Model Documentation of the 'NN10'

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:

$$x \in \mathbb{R}^8 u \qquad \in \mathbb{R}^3 w \in \mathbb{R}^3 z \qquad \in \mathbb{R}^2 y \in \mathbb{R}^3$$

System Equations:

$$\dot{x}(t) = Ax(t) + B_1 w(t) + Bu(t) \tag{1a}$$
$$z(t) = C_1 x(t) + D_{11} w(t) + D12 u(t) \tag{1b}$$
$$y(t) = Cx(t) + D21 w(t) \tag{1c}$$

Outputs: z

2.1 Exemplary parameter values

Symbol	Value
A	$\begin{bmatrix} 0 & -1.0 & 0 & 0 & 0 & 0 & 0 & 1.0 \\ 1.0 & 2.0 & 0 & 0 & 1.0 & 0 & 0 & -2.0 \\ 0 & -1.0 & 0 & 0 & 5.0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 & -7.0 & 0 & 0 & -2.0 \\ 0 & -1.0 & 0 & 1.0 & 4.0 & 0 & 0 & 2.0 \\ 0 & -2.0 & 0 & 0 & 2.0 & 0 & 0 & 3.0 \\ 0 & 0 & 0 & 0 & -1.0 & 1.0 & 0 & -2.0 \\ 0 & -1.0 & 0 & 0 & 1.0 & 0 & 1.0 & -1.0 \end{bmatrix}$
B	$\begin{bmatrix} 0 & 1.0 & 2.0 \\ 1.0 & 0 & 1.0 \\ -1.0 & -1.0 & -3.0 \\ 1.0 & 0 & 1.0 \\ 0 & 2.0 & 4.0 \\ 2.0 & 1.0 & 5.0 \\ -1.0 & 1.0 & 1.0 \\ 1.0 & -1.0 & -1.0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 & 1.0 & 2.0 \\ 1.0 & 0 & 1.0 \\ -1.0 & -1.0 & -3.0 \\ 1.0 & 0 & 1.0 \\ 0 & 2.0 & 4.0 \\ 2.0 & 1.0 & 5.0 \\ -1.0 & 1.0 & 1.0 \\ 1.0 & -1.0 & -1.0 \end{bmatrix}$
C_1	$\begin{bmatrix} 1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
C	$\begin{bmatrix} 0 & 1.0 & 0 & 0 & -2.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.0 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.

The original description was:

NN10 X. A. Wang, "Grassmannian, Central Projection, and Output Feedback Pole Assignment of Linear Systems", TOAC, Vol. 41, Nr. 6, pp. 786-794, 1996 Example 3.7
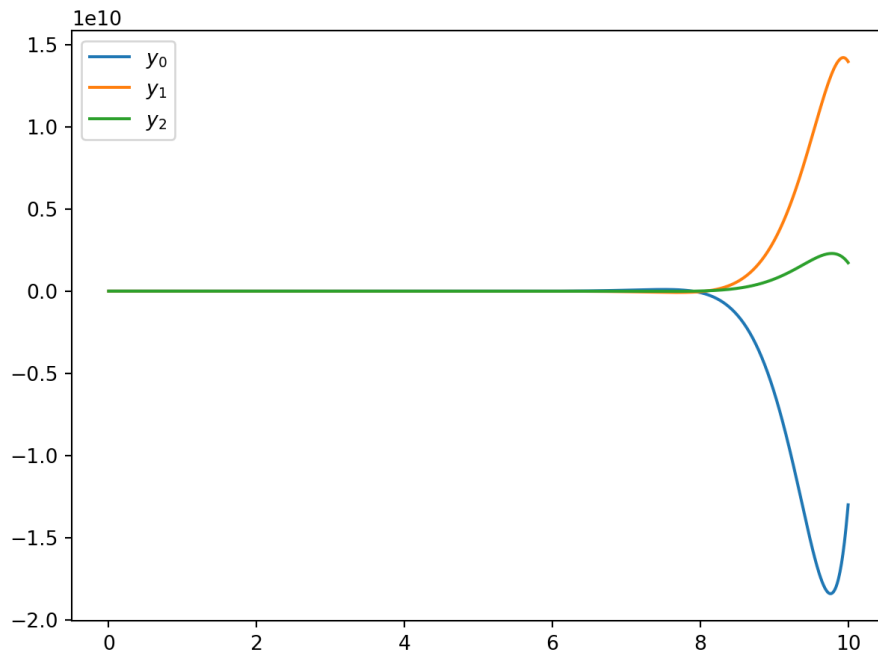
4   Simulation

Figure 1: Simulation of the NN10.

References

[1] . A. Wang, "Grassmannian, Central Projection, and Output Feedback Pole Assignment of Linear Systems", TOAC, Vol. 41, Nr. 6, pp. 786-794, 1996 Example 3.7