Discrete Mathematics Seminar

Illinois State University

2:00–2:50 pm, October 29

Speaker: Hemanshu Kaul, Illinois Institute of Technology

Chromatic Number of the Square of the Kneser Graph

Kneser Graph, $K(n,k)$ with vertices for all k-subsets of $[n]$ and edges corresponding to disjoint sets, models intersecting (or rather, non-intersecting) families of sets and has been studied since at least 1886 starting with the Petersen Graph. The chromatic number of the Kneser graph was famously found by Lovász in 1978 using topological tools, answering a question of Kneser from 1955.

In 2002, Furedi asked for the chromatic number of the square of the Kneser graph. A square of a graph G includes edges between all pairs of vertices with distance at most 2 in G. For the square of the Kneser graph, $K(2k+1,k)$, it is conjectured that the chromatic number is at most $2k+c$ where c is a constant. The best result towards this conjecture, after progress over 16 years, is $(32/15)k+32$ for $k > 6$. We improve this to $2(k+1)+\lg(k)$ for all $k > 1$. We also show that the conjecture is true, with a bound of $2k+2$, for all k such that $k+1$ is a power of 2. (All terminology related to Kneser graphs will be defined and discussed in the talk.)

This is joint work with Jeong Hyun Kang, UWG.