Abstract

In Chapter 1, some necessary definitions and results from commutative algebra are given along with a description on the progress towards the Stanley decompositions of multigraded $S$-modules, where $S = K[x_1, \ldots, x_n]$ is a polynomial ring in $n$ variables over a field $K$.

In Chapter 2, we study the behavior of Stanley decompositions and of pretty clean filtrations under reduction modulo a regular element. We prove that the Stanley depth of cyclic module drop by one under reduction modulo a regular element. We see that the cyclic module is pretty clean if and only if the reduction modulo a regular element is pretty clean. We also discuss the behavior of depth, Stanley depth and dimension on algebra tensor products.

In Chapter 3, it is shown that to what extend Stanley depth behaves like ordinary depth under reduction modulo an element and is clarified the different behavior of the two concepts by some examples. We discuss the behavior of depth, Stanley depth and dimension along short exact sequences of finitely generated multigraded $S$-modules.