Model Documentation of the 'NN11'

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:

$$x \in \mathbb{R}^1 6u \qquad \in \mathbb{R}^3 w \in \mathbb{R}^3 z \qquad \in \mathbb{R}^3 y \in \mathbb{R}^5$$

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	$\begin{bmatrix} -101.0 & -99.9 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -101.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -101.0 & -99.9 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -101.0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1.0 & 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1.0 & 0 & 0 & 0 & 1.0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1.0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 427.098 & -46.8341 & -1.0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 232.0719 & 120.4649 & 0 & -1.0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -764.2456 & 85.4154 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 166.827 & -264.7739 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.3162 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -0.125 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.3162 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -0.125 & 0 & 0 & 0 & 0 \end{bmatrix}$
B	$\begin{bmatrix} 0 & -9.995 & 0 \\ 0.199 & -9.995 & 0 \\ 0.211 & 0 & -9.995 \\ -0.233 & 0 & -9.995 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 2.7173 & 1.4274 \\ 0 & 1.4274 & 2.8382 \\ 0 & -4.7909 & -2.6032 \\ 0 & 1.0261 & -2.6393 \\ 0.11 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0.01 & 0 & 0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 & -9.995 & 0 \\ 0.199 & -9.995 & 0 \\ 0.211 & 0 & -9.995 \\ -0.233 & 0 & -9.995 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 2.7173 & 1.4274 \\ 0 & 1.4274 & 2.8382 \\ 0 & -4.7909 & -2.6032 \\ 0 & 1.0261 & -2.6393 \\ 0.11 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0.01 & 0 & 0 \end{bmatrix}$
C_1	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 1.5564 & 3.4834 & 0 & 0 & 0.0016 & 0.0035 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 3 & 0 & 0 & 0 & 0 & 0 & -0.4743 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.3479 & 0 \end{bmatrix}$
C	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.3162 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.3162 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1.5564 & 3.4834 & 0 & 0 & 0.0016 & 0.0035 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.4743 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.3479 & 0 \end{bmatrix}$
D	$\begin{bmatrix} 0 & 0 & 0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.
The original description was:
NN11 P. Apkarian and H. D. Tuan, "Robust Conrol via Concave Minimization, Local and Global Algorithms", TOAC, Vol. 45, Nr. 2, pp. 299-305, 2000

4 Simulation

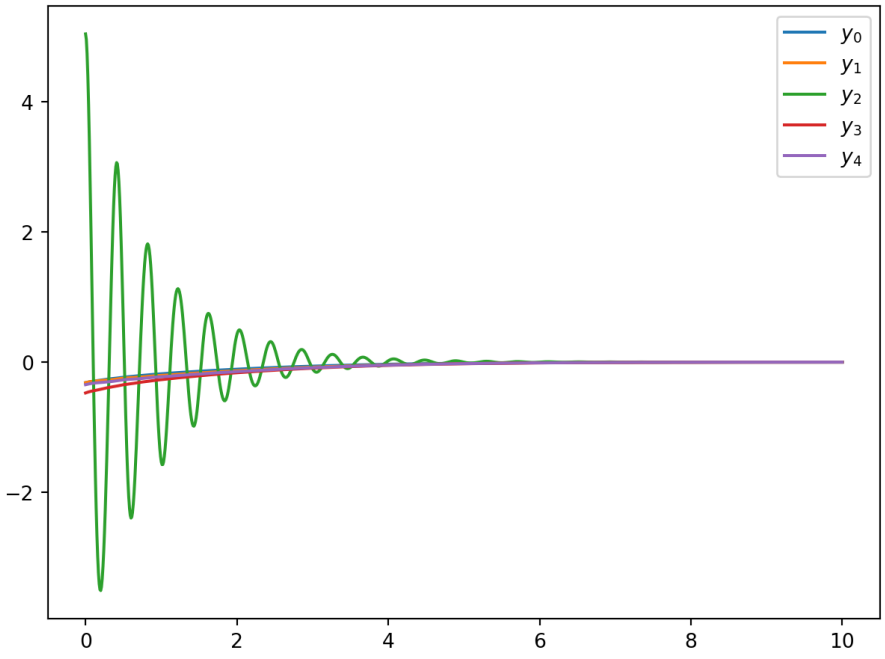

Figure 1: Simulation of the NN11.

References

[1] . Apkarian and H. D. Tuan, "Robust Conrol via Concave Minimization, Local and Global Algorithms", TOAC, Vol. 45, Nr. 2, pp. 299-305, 2000