

CoCoALib - Feature #1212

New function: GBasisByHomog

05 Aug 2018 16:41 - Anna Maria Bigatti

Status:	Closed	Start date:	05 Aug 2018
Priority:	Normal	Due date:	
Assignee:	Anna Maria Bigatti	% Done:	100%
Category:	New Function	Estimated time:	8.00 hours
Target version:	CoCoALib-0.99850	Spent time:	7.70 hours
Description			
Implement GBasis computation via homogenization			
Related issues:			
Related to CoCoALib - Slug #1105: Primary Decompositon (zero-dim) slow cases		Closed	02 Oct 2017
Related to CoCoALib - Feature #1094: Revive code for SelfSaturating GBasis		In Progress	09 Aug 2017
Related to CoCoA-5 - Slug #1114: Some other examples for 0-dim radical		Closed	31 Oct 2017
Related to CoCoA-5 - Bug #1230: PrimaryDecomposition with lex ordering		Closed	19 Oct 2018
Related to CoCoALib - Bug #1379: Fails to recognize zero-dim ideal		Closed	27 Dec 2019
Related to CoCoALib - Bug #1423: Radical 0-dim NYI? missing case for GBasisB...		Closed	25 Feb 2020
Related to CoCoALib - Feature #1434: GBasisByHomog for DegLex		Closed	04 Mar 2020

History

#1 - 05 Aug 2018 16:41 - Anna Maria Bigatti

- Related to Slug #1105: Primary Decompositon (zero-dim) slow cases added

#2 - 05 Aug 2018 16:42 - Anna Maria Bigatti

- Related to Feature #1094: Revive code for SelfSaturating GBasis added

#3 - 05 Aug 2018 18:21 - Anna Maria Bigatti

- Target version changed from CoCoALib-0.99600 to CoCoALib-0.99650 November 2019

Implemented for the case ordering is StdDegRevLex (SparsePolyOps-ideal.C).  
This is enough for PrimaryDecomposition slug [#1105](#).

General case postponed.

#4 - 05 Aug 2018 18:21 - Anna Maria Bigatti

- % Done changed from 10 to 60

#5 - 06 Aug 2018 16:08 - Anna Maria Bigatti

- Subject changed from New function: GBasisViaHomog to New function: GBasisByHomog

#6 - 06 Aug 2018 16:08 - Anna Maria Bigatti

- Related to Slug #1114: Some other examples for 0-dim radical added

#7 - 22 Oct 2018 16:04 - Anna Maria Bigatti

- Related to Bug #1230: PrimaryDecomposition with lex ordering added

#8 - 01 Oct 2019 12:11 - John Abbott

- Target version changed from CoCoALib-0.99650 November 2019 to CoCoALib-0.99700

#### #9 - 27 Dec 2019 16:44 - Anna Maria Bigatti

- Related to Bug #1379: Fails to recognize zero-dim ideal added

#### #10 - 27 Dec 2019 16:48 - Anna Maria Bigatti

I had implemented a *trick* which I believed would be enough for interreducing (compute the GB twice). But it is not (see [#1379](#)): indeed it is not even minimal (with lex).

```
Use QQ[x,y,z], Lex;
I := ideal(y*z -2*z^5 -2*z^4 +2*z^3, y^2 -16*z^5 -12*z^4 +12*z^3 +12*z^2, x*y -2*x*z -5*y +6*z^5 +2*z^3 -8*z
^2 +10*z, x^2 +10*x*z -10*x -51*z^5 +74*z^4 +16*z^3 -14*z^2 -50*z +25, x*z^2 -x*z +5*z^5 -6*z^4 -4*z^3 +5*z,
z^6 -z^5 -z^4 +z^2, z^3 -z -1);
GBasisByHomog(I);
--> [y -4*z -2, x -z^2, x*z -z -1, x^2 -z^2 -z, z^3 -z -1]
```

#### #11 - 27 Dec 2019 18:49 - Anna Maria Bigatti

The trick didn't work ... they usually don't.  
Fixed interreduction

#### #12 - 27 Dec 2019 19:20 - Anna Maria Bigatti

checked-in. Made new pre-release for Mac.

#### #13 - 27 Dec 2019 19:21 - Anna Maria Bigatti

- Estimated time changed from 5.00 h to 8.00 h

#### #14 - 13 Jan 2020 18:23 - Anna Maria Bigatti

This works fine now, but only for few orderings.  
The general case will not be done for this release. Postponing.

#### #15 - 13 Jan 2020 18:24 - Anna Maria Bigatti

- Target version changed from CoCoALib-0.99700 to CoCoALib-0.99800

#### #16 - 25 Feb 2020 18:27 - Anna Maria Bigatti

- Related to Bug #1423: Radical 0-dim NYI? missing case for GBasisByHomog added

#### #17 - 25 Feb 2020 18:28 - Anna Maria Bigatti

Urgent: DegLex (should be easy)

#### #18 - 04 Mar 2020 19:36 - Anna Maria Bigatti

- Related to Feature #1434: GBasisByHomog for DegLex added

#### #19 - 07 Mar 2020 08:51 - Anna Maria Bigatti

- % Done changed from 60 to 70

Notes for me. In general: M matrix ordering.

If first row of M all positive

m m m 1

M 0

otherwise

1 1 1 1

1 1 1 0

M 0

and then call MakeTermOrd so make it square

**#20 - 04 Feb 2022 22:22 - John Abbott**

- Target version changed from CoCoALib-0.99800 to CoCoALib-0.99850

**#21 - 22 Mar 2024 14:32 - Anna Maria Bigatti**

- Status changed from In Progress to Closed

- % Done changed from 70 to 100

Good thing I wrote [#1212-19](#)! My first implementation was wrong (embarrassing).

Now all implemented and I added a CoCoA-5 test: test-GB.cocoa5