Model Documentation of the 'NN6'

1 Nomenclature

1.1 Nomenclature for Model Equations

x	state vector
u	control input vector
w	noise vector
z	regulated output vector
y	measurement vector

2 Model Equations

State Vector and Input Vector:

$$x \in \mathbb{R}^9 u \qquad \in \mathbb{R}^1 w \in \mathbb{R}^9 z \qquad \in \mathbb{R}^9 y \in \mathbb{R}^4$$

System Equations:

$$\dot{x}(t) = Ax(t) + B_1 w(t) + Bu(t) \tag{1a}$$
$$z(t) = C_1 x(t) + D_{11} w(t) + D12u(t) \tag{1b}$$
$$y(t) = Cx(t) + D21w(t) \tag{1c}$$

Outputs: z

2.1 Exemplary parameter values

Symbol	Value
A	$\begin{bmatrix} 0 & 1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -20.0 & -4.2 & 0 & 4.45 & 12.5 & 0 & 100.0 & 0 \\ 0 & 0 & 0 & 1.0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 4.7 & 8.35 & 0 & -1.1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -3.3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1.0 & 0 & 0 \\ 0 & 10.9 & 0 & 0 & -2.55 & -250.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.0 \\ 0 & 5.9 & 0 & 0 & -1.39 & 0 & 0 & -3700.0 & 0 \end{bmatrix}$
B	$\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 3.3 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 3.3 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$
C_1	$\begin{bmatrix} 3.16227766 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 3.16227766 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 3.16227766 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 3.16227766 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3.16227766 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 3.16227766 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 3.16227766 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3.1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
C	$\begin{bmatrix} 1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 & 0 & 0.66 & 0 & 1.2 & 0 \\ 0 & 0 & 0 & 1.0 & 0 & 0 & 0.66 & 0 & 1.2 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.
The original description was:
NN6 H. P. Horisberger and P. R. Belanger, "Solution of the Optimal Constant Output Feedback Problem by Conjugate Gradients", TOAC, Vol. 19, pp. 434-435, 1974 ehemals HB1

4 Simulation

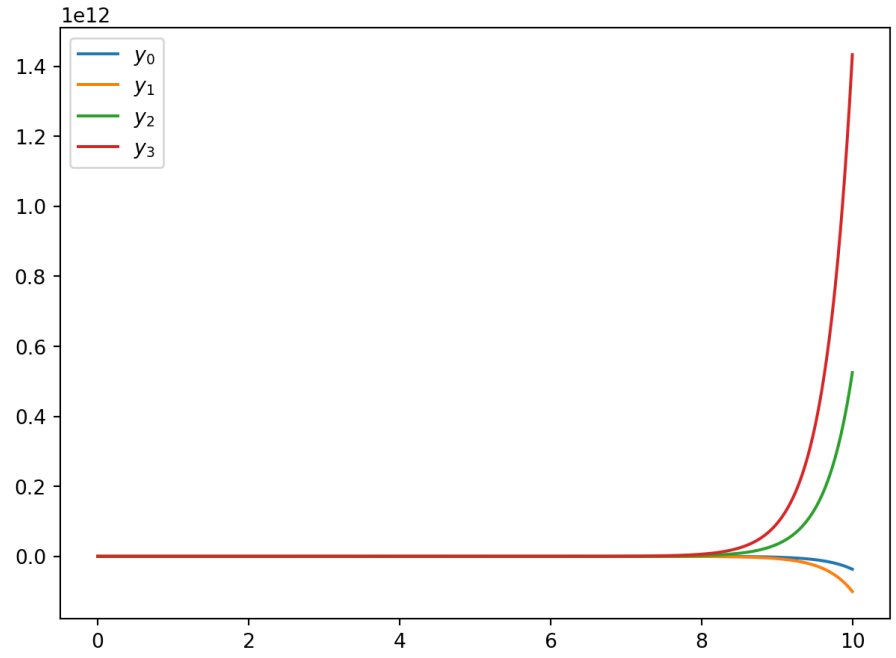

Figure 1: Simulation of the NN6.

References

[1] . P. Horisberger and P. R. Belanger, "Solution of the Optimal Constant Output Feedback Problem by Conjugate Gradients", TOAC, Vol. 19, pp. 434-435, 1974