Coboundary expansion, codes, and agreement tests

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Abstract

High dimensional expansion is a generalization of expansion in graphs to hypergraphs, simplicial complexes, and more general poset structures. Two main notions are studied: the first is a spectral notion that is related to random walks and mixing, and the second is a cohomological notion called coboundary expansion. Coboundary expansion was introduced by Linial and Meshulam, and by Gromov that combines combinatorics, topology, and linear algebra. Kaufman and Lubotzky observed its relation to "Property testing", and in recent years it has found several applications in theoretical computer science, including for error correcting codes (both classical and quantum), for PCP agreement tests, and even for studying polarization in social networks. In the talk I will introduce this notion and some of its applications. No prior knowledge is assumed, of course.

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