$.

This question was answered recently (by T. Kaufman, D. Kazhdan and A. Lubotzky for $d=2$ and by T. Kaufman and S. Evra for general d) by showing that the d -skeleton of $(d+1)$ -dimensional Ramanujan complexes provide such topological expanders. We will describe these developments and the general area of high dimensional expanders.