

## CoCoA-5 - Support #1478

### HilbertBasis: clarify

06 Aug 2020 16:34 - John Abbott

<b>Status:</b>	Closed	<b>Start date:</b>	06 Aug 2020
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>	Anna Maria Bigatti	<b>% Done:</b>	100%
<b>Category:</b>	Manual/documentation	<b>Estimated time:</b>	0.50 hour
<b>Target version:</b>	CoCoA-5.4.0	<b>Spent time:</b>	0.50 hour

**Description**  
Andraschko writes...

Solving linear Diophantine systems of equations with Normaliz. According to Prof. Kreuzer, it is possible to compute Hilbert Bases using the Nmz-functions from CoCoA, but I didn't find anything useful yet. E.g. the function NmzHilbertBasis doesn't do anything useful for me - I also have no idea what a "Hilbert-Gordan Basis" is (not even Google does).

**Related issues:**

Related to CoCoA-5 - Design #1194: Rename HilbertBasisKer into LinKerHilbertB...	<b>Rejected</b>	<b>25 Jun 2018</b>
Related to CoCoA-5 - Support #225: HilbertBasis: cocoa vs normaliz	<b>Closed</b>	<b>10 Sep 2012</b>
Related to CoCoA-5 - Feature #1596: Add CoCoA5 function NmzHilbertBasisKer	<b>Resolved</b>	<b>14 May 2021</b>

### History

#### #1 - 06 Aug 2020 16:34 - John Abbott

- Related to Design #1194: Rename HilbertBasisKer into LinKerHilbertBasis? added

#### #2 - 06 Aug 2020 16:34 - John Abbott

- Related to Support #225: HilbertBasis: cocoa vs normaliz added

#### #3 - 08 May 2021 17:14 - Anna Maria Bigatti

It seems that

```

/**/ M:= matrix(ZZ,
      [[3, -1, 1, 0],
       [-1, 1, 0, 1]]);
/**/ NmzHilbertBasis(M);
matrix(ZZ,
      [[-1, 1, 0, 1],
       [3, -1, 1, 0]])

```

gives the wrong answer (gives the 2 vectors in M). The code in ExternalLibs-Normaliz.C seems right (line 248). I tried to guess how to call NmzComputation, but our manual is not sufficient to understand how to do it

```

/**/ M:= matrix(ZZ,
      [[3, -1, 1, 0],
       [-1, 1, 0, 1]]);
/**/ cone := record[Generators := M];

/**/ /**/ NmzComputation(cone, ["HilbertBasis"]);
--> ERROR: Some error in the normaliz input data detected: Unknown type "Generators"!
--> [CoCoALib] NmzComputation
--> /**/ NmzComputation(cone, ["HilbertBasis"]);
-->

```

investigate, and improve manual for NmzComputation.

**#4 - 14 May 2021 16:50 - Anna Maria Bigatti**

- Related to Feature #1596: Add CoCoA5 function `NmzHilbertBasisKer` added

**#5 - 14 May 2021 17:03 - Anna Maria Bigatti**

Anna Maria Bigatti wrote:

It seems that

[...]

gives the wrong answer (gives the 2 vectors in M). The code in `ExternalLibs-Normaliz.C` seems right (line 248).

I tried to guess how to call `NmzComputation`, but our manual is not sufficient to understand how to do it

[...]

investigate, and improve manual for `NmzComputation`.

That is right. There is now the new function `NmzHilbertBasisKer` [#1596](#)

**#6 - 23 Feb 2022 12:28 - John Abbott**

- Status changed from *New* to *Closed*

- Assignee set to *Anna Maria Bigatti*

- Target version changed from *CoCoA-5.4.2* to *CoCoA-5.4.0*

- % Done changed from *0* to *100*

- Estimated time set to *0.50 h*

This has been completely resolved by introducing the new function `NmzHilbertBasisKer` (see issue [#1596](#)).

The new fn will soon be added to doc.

Closing.