

The second largest eigenvalue of Cayley graphs

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This talk is largely based on joint work with Yuxuan Li and Binzhou Xia.

It is well known that the second largest eigenvalue of Cayley graphs plays an important role in many applications. In the world of random processes, Aldous' spectral gap conjecture asserts that on any graph the random walk process and the random interchange process have the same spectral gap. In the unweighted case this is equivalent to saying that for any set T of transpositions in S_n , the Cayley graph $\text{Cay}(S_n, T)$ has the same spectral gap as the graph with vertex set $[n]$ and edges $\{i, j\}$ for $(i, j) \in T$. Proved by Caputo, Liggett and Richthammer (2010) in its general form, Aldous' conjecture has inspired much interest in the second largest eigenvalue of Cayley graphs in recent years. In this talk I will give an overview of recent research on the second largest eigenvalue of some Cayley graphs with a focus on Aldous' conjecture and its generalizations.