

GC\_ReadmeN10 for the grobcov.lib library  
Release N10 (June 2020)

After downloading **grobcov** you will obtain  
The file grobcovN10.zip.  
Extracting it you will obtain the folder grobcovN10.

- Folder grobcovN10 contents:

- 1) grobcov.lib (version N10 of the library),
- 2) The file GC\_EXAMPLES.sg,  
to be read in Singular and it uses grobcov.lib:
- 3) The file GC\_HELPS.sg  
to be read in Singular and it uses grobcov.lib:

Copy these 3 files into your Singular directory.

You can execute in Singular

- LIB "grobcov.lib";
- <"GC\_EXAMPLES.sg";
- <"GC\_HELPS.sg";

That will help you as guide for the use of the library

These files are given to facilitate the use of the Singular  
grobcov.lib library, programmed by Antonio Montes and containing the  
Montes-Wibmer algorithm for computing the Gröbner cover of a parametric ideal.

If you want to obtain the latest actualization of the library grobcov.lib, you can  
download it from the web:

<https://mat.upc.edu/en/people/antonio.montes/>  
containing the files described here. The basic routines are:

grobcov, cgsdr, extendGC, extendpoly,  
pdivi, pnormalf, Crep, Prep, PtoCrep,  
ConsLevels, Levels, DifConsLCSets, Grob1Levels,  
locus, stdlocus, lodusdg, locusto, discrim,  
envelop, AssocTanToEnv, FamElemsAtEnvCompPoints  
ADGT, intersectpar,  
WLemma

The new version N10 includes procedures for computing:

- Comprehensive Groebner System (CGS) (Kapur-Sun-Wang),
- canonical Groebner Cover of a parametric ideal (grobcov) (Montes-Wibmer),
- canonical union and representation of constructible sets (Brunat-Montes)
- Automatic Deduction of Geometric Theorems (ADGT)
- loci computation with their taxonomies (Abanades, Botana, Montes, Recio) and applications to dynamic geometry,
- envelop computation and taxonomy (Montes et al.) and applications to dynamic geometry.

The book:

"The Gröbner Cover". A. Montes. Algorithms and Computation in Mathematics, 27. Springer (2019) can be used as Manual of the library.

Articles describing algorithms included in the library are:

- Comprehensive Groebner System (GCS) (KSW algorithm):

D. Kapur, Y. Sun, and D.K. Wang.

"A New Algorithm for Computing Comprehensive Groebner Systems".  
Proceedings of ISSAC'2010, ACM Press, (2010), 29-36.

- Groebner Cover of a parametric ideal :

A. Montes, M. Wibmer.

"Groebner Bases for Polynomial Systems with Parameters."  
Journal of Symbolic Computation 45 (2010) 1391 - 1425.

- Loci computation:

Abanades, Botana, Montes, Recio:

"An Algebraic Taxonomy for Locus Computation in Dynamic Geometry".  
Computer-Aided Design 56 (2014) 22-33.

- Canonical representation of constructible sets:

A. Montes, J.M. Brunat,

"Computing the canonical representations of constructible sets".  
Math. Comput. Sci (2016) 10:165-178.

- ADGT:

A. Montes,

"Automatic Deduction of Geometric Theorems using the Gröebner Cover",  
Proceedings of EACA 2018.

- Envelop computation: (see the book)