On Hypergraph Designs

Saad I. El-Zanati*, Illinois State University

A commonly studied problem in combinatorics concerns decompositions of graphs into edge-disjoint subgraphs. For graphs G and K, a G-decomposition of K is a partition of the edge set of K into subgraphs isomorphic to G. The problem is of most interest when both G and K are both complete graphs. Other cases though have also attracted attention. Decompositions of complete graphs into cycles, stars and trees in general are among the popular questions.

Corresponding questions for decompositions of t-uniform hypergraphs are of interest. The only general question that is settled in this case is H-decompositions of complete t-uniform hypergraphs, where H is a matching. Though, it is now known that the necessary conditions for H-decompositions of complete t-uniform hypergraphs are asymptotically sufficient.

In this talk, we will survey some of the known decomposition results and techniques for 3-uniform and 4-uniform hypergraphs and discuss how a uniformity reduction approach can in some saces help with finding decompositions of higher uniformity hypergraphs.

Keywords: hypergraph decompositions, uniformity reduction