

# Abstract

The primary decomposition methods of Eisenbud, Huneke and Vasconcelos are analysed in detail providing proofs of important theorems and all the corresponding algorithms are programmed in the language of SINGULAR. Moreover, we investigated the parallelization of two modular algorithms. In fact, we consider the modular computation of Gröbner bases (resp. standard bases) and the modular computation of the associated primes of a zero-dimensional ideal and describe their parallel implementation in SINGULAR. The algorithms of Shimoyama and Yokoyama for primary decomposition of ideals are generalized to submodules of a free module over the polynomial ring in several variables with coefficients in a field. The algorithms are implemented in SINGULAR.