PhD Thesis

Title :

"Des méthodes symboliques-numériques et exactes pour la factorisation absolue des polynômes en deux variables"

Jury :

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This thesis is about absolute factorization algorithms. The first chapter is a survey on this topic, and then we describe our contributions. They are divided in two parts.

The first part corresponds to the symbolic-numeric study. We give a method which allows us to get an exact absolute factorization from an approximate one. Next, this method is used to get an absolute polynomial factorization algorithm. This algorithm uses ideas developped by A. Galligo, D. Rupprecht, and M. van Hoeij. Thanks to the LLL algorithm, it allows us to get the absolute factorization for polynomials with big degree (bigger than 100). It was impossible before.

In the second part, we give two algorithms. The first one adapt a "lifting and recombination" scheme to the Gao's algorithm. We get then a new algorithm with a better complexity than the Gao's one. The second one is a Las Vegas algorithm. It is an absolute irreducibility test for polynomials with integer coefficients. This algorithm use modular computations, and the shape of the Newton's polytope.

Keywords : polynomials with several variables, absolute factorization, symbolic-numeric algorithm, symbolic algorithm, LLL, Newton's polytope.