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Regularity and projective dimension of toric ideals of bipartite graphs

The regularity and projective dimension of combinatorially-defined ideals are frequently-studied invariants in combinatorial commutative algebra. In particular, much work has been done towards understanding the values these invariants can achieve for toric ideals I_G associated with a graph G. In this talk, we fully describe the possible values of these invariants for I_G as G ranges over all bipartite graphs on a fixed number of vertices. As a corollary, we show that any pair of positive integers can be realized as the regularity and projective dimension of a toric ideal of a bipartite graph. Finally, we demonstrate how our main result allows us to completely determine the values all five major invariants studied in the literature for this family of graphs.