

# $\mathrm{pfpcoh}$ (cohomology/homology groups for $\mathfrak{p} \in \mathbb{F}_q$ )

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# 1 $pF_q$ ()

$pF_q$  ( ${}_pF_q$ ) ().

OpenXM/Risa/Asir ,

load("pfpcoh.rr")\$ load("pfphom.rr")\$

## 1.0.1 pfp\_omega

pfp\_omega( $P$ )

: It returns the Gauss-Manin connection Omega for the generalized hypergeometric function  $P F_{P-1}$  (aa1,aa2, ...; cc1, cc2, ...;x) .

Description:

Define a vector valued function  $Y$  of which elements are generalized hypergeometric function  $f_1=F$  and  $f_2=xd f_1/dx$ ,  $f_3=xd f_2/dx$ , ... It satisfies  $dY/dx=Omega Y$ . Generalized hypergeometric function is defined by the series  $p F_{p-1}(aa1,aa2, ...; cc1, cc2, ...;x) = \sum_{k=0, \infty} (aa1)_k (aa2)_k \dots / ((1)_k (cc1)_k (cc2)_k \dots) x^k$

Example:

pfp\_omega(3);

## 1.0.2 pfpcoh\_intersection

pfpcoh\_intersection( $P$ )

: pfpcoh\_intersection( $P$ ) returns an intersection matrix for cocycles associated to the generalized hypergeometric function  $p F_{p-1}$ .

Description:

This program pfpcoh.rr computes an intersection matrix  $S$  of cocycles of  $p F_{p-1}$  and compares it with the matrix obtained by solving a differential equation for intersection matrix.

Algorithm:

Ohara, Sugiki, Takayama, Quadratic Relations for Generalized Hypergeometric Functions  $p F_{p-1}$

Example:

load("pfpcoh.rr")\$  
S=pfpcoh\_intersection(3);

Author : K.Ohara

## 1.0.3 pfphom\_intersection

pfphom\_intersection( $P$ )

: intersection matrix of homology cycles.

Description:

Computing intersection matrix of cycles associated to  $pF_{-}(p-1)$ . As to the meaning of parameters  $c_1, c_2, c_3, \dots$ , see the paper Ohara, Kyushu J. Math. Vol. 51 PP.123.

Algorithm:

Ohara, Sugiki, Takayama, Quadratic Relations for Generalized Hypergeometric Functions  $pF_{p-1}$

Example:

```
SS = pfphom_intersection(3)$
```

You get the intersection matrix of homologies for  $3F_2$ .

Author : K.Ohara

#### 1.0.4 pfphom\_monodromy\_pair\_kyushu

pfphom\_monodromy\_pair\_kyushu( $P$ )

:

Description:

It returns the pair of monodromy matrices.

Algorithm:

Ohara, Kyushu J. Math. Vol.51 PP.123 (1997)

Example:

```
MP = pfphom_monodromy_pair_kyushu(3)$
```

You get a pair of monodromy matrices for  $3F_2$  standing for two paths encircling 0 and 1.

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