



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PURE MATHEMATICS

Refined estimates on the clique number of generalized Paley graphs

by

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Abstract

Let $d \geq 2$ and let q be a prime power such that $q \equiv 1 \pmod{2d}$. The d -Paley graph of order q is the graph whose vertex set is the finite field F_q , where two vertices are adjacent if and only if their difference is a nonzero d -th power in F_q . Estimating the clique number of generalized Paley graphs is of special interest in arithmetic combinatorics, algebraic graph theory, analytic number theory, finite geometry, and other related areas. In this talk, I will talk about recent progress on the improvement of the clique number of these graphs. In particular, I will show that the clique number of the d -Paley graph of order q is at most $\sqrt{q}/\sqrt{d} + O(\sqrt{q}/\sqrt{p})$, where q is an odd power of a prime p . This significantly improves the best-known generic upper bound $\sqrt{q} - o(p)$ and matches with the bound $\sqrt{p}/\sqrt{d} + O(1)$ for primes p in a recent breakthrough work of Hanson and Petridis. Moreover, this new bound is asymptotically sharp for an infinite family of graphs, which leads to the further discovery of the first nontrivial instance of families of generalized Paley graphs where the clique number can be explicitly determined.

Date : 6 September 2023 (Wednesday)

Time : 4:00pm

Venue : Room 3472 (Lifts 25/26)

All are Welcome!