

In [2]: run franke\_oo.py

x =  
/usr/lib/python2.7/site-packages/IPython/frontend.py:30: UserWarning: The top-level `frontend`  
package has been deprecated. All its subpackages have been moved to the top `IPython` level.  
warn("The top-level `frontend` package has been deprecated. "

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix}$$

xdot =

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \\ \dot{x}_4 \\ \dot{x}_5 \end{bmatrix}$$

0 = F(x,xdot) =

$$\begin{bmatrix} -x_3x_4 + \dot{x}_1 \\ -x_4 + \dot{x}_2 \\ -x_5 + \dot{x}_3 \end{bmatrix}$$

i = 0 #####

P10 [3 x 5] =

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}$$

P00 [3 x 5] =

$$\begin{bmatrix} 0 & 0 & -x_4 & -x_3 & 0 \\ 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & -1 \end{bmatrix}$$

$$P10\_roc \ [5 \times 2] =$$

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$P10\_rpinv \ [5 \times 3] =$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$P10\_dot \ [3 \times 5] =$$

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$A0 \ [3 \times 3] =$$

$$\begin{bmatrix} 0 & 0 & -x_4 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$B0 \ [3 \times 2] =$$

$$\begin{bmatrix} -x_3 & 0 \\ -1 & 0 \\ 0 & -1 \end{bmatrix}$$

B0\_loc [1 x 3] =

$$\begin{bmatrix} -1 & x_3 & 0 \end{bmatrix}$$

B0\_lpinv [2 x 3] =

$$\begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

i = 1 #####

P11 [1 x 3] =

$$\begin{bmatrix} -1 & x_3 & 0 \end{bmatrix}$$

P01 [1 x 3] =

$$\begin{bmatrix} 0 & 0 & x_4 \end{bmatrix}$$

P11\_roc [3 x 2] =

$$\begin{bmatrix} x_3 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$$

P11\_rpinv [3 x 1] =

$$\begin{bmatrix} -1 \\ 0 \\ 0 \end{bmatrix}$$

P11\_dot [1 x 3] =

$$\begin{bmatrix} 0 & \dot{x}_3 & 0 \end{bmatrix}$$

A1 [1 x 1] =

$$\begin{bmatrix} 0 \end{bmatrix}$$

B1 [1 x 2] =

$$\begin{bmatrix} -\dot{x}_3 & x_4 \end{bmatrix}$$

--- Sonderfall 4.7 -----

B1\_tilde [1 x 1] =

$$\begin{bmatrix} 1 \end{bmatrix}$$

Z1 [3 x 1] =

$$\begin{bmatrix} \frac{x_3 x_4}{\dot{x}_3} \\ \frac{x_4}{\dot{x}_3} \\ 1 \end{bmatrix}$$

Z1\_lpinv [1 x 3] =

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

#####

Algorithmus am Ende

Q-matrix =

$$\begin{bmatrix} -1 & x_3 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}$$

G-matrix =

$$\begin{bmatrix} \frac{1}{\dot{x}_3} (x_3 s - \dot{x}_3) & \frac{x_3 x_4}{\dot{x}_3} \\ \frac{s}{\dot{x}_3} & \frac{x_4}{\dot{x}_3} \\ 0 & 1 \\ \frac{s^2}{\dot{x}_3} & \frac{x_4 s}{\dot{x}_3} \\ 0 & s \end{bmatrix}$$

w1 = (-1) dx1+(x3) dx2

w2 = (1) dx3

#####

w[0].d^w[1]=0

<-> Integrabilitätsbedingung für w[0] erfüllt.

w[1].d = 0

<-> Integrabilitätsbedingung für w[1] erfüllt.

Der Fläche Ausgang wurde berechnet:

y2 =

$$x_3$$

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In [3]: