

# **noropd**

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noropd User's Manual  
Edition 1.0  
Feb 2011

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## 1 羣脰茹 c 宴若 noro\_pd.rr

ヤ , asir-contrib 宴若吾 蚊 , 羣脰宴若 'noro\_pd.rr' ヤ 茯 . 宴若吾 餞帥 , 障 'noro\_pd.rr' 若.

```
[1539] load("noro_pd.rr");
```

宴若吾 醇違若喝冴 , noro\_pd. ヤ.

### 1.1 羣脰茹

#### 1.1.1 noro\_pd.syci\_dec

```
noro_pd.syci_dec(I,vars[|options|])
```

ヤ I 脰茹 c 荐膊.

```
return [QL(1),QL(2),...] 鴻, QL(i) [[Q(i1),P(i1)],[(i2),P(i2)],...] 鴻.
```

I 素綰 鴻

vars 素違 鴻

options 箏 .

- ヤ I 脰茹 c 荐膊. 'noro\_pd.rr' 茗 羣脰茹 c 眼 冴 SYCI 眼 冴 若違 , 'primdec' 茗 Shimoyama-Yokoyama (SY 眼 冴) 壕 .  
ヤ I 絮脰ヤ Ass(I) 電 < : A(1) 罐球篁絮脰ヤ , Ass(I) A(1),...,A(i-1) ヤ 賢 サ絨 A(i) . SYCI 眼 冴, A(i) i 荐膊ヤ, 絲上羣脰 荐膊 眼 冴 . 羣脰 膊 ヤ . 翫, I 絮脰ヤ 帥荐膊 眼 冴 . A(i) 篁絮脰ヤ 喝 綽羣脰 i .  
阪 , Q(ij) I Pij-羣脰 , Q(ij) I 脰茹 c 箏. QL(i) i 箏. 鴻 QL(1) 腴恰サ絨篁絮脰ヤ 箏. QL(1) , 3よ 脰 サ素 .
- 激 ass=1 紵翫, QL(1) 障 Q(1j) 炊脰 (紵よ羣脰) , QL(2) 篁ラ 障 Q(ij) I 箏 茹 f . , P(ij) I 絮脰ヤ , P(ij) I 絮脰ヤ 箏 荐若.
- 遺箏 茹 c 荐膊, 激 mod=p (p 30 篁ヤ ) 紵 p 餞箏 茹 c 荐膊. , p 絨 荐膊 , 若 ヤ. (p 5 罇篁ヤ 尊 .)
- iso=n (n 0,1,2,3 ) 紵, saturation 荐膊 号素. n=1 .
- 激 time=1 紵, 荐膊 荐潟茵 ず.
- 激 para=proclist 紵, h膊茵. proclist noro\_pd.init\_pprocs 祉鴻 鴻 .
- 激 f4=1 紵翫, 純 F4 眼 冴 . Buchberger 眼 冴 .
- 激 trace=1 紵翫, 純 trace 眼 冴 . trace Buchberger 障 F4 眼 冴 .
- 激 intgb=1 紵翫, 茲違 ヤ 演 , 2 ヤヤ ヤ 演 荐膊 弘菴 膊, 罰 演 違 弱阪 荐膊. 違 弱阪荐膊 弘菴.

```

[1539] load("noru_pd.rr");
[1707] B=[x00*x11-x01*x10,x01*x12-x02*x11,x02*x13-x03*x12,x03*x14-x04*x13,
-x11*x20+x21*x10,-x21*x12+x22*x11,-x22*x13+x23*x12,-x23*x14+x24*x13]$
[1708] V=[x00,x01,x02,x03,x04,x10,x11,x12,x13,x14,x20,x21,x22,x23,x24]$
[1709] QD=noro_pd.syci_dec(B,V|time=1)$
[total,1.08407,ass,0.620039,pd,0.33202,iso,0.260016,int,0.024003,
ext,0.464029]
[elapsed,1.09038,ass,0.624087,pd,0.338769,iso,0.244057,int,0.0343642,
ext,0.466293]
[1710] map(length,QD);
[10,5,3,1]
[1711] QD[2][0];
[[x03*x01*x14*x20-x21*x04*x03*x10,(x23*x21*x02-x22*x21*x03)*x10,
x23*x21*x03*x10,x01*x12*x20-x21*x02*x10,-x01*x13*x20+x21*x03*x10,
-x21*x03*x14+x23*x04*x11,-x22*x03*x14+x23*x04*x12,x01^2,x03^2,
-x00*x11+x01*x10,x10^2,x01*x11,-x01*x12+x02*x11,x01*x13-x03*x11,
x10*x11,x11^2,-x02*x13+x03*x12,-x11*x12,x12^2,x03*x13,-x03*x14+x04*x13,
x11*x13,-x12*x13,x13^2,x13*x14,x14^2,-x11*x20+x21*x10,x21*x11,
x21*x12-x22*x11,x21*x13-x23*x11,x21^2,x22*x13-x23*x12,-x23*x13,
-x23*x14+x24*x13,x23^2],
[x01,x03,x10,x11,x12,x13,x14,x21,x23]]

```

### 1.1.2 noro\_pd.prime\_dec

`noro_pd.syci_dec(I,vars[|options])`

や  $I$  劫牙 や 茹 c 荐膊.

`return` 鴻 ( 塋違 )

$I$  紊縋 鴻

`vars` 紊違 鴻

`options` 箏 .

- ,  $I$  劫牙 や 茹 c 鴻  $[P(1),P(2),\dots]$  菴.
- 激  $indep=1$  紵翫,  $[[P(1),Y(1)],[P(2),Y(2)],\dots]$  菴. ,  $Y(i)$   $P(i)$  罐球え .
- 激  $radical=1$  紵翫, 塋や 鴻  $PL$  ,  $I$  劫  $rad$  鴻  $[PL,rad]$  菴.

```

[1712] PD=noro_pd.prime_dec(B,V|radical=1)$
[1713] PD[0][0];
[x10,-x11,x12,x13,x14]
[1714] PD[1];
[-x03*x02*x01*x14*x20+x24*x02*x01*x00*x13,\dots,x23*x14-x24*x13]

```

## 1.2 c

### 1.2.1 noro\_pd.ideal\_intersection

`noro_pd.ideal_intersection(I1,I2,vars,ord[|mod=p])`

や  $I1, I2$  演 荐膊.

```

return      紊綬 鴻
I           紊綬 鴻
vars        紊違 鴻
ord         綺
• 菴 鴻 I1 I2 演 ord 違 阪 c .
•      遺箏 膊, 激 mod=p 紵翫 p 箵箏 膊茵.
[1707] A=[j*h*g*f*e*d*b,j*i*g*d*c*b,j*i*h*g*d*b,j*i*h*e*b,i*e*c*b,z]$
[1708] B=[a*d-j*c,b*c,d*e-f*g*h]$
[1709] V=[a,b,c,d,e,f,g,h,i,j,z]$
[1710] noro_pd.ideal_intersection(A,B,V,0);
[(j*h*g*f*e^2*d^2-j*h^2*g^2*f^2*e*d)*b,j*h*g*f*e*d*b*a,
-j*h*g*f*e*d*c*b,j*i*h*g*f*e*b*a,(-j*i*h*e*d^2+j*i*h^2*g*f*d)*b,
(-j*i*h*e^2*d+j*i*h^2*g*f*e)*b,-j*i*h*e*d*b*a,-j*i*h*g*d*b*a,
j*i*g*d*c*b,i*e*c*b,-z*e*d+z*h*g*f,-z*c*b,-z*d*a+z*j*c]

```

### 1.2.2 noro\_pd.ideal\_intersection\_m

```

noro_pd.ideal_intersection_m(I1,I2,vars,ord[|mod=p])
      や I1, I2 演 荐膊.
return      紊綬 鴻
I           紊綬 鴻
vars        紊違 鴻
ord         綺
      I2 違 弱阪, I1 膾祉 違紊翫 noro_pd.ideal_intersection 蕭 翫.
• 菴 鴻 演 膾祉 綽演 違 弱阪 c .
•      遺箏 膊, 激 mod=p 紵翫 p 箵箏 膊茵.
[1754] B=[z*j*i*e*d*c*b+(z*i*h*g+z*j*h)*f*e*d*c,...,z*j*e*c*b+4*z*i*h*g*e*c]
[1755] V=[b,c,d,e,f,g,h,i,j,z]
[1756] G=nd_gr(B,V,0,0)$
[1757] cputime(1)$
0sec(1.907e-06sec)
[1758] I1=noro_pd.ideal_intersection(G,G,V,0)$
0.316sec + gc : 0.012sec(0.3301sec)
[1759] I2=noro_pd.ideal_intersection_m(G,G,V,0)$
0.064sec + gc : 0.012sec(0.07933sec)

```

### 1.2.3 noro\_pd.ideal\_list\_intersection

```

noro_pd.ideal_intersection(ilst,vars,ord[|mod=p])
      や      鴻 ilst 演 荐膊.
return      紊綬 鴻
ilst        紊綬 鴻 鴻

```

```

vars      素違 鴻
• 菴 鴻 演 違 弱阪  c .
•      遺箏 膊, 激  mod=p 紵翫 p 箵箏 膊茵.
[1709] PL=noro_pd.prime_dec(B,V|radical=1)$
[1710] Int=noro_pd.ideal_list_intersection(PL[0],V,0)$
[1711] gb_comp(Int,PL[1]);
1

```

### 1.2.4 noro\_pd.colon

```

noro_pd.colon(I,f,vars[|mod=p])
      I:f 荐膊.

return  素縵 鴻
I      素縵 鴻
f      素縵
vars    素違 鴻
• 菴 鴻 I:f 違 弱阪 .
•      遺箏 膊, 激  mod=p 紵翫 p 箵箏 膊茵.
[1640] B=[(x+y+z)^50,(x-y+z)^50]$
[1641] V=[x,y,z]$
[1642] noro_pd.colon(B,y^98,V);
[-x-z,-y]

```

### 1.2.5 noro\_pd.ideal\_colon

```

noro_pd.colon(I,J,vars[|mod=p])
      I:J 荐膊.

return  素縵 鴻
I      素縵 鴻
J      素縵 鴻
vars    素違 鴻
• 菴 鴻 I:J 違 弱阪  c .
•      遺箏 膊, 激  mod=p 紵翫 p 箵箏 膊茵.
[1640] B=[(x+y+z)^50,(x-y+z)^50]$
[1641] V=[x,y,z]$
[1642] noro_pd.ideal_colon(B,[(x+y+z)^49,(x-y+z)^49],V);
[-y^49*x-z*y^49,-y^50,-x^2-2*z*x+y^2-z^2]

```

### 1.2.6 noro\_pd.sat

```

noro_pd.sat(I,f,vars[|mod=p])
      I f  saturation 荐膊.

```

```

return      素縵 鴻
I           素縵 鴻
f           素縵
vars        素違 鴻
• 菴 鴻 I:f 違 弱阪    c .
•          遺箏 膊, 激 mod=p 紵翫 p 箴箏    膊茵.
  [1640] B=[(x+y+z)^50,(x-y+z)^50]$
  [1641] V=[x,y,z]$
  [1642] noro_pd.sat(B,y,V);
  [1]

```

### 1.2.7 noro\_pd.ideal\_sat

```

noro_pd.ideal_sat(I,J,vars[|mod=p])
      I:J 荐膊.
return      素縵 鴻
I           素縵 鴻
J           素縵 鴻
vars        素違 鴻
• 菴 鴻 I:J 違 弱阪    c .
•          遺箏 膊, 激 mod=p 紵翫 p 箴箏    膊茵.
  [1640] B=[(x+y+z)^50,(x-y+z)^50]$
  [1641] V=[x,y,z]$
  [1642] noro_pd.ideal_sat(B,[(x+y+z)^49,(x-y+z)^49],V);
  [1]

```

### 1.2.8 noro\_pd.init\_pprocs

```

noro_pd.init_pprocs(m[|nox=1])
      h膊 祉鴻莎桁.
return      廩違 鴻
m           罩 f 廩
• h膊      祉 (ox_asir) 莎桁, 激 鴻菴.
• 若 c      '.asirrc' load("noro_pd.rr")$ ヤ , ox_asir 儀 'noro_pd.rr' 茯
  粹昭障, h膊 .
• 激 nox=1 紵翫, 莎桁 祉鴻 脂 阪    c 渴 .
  [1544] P=noro_pd.init_pprocs(6|nox=1)$
  [1545] B=[x00*x11-x01*x10,x01*x12-x02*x11,x02*x13-x03*x12,x03*x14-x04*x13,
x04*x15-x05*x14,x05*x16-x06*x15,x06*x17-x07*x16,-x11*x20+x21*x10,
-x21*x12+x22*x11,-x22*x13+x23*x12,-x23*x14+x24*x13,-x24*x15+x25*x14,
-x25*x16+x26*x15,-x26*x17+x27*x16]$

```

```
[1546] V=[x00,x01,x02,x03,x04,x05,x06,x07,x10,x11,x12,x13,x14,x15,x16,  
x17,x20,x21,x22,x23,x24,x25,x26,x27]$  
[1547] noro_pd.syci_dec(B,V|time=1)$  
[total,205.581,ass,108.743,pd,31.582,iso,64.9081,int,11.7367,ext,96.8381]  
[elapsed,206.177,ass,109.052,pd,31.679,iso,65.0682,int,11.7853,ext,97.1254]  
[1548] noro_pd.syci_dec(B,V|time=1,para=P)$  
[total,30.0339,ass,29.5498,pd,23.7695,iso,1.96412,int,3.32021,ext,0.48403]  
[elapsed,79.0897,ass,62.5683,pd,26.0532,iso,28.037,int,7.97536,ext,16.5214]
```



## Index

(Index is nonexistent)

(Index is nonexistent)

## Short Contents

1	羣 <sup>96</sup> 脛 <sup>a0</sup> <sup>88</sup> <sup>86</sup> 茹 <sup>c</sup> <sup>83</sup> <sup>91</sup> <sup>83</sup> <sup>82</sup> 宴 <sup>83</sup> 若 <sup>82</sup> noro_pd.rr . . . . .	1
	Index . . . . .	7

# Table of Contents

1	羣 <sup>96</sup> 膾 <sup>a0</sup> <sup>88</sup> 茹 <sup>c</sup> <sup>83</sup> <sup>91</sup> <sup>83</sup> <sup>82</sup> 宴 <sup>83</sup> 若 <sup>82</sup> noro_pd.rr .....	1
1.1	羣 <sup>96</sup> 膾 <sup>a0</sup> <sup>88</sup> 茹 <sup>c</sup> .....	1
1.1.1	noro_pd.syci_dec .....	1
1.1.2	noro_pd.prime_dec .....	2
1.2	<sup>96</sup> <sup>80</sup> c <sup>81</sup> <sup>99</sup> <sup>82</sup> <sup>8b</sup> <sup>96</sup> <sup>95</sup> .....	2
1.2.1	noro_pd.ideal_intersection .....	2
1.2.2	noro_pd.ideal_intersection_m .....	3
1.2.3	noro_pd.ideal_list_intersection .....	3
1.2.4	noro_pd.colon .....	4
1.2.5	noro_pd.ideal_colon .....	4
1.2.6	noro_pd.sat .....	4
1.2.7	noro_pd.ideal_sat .....	5
1.2.8	noro_pd.init_pprocs .....	5
	Index .....	7