Model Documentation of the 'DIS3'

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:

$$x \in \mathbb{R}^6 u \qquad \in \mathbb{R}^4 w \in \mathbb{R}^6 z \qquad \in \mathbb{R}^6 y \in \mathbb{R}^4$$

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	$\begin{bmatrix} -1.0 & 0 & 0 & 0 & 0 & 0 \\ -1.0 & 1.0 & 1.0 & 0 & 0 & 0 \\ 1.0 & -2.0 & -1.0 & -1.0 & 1.0 & 1.0 \\ 0 & 0 & 0 & -1.0 & 0 & 0 \\ -8.0 & 1.0 & -1.0 & -1.0 & -2.0 & 0 \\ 4.0 & -0.5 & 0.5 & 0 & 0 & -4.0 \end{bmatrix}$
B	$\begin{bmatrix} 0 & 1.0 & 0 & 0 \\ 1.0 & 0 & 0 & 0 \\ 1.0 & 1.0 & 0 & 0 \\ 0 & 0 & 0 & -1.0 \\ 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 1.0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 & 1.0 & 0 & 0 \\ 1.0 & 0 & 0 & 0 \\ 1.0 & 1.0 & 0 & 0 \\ 0 & 0 & 0 & -1.0 \\ 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 1.0 \end{bmatrix}$
C_1	$\begin{bmatrix} 1.0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1.0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1.0 \end{bmatrix}$
C	$\begin{bmatrix} 0 & 1.0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1.0 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1.0 & 0 & 0 & 0 \\ 0 & 1.0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 1.0 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

3   Derivation and Explanation

This model is part of the "'COMPleib"' - library and was automatically imported into ACKREP.
The original description was:
DIS3 M. Saif and Y. Guan,"Decentralized State Estimation in Large-Scale Interconnected Dynamical Systems", AUTO, Vol. 28, Nr. 1, pp. 215-219
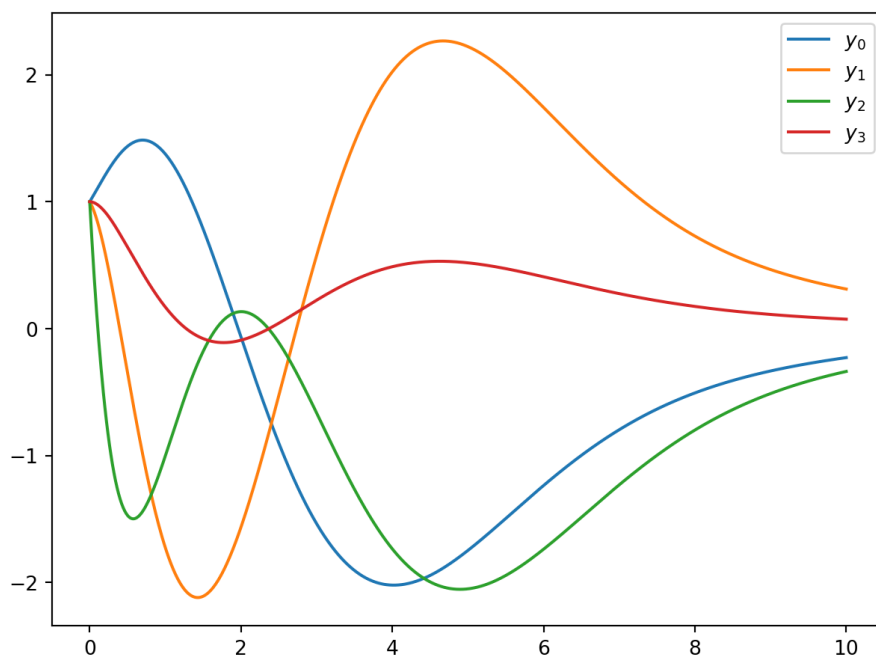
4   Simulation

Figure 1: Simulation of the DIS3.

References

[1] . Saif and Y. Guan,"Decentralized State Estimation in Large-Scale Interconnected Dynamical Systems", AUTO, Vol. 28, Nr. 1, pp. 215-219