

DIFFERENTIAL METHODS FOR 0-DIMENSIONAL SCHEMES

MARTIN KREUZER

Given a 0-dimensional subscheme X in P^n , the traditional way to study the geometry of X is to look at algebraic properties of its homogeneous coordinate ring $R = K[x_0, \dots, x_n]/I_X$ and the structure of the canonical module of R . Here we introduce and exploit a novel approach: we look at the Kaehler differential algebra $\Omega_{R/K}$ which is the exterior algebra over the Kaehler differential module $\Omega_{R/K}^1$ of X . Based on a careful examination of the embedding of R into its normal closure and the corresponding embedding of $\Omega_{R/K}^1$, we provide new bounds for the regularity index of the Kaehler differential module and connect it to the geometry of X in low embedding dimensions.