

## Combinatorics and Discrete Probability Seminar

*On the eigenvalues of the graphs  $D(5,q)$*

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**Abstract:** In 1995, Lazebnik and Ustimenko introduced the family of  $q$ -regular graphs  $D(k,q)$ , which is defined for any positive integer  $k$  and prime power  $q$ . The connected components of the graph  $D(k, q)$  have provided the best-known general lower bound on the size of a graph for any given order and girth to this day. Furthermore, Ustimenko conjectured that the second largest eigenvalue of  $D(k, q)$  is always less than or equal to  $2\sqrt{q}$ , indicating that the graphs  $D(k,q)$  are almost Ramanujan graphs. In this talk, we will discuss some recent progress on this conjecture. This includes the result that the second largest eigenvalue of  $D(5,q)$  is less than or equal to  $2\sqrt{q}$  when  $q$  is an odd prime power. This is joint work with Vladislav Taranchuk.

Monday, November 4 at 3:00 PM in 1227 SEO