CASTELNUOVO-MUMFORD REGULARITY AND MULTISECANT LINES

EUISUNG PARK (KOREA UNIVERSITY)

Abstract. For a closed subscheme $X \subset \mathbb{P}^r$, let $\ell(X)$ denote the largest integer ℓ such that X admits a proper ℓ-secant line. Thus X always satisfies the inequality

$$\mathrm{reg}(X) \geq \ell(X). \tag{1}$$

Also, if $\mathrm{reg}(X) = \ell(X)$ then we get an intuitive and geometric grasp of the reason why X fails to be $(\mathrm{reg}(X)-1)$-regular. In this talk, we will speak about two kind of results. First, we will explain the following

Theorem 0.1. *Let $X \subset \mathbb{P}^r$ be a nondegenerate finite subscheme of length $d \geq r+3$. If $\mathrm{reg}(X) \geq \frac{d-r+5}{2}$, then $\ell(X) = \mathrm{reg}(X)$.*

Then we will describe the shape of the minimal free resolution of X completely when X is a finite scheme of maximal regularity and when X is a curve of maximal regularity which is contained in a rational normal surface scroll.