```
> restart
> with(DifferentialGeometry) : with(JetCalculus) :
> DGsetup( [x, t], [u], E, 1 ) :
```

E >
$$\frac{1}{(u_1-u_2)^3\cdot(u_1+u_2)^3}\left(\left(x\cdot u_1^3-3\cdot u_2\cdot t\cdot u_1^2+3\cdot u_2^2\cdot x\cdot u_1-u_2^3\cdot t\right)\cdot\left(\left(1-2\cdot u_{[\,]}^2\right)\cdot\left(-u_{1,\,1}+u_{2,\,2}\right)+2\cdot u_{[\,]}\cdot\left(u_2^2-u_1^2\right)\right)\right)$$

$$\frac{\left(-3\,t\,u_1^2\,u_2-t\,u_2^3+x\,u_1^3+3\,x\,u_1\,u_2^2\right)\left(\left(-2\,u_{[\,]}^2+1\right)\left(-u_{1,\,1}+u_{2,\,2}\right)+2\,u_{[\,]}\left(-u_1^2+u_2^2\right)\right)}{(u_1-u_2)^3\,(u_1+u_2)^3} \tag{1.1}$$

E >

E > $A := evalDG(\,((\mathbf{1.1}))\;Dx\;\&w\;Dt)$

$$A := -\left(\frac{1}{(u_1-u_2)^3\,(u_1+u_2)^3}\left(\left(3\,u_2\,t\,u_1^2+u_2^3\,t-x\,u_1^3-3\,u_2^2\,x\,u_1\right)\left(2\,u[\,]^2\,u_{1,\,1}-2\,u[\,]^2\,u_{2,\,2}-2\,u[\,]\,u_1^2+2\,u[\,]\,u_2^2-u_{1,\,1}+u_{2,\,2}\right)Dx\right)\wedge Dt\right) \tag{1.2}$$

E > $simplify(HorizontalHomotopy(A))$

$$-\left(\left(\frac{1}{(u_1-u_2)^3\,(u_1+u_2)^3}\left(t\left(\int_0^1\left(-\infty\,(u_1+u_2)\left(1+\left(u_{2,\,2}+u_{1,\,1,\,2}+u_{1,\,2,\,2}+u_2+u_{1,\,2}\right)\_z1\right)\_z1\,(u_1-u_2)\left(u_1^4+u_2^4\right)\operatorname{signum}\left(1,\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.\frac{1}{\_z1^2\,(u_1-u_2)^4\,(u_1+u_2)^4}\left(\_z1\,t\,u_2^6+\left(-3\,\_z1\,x\,u_1-u[\,]\right)u_2^5+3\,\_z1\left(\frac{2\,t\,u_1^2}{3}+u[\,]\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\right)u_2^4-12\left(-\frac{\_z1\,x\,u_1^2}{6}+\frac{u[\,]\,u_1}{6}+\_z1\,u[\,]\left(t\,u_{1,\,2}+x\,u_{1,\,1}\right)\right)u_1\,u_2^3+18\,\_z1\,u_1^2\left(-\frac{t\,u_1^2}{6}+u[\,]\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\right)u_2^2-12\,u_1^3\left(-\frac{\_z1\,x\,u_1^2}{12}\right.\right.\right.\right.\right.\right.$$

$$-\frac{u[\,]\,u_1}{4}+\_z1\,u[\,]\left(t\,u_{1,\,2}+x\,u_{1,\,1}\right)\Bigg)\,u_2+3\,\_z1\,u[\,]\,u_1^4\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\Bigg)\Bigg)$$

$$+\infty\left(u_1+u_2\right)\_z1\left(1+\left(u_{1,\,1,\,2}+u_{1,\,2,\,2}+u_1+u_{1,\,1}+u_{1,\,2}\right)\_z1\right)\left(u_1-u_2\right)\left(u_1^4+\right.$$

$$\left.u_2^4\right)\,\text{signum}\Bigg(1,\,\frac{1}{\_z1^2\left(u_1-u_2\right)^4\left(u_1+u_2\right)^4}\Bigg(\_z1\,x\,u_1^6+\left(-3\,\_z1\,t\,u_2-u[\,]\right)u_1^5$$

$$+3\,\_z1\left(\frac{2\,x\,u_2^2}{3}+u[\,]\left(t\,u_{1,\,2}+x\,u_{2,\,2}\right)\right)u_1^4-12\,u_2\left(-\frac{t\,\_z1\,u_2^2}{6}+\frac{u[\,]\,u_2}{6}\right.$$

$$\left.+\_z1\,u[\,]\left(t\,u_{2,\,2}+x\,u_{1,\,2}\right)\right)u_1^3+18\,\_z1\,u_2^2\left(-\frac{x\,u_2^2}{6}+u[\,]\left(t\,u_{1,\,2}+x\,u_{2,\,2}\right)\right)u_1^2$$

$$-12\left(-\frac{t\,\_z1\,u_2^2}{12}-\frac{u[\,]\,u_2}{4}+\_z1\,u[\,]\left(t\,u_{2,\,2}+x\,u_{1,\,2}\right)\right)u_2^3\,u_1+3\,\_z1\,u[\,]\,u_2^4\left(t\,u_{1,\,2}\right.$$

$$\left.+x\,u_{2,\,2}\right)\Bigg)\Bigg)+6\left(u[\,]\left(u_1^2-u_2^2+u[\,]\left(-u_{1,\,1}+u_{2,\,2}\right)\right)\_z1^2-\frac{u_{2,\,2}}{2}+\frac{u_{1,\,1}}{2}\right)\left(t\right.$$

$$\left.u_1^2\,u_2+\frac{1}{3}\,t\,u_2^3-\frac{1}{3}\,x\,u_1^3-x\,u_1\,u_2^2\right)\Bigg)\,\text{d\_z1}\Bigg)\Bigg)$$

$$+\text{signum}\Bigg(\frac{1}{\left(u_1-u_2\right)^4\left(u_1+u_2\right)^4}\Bigg(t\,u_2^6+\left(-3\,x\,u_1-u[\,]\right)u_2^5+\left(2\,t\,u_1^2\right.$$

$$\left.+3\,u[\,]\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\right)u_2^4+\left(2\,x\,u_1^3-2\,u[\,]\,u_1^2-12\,u[\,]\left(t\,u_{1,\,2}+x\,u_{1,\,1}\right)u_1\right)u_2^3$$

$$+18\left(-\frac{t\,u_1^2}{6}+u[\,]\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\right)u_1^2\,u_2^2+\left(x\,u_1^5+3\,u[\,]\,u_1^4-12\,u[\,]\left(t\,u_{1,\,2}\right.\right.$$

$$\left.\left.+x\,u_{1,\,1}\right)u_1^3\right)u_2+3\,u[\,]\,u_1^4\left(t\,u_{1,\,1}+x\,u_{1,\,2}\right)\Bigg)\Bigg)\,\infty\Bigg)\,Dx\Bigg)$$

$$+\left(\frac{1}{(u_1-u_2)^3\,(u_1+u_2)^3}\left(x\left(\int_0^1\left(-\infty\,(u_1+u_2)\,\left(1+\left(u_{2,2}+u_{1,1,2}+u_{1,2,2}+u_2\right.\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.\left.+u_{1,2}\right)\,\_z1\right)\,\_z1\,(u_1-u_2)\,\left(u_1^4+u_2^4\right)\,\mathrm{signum}\left(1,\right.\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.\frac{1}{\_z1^2\,(u_1-u_2)^4\,(u_1+u_2)^4}\left(\_z1\,t\,u_2^6+\left(-3\,\_z1\,x\,u_1-u[\,]\right)\,u_2^5+3\,\_z1\left(\frac{2\,t\,u_1^2}{3}\right.\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.+u[\,]\,\left(t\,u_{1,1}+x\,u_{1,2}\right)\right)\,u_2^4-12\left(-\frac{\_z1\,x\,u_1^2}{6}+\frac{u[\,]\,u_1}{6}+\_z1\,u[\,]\,\left(t\,u_{1,2}\right.\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.+x\,u_{1,1}\right)\right)\,u_1\,u_2^3+18\,\_z1\,u_1^2\left(-\frac{t\,u_1^2}{6}+u[\,]\,\left(t\,u_{1,1}+x\,u_{1,2}\right)\right)\,u_2^2-12\,u_1^3\left(-\frac{\_z1\,x\,u_1^2}{12}\right.\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.-\frac{u[\,]\,u_1}{4}+\_z1\,u[\,]\,\left(t\,u_{1,2}+x\,u_{1,1}\right)\right)\,u_2+3\,\_z1\,u[\,]\,u_1^4\,\left(t\,u_{1,1}+x\,u_{1,2}\right)\right)\right)\right.\right.\right.\right.\right.\right.$$

$$+\infty\,(u_1+u_2)\,\_z1\,\left(1+\left(u_{1,1,2}+u_{1,2,2}+u_1+u_{1,1}+u_{1,2}\right)\,\_z1\right)\,(u_1-u_2)\,\left(u_1^4+\right.$$

$$\left.u_2^4\right)\,\mathrm{signum}\left(1,\frac{1}{\_z1^2\,(u_1-u_2)^4\,(u_1+u_2)^4}\left(\_z1\,x\,u_1^6+\left(-3\,\_z1\,t\,u_2-u[\,]\right)\,u_1^5\right.\right.$$

$$\left.\left.+3\,\_z1\left(\frac{2\,x\,u_2^2}{3}+u[\,]\,\left(t\,u_{1,2}+x\,u_{2,2}\right)\right)\,u_1^4-12\,u_2\left(-\frac{t\,\_z1\,u_2^2}{6}+\frac{u[\,]\,u_2}{6}\right.\right.\right.$$

$$\left.\left.\left.+\_z1\,u[\,]\,\left(t\,u_{2,2}+x\,u_{1,2}\right)\right)\,u_1^3+18\,\_z1\,u_2^2\left(-\frac{x\,u_2^2}{6}+u[\,]\,\left(t\,u_{1,2}+x\,u_{2,2}\right)\right)\,u_1^2\right.\right.$$

$$\left.\left.-12\left(-\frac{t\,\_z1\,u_2^2}{12}-\frac{u[\,]\,u_2}{4}+\_z1\,u[\,]\,\left(t\,u_{2,2}+x\,u_{1,2}\right)\right)\,u_2^3\,u_1+3\,\_z1\,u[\,]\,u_2^4\,\left(t\,u_{1,2}\right.\right.\right.$$

$$+x\,u_{2,2}\Big)\Big)+6\left(u[\,]\left(u_1^2-u_2^2+u[\,]\left(-u_{1,1}+u_{2,2}\right)\right)\_zI^2-\frac{u_{2,2}}{2}+\frac{u_{1,1}}{2}\right)\left(t$$

$$u_1^2\,u_2+\frac{1}{3}\,t\,u_2^3-\frac{1}{3}\,x\,u_1^3-x\,u_1\,u_2^2\Big)\Big)\,\mathrm{d}\_zI\Big)\Big)$$

$$-\operatorname{signum}\left(\frac{1}{\left(u_1-u_2\right)^4\left(u_1+u_2\right)^4}\left(x\,u_1^6+\left(-3\,t\,u_2-u[\,]\right)u_1^5+\left(2\,x\,u_2^2\right.\right.\right.$$

$$\left.\left.+3\,u[\,]\left(t\,u_{1,2}+x\,u_{2,2}\right)\right)u_1^4+\left(2\,t\,u_2^3-2\,u[\,]\,u_2^2-12\,u[\,]\left(t\,u_{2,2}+x\,u_{1,2}\right)u_2\right)u_1^3$$

$$+18\left(-\frac{x\,u_2^2}{6}+u[\,]\left(t\,u_{1,2}+x\,u_{2,2}\right)\right)u_2^2\,u_1^2+\left(t\,u_2^5+3\,u[\,]\,u_2^4-12\,u[\,]\left(t\,u_{2,2}\right.\right.$$

$$\left.\left.\left.+x\,u_{1,2}\right)u_2^3\right)u_1+3\,u[\,]\left(t\,u_{1,2}+x\,u_{2,2}\right)u_2^4\right)\Big)\,\infty\Big)\,Dt$$

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