Presentation of "The Gröbner Cover"

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I present the book “The Gröbner Cover” [6], that will be published during the present year. The contents are the following:

Preface
1. Preliminaries

Part 1. Theory
2. Constructible sets
3. Comprehensive Gröbner Systems
4. I-regular functions on a locally closed set
5. The Canonical Gröbner Cover

Part 2. Applications
6. Automatic Deduction of Geometric Theorems
7. Geometric Loci
8. Geometric Envelopes

Appendix
Bibliography

The genesis of this book is paper [7] for studying parametric polynomial systems.

Part 1 Theory: contains all the necessary tools to prove the existence and computation methods for obtaining the Canonical Gröbner Cover of a parametric polynomial system; particularly, in Chapter 3, we provide the definitions and computation methods for obtaining all the canonical representations of constructible sets [3] and locally closed sets, that are used in Chapter 5 to obtain the Gröbner Cover, as well as for defining and computing all the algorithms provided in Part 2.

Part 2 Applications: contains three natural and interesting applications. Chapter 6 develops a new algorithm for Automatic Deduction of Geometric Theorems (ADGT) that, given a common geometric proposition of the form \((H \land \neg H_1) \Rightarrow (T \land \neg T_1)\), determines complementary hypothesis for the proposition to become a Theorem. The approach to this application was initiated in [5], but the new algorithm has not yet been published. Concerning Chapter 7, we introduced in [1] the taxonomy of the irreducible components of a Geometric Locus, which is determined by our locus algorithm. The content of Chapter 8, which has not yet been published either, generalizes the classical definitions, theorems and algorithms [2] for determining the envelope of a family of hyper-surfaces with more degrees of freedom than usual. Moreover, a new algorithm for determining the irreducible algebraic components of the envelope, as well as two other algorithms for approaching the real projection of the envelope are provided.

All the algorithms described in the text are implemented in the Singular library “grobcov.lib” [8], whose latest implementation can be downloaded from the web [4]. The book can also be used as a User Manual for the library.
In the talk I will present some examples using the new algorithms to show their utility and I will give a general outlook about the book.

**Keywords:** Parametric Polynomial System, Canonical Discussion, Parametric Gröbner System, Gröbner System.

**References**


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