Abstract

In this thesis we classify all unmixed monomial ideals I of codimension 2 which are generically a complete intersection and which have the property that the symbolic power algebra $A(I)$ is standard graded. We give a lower bound for the highest degree of a generator of $A(I)$ in the case that I is a modification of the vertex cover ideal of a bipartite graph, and show that this highest degree can be any given number. We furthermore give an upper bound for the highest degree of a generator of the integral closure of $A(I)$ in the case that I is a monomial ideal which is generically a complete intersection.

Minh and Trung presented criteria for the Cohen-Macaulayness of a monomial ideal in terms of its primary decomposition. We extend their criteria to characterize the unmixed monomial ideals for which the equality $\operatorname{depth}(S/I) = \operatorname{depth}(S/\sqrt{I})$ holds. As an application we characterize all the pure simplicial complexes Δ which have rigid depth, that is, which satisfy the condition that for every unmixed monomial ideal $I \subset S$ with $\sqrt{I} = I_\Delta$ one has $\operatorname{depth}(I) = \operatorname{depth}(I_\Delta)$.

It is shown that a squarefree principal Borel ideal satisfies the persistence property for the associated prime ideals. For the graded maximal ideal we compute the index of stability with respect to squarefree principal Borel ideals and determine their stable set of associated prime ideals.