

Bounds on the number of generators of prime ideals

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Let P be a non-degenerate homogeneous prime ideal of height h in a standard graded polynomial ring over a field K . When K is algebraically closed, a classical result attributed to Castelnuovo establishes an upper bound, which only depends on h , on the number of linearly independent quadrics contained in P . In joint work with Giulio Caviglia, we extend Castelnuovo's result by proving that the number of minimal generators of P in any degree j can be bounded above by an explicit function that only depends on j and h . In addition to providing a bound for generators in any degree j , not just for quadrics, our techniques allow us to drop the assumption that K is algebraically closed. In addition, we obtain analogous upper bounds on all graded Betti numbers of any radical ideal.