

nn_ndbf

nn_ndbf User's Manual
Edition 1.0
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1 New b-function package nn_ndbf.rr

```
奢, asir-contrib , ·b 'nn_ndbf.rr' . , 'nn_ndbf.rr' .
  [...] load("nn_ndbf.rr");
, t ndbf . . 奢 , .
```

1.1 b

1.1.1 ndbf.bfunction

```
ndbf.bfunction(f[|weight=w,heruristic=yesno,vord=v,op=yesno]) :: f b .
return
```

f

w [v1,w1,...,vn,wn]

yesno 0 1

v

- asir-contrib 'nn_ndbf.rr' d.
- *f b* (global b-function) . *b* , · op=1 , *b b* , *P* [*b,P*] . $Pf^{(s+1)}=b(s)f^s$.
v1,...,vn,dv1,...,dvn . . , *d* . , *p* , ·5·
- · weight=[*v1,w1,...,vn,wn*] , (*v1,...,vn*) · weight (*w1,...,wn*) . . , *f* (*w1,...,wn*) ·
weighted homogeneous .
- · heuristic=1 , . t 奢 .
- , , · vord=v ☒ .

```
[...] load("nn_ndbf.rr");
[...] ndbf.bfunction(x^3-y^2*z^2);
-11664*s^7-93312*s^6-316872*s^5-592272*s^4-658233*s^3-435060*s^2
-158375*s-24500
[...] ndbf.bfunction(x^3-y^2*z^2|op=1);
[-11664*s^7-93312*s^6-316872*s^5-592272*s^4-658233*s^3-435060*s^2
-158375*s-24500,(108*z^3*x*dz^3+756*z^2*x*dz^2+1080*z*x*dz+216*x)*dx^4
...
+(729/8*z^3*dz^5+9477/8*z^2*dz^4+5103/2*z*dz^3+2025/2*dz^2)*dy^2]
[...] F=256*u1^3-128*u3^2*u1^2+(144*u3*u2^2+16*u3^4)*u1-27*u2^4
-4*u3^3*u2^2$
[...] ndbf.bfunction(F|weight=[u3,2,u2,3,u1,4]);
576*s^6+3456*s^5+8588*s^4+11312*s^3+8329*s^2+3250*s+525
```

1.1.2 ndbf.bf_local

```
ndbf.bf_local(f,p[|weight=w,heruristic=yesno,vord=v,op=yesno]) :: f p b
```

·

return

f

p $[v1, a1, \dots, vn, an]$

w $[v1, w1, \dots, vn, wn]$

yesno 0 1

v

- asir-contrib 'nn_ndbf.rr' d.
- $f(v1, \dots, vn) = (a1, \dots, an)$ b (local b-function) . \$b\$, .
- $b, \cdot op=1$, b b, $\$a(x)\$ P [b, a(x), P]$. $a(x)P f^{s+1} = b(s)f^s$. $v1, \dots, vn, dv1, \dots, dvn$. . , d . , p , 5 .
- $\cdot weight = [v1, w1, \dots, vn, wn]$, $(v1, \dots, vn) \cdot weight (w1, \dots, wn)$. . , $f (w1, \dots, wn) \cdot$ weighted homogeneous .
- $\cdot heuristic=1$, . t 攀 .
- , , $\cdot vord=v$ ☒ .

```
[...] load("nn_ndbf.rr");
[...] ndbf.bf_local(y*((x+1)*x^3-y^2), [x, -1, y, 0]);
[[-s-1, 2]]
[...] ndbf.bf_local(y*((x+1)*x^3-y^2), [x, -1, y, 0] |op=1);
[[[-s-1, 2]], 12*x^3+36*y^2*x-36*y^2, (32*y*x^2+56*y*x)*dx^2
+((-8*x^3-2*x^2+(128*y^2-6)*x+112*y^2)*dy+288*y*x+(-240*s-128)*y)*dx
+(32*y*x^2-6*y*x+128*y^3-9*y)*dy^2+(32*x^2+6*s*x+640*y^2+39*s+30)*dy
+(-1152*s^2-3840*s-2688)*y]
```

1.1.3 ndbf.bf_strat

`ndbf.bf_strat(f[|weight=w,heruristic=h,vord=v])`
 :: f , b 鲁 (stratification) .

return

f

w $[v1, w1, \dots, vn, wn]$

h 0 1

v

- asir-contrib 'nn_ndbf.rr' d.
- f b (global b-function) . s .
- $\cdot weight = [v1, w1, \dots, vn, wn]$, $(v1, \dots, vn) \cdot weight (w1, \dots, wn)$. . , $f (w1, \dots, wn) \cdot$ weighted homogeneous .
- $\cdot heuristic=1$, . t 攀 .
- , , $\cdot vord=v$ ☒ .

```
[...] load("nn_ndbf.rr");
[...] F=256*u1^3-128*u3^2*u1^2+(144*u3*u2^2+16*u3^4)*u1-27*u2^4
-4*u3^3*u2^2$
[...] ndbf.bf_strat(F);
[[[u3^2, -u1, -u2], [-1], [[-s-1, 2], [16*s^2+32*s+15, 1], [36*s^2+72*s+35, 1]]],
```

```

[[-4*u1+u3^2,-u2],[96*u1^2+40*u3^2*u1-9*u3*u2^2,...],[[-s-1,2]]],
[[-2048*u1^3-...],[-u3*u2,u2*u1,...],[[-s-1,1],...]],
[[-256*u1^3+128*u3^2*u1^2+...],[...],[[-s-1,1]]],
[[],[[-256*u1^3+128*u3^2*u1^2+...],[...]]]

```

1.1.4 ndbf.action_on_gfs

```

ndbf.action_on_gfs(op,v,gfs)
:: op gf^(s+a) .

```

return

op

gfs [g,f,s+a]

v f (v=[v1,...,vn])

- op gf^(s+a) .
- g v1,...,vn .
- op [v1,...,vn,dv1,...,dvn] .
- [g,f,s+a] gf^(s+a) .
- [h,f,s+c] , hf^(s+b) . c 0. op b- b(s) , a=1 c=0 , h=b(s) (global case) h=d(v)b(s) (local case) .

```

[...] load("nn_ndbf.rr");
[...] F=x^5-y^2*z^2$
[...] B=ndbf.bfunction(F|op=1)$
[...] ndbf.action_on_gfs(B[1],[x,y,z],[1,F,s+1]);
[-6250000000*s^13-...-2985505717194*s-245434132944,x^5-z^2*y^2,s]
[...] L=ndbf.bf_local(F,[x,0,y,0,z,1]|op=1)$
[...] ndbf.action_on_gfs(L[2],[x,y,z],[1,F,s+1]);
[(-100000*s^5-500000*s^4-990000*s^3-970000*s^2-470090*s-90090)*z^2,
x^5-z^2*y^2,s]

```

1.2 Annihilator

1.2.1 ndbf.ann

```

ndbf.ann(f[|weight=w]) :: f · f^s annihilator ideal .

```

return

f

w [v1,w1,...,vn,wn]

- asir-contrib 'nn_ndbf.rr' d.
- f · , f^s annihilator ideal . , s . , ndbf.bf_local .
- weight=[v1,w1,...,vn,wn] , (v1,...,vn) · weight (w1,...,wn) . · , f (w1,...,wn) · weighted homogeneous .

```

[...] load("nn_ndbf.rr");
[...] ndbf.ann(x*y*z*(x^3-y^2*z^2));

```

$$\begin{aligned}
 & [(-x^4*dy^2+3*z^4*x*dz^2+12*z^3*x*dz+6*z^2*x)*dx+4*z*x^3*dz*dy^2 \\
 & -z^5*dz^3-6*z^4*dz^2-6*z^3*dz, \\
 & (x^4*dy-3*z^3*y*x*dz-6*z^2*y*x)*dx-4*z*x^3*dz*dy+z^4*y*dz^2+3*z^3*y*dz, \\
 & (-x^4+3*z^2*y^2*x)*dx+(4*z*x^3-z^3*y^2)*dz, 2*x*dx+3*z*dz-11*s, \\
 & -y*dy+z*dz]
 \end{aligned}$$

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