

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,...,vn,an]
w          [v1,w1,...,vn,wn]
yesno      0 1
v
• asir-contrib 'nn_ndbf.rr' d.
•  $f(v1,...,vn)=(a1,...,an)$  b (local b-function) .  $b$  , .
•  $b, \cdot op=1$  ,  $b$   $b$ ,  $a(x)$   $P$   $[b,a(x),P]$  .  $a(x)P^{\wedge}(s+1)=b(s)f^{\wedge}s$  .  $v1,...,vn,dv1,...,dvn$ 
  . . , d . , . p , . 5 .
•  $\cdot weight=[v1,w1,...,vn,wn]$  ,  $(v1,...,vn) \cdot weight (w1,...,wn)$  . . ,  $f (w1,...,wn) \cdot$ 
  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 ☒ (stratification) .
```

return

```

f
w          [v1,w1,...,vn,wn]
h          0 1
v
• asir-contrib 'nn_ndbf.rr' d.
•  $f$  b (global b-function) .  $s$  .
•  $\cdot weight=[v1,w1,...,vn,wn]$  ,  $(v1,...,vn) \cdot weight (w1,...,wn)$  . . ,  $f (w1,...,wn) \cdot$ 
  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]);
[-62500000000*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));

```

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

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