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Regularity of the vanishing ideal over a parallel composition of paths

In 2011, Renteria, Simis and Villarreal introduced a new class of binomial ideals associated to graphs. One associates to a simple graph, G, the vanishing ideal of a subset of a projective space over a finite field, parameterized by the edges of G. The algebraic invariants of the ideal are then naturally related to the invariants of the series of evaluation codes obtained from the parameterized subset. In particular, we know that their regularity is the upper limit for the order of a nontrivial linear code in the series.

The focus of our talk will be rather the link between the regularity of the ideal and the combinatorial invariants of G. We will report on a recent joint work with A. Macchia, M. Vaz Pinto and R. Villarreal in which we compute the regularity in the case of a 2-connected graph given by a parallel composition of an arbitrary number of paths. Our results give evidence for the existence of a relation between the regularity of the ideal and a nontrivial invariant of G.