

n_wishartd

n_wishartd User's Manual
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1 matrix 1F1 茹箏吾 狗宴若 n_wishartd.rr

ヤ , asir-contrib 宴若吾 蚊 , matrix 1F1 絲乘箏 緇 合縷膾祉荐膊宴若
 ‘n_wishartd.rr’ や 苾 . 宴若吾箴帥 , 障 ‘n_wishartd.rr’ 若.

[...] load("n_wishartd.rr");

宴若吾 醇違若喝訝 , n_wishartd. や.

1.1 matrix 1F1 茹箏吾 狗

1.1.1 n_wishartd.diagpf

n_wishartd.diagpf(*m*,*blocks*)

m 紊違 1F1 羣合縷, *blocks* 紵 絲乘箏 狗緇 合縷膾祉荐膊.

return $[E1, E2, \dots]$ 鴻, E_i 違篆違 緇 箴 , 狗 1F1 九.

m 俱

vars $[[s1, e1], [s2, e2], \dots]$ 鴻.

options 箏 .

- *m* 紊違 1F1 羣合縷, *blocks* 紵 絲乘箏 狗緇 合縷膾祉荐膊.
 - *blocks* $[s, e]$ $ys=y(s+1)=\dots=ye$ 濁. 篁 *h* ; 紊違 *ye* .
 - *blocks* 違障 紵. 鴻, 箏や 違 $[s, s]$ 紵.
 - 違紹吾 , 上 , 紊違 泣や訝 36 篁ヤ .
 - 阪緇 箴 若 $\langle \text{undefined} \rangle [\text{違篆違 緇 箴}]$, page $\langle \text{undefined} \rangle$.
- ```
[2649] Z=n_wishartd.diagpf(5,[[1,3],[4,5]]);
[
 [[[-1, []]], (1)*<<0,0,0,0,3,0>>],
 [[[-2, [[y1-y4,1]]], [-2, [[y4,1]]]], (1)*<<0,1,0,0,1,0>>],
 [[[9/2, [[y1-y4,1]]], [-3*c+11/2, [[y4,1]]], [3, []]], (1)*<<0,0,0,0,2,0>>],
 ...
 [[[-6*a, [[y1-y4,1], [y4,1]]], [(4*c-10)*a, [[y4,2]]], [-4*a, [[y4,1]]]],
 (1)*<<0,0,0,0,0,0>>],
 [[[-1, []]], (1)*<<0,4,0,0,0,0>>],

 [[[-6, [[y1-y4,1]]], [-6*c+10, [[y1,1]]], [6, []]], (1)*<<0,3,0,0,0,0>>],
 [[[5, [[y1-y4,1]]], [-5, [[y1,1]]]], (1)*<<0,2,0,0,1,0>>],
 ...
 [[[21*a, [[y1-y4,2], [y1,1]]], [(36*c-87)*a, [[y1-y4,1], [y1,2]]],
 [-36*a, [[y1-y4,1], [y1,1]]], [(18*c^2-84*c+96)*a, [[y1,3]]],
 [-9*a^2+(-36*c+87)*a, [[y1,2]]], [18*a, [[y1,1]]]], (1)*<<0,0,0,0,0,0>>]]
]
```

### 1.1.2 n\_wishartd.message

n\_wishartd.message(*onoff*)  
 荐膊箒 < 祉若後阪 on/off .  
*onoff*      *onoff*=1      < 祉若吾阪, *onoff*=0 .  
 • 荐膊箒 < 祉若後阪 on/off .      off .

## 1.2 狗 違 膊

### 1.2.1 n\_wishartd.prob\_by\_hgm

n\_wishartd.prob\_by\_hgm(*m*,*n*,[*p1*,*p2*,...],[*s1*,*s2*,...],*t*[|*options*])  
 HGM 茲堺やゆ怨h Wishart 茵 紊 堺や紹 違 や荐膊.  
 return  
*m*      紊違  
*n*      怨壘  
[*p1*,*p2*,...] 茲堺や 違 鴻  
[*s1*,*s2*,...] 茲堺  
• 堺 *si* *pi* ゆ 茹茵怨h Wishart 茵 紊 堺 *ll* 紹 違  $Pr[ll < t]$  荐膊.  
• 鴻違紵 潟= 炊, 鴻違 2 箒ゆ 膊脰 後 茯ゆ勲  $eps(10^{-4})$  障 弘菴  
• *eq* 激 恰紵 翫, [*p1*,*p2*,...] 紵絲乘 狗緇 合綬膾祉荐膊. 紵翫, 激 潟 紵 鴻 狗合綬 膊.  
• *eps* 激 潟紵翫, 紵や *eps* 膊.  
• *td* 激 潟紵翫, 膊 鴻脰違 *td* 紵 違障 膊 (100).  
• *rk* 激 潟紵翫, 紵菴 違 潟= 炊 . 荐宴や 4 障 5, 5 .  
• 鴻脰域 膊 育 *c*, 潟 *c* 活 膊 育 *c*, 違 2 篋ヤ 翫 紵 .  
[... ] n\_wishartd.message(1)\$  
[... ] P=n\_wishartd.prob\_by\_hgm(10,100,[9,1],[1/100,1],100|eps=10<sup>-6</sup>);  
...  
[x0=,8/25]  
Step=10000  
[0]  
[8.23700622458446e-17,8.23700622459772e-17]  
...  
Step=1280000  
[0][100000][200000][300000]...[900000][1000000][1100000][1200000]  
[0.516246820120598,0.516246820227214]  
[log ratio=,4.84611265040128]  
Step=2560000  
[0][100000][200000][300000]...[2200000][2300000][2400000][2500000]

```
[0.516246912003845,0.516246912217004]
[log_ratio=,4.93705929488356]
[diag,18.6292,pfaffian,1.09207,ps,41.0026,rk,213.929]
0.516246912217004
266.4sec + gc : 8.277sec(276.8sec)
```

### 1.2.2 n\_wishartd.prob\_by\_ps

```
n_wishartd.prprob_by_ps(m,n,[p1,p2,...],[s1,s2,...],t[|options])
 鴻脰違 茲堺やゆ怨h Wishart 茵 紊 堺や紹 違 や荐膊.

m 紊違
n 怨墾

[p1,p2,...] 茲堺や 違 鴻
[s1,s2,...] 茲堺

• 翫 や 後 茯ゆ黜 eps (や 10-4) 篁ヤ 障, 鴻脰違 違 膊. や紹
 違 や荐膊 .

• eps 激 滂紵翫, 紵や eps 膊. eq 激 恰紵 翫, [p1,p2,...] 紵絲乘 狗緇 合
 縷膾祉荐膊. 紵翫, 激 滂 紵 鴻 狗合縷 膊.

• t や絨翫 水 .

[...] Q=n_wishartd.prob_by_ps(10,100,[9,1],[1/100,1],1/2);
...
[I=,109,act,24.9016,actmul,0,gr,19.7852]
2.69026137621748e-165
61.69sec + gc : 2.06sec(64.23sec)
[...] R=n_wishartd.prob_by_hgm(10,100,[9,1],[1/100,1],1/2|td=50);
[diag,15.957,pfaffian,1.00006,ps,5.92437,rk,1.29208]
2.69026135182769e-165
23.07sec + gc : 1.136sec(24.25sec)
```

### 1.2.3 n\_wishartd.ps

```
n_wishartd.ps(z,v,td)
 緇 合縷膾祉 鴻脰域 紵 違障 膊.

return 紊縷 鴻

z 遺違 小箴 鴻

v 紊違 鴻

• 脰 [p,pd] 鴻, p td 黽<障 鴻脰域 , pd p td 黽 .

• z , v 紵紊遺札紊 <帥 .

[...] Z=n_wishartd.diagpf(10,[[1,5],[6,10]])$
[...] Z0=subst(Z,a,(10+1)/2,c,(10+100+1)/2)$
[...] PS=n_wishartd.ps(Z0,[y1,y6],10)$
[...] PS[0];
197230789502743383953639/230438384724900975787223158176000*y110+
```

```

...
+(6738842542131976871672233/1011953706634779427957034268904320*y6^9
...+3932525/62890602*y6^2+1025/4181*y6+55/111)*y1
+197230789502743383953639/230438384724900975787223158176000*y6^10
+...+1395815/62890602*y6^3+3175/25086*y6^2+55/111*y6+1

```

## 1.3 遺違 小箏

### 1.3.1 違 ；

matrix 1F1 羣縑 合縑 違  $1/y_i, 1/(y_i-y_j)$  医 吾 . , 帥 絲乘吾 狗  
眼 牙 罕 違 吾.

- 罰 障  $y_i^{n_0}(y_{i1}-y_{j1})^{n_1}(y_{i2}-y_{j2})^{n_2}\dots(y_{ik}-y_{jk})^{n_k}$   $[[y_{i0},n_0],[y_{i1}-y_{j1},n_1],\dots,[y_{ik}-y_{jk},n_k]]$  綵 鴻 ; . , 紕  $y_i-y_j$   $i>j$  羣, 紕 箏紕 綺 翫.
- $f$  箏 鴻脛 ,  $c$  紕違 , 縑  $c/f$   $[c,f]$  ; 障.  $f=[]$  翫, 罰 1 滂.
- 縑,  $c1/f1+\dots+ck/fk$   $[[c1,f1],\dots,[ck,fk]]$  ; 障 . , 箏紕 綺 翫.
- 違 亞脛脛, 0 繪.

### 1.3.2 遺違 小箏 ；

膀 違 , 篆違 縑 箏 茵 障 .  $f1,\dots,fk$  違 ; ,  $d1,\dots,dk$   $h$  ; 上縑 ( 紕 綺  
 $d1>\dots>dk$ ) , 縑 箏  $f1*d1+\dots+fk*dk$   $[f1,d1],\dots,[fk,dk]$  ; 障.

### 1.3.3 遺違 小箏 膊

#### 1.3.3.1 n\_wishartd.wsetup

n\_wishartd.wsetup( $m$ )

$m$  俱

- $m$  篆違 膊医祉. 篆違  $y_0,y1,\dots,y_m, dy_0,\dots,dym$   $y_0, dy_0$  賢脛 膊 弱違 .

#### 1.3.3.2 n\_wishartd.addpf

n\_wishartd.addpf( $p1,p2$ )

return 遺違 小箏

$p1, p2$  遺違 小箏

- 縑 箏  $p1, p2$  罷.

#### 1.3.3.3 n\_wishartd.mulcpf

n\_wishartd.mulcpf( $c,p$ )

return 遺違 小箏

$c$

$p$  遺違 小箏

- $c$  小箏  $p$  荐膊.

## 1.3.3.4 n\_wishartd.mulpf

n\_wishartd.mulpf(p1,p2)

return 遺違 小箵

p1, p2 遺違 小箵

- 緇 箵 p1, p2 荐膊.

## 1.3.3.5 n\_wishartd.muldpf

n\_wishartd.muldpf(y,p)

return 遺違 小箵

y 紊

p 遺違 小箵

- 紊 y , 緇 箵 dy p 小箵 腥荐膊.

```
[...] n_wishartd.wsetup(4)$
[...] P=n_wishartd.wishartpf(4,1);
[[[1,[]]],(1)*<<0,2,0,0,0>>],[[1/2,[y1-y2,1]]],[1/2,[y1-y3,1]],
...,[[[-a,[y1,1]]]],(1)*<<0,0,0,0,0>>]]
[...] Q=n_wishartd.muldpf(y1,P);
[[[1,[]]],(1)*<<0,3,0,0,0>>],[[1/2,[y1-y2,1]]],[1/2,[y1-y3,1]],
...,[[[a,[y1,2]]]],(1)*<<0,0,0,0,0>>]]
```

## 1.4 Runge-Kutta 羈 薑紃荅

n\_wishartd.ps\_by\_hgm , c 活荐膊, 箏鴻違 Runge-Kutta 羈紃茵 篋取 や荐膊脰  
粹昭翠 rk\_ratmat 紃茵 . 違, や箏脰上壘 紃障 鴻違 2 臍違菴 茵. rk\_ratmat  
, 腮綺 , 戎 茹 h .

## 1.4.1 rk\_ratmat

rk\_ratmat(rk45,num,den,x0,x1,s,f0)

遺違 や膩綵 幻緇 合綹膾祉 Runge-Kutta 羈

return 紃違 鴻

rk45 4 障 5

num 紃域

den 紊綹

x0, x1 紃

s 俱

f0 紃

- num 泣や冴 k ,  $P(x)=1/\text{den}(\text{num}[0]+\text{num}[1]x+\dots+\text{num}[k-1]x^{(k-1)})$   $dF/dx$   
=  $P(x)F$ ,  $F(x_0)=f_0$  Runge-Kutta 羈 .

- *rk45* 4 4 電 Runge-Kutta, 5 5 電 Runge-Kutta 眼 冚紵茵. 紵薑紵茗, adaptive 眼 冚 茗 .
- *s* 鴻違, 祉水  $(x1-x0)/s$  .
- *f0* 泣や $n$  , *num*  $n$  電 壕 .
- 脰, 激 *s* 違 鴻  $[r1,...,rs]$  , *ri*  $i$  鴻 膊 茹 *c* 0 . 電 < 鴻 蚊 *ri* 蚊 , 脰 茹  $F(x1)$  0  $rs*r(s-1)*...*r1$  .
- 合綬膩綵 , Runge-Kutta 鴻膩綵 , 脰 01 荀 , 箏 脰上 壘羌 絨違 膀蚊 障 緇 . *f0* 脰上壘羌 絨違 障 翫 , *f0* 罩 *h* *rk\_ratmat* 紵茵, *f0* 0 .

```
[...] F=ltov([sin(1/x),cos(1/x),sin(1/x^2),cos(1/x^2)]);
[sin((1)/(x)) cos((1)/(x)) sin((1)/(x^2)) cos((1)/(x^2))]
[...] F0=map(eval,map(subst,F,x,1/10));
[-0.54402111088937 -0.839071529076452 -0.506365641109759 0.862318872287684]
[...] N0=matrix(4,4,[0,0,0,0],[0,0,0,0],[0,0,0,-2],[0,0,2,0])$
[...] N1=matrix(4,4,[0,-1,0,0],[1,0,0,0],[0,0,0,0],[0,0,0,0])$
[...] N=ltov([N0,N1])$
[...] D=x^3$
[...] R=rk_ratmat(5,N,D,1/10,10,10^4,F0)$
[...] for(T=R,A=1;T!=[];T=cdr(T))A *=car(T)[1];
[...] A;
0.0998334
[...] F1=map(eval,map(subst,F,x,10));
[0.0998334166468282 0.995004165278026 0.00999983333416666 0.999950000416665]
```



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