Model Documentation of the 'Chemical reactor model by'

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:

$$x \in \mathbb{R}^8 u \qquad \in \mathbb{R}^1 w \in \mathbb{R}^1 z \qquad \in \mathbb{R}^1 y \in \mathbb{R}^1$$

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	$\begin{bmatrix} 0.5623 & -0.01642 & 0.01287 & -0.0161 & 0.02094 & -0.02988 & 0.0183 & 0.008743 \\ 0.102 & 0.6114 & -0.02468 & 0.02468 & -0.03005 & 0.04195 & -0.02559 & 0.03889 \\ 0.1361 & 0.2523 & 0.641 & -0.03404 & 0.03292 & -0.04296 & 0.02588 & 0.08467 \\ 0.09951 & 0.2859 & 0.3476 & 0.6457 & -0.03249 & 0.03316 & -0.01913 & 0.1103 \\ -0.04794 & 0.08708 & 0.3297 & 0.3102 & 0.6201 & -0.03015 & 0.01547 & 0.08457 \\ -0.1373 & -0.1224 & 0.1705 & 0.3106 & 0.191 & 0.5815 & -0.01274 & 0.05394 \\ -0.1497 & -0.1692 & 0.1165 & 0.2962 & 0.1979 & 0.07631 & 0.5242 & 0.04702 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.6065 \end{bmatrix}$
B	$\begin{bmatrix} -0.1774 \\ -0.2156 \\ -0.2194 \\ -0.09543 \\ 0.0579 \\ 0.09303 \\ 0.08962 \\ 0 \end{bmatrix}$
B_1	$\begin{bmatrix} -0.1774 \\ -0.2156 \\ -0.2194 \\ -0.09543 \\ 0.0579 \\ 0.09303 \\ 0.08962 \\ 0 \end{bmatrix}$
C_1	$\begin{bmatrix} -0.0465 & -0.1135 & -0.1909 & -0.2619 & -0.2634 & -0.1422 & -0.0002 & 0.1856 \end{bmatrix}$
C	$\begin{bmatrix} -0.0049 & 0.0049 & -0.006 & 0.01 & 0.0263 & 0.3416 & 0.6759 & 0 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0.1001 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 1.0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.
The original description was:
REA4 Chemical reactor model by P. M. Maekilae, "Parametric LQ Control", IJOC, Vol. 41, Nr. 6, pp. 1413-1428, 1985 discrete modell

4 Simulation

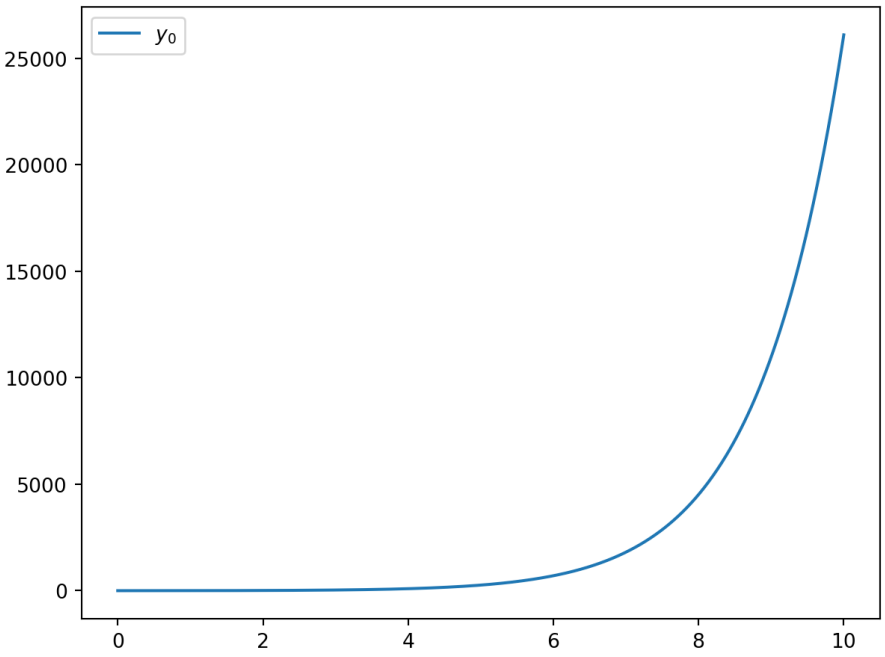

Figure 1: Simulation of the Chemical reactor model by.

References

[1] . M. Maekilae, "Parametric LQ Control", IJOC, Vol. 41, Nr. 6, pp. 1413-1428, 1985 discrete modell