

## CoCoA-5 - Slug #1581

### Slow sqfr: rad(f)

02 Mar 2021 08:35 - John Abbott

<b>Status:</b>	New	<b>Start date:</b>	02 Mar 2021
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assignee:</b>		<b>% Done:</b>	0%
<b>Category:</b>	enhancing/improving	<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>	CoCoA-5.4.2	<b>Spent time:</b>	0.75 hour
<b>Description</b>			
This poly arises in the first computation from issue <a href="#">#948</a> . CoCoA takes too long to compute its radical:			
<pre>use ZZ/(101)[c[0..23]]; f := c[3]*c[7]*c[19]^3 -c[3]*c[14]*c[19]^3 +c[6]*c[14]*c[19]^3 +3*c[2]*c[15]*c[19]^3 -c[9]*c[17]*c[19]^3 +c[5]*c[18]*c[19]^3 +c[1]*c[19]^4 -2*c[14]*c[17]*c[19]^2*c[21] +c[17]^2*c[19]^2*c[21] +3*c[13]*c[18]*c[19]^2*c[21] +2*c[5]*c[19]^3*c[21] -c[7]*c[15]*c[19]*c[21]^2 +2*c[15]*c[17]*c[19]*c[21]^2 -3*c[13]*c[19]^2*c[21]^2 +2*c[7]*c[15]^2*c[18]*c[22] -4*c[7]*c[14]*c[15]*c[19]*c[22] -c[3]*c[15]^2*c[19]*c[22] +c[6]*c[15]^2*c[19]*c[22] +5*c[7]*c[15]*c[17]*c[19]*c[22] -c[15]*c[17]^2*c[19]*c[22] -3*c[7]*c[13]*c[19]^2*c[22] +c[13]*c[14]*c[19]^2*c[22] -c[5]*c[15]*c[19]^2*c[22] -c[7]*c[15]^2*c[21]*c[22] +2*c[15]^2*c[17]*c[21]*c[22] -4*c[13]*c[15]*c[19]*c[21]*c[22] -c[13]*c[15]^2*c[22]^2 +2*c[7]*c[14]*c[15]*c[18]*c[23] +2*c[3]*c[15]^2*c[18]*c[23] -2*c[6]*c[15]^2*c[18]*c[23] -c[3]*c[7]*c[15]*c[19]*c[23] -3*c[2]*c[15]^2*c[19]*c[23] +2*c[3]*c[15]*c[17]*c[19]*c[23] -3*c[6]*c[15]*c[17]*c[19]*c[23] -c[7]*c[17]^2*c[19]*c[23] -c[14]*c[17]^2*c[19]*c[23] +2*c[17]^3*c[19]*c[23] -2*c[13]*c[14]*c[18]*c[19]*c[23] +48*c[3]*c[13]*c[19]^2*c[23] -50*c[6]*c[13]*c[19]^2*c[23] +49*c[9]*c[13]*c[19]^2*c[23] +3*c[5]*c[17]*c[19]^2*c[23] -c[7]*c[14]*c[15]*c[21]*c[23] -c[3]*c[15]^2*c[21]*c[23] +c[6]*c[15]^2*c[21]*c[23] +3*c[7]*c[15]*c[17]*c[21]*c[23] -2*c[15]*c[17]^2*c[21]*c[23] +c[13]*c[15]*c[18]*c[21]*c[23] +50*c[7]*c[13]*c[19]*c[21]*c[23] +c[13]*c[14]*c[19]*c[21]*c[23] -3*c[5]*c[15]*c[19]*c[21]*c[23] +49*c[13]*c[17]*c[19]*c[21]*c[23] +49*c[7]*c[13]*c[15]*c[22]*c[23] +2*c[13]*c[14]*c[15]*c[22]*c[23] +c[5]*c[15]^2*c[22]*c[23] +49*c[13]*c[15]*c[17]*c[22]*c[23] -46*c[13]^2*c[19]*c[22]*c[23] -49*c[11]*c[13]^2*c[23]^2 -49*c[7]*c[13]*c[14]*c[23]^2 -49*c[3]*c[13]*c[15]*c[23]^2 -49*c[6]*c[13]*c[15]*c[23]^2 -c[5]*c[14]*c[15]*c[23]^2 -c[1]*c[15]^2*c[23]^2 -2*c[7]*c[13]*c[17]*c[23]^2 +c[13]*c[14]*c[17]*c[23]^2 +50*c[13]*c[17]^2*c[23]^2 -3*c[13]^2*c[18]*c[23]^2 -50*c[5]*c[13]*c[19]*c[23]^2 +2*c[13]^2*c[21]*c[23]^2 +4*c[14]*c[16]*c[19]^2 -2*c[16]*c[17]*c[19]^2 -6*c[12]*c[18]*c[19]^2 -5*c[4]*c[19]^3 +4*c[7]*c[15]*c[19]*c[20] -8*c[15]*c[17]*c[19]*c[20] +6*c[13]*c[19]^2*c[20] +3*c[12]*c[19]^2*c[21] -4*c[15]^2*c[16]*c[22] +8*c[12]*c[15]*c[19]*c[22] -6*c[7]*c[15]*c[16]*c[23] +4*c[15]*c[16]*c[17]*c[23] -2*c[12]*c[15]*c[18]*c[23] +c[7]*c[12]*c[19]*c[23] +6*c[4]*c[15]*c[19]*c[23] +3*c[13]*c[16]*c[19]*c[23] -2*c[13]*c[15]*c[20]*c[23] +c[12]*c[15]*c[21]*c[23] +48*c[12]*c[13]*c[23]^2;</pre>			
<b>Related issues:</b>			
Related to CoCoA-5 - Bug #1567: Radical in non-zero char		Closed	21 Jan 2021
Related to CoCoA-5 - Slug #948: radical is slow (compared to singular) on the...		Closed	18 Oct 2016

### History

#### #1 - 04 Mar 2021 17:06 - John Abbott

Problem arose while computing radical of 1st example in issue [#948](#)  
The critical line was 151 in radical.cpkg5

```
I := ideal([rad(K) | K In gens(I)]) + ideal([rad(K) | K In GBasis(I)]);
```

#### #2 - 04 Mar 2021 17:14 - Anna Maria Bigatti

- Related to Bug #1567: Radical in non-zero char added

**#3 - 04 Mar 2021 17:16 - John Abbott**

- Related to Slug #948: radical is slow (compared to singular) on these examples added

**#4 - 12 Oct 2021 09:22 - John Abbott**

**2021-10-12** this is still a problem.

Presumably the problem comes from computing a multivariate gcd over a finite field (which involves computing a GBasis... and the GBasis is slow). I read the input in the description and then proceeded with:

```
SetVerbosityLevel(100);  
r := radical(f);
```

[stopped after about 230s]