

# On the extremal number of face-incidence graphs

*Thursday, 29 August 2024 17:00 (30 minutes)*

The  $(k, r)$ -incidence graph of a regular polytope  $\mathcal{P}$  is the bipartite incidence graph between  $k$ -faces and  $r$ -faces of  $\mathcal{P}$ . We obtain a general upper bound and a corresponding supersaturation result for the extremal number of the  $(k, r)$ -incidence graph of any regular polytope.

This generalises recent results of Janzer and Sudakov, who obtained the same bound for hypercubes and bipartite Kneser graphs, and confirms the conjecture of Conlon and Lee on the extremal number of  $K_{d,d}$ -free bipartite graphs for certain  $(k, r)$ -incidence graphs.

Our proof, based on the reflection group method developed by Conlon and Lee, presents the method in a purely algebraic manner.

As a consequence, this puts a number of results, including the Janzer-Sudakov theorem, the Conlon-Lee theorem on weakly norming graphs, and Coregliano's theorem on Sidorenko's conjecture, in the unified framework and simplifies all the proofs.

Joint work with David Conlon and Joonkyung Lee.

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