

```
> restart;alias(sigma=sigma(z),phi=phi(x),H=H(z)):with(PDEtools)
:with(PDEtools):with(plots):with(LinearAlgebra):with(linalg):
> S6JIMBO:=diff(sigma,z)*(z*(z-1)*diff(sigma,z,z))^2+(diff(sigma,z)
*(2*sigma-(2*z-1)*diff(sigma,z))+nu[1]*nu[2]*nu[3]*nu[4])^2-
product(diff(sigma,z)+nu[k]^2,k=1..4);
```

$$S6JIMBO := \left(\frac{\partial}{\partial z} \sigma \right) z^2 (z-1)^2 \left(\frac{\partial^2}{\partial z^2} \sigma \right)^2 + \left(\left(\frac{\partial}{\partial z} \sigma \right) \left(2\sigma - (2z-1) \left(\frac{\partial}{\partial z} \sigma \right) \right. \right. \quad (1)$$

$$\left. \left. + v_1 v_2 v_3 v_4 \right)^2 - \left(\frac{\partial}{\partial z} \sigma + v_1^2 \right) \left(\frac{\partial}{\partial z} \sigma + v_2^2 \right) \left(\frac{\partial}{\partial z} \sigma + v_3^2 \right) \left(\frac{\partial}{\partial z} \sigma + v_4^2 \right)$$

```
> P6H:=(diff(H,z)+A)*z^2*(z-1)^2*(diff(H,z,z))^2+((diff(H,z)+A)*
(2*H+2*A*z+2*B-(2*z-1)*(diff(H,z)+A))+nu[1]*nu[2]*nu[3]*nu[4])^2-
(diff(H,z)+A+nu[1]^2)*(diff(H,z)+A+nu[2]^2)*(diff(H,z)+A+nu[3]^2)
*(diff(H,z)+A+nu[4]^2);
```

$$P6H := \left(\frac{\partial}{\partial z} H + A \right) z^2 (z-1)^2 \left(\frac{\partial^2}{\partial z^2} H \right)^2 + \left(\left(\frac{\partial}{\partial z} H + A \right) \left(2H + 2Az + 2B - (2z \right. \quad (2)$$

$$\left. - 1) \left(\frac{\partial}{\partial z} H + A \right) \right) + v_1 v_2 v_3 v_4 \right)^2 - \left(\frac{\partial}{\partial z} H + A + v_1^2 \right) \left(\frac{\partial}{\partial z} H + A + v_2^2 \right) \left(\frac{\partial}{\partial z} H + A \right.$$

$$\left. + v_3^2 \right) \left(\frac{\partial}{\partial z} H + A + v_4^2 \right)$$

```
> A:=(a*n-(1/4)*(1+a-b)^2);B:=n/4*(1+b-2*c-a)+A/4*(a^2-a*c+a+b^2-c*
b-b+c);
```

$$A := a n - \frac{1}{4} (1 + a - b)^2$$

$$B := \frac{1}{4} n (1 + b - 2c - a) + \frac{1}{4} \left(a n - \frac{1}{4} (1 + a - b)^2 \right) (a^2 - a c + b^2 - b c + a - b \quad (3)$$

$$+ c)$$

```
> H:=sigma-A*z-B;
```

$$H := - \left(a n - \frac{1}{4} (1 + a - b)^2 \right) z - \frac{1}{4} n (1 + b - 2c - a) - \frac{1}{4} \left(a n - \frac{1}{4} (1 + a \quad (4)$$

$$- b)^2 \right) (a^2 - a c + b^2 - b c + a - b + c) + \sigma$$

```
> P6H-S6JIMBO;
```

$$0 \quad (5)$$

```
> a:=-6;b:=-40;c:=-10;n:=3;
```

$$a := -6$$

$$b := -40$$

$$c := -10$$

$$n := 3$$

(6)

```
> nu[1] := 1/2*(1-b-2*n+a);nu[2] := -1/2*(1-2*c+b+a);nu[3] := 1/2*
(1+a-b);nu[4] := 1/2*(1-a-b);
```

$$v_1 := \frac{29}{2}$$

$$v_2 := \frac{25}{2}$$

$$v_3 := \frac{35}{2}$$

$$v_4 := \frac{47}{2}$$

(7)

```

> mu:=(k)->expand(sort(simplify((-1)^(-a)*Beta(a+2-c-n+k,1+c-b-n)*
z^(-a)*hypergeom([a,2-c+a+k-n],[a+k+3-b-2*n],1/z)))):
> psi:=Determinant(HankelMatrix(<seq(mu(i),i=0..2*n-2)>,n))
:HankelMatrix(<seq(mu(i),i=0..2*n-2)>,n):
> sigma:=convert(z*(z-1)*diff(ln(psi),z)+(a*n-(1/4)*(1+a-b)^2)*z+
n/4*(1+b-2*c-a)+1/4*(a^2-a*c+a+b^2-c*b-b+c),parfrac,z):
> collect(numer(expand(expand(S6JIMBO))),[z],factor);

```

0

(8)