```
> restart:

  ordre := 7;
  tau := -15:

  ## 7 NORMALISATION TERMINALE

  rho := (4/15*I)*conjugate(f[0, 0, 3])-(1/30*I)*F[4, 0, 3, 0, 0]+
  (1/30*I)*conjugate(F[4, 0, 3, 0, 0])+(1/15*I)*conjugate(g[1, 0,
  2])+(1/30*I)*G[4, 0, 3, 0, 0]-(1/30*I)*conjugate(G[4, 0, 3, 0,
  0])-(1/15*I)*g[1, 0, 2]-(4/15*I)*f[0, 0, 3]:

  ImF40300 := 0:
  assume(ReF40300,real):
  #assume(ImF40300,real):
  F[4,0,3,0,0] := ReF40300 + I*ImF40300:

  ImG40300 := 0:
  assume(ReG40300,real):
  #assume(ImG40300,real):
  G[4,0,3,0,0] := ReG40300 + I*ImG40300:

  ## 7 CONSEQUENCES POUR LA TRANSITIVITE FROM vf

  G[5,0,1,1,0] := F[5,0,1,1,0]:

  G[3,0,2,1,0] := tau:
  F[3,0,2,1,0] := tau:

  G[4,0,2,1,0] := -(1/9)*conjugate(G[3, 0, 2, 1, 0])*G[5, 0, 1, 1,
  0]+(2/9)*G[3, 0, 2, 1, 0]*conjugate(G[5, 0, 1, 1, 0]):
  F[4,0,2,1,0] := -(1/9)*conjugate(F[3, 0, 2, 1, 0])*F[5, 0, 1, 1,
  0]+(2/9)*F[3, 0, 2, 1, 0]*conjugate(F[5, 0, 1, 1, 0]):

  G[3,1,3,0,0] := -(5/3)*G[5, 0, 1, 1, 0]+(1/9)*conjugate(G[3, 0,
  2, 1, 0])*conjugate(G[5, 0, 1, 1, 0])+(4/3)*conjugate(G[4, 0, 2,
  1, 0])+(2/3)*G[4, 0, 2, 1, 0]-(2/9)*conjugate(G[3, 0, 2, 1, 0])*
  G[5, 0, 1, 1, 0]:
  F[3,1,3,0,0] := -(5/3)*F[5, 0, 1, 1, 0]+(1/9)*conjugate(F[3, 0,
  2, 1, 0])*conjugate(F[5, 0, 1, 1, 0])+(4/3)*conjugate(F[4, 0, 2,
  1, 0])+(2/3)*F[4, 0, 2, 1, 0]-(2/9)*conjugate(F[3, 0, 2, 1, 0])*
  F[5, 0, 1, 1, 0]:

  G[3,0,2,1,1] := (1/3)*G[3, 0, 2, 1, 0]*G[5, 0, 0, 1, 1]+(2/3)*G
  [3, 0, 2, 1, 0]*conjugate(G[5, 0, 0, 1, 1]):
  F[3,0,2,1,1] := (1/3)*F[3, 0, 2, 1, 0]*F[5, 0, 0, 1, 1]+(2/3)*F
  [3, 0, 2, 1, 0]*conjugate(F[5, 0, 0, 1, 1]):

  G[5,0,0,2,0] := -(1/10)*conjugate(G[3, 0, 2, 1, 0]):
  F[5,0,0,2,0] := -(1/10)*conjugate(F[3, 0, 2, 1, 0]):

  G[3,0,2,2,0] := -10:
  F[3,0,2,2,0] := -10:
```

```
G[4,0,1,2,0] := (1/2)*G[3, 0, 2, 1, 0]-5-(1/2)*G[3, 0, 2, 2, 0]:
F[4,0,1,2,0] := (1/2)*F[3, 0, 2, 1, 0]-5-(1/2)*F[3, 0, 2, 2, 0]:

G[4, 0, 0, 3, 0] := 0:  F[4, 0, 0, 3, 0] := 0:
G[4, 0, 0, 2, 1] := 0:  F[4, 0, 0, 2, 1] := 0:
G[3, 0, 1, 3, 0] := 0:  F[3, 0, 1, 3, 0] := 0:
G[3, 0, 1, 2, 1] := 0:  F[3, 0, 1, 2, 1] := 0:
G[3, 0, 0, 4, 0] := 0:  F[3, 0, 0, 4, 0] := 0:
G[3, 0, 0, 3, 1] := 0:  F[3, 0, 0, 3, 1] := 0:
```

ORDRE 7

NORMALISATION SUPPLEMENTAIRE

```
alpha := 0:
G[6,0,0,1,0] := 0: F[6,0,0,1,0] := 0:
```

7 SPORADIQUES RESTANTES

```
f[1,0,2] := -(6*I)*conjugate(alpha)*alpha*rho-rho^2+5*alpha^2*
conjugate(alpha)^2-I*G[3, 0, 2, 1, 0]*alpha+(2*I)*conjugate(G[3,
0, 2, 1, 0])*conjugate(alpha):
g[0,0,2] := I*conjugate(alpha)^2*rho-conjugate(alpha)^3*alpha-
(5*I)*alpha:
```

7 EQUATIONS 0 = Eq[h,i,2,0,l]

```
g[0,1,2] := 3*conjugate(alpha)^2*alpha^2+(10*I)*alpha*conjugate
(alpha)*rho+f[1, 0, 2]-conjugate(f[1, 0, 2]):
g[0,3,1] := 0:
g[1,2,1] := -(4*I)*alpha^3:
g[2,1,1] := 30*alpha^3*conjugate(alpha)+(6*I)*conjugate(G[3, 0,
2, 1, 0])*alpha+(2*I)*alpha^2*rho+10*conjugate(g[0, 0, 2]):
g[3,0,1] := -(8/3*I)*alpha*f[1, 0, 2]+(20*I)*conjugate(alpha)*
conjugate(g[0, 0, 2])-(8/3*I)*alpha*conjugate(f[1, 0, 2])+
(200/3*I)*alpha^3*conjugate(alpha)^2+4*conjugate(g[1, 0, 2])-16*
conjugate(G[3, 0, 2, 1, 0])*alpha*conjugate(alpha)+14*G[3, 0, 2,
1, 0]*alpha^2+16*rho*alpha^2*conjugate(alpha)+(20/3*I)*alpha*
rho^2+24*conjugate(f[0, 0, 3]):
g[0,5,0] := 0:
g[1,4,0] := 0:
g[2,3,0] := 0:
g[3,2,0] := 0:
g[4,1,0] := (20*I)*alpha+5*alpha^4:
g[5,0,0] := -42*alpha*conjugate(alpha)+8*G[5, 0, 0, 2, 0]*
alpha^2+(4*I)*G[5, 0, 1, 1, 0]*alpha+(8*I)*alpha*conjugate(g[0,
0, 2])+(14*I)*alpha^4*conjugate(alpha)-(2*I)*rho-4*alpha^3*rho:
```

7 EQUATIONS 0 = Eq[h,i,1,0,l]

```
f[0,2,2] := I*alpha^3 :
f[1,1,2] := -11*alpha^3*conjugate(alpha)+(5*I)*alpha^2*rho-
conjugate(g[0, 0, 2]):
f[2,0,2] := -(1/2)*conjugate(g[1, 0, 2])-(8/3*I)*alpha*f[1, 0,
2]-(1/3*I)*alpha*rho^2+2*conjugate(G[3, 0, 2, 1, 0])*alpha*
conjugate(alpha)-2*G[3, 0, 2, 1, 0]*alpha^2-(6*I)*conjugate
```

```
(alpha)*conjugate(g[0, 0, 2])+(7/3*I)*alpha*conjugate(f[1, 0, 2]
)-(49/3*I)*alpha^3*conjugate(alpha)^2-6*conjugate(f[0, 0, 3])+8*
rho*alpha^2*conjugate(alpha):
f[0,4,1] := 0:
f[1,3,1] := 0:
f[2,2,1] := 0:
f[3,1,1] := -10*alpha^4:
f[4,0,1] := -(23*I)*conjugate(alpha)*alpha^4-(8*I)*alpha*
conjugate(g[0, 0, 2])+10*alpha*conjugate(alpha)-2*alpha^3*rho:
f[0,6,0] := 0:
f[1,5,0] := 0:
f[2,4,0] := 0:
f[3,3,0] := 0:
f[4,2,0] := 0:
f[5,1,0] := 0:
f[6,0,0] := 8*alpha^2+(2*I)*G[6, 0, 0, 1, 0]*alpha-I*alpha^5:

## 7 EQUATIONS 0 = Eq[h,i,0,0,l]

h[0,1,3] := -2*alpha^3*conjugate(alpha)+(2*I)*alpha^2*rho:
h[1,0,3] := -2*rho*alpha^2*conjugate(alpha)+(4*I)*alpha^3*
conjugate(alpha)^2+(2*I)*alpha*rho^2-(2*I)*conjugate(alpha)*
conjugate(g[0, 0, 2])-(2*I)*f[1, 0, 2]*alpha-2*conjugate(f[0, 0,
3]):
h[0,3,2] := 0:
h[1,2,2] := 0:
h[2,1,2] := -10*alpha^4:
h[3,0,2] := -14*alpha^3*rho-(26*I)*conjugate(alpha)*alpha^4-(6*
I)*alpha*conjugate(g[0, 0, 2]):
h[0,5,1] := 0:
h[1,4,1] := 0:
h[2,3,1] := 0:
h[3,2,1] := 0:
h[4,1,1] := 0:
h[5,0,1] := -(6*I)*alpha^5+2*alpha^2:
h[0,7,0] := 0:
h[1,6,0] := 0:
h[2,5,0] := 0:
h[3,4,0] := 0:
h[4,3,0] := 0:
h[5,2,0] := 0:
h[6,1,0] := 0:
h[7,0,0] := 0:

## CONSEQUENCES POUR LA TRANSITIVITE FROM vf

G[4,0,0,2,0] := 0:  F[4,0,0,2,0] := 0:
G[3,0,1,2,0] := 0:  F[3,0,1,2,0] := 0:
G[3,0,0,2,1] := 0:  F[3,0,0,2,1] := 0:
G[3,0,0,3,0] := 0:  F[3,0,0,3,0] := 0:

## HYPOTHESE DE BRANCHE

lambda := 1:
G[5,0,0,1,0] := 1:  F[5,0,0,1,0] := 1:
```

```
G[3,0,0,2,0] := 0:  F[3,0,0,2,0] := 0:
```

PRENORMALISATIONS TOUJOURS POSSIBLES, QUELS QUE SOIENT LES BRANCHEMENTS ENSUITE

ORDRE 6

6 STABILISER SPORADIQUES

```
g[1,0,1] := (8*I)*lambda^2*conjugate(alpha)*conjugate(G[4, 0, 0,
2, 0])+12*lambda^2*conjugate(alpha)^2*conjugate(G[3, 0, 0, 2, 0]
)/conjugate(lambda)-(4*I)*lambda*conjugate(alpha)^2*
alpha/conjugate(lambda)-4*lambda*conjugate(alpha)*alpha*G[3, 0,
0, 2, 0]-2*lambda*conjugate(alpha)*rho/conjugate(lambda):
f[0,0,2] := -conjugate(lambda)*alpha*lambda*G[3, 0, 0, 2, 0]*
conjugate(alpha)+2*conjugate(alpha)^2*lambda^2*conjugate(G[3, 0,
0, 2, 0])+(1/2)*lambda*rho*conjugate(alpha)-(1/4)*conjugate
(lambda)*g[1, 0, 1]:
```

6 FIN RESOLUTION PREVUE AVEC LA SPORADIQUE Eq6[3,0,3,0,0]

```
g[2,0,1] := (52/3)*conjugate(lambda)*lambda*alpha^2*G[3, 0, 0,
2, 0]^2-(14/3)*lambda*conjugate(alpha)^2*alpha^2/conjugate
(lambda)-(8/3)*f[1, 0, 2]/conjugate(lambda)+4*conjugate(G[3, 0,
1, 2, 0])*lambda^3*conjugate(alpha)^2/conjugate(lambda)-(104/3)*
lambda^2*conjugate(alpha)*conjugate(G[3, 0, 0, 2, 0])*alpha*G[3,
0, 0, 2, 0]+(100/3)*lambda^3*conjugate(alpha)^2*conjugate(G[3,
0, 0, 2, 0])^2/conjugate(lambda)+4*conjugate(lambda)*G[3, 0, 1,
2, 0]*lambda*alpha^2-(8*I)*conjugate(lambda)*G[3, 0, 0, 3, 0]*
alpha^3-(8*I)*f[0, 0, 2]*alpha/conjugate(lambda)+(2/3*I)*alpha*g
[1, 0, 1]+(8*I)*conjugate(G[3, 0, 0, 3, 0])*lambda^3*conjugate
(alpha)^3/conjugate(lambda)^2-(2*I)*conjugate(G[3, 0, 2, 1, 0])*
lambda^3*conjugate(alpha)+(2*I)*conjugate(lambda)*G[3, 0, 2, 1,
0]*lambda^2*alpha-(2*I)*conjugate(alpha)*alpha*lambda*
rho/conjugate(lambda)-(1/3)*lambda*rho^2/conjugate(lambda)+
(16/3*I)*G[3, 0, 0, 2, 0]*lambda*conjugate(alpha)*alpha^2+(7/3*
I)*lambda^2*conjugate(alpha)*conjugate(g[1, 0, 1])/conjugate
(lambda)^2+(4/3)*lambda*conjugate(f[1, 0, 2])/conjugate(lambda)
^2-8*rho*lambda*alpha*G[3, 0, 0, 2, 0]-(112/3*I)*conjugate(G[3,
0, 0, 2, 0])*lambda^2*conjugate(alpha)^2*alpha/conjugate(lambda)
:
```

6 STABILISER 0 = F[h,i,2,0,l] = G[h,i,2,0,l]

```
g[0,2,1] := lambda*alpha^2/conjugate(lambda)+(6*I)*lambda^2*
alpha*conjugate(G[3, 0, 0, 2, 0])/conjugate(lambda):
g[1,1,1] := 4*lambda*alpha^2*G[3, 0, 0, 2, 0]-28*lambda^2*
conjugate(G[3, 0, 0, 2, 0])*conjugate(alpha)*alpha/conjugate
(lambda)-6*lambda*rho*alpha/conjugate(lambda)+(12*I)*lambda*
conjugate(alpha)*alpha^2/conjugate(lambda)+2*lambda^2*conjugate
(g[1, 0, 1])/conjugate(lambda)^2+12*lambda*conjugate(f[0, 0, 2])
/conjugate(lambda)^2:
g[0,4,0] := 0:
g[1,3,0] := 0:
g[2,2,0] := 0:
g[3,1,0] := (4*I)*alpha^3*lambda/conjugate(lambda):
```

```
g[4,0,0] := -(2*I)*lambda^2*conjugate(G[3,0,0,2,0])*conjugate
(alpha)*alpha^2/conjugate(lambda)-(18*I)*lambda*alpha^3*G[3,0,0,
2,0]+8*lambda^2*alpha^2*G[4,0,0,2,0]-I*lambda*rho*
alpha^2/conjugate(lambda)-lambda*conjugate(alpha)*
alpha^3/conjugate(lambda)+(4*I)*lambda^2*conjugate(g[1,0,1])*
alpha/conjugate(lambda)^2+(8*I)*lambda*conjugate(f[0,0,2])*
alpha/conjugate(lambda)^2-4*lambda^2*conjugate(g[0,0,2])
/conjugate(lambda)^2:

## 6 STABILISER 0 = F[h,i,1,0,l] = G[h,i,1,0,l]

h[0,0,3] := -(1/2*I)*lambda*alpha*conjugate(alpha*lambda*rho)-
(1/3)*lambda*conjugate(rho^2*lambda)-(13/3*I)*alpha*lambda^2*
conjugate(lambda*alpha^2*G[3,0,0,2,0])+(1/3*I)*G[3,0,0,2,0]*
alpha^2*lambda*conjugate(lambda^2*alpha)+(1/3*I)*lambda^2*
conjugate(alpha*g[1,0,1])+(1/4*I)*lambda^2*alpha*conjugate(g[3,
0,0])+(1/6*I)*alpha*g[1,0,1]*conjugate(lambda)^2-(2/3)*lambda*
alpha^2*conjugate(lambda*alpha^2)+(1/3)*lambda*conjugate(f[1,0,
2])+(1/3)*f[1,0,2]*conjugate(lambda)-(8/3)*G[3,0,0,2,0]*alpha*
lambda^2*conjugate(G[3,0,0,2,0]*alpha*lambda^2)+(4/3)*G[3,0,0,2,
0]^2*lambda*alpha^2*conjugate(lambda)^3+(4/3)*lambda^3*conjugate
(G[3,0,0,2,0]^2*alpha^2*lambda):

f[0,1,2] := -(5/2*I)*alpha^2*lambda*conjugate(alpha)-(11/2)*
conjugate(lambda)*G[3,0,0,2,0]*alpha^2*lambda+(7/2)*alpha*
lambda^2*conjugate(G[3,0,0,2,0])*conjugate(alpha)-(1/4)*lambda*
alpha*rho+(1/4)*lambda^2*conjugate(g[1,0,1])/conjugate(lambda)+
(1/8)*conjugate(lambda)*g[3,0,0]:
f[0,3,1] := 0:
f[1,2,1] := 0:
f[2,1,1] := -(6*I)*alpha^3*lambda:
f[3,0,1] := -(14*I)*conjugate(lambda)*lambda*alpha^3*G[3,0,0,2,
0]+(3/2*I)*conjugate(lambda)*alpha*g[3,0,0]+(6*I)*alpha^2*
lambda^2*conjugate(G[3,0,0,2,0])*conjugate(alpha)-I*alpha^2*
lambda*rho+2*lambda^2*conjugate(g[0,0,2])/conjugate(lambda)+6*
alpha^3*lambda*conjugate(alpha):
f[0,5,0] := 0:
f[1,4,0] := 0:
f[2,3,0] := 0:
f[3,2,0] := 0:
f[4,1,0] := 0:
f[5,0,0] := alpha^4*lambda+(2*I)*G[5,0,0,1,0]*lambda^4*alpha:

## 6 STABILISER 0 = F[h,i,0,0,l] = G[h,i,0,0,l]

h[0,2,2] := 0:
h[1,1,2] := -(4*I)*alpha^3*lambda*conjugate(lambda):
h[2,0,2] := (9*I)*alpha^2*conjugate(lambda)*lambda^2*conjugate(G
[3,0,0,2,0])*conjugate(alpha)-(25*I)*lambda*alpha^3*G[3,0,0,2,0]
*conjugate(lambda)^2+12*lambda*conjugate(alpha)*conjugate
(lambda)*alpha^3+(3/2*I)*alpha*lambda^2*conjugate(g[1,0,1])-
(7/2*I)*alpha^2*conjugate(lambda)*lambda*rho+(5/4*I)*alpha*
conjugate(lambda)^2*g[3,0,0]+lambda^2*conjugate(g[0,0,2]):
h[0,4,1] := 0:
h[1,3,1] := 0:
h[2,2,1] := 0:
```

```
h[3,1,1] := 0:
h[4,0,1] := 5*alpha^4*lambda*conjugate(lambda):
h[0,6,0] := 0:
h[1,5,0] := 0:
h[2,4,0] := 0:
h[3,3,0] := 0:
h[4,2,0] := 0:
h[5,1,0] := 0:
h[6,0,0] := 0:

## ORDRE 5

## 5 SPORADIQUES

g[2,0,0] := (6*I)*lambda^2*conjugate(alpha)*conjugate(G[3,0,0,2,
0])/conjugate(lambda)-(2*I)*lambda*alpha*G[3,0,0,2,0]-I*lambda*
rho/conjugate(lambda)+3*lambda*conjugate(alpha)*alpha/conjugate
(lambda):
g[0,0,1] := lambda*conjugate(alpha)^2/conjugate(lambda):

## 5 STABILISER 0 = F[h,i,2,0,l] = G[h,i,2,0,l]

g[0,1,1] := conjugate(alpha)*lambda*alpha/conjugate(lambda)-
(1/2)*lambda^2*conjugate(g[2,0,0])/conjugate(lambda)^2-(1/2)*g
[2,0,0]:
g[0,3,0] := 0:
g[1,2,0] := 0:
g[2,1,0] := 2*lambda*alpha^2/conjugate(lambda)-5*lambda^2*
conjugate(g[0,0,1])/conjugate(lambda)^2:
g[3,0,0] := (2*I)*lambda*conjugate(alpha)*alpha^2/conjugate
(lambda)+8*G[3,0,0,2,0]*lambda*alpha^2-(6*I)*lambda^2*conjugate
(g[0,0,1])*conjugate(alpha)/conjugate(lambda)^2-I*g[2,0,0]*
alpha+I*lambda^2*alpha*conjugate(g[2,0,0])/conjugate(lambda)
^2+4*lambda*alpha*rho/conjugate(lambda)-2*lambda^2*conjugate(g
[1,0,1])/conjugate(lambda)^2-8*conjugate(f[0,0,2])*
lambda/conjugate(lambda)^2:

## 5 STABILISER 0 = F[h,i,1,0,l] = G[h,i,1,0,l]

f[0,2,1] := 0:
f[1,1,1] := 2*lambda*alpha^2+lambda^2*conjugate(g[0,0,1])
/conjugate(lambda):
f[2,0,1] := -lambda*alpha*rho-(1/2*I)*alpha^2*lambda*conjugate
(alpha)+(4*I)*lambda^2*conjugate(alpha)*conjugate(g[0,0,1])
/conjugate(lambda)+(1/2)*lambda^2*conjugate(g[1,0,1])/conjugate
(lambda)+(1/4*I)*lambda^2*alpha*conjugate(g[2,0,0])/conjugate
(lambda)+(5/4*I)*conjugate(lambda)*g[2,0,0]*alpha+4*lambda*
conjugate(f[0,0,2])/conjugate(lambda):
f[0,4,0] := 0:
f[1,3,0] := 0:
f[2,2,0] := 0:
f[3,1,0] := 0:
f[4,0,0] := -I*alpha^3*lambda+(2*I)*alpha*lambda^2*conjugate(g
[0,0,1])/conjugate(lambda):

## 5 STABILISER 0 = F[h,i,0,0,l] = G[h,i,0,0,l]
```

```
h[0,1,2] := alpha^2*conjugate(lambda)*lambda:
h[1,0,2] := (2*I)*lambda^2*conjugate(alpha)*conjugate(g[0,0,1])+
I*conjugate(lambda)*alpha^2*lambda*conjugate(alpha)+2*conjugate
(f[0,0,2])*lambda+(1/2*I)*conjugate(lambda)^2*g[2,0,0]*alpha+
(1/2*I)*lambda^2*alpha*conjugate(g[2,0,0])+2*lambda*alpha*rho*
conjugate(lambda):
h[0,3,1] := 0:
h[1,2,1] := 0:
h[2,1,1] := 0:
h[3,0,1] := (4*I)*lambda^2*conjugate(g[0,0,1])*alpha:
h[0,5,0] := 0:
h[1,4,0] := 0:
h[2,3,0] := 0:
h[3,2,0] := 0:
h[4,1,0] := 0:
h[5,0,0] := 0:

## ORDRE 4

g[1,0,0] := (2*I)*lambda*conjugate(alpha)/conjugate(lambda):

f[1,0,1] := -3*lambda*conjugate(alpha)*alpha-(1/2*I)*conjugate
(lambda)*alpha*g[1,0,0]+(3/2*I)*lambda^2*conjugate(alpha)*
conjugate(g[1,0,0])/conjugate(lambda)-(5/8)*lambda*g[1,0,0]*
conjugate(g[1,0,0])-(1/4)*conjugate(lambda)*g[2,0,0]-(1/4)*
lambda^2*conjugate(g[2,0,0])/conjugate(lambda)+I*lambda*rho:

g[0,2,0] := 0:
g[1,1,0] := -(2*I)*lambda*alpha/conjugate(lambda):

f[0,1,1] := I*lambda*alpha:
f[0,3,0] := 0:
f[1,2,0] := 0:
f[2,1,0] := 0:
f[3,0,0] := (3*I)*lambda^2*alpha*conjugate(g[1,0,0])/conjugate
(lambda)-4*lambda*alpha^2-lambda^2*conjugate(g[0,0,1])/conjugate
(lambda)+(1/2)*lambda^3*conjugate(g[1,0,0])^2/conjugate(lambda)
^2:

h[0,2,1] := 0:
h[1,1,1] := 0:
h[2,0,1] := I*lambda^2*alpha*conjugate(g[1,0,0])-4*alpha^2*
conjugate(lambda)*lambda-lambda^2*conjugate(g[0,0,1]):
h[0,4,0] := 0:
h[1,3,0] := 0:
h[2,2,0] := 0:
h[3,1,0] := 0:
h[4,0,0] := 0:

## ORDRE 3

g[0,1,0] := lambda/conjugate(lambda):

f[0,2,0] := 0:
f[1,1,0] := 0:
f[2,0,0] := -(1/2)*lambda^2*conjugate(g[1,0,0])/conjugate
```

```
(lambda)-(2*I)*lambda*alpha:

h[0,1,1] := 0:
h[1,0,1] := -(2*I)*lambda*alpha*conjugate(lambda):
h[0,3,0] := 0:
h[1,2,0] := 0:
h[2,1,0] := 0:
h[3,0,0] := 0:

## ORDRE 2

f[0,1,0] := 0:

h[0,0,1] := lambda*conjugate(lambda):
h[0,2,0] := 0:
h[1,1,0] := 0:
h[2,0,0] := 0:

## ORDRE 1

h[1,0,0] := 0:
h[0,1,0] := 0:

## CALCULS

FF :=

z*zb

+ (1/2)*zb^2*s+(1/2)*z^2*sb

+ z*zb*s*sb

+ (1/2)*s*sb^2*z^2+(1/2)*zb^2*s^2*sb
+ conjugate(F[3,0,0,2,0])*s^2*zb^3 + F[3,0,0,2,0]*z^3*sb^2

+ z*zb*s^2*sb^2
+ F[5,0,0,1,0]*z^5*sb
+ conjugate(F[5,0,0,1,0])*s*zb^5
+ F[4,0,0,2,0]*z^4*sb^2
+ conjugate(F[4,0,0,2,0])*s^2*zb^4
+ F[3,0,2,1,0]*z^3*zb^2*sb
+ conjugate(F[3,0,2,1,0])*z^2*s*zb^3
+ F[3,0,1,2,0]*z^3*zb*sb^2
+ conjugate(F[3,0,1,2,0])*z*s^2*zb^3
+ F[3,0,0,3,0]*z^3*sb^3
+ conjugate(F[3,0,0,3,0])*s^3*zb^3
+ 3*conjugate(F[3,0,0,2,0])*z*s^2*zb^2*sb
+ 3*F[3,0,0,2,0]*z^2*s*zb*sb^2

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+ (1/2)*sb^3*s^2*z^2+(1/2)*zb^2*s^3*sb^2
+ conjugate(F[3, 0, 0, 2, 1])*s^2*zb^3*v+F[3, 0, 0, 2, 1]*z^3*
sb^2*v+F[4, 0, 3, 0, 0]*z^4*zb^3+F[3, 1, 3, 0, 0]*z^3*s*zb^3+
conjugate(F[3, 0, 2, 2, 0])*z^2*s^2*zb^3+conjugate(F[3, 0, 1, 3,
```

```
0])*z*s^3*zb^3+conjugate(F[3, 0, 0, 4, 0])*s^4*zb^3+conjugate(F
[4, 0, 3, 0, 0])*z^3*zb^4+conjugate(F[4, 0, 2, 1, 0])*z^2*s*
zb^4+conjugate(F[4, 0, 1, 2, 0])*z*s^2*zb^4+conjugate(F[4, 0, 0,
3, 0])*s^3*zb^4+conjugate(F[5, 0, 1, 1, 0])*z*s*zb^5+conjugate(F
[5, 0, 0, 2, 0])*s^2*zb^5+conjugate(F[6, 0, 0, 1, 0])*s*zb^6+F
[6, 0, 0, 1, 0]*z^6*sb+F[5, 0, 1, 1, 0]*z^5*zb*sb+F[4, 0, 2, 1,
0]*z^4*zb^2*sb+conjugate(F[3, 1, 3, 0, 0])*z^3*zb^3*sb+F[5, 0,
0, 2, 0]*z^5*sb^2+F[4, 0, 1, 2, 0]*z^4*zb*sb^2+F[3, 0, 2, 2, 0]*
z^3*zb^2*sb^2+F[4, 0, 0, 3, 0]*z^4*sb^3+F[3, 0, 1, 3, 0]*z^3*zb*
sb^3+F[3, 0, 0, 4, 0]*z^3*sb^4+5*F[5, 0, 0, 1, 0]*z^4*s*zb*sb+3*
conjugate(F[3, 0, 2, 1, 0])*z^3*s*zb^2*sb+3*conjugate(F[3, 0, 1,
2, 0])*z^2*s^2*zb^2*sb+4*F[4, 0, 0, 2, 0]*z^3*s*zb*sb^2+3*
conjugate(F[3, 0, 0, 2, 0])*z^2*s^2*zb*sb^2+3*F[3, 0, 0, 3, 0]*
z^2*s*zb*sb^3+3*conjugate(F[3, 0, 0, 3, 0])*z*s^3*zb^2*sb+3*F[3,
0, 2, 1, 0]*z^2*s*zb^3*sb+4*conjugate(F[4, 0, 0, 2, 0])*z*s^2*
zb^3*sb+5*conjugate(F[5, 0, 0, 1, 0])*z*s*zb^4*sb+3*F[3, 0, 1,
2, 0]*z^2*s*zb^2*sb^2+3*F[3, 0, 0, 2, 0]*z*s^2*zb^2*sb^2+3*F[3,
0, 0, 2, 0]*z^3*s*sb^3+3*conjugate(F[3, 0, 0, 2, 0])*s^3*zb^3*sb

## 8

:

GG :=

z1*z1b

+ (1/2)*z1b^2*s1+(1/2)*z1^2*s1b

+ z1*z1b*s1*s1b

+ (1/2)*s1*s1b^2*z1^2+(1/2)*z1b^2*s1^2*s1b
+ conjugate(G[3,0,0,2,0])*s1^2*z1b^3 + G[3,0,0,2,0]*z1^3*s1b^2

+ z1*z1b*s1^2*s1b^2
+ G[5,0,0,1,0]*z1^5*s1b
+ conjugate(G[5,0,0,1,0])*s1*z1b^5
+ G[4,0,0,2,0]*z1^4*s1b^2
+ conjugate(G[4,0,0,2,0])*s1^2*z1b^4
+ G[3,0,2,1,0]*z1^3*z1b^2*s1b
+ conjugate(G[3,0,2,1,0])*z1^2*s1*z1b^3
+ G[3,0,1,2,0]*z1^3*z1b*s1b^2
+ conjugate(G[3,0,1,2,0])*z1*s1^2*z1b^3
+ G[3,0,0,3,0]*z1^3*s1b^3
+ conjugate(G[3,0,0,3,0])*s1^3*z1b^3
+ 3*conjugate(G[3,0,0,2,0])*z1*s1^2*z1b^2*s1b
+ 3*G[3,0,0,2,0]*z1^2*s1*z1b*s1b^2

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+ (1/2)*s1b^3*s1^2*z1^2+(1/2)*z1b^2*s1^3*s1b^2
+ conjugate(G[3, 0, 0, 2, 1])*s1^2*z1b^3*v1+G[3, 0, 0, 2, 1]*
z1^3*s1b^2*v1+G[4, 0, 3, 0, 0]*z1^4*z1b^3+G[3, 1, 3, 0, 0]*z1^3*
s1*z1b^3+conjugate(G[3, 0, 2, 2, 0])*z1^2*s1^2*z1b^3+conjugate(G
[3, 0, 1, 3, 0])*z1*s1^3*z1b^3+conjugate(G[3, 0, 0, 4, 0])*s1^4*
z1b^3+conjugate(G[4, 0, 3, 0, 0])*z1^3*z1b^4+conjugate(G[4, 0,
```

```
2, 1, 0])*z1^2*s1*z1b^4+conjugate(G[4, 0, 1, 2, 0])*z1*s1^2*
z1b^4+conjugate(G[4, 0, 0, 3, 0])*s1^3*z1b^4+conjugate(G[5, 0,
1, 1, 0])*z1*s1*z1b^5+conjugate(G[5, 0, 0, 2, 0])*s1^2*z1b^5+
conjugate(G[6, 0, 0, 1, 0])*s1*z1b^6+G[6, 0, 0, 1, 0]*z1^6*s1b+G
[5, 0, 1, 1, 0]*z1^5*z1b*s1b+G[4, 0, 2, 1, 0]*z1^4*z1b^2*s1b+
conjugate(G[3, 1, 3, 0, 0])*z1^3*z1b^3*s1b+G[5, 0, 0, 2, 0]*
z1^5*s1b^2+G[4, 0, 1, 2, 0]*z1^4*z1b*s1b^2+G[3, 0, 2, 2, 0]*
z1^3*z1b^2*s1b^2+G[4, 0, 0, 3, 0]*z1^4*s1b^3+G[3, 0, 1, 3, 0]*
z1^3*z1b*s1b^3+G[3, 0, 0, 4, 0]*z1^3*s1b^4+5*G[5, 0, 0, 1, 0]*
z1^4*s1*z1b*s1b+3*conjugate(G[3, 0, 2, 1, 0])*z1^3*s1*z1b^2*
s1b+3*conjugate(G[3, 0, 1, 2, 0])*z1^2*s1^2*z1b^2*s1b+4*G[4, 0,
0, 2, 0]*z1^3*s1*z1b*s1b^2+3*conjugate(G[3, 0, 0, 2, 0])*z1^2*
s1^2*z1b*s1b^2+3*G[3, 0, 0, 3, 0]*z1^2*s1*z1b*s1b^3+3*conjugate
(G[3, 0, 0, 3, 0])*z1*s1^3*z1b^2*s1b+3*G[3, 0, 2, 1, 0]*z1^2*s1*
z1b^3*s1b+4*conjugate(G[4, 0, 0, 2, 0])*z1*s1^2*z1b^3*s1b+5*
conjugate(G[5, 0, 0, 1, 0])*z1*s1*z1b^4*s1b+3*G[3, 0, 1, 2, 0]*
z1^2*s1*z1b^2*s1b^2+3*G[3, 0, 0, 2, 0]*z1*s1^2*z1b^2*s1b^2+3*G
[3, 0, 0, 2, 0]*z1^3*s1*s1b^3+3*conjugate(G[3, 0, 0, 2, 0])*
s1^3*z1b^3*s1b
```

8

:

```
f[0,0,0] := 0:  g[0,0,0] := 0:  h[0,0,0] := 0:

f[1,0,0] := lambda:  f[0,0,1] := - I*lambda*conjugate(alpha):
#assume(rho,real):
h[0,0,2] := lambda*conjugate(lambda)*(-alpha*conjugate(alpha)+I*
rho):

z1 := add(add(add(f[hh,i,l]*z^hh*s^i*w^l, hh=0..ordre-1-i-2*l),
i=0..ordre-1-2*l), l=0..(ordre-1)/2):

z1b := add(add(add(conjugate(f[hh,i,l])*zb^hh*sb^i*wb^l, hh=0..
ordre-1-i-2*l), i=0..ordre-1-2*l), l=0..(ordre-1)/2):


s1 := add(add(add(g[hh,i,l]*z^hh*s^i*w^l, hh=0..ordre-2-i-2*l),
i=0..ordre-2-2*l), l=0..(ordre-2)/2):

s1b := add(add(add(conjugate(g[hh,i,l])*zb^hh*sb^i*wb^l, hh=0..
ordre-2-i-2*l), i=0..ordre-2-2*l), l=0..(ordre-2)/2):


w1 := add(add(add(h[hh,i,l]*z^hh*s^i*w^l, hh=0..ordre-i-2*l), i=
0..ordre-2*l), l=0..ordre/2):

w1b := add(add(add(conjugate(h[hh,i,l])*zb^hh*sb^i*wb^l, hh=0..
ordre-i-2*l), i=0..ordre-2*l), l=0..ordre/2):
```

```
w  := FF + I*v:
wb := FF - I*v:

u1 := (w1+w1b)/2:
v1 := (w1-w1b)/(2*I):



eqdef := mtaylor( - u1 + GG, [z,s,zb,sb,v], ordre+1, [1,1,1,1,2]
) :


## TOUTES LES EQUATIONS COMPLEXES

printlevel := 4:
for m from 0 to ordre do
for l from 0 to m/2 do
for k from 0 to m-2*l do
for j from 0 to m-k-2*l do
for i from 0 to m-j-k-2*l do

EEq||m[m-i-j-k-2*l,i,j,k,l] :=
expand(expand(coeftayl(eqdef, [z,s,zb,sb,v]=[0,0,0,0,0], [m-i-j-
k-2*l,i,j,k,l])));

od; od; od; od; od;

## SELECTIONNER CELLES QUI SONT NON NULLES

printlevel := 5:
for m from 0 to ordre do
for l from 0 to m/2 do
for k from 0 to m-2*l do
for j from 0 to m-k-2*l do
for i from 0 to m-j-k-2*l do

if EEq||m[m-i-j-k-2*l,i,j,k,l] <> 0 then
   Eq||m[m-i-j-k-2*l,i,j,k,l] := expand(expand(EEq||m[m-i-j-
k-2*l,i,j,k,l])); end if;

od; od; od; od; od;
```

$$ordre := 7 \tag{1}$$

```
>

## Eq[h,i,0,0,l]

for l from 0 to ordre/2 do
for i from 0 to ordre-2*l do
```

```
if expand(EEq||ordre[ordre-i-2*l,i,0,0,l]) <> 0 then
Eq||ordre[ordre-i-2*l,i,0,0,l] := expand(EEq||ordre[ordre-i-2*l,
i,0,0,l]); end if;

od; od;
```

```
>

## Eq[h,i,1,0,l]

for l from 0 to (ordre-1)/2 do
for i from 0 to ordre-1-2*l do

if expand(expand(EEq||ordre[ordre-1-i-2*l,i,1,0,l])) <> 0 then
Eq||ordre[ordre-1-i-2*l,i,1,0,l] := expand(expand(EEq||ordre
[ordre-1-i-2*l,i,1,0,l])); end if;

od; od;
```

```
>

## Eq[h,i,2,0,l]

for l from 0 to (ordre-2)/2 do
for i from 0 to ordre-2-2*l do

if expand(EEq||ordre[ordre-2-i-2*l,i,2,0,l]) <> 0 then
Eq||ordre[ordre-2-i-2*l,i,2,0,l] := expand(EEq||ordre[ordre-2-
i-2*l,i,2,0,l]); end if;

od; od;
```

```
> l1 := (ordre - (0+1+3+0))/2;
for l from floor(l1) to l1 do
if l1-floor(l1) = 0
and expand(EEq||ordre[0,1,3,0,l]) <> 0 then
Eq||ordre[0,1,3,0,l] := expand(EEq||ordre[0,1,3,0,l]); end if;
od;
```

```
> l2 := (ordre - (0+1+4+0))/2;
for l from floor(l2) to l2 do
```

```
if l2-floor(l2) = 0
and expand(EEq||ordre[0,1,4,0,l]) <> 0 then
Eq||ordre[0,1,4,0,l] := expand(EEq||ordre[0,1,4,0,l]); end if;
od;
```

```
> l3 := (ordre - (1+1+3+0))/2;
for l from floor(l3) to l3 do
if l3-floor(l3) = 0
and expand(EEq||ordre[1,1,3,0,l3]) <> 0 then
Eq||ordre[1,1,3,0,l3] := expand(EEq||ordre[1,1,3,0,l3]); end if;
od;
```

```
> l4 := (ordre - (1+1+4+0))/2;
for l from floor(l4) to l4 do
if l4-floor(l4) = 0
and expand(EEq||ordre[1,1,4,0,l4]) <> 0 then
Eq||ordre[1,1,4,0,l4] := expand(EEq||ordre[1,1,4,0,l4]); end if;
od;
```

```
> l5 := (ordre - (3+0+3+0))/2;
for l from floor(l5) to l5 do
if l5-floor(l5) = 0
and expand(EEq||ordre[3,0,3,0,l5]) <> 0 then
Eq||ordre[3,0,3,0,l5] := expand(EEq||ordre[3,0,3,0,l5]); end if;
od;
```