ABSTRACT

In the first chapter some basic notions and results from commutative algebra are being introduced along with a description on the progress towards the Stanley's conjecture.

In the second chapter, we have shown that the Stanley's conjecture holds for a polynomial ring over a field in four variables. In the case of polynomial ring in five variables, we prove that the monomial ideals with all associated primes of height two, are Stanley ideals. Moreover we have introduced the Janet's algorithm for the Stanley decomposition of a monomial ideal $I \subset S = K[x_1, ..., x_n]$ and prove that Janet's algorithm gives the squarefree Stanley decomposition of S/I for a squarefree monomial ideal I. We have also shown that the Janet's algorithm gives a partition of a simplicial complex.

In the third and last chapter, we have shown that the regularity of monomial ideals of $K[x_1, \ldots, x_n]$ (K being a field), whose associated prime ideals are totally ordered by inclusion is upper bounded by a linear function in n.