LAURA GHEZZI, New York City College of Technology–CUNY, 300 Jay Street, N711, Brooklyn, NY 11201

A generalization of the Strong Castelnuovo Lemma

We consider a set $X$ of distinct points in the $n$-dimensional projective space over an algebraically closed field $k$. Let $A$ denote the coordinate ring of $X$, and let $a_i(X) = \dim_k \text{Tor}_i^A(A, k)_{i+1}$. Green’s Strong Castelnuovo Lemma (SCL) shows that if the points are in general position, then $a_{n-1}(X) \neq 0$ (that is, there are linear syzygies up to order $n - 1$) if and only if the points are on a rational normal curve. Cavaliere, Rossi and Valla conjectured that if the points are not necessarily in general position the possible extension of the SCL should be the following: $a_{n-1}(X) \neq 0$ if and only if either the points are on a rational normal curve or in the union of two linear subspaces whose dimensions add up to $n$. In this work we prove the conjecture.