

# Model Documentation of the 'DIS5'

## 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:

$$x \in \mathbb{R}^4 \quad u \in \mathbb{R}^2 \quad w \in \mathbb{R}^3 \quad z \in \mathbb{R}^3 \quad y \in \mathbb{R}^2$$

System Equations:

$$\dot{x}(t) = Ax(t) + B_1w(t) + Bu(t) \tag{1a}$$

$$z(t) = C_1x(t) + D_{11}w(t) + D_{12}u(t) \tag{1b}$$

$$y(t) = Cx(t) + D_{21}w(t) \tag{1c}$$

Outputs:  $z$

## 2.1 Exemplary parameter values

Symbol	Value
$A$	$\begin{bmatrix} 0.8189 & 0.0863 & 0.09 & 0.0813 \\ 0.2524 & 1.0033 & 0.0313 & 0.2004 \\ -0.0545 & 0.0102 & 0.7901 & -0.258 \\ -0.1918 & -0.1034 & 0.1602 & 0.8604 \end{bmatrix}$
$B$	$\begin{bmatrix} 0.0045 & 0.0044 \\ 0.1001 & 0.01 \\ 0.0003 & -0.0136 \\ -0.0051 & 0.0936 \end{bmatrix}$
$B_1$	$\begin{bmatrix} 0.0045 & 0.0044 \\ 0.1001 & 0.01 \\ 0.0003 & -0.0136 \\ -0.0051 & 0.0936 \end{bmatrix}$
$C_1$	$\begin{bmatrix} 1.0 & 0 & -1.0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$
$C$	$\begin{bmatrix} 1.0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 \end{bmatrix}$
$D_{11}$	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
$D_{12}$	$\begin{bmatrix} 0 & 0 \\ 1.0 & 0 \\ 0 & 1.0 \end{bmatrix}$
$D_{21}$	$\begin{bmatrix} 0 & 1.0 & 0 \\ 0 & 0 & 1.0 \end{bmatrix}$

## 3 Derivation and Explanation

This model is part of the "COMpleib" - library and was automatically imported into ACKREP.

The original description was:

DIS5 M. C. de Oliveira, J. F. Camino and R. E. Skelton, A Convexifying Algorithm of Structured Linear Controllers Tech. Report, FAPESP and CAPES, Brazil discrete model

## 4 Simulation

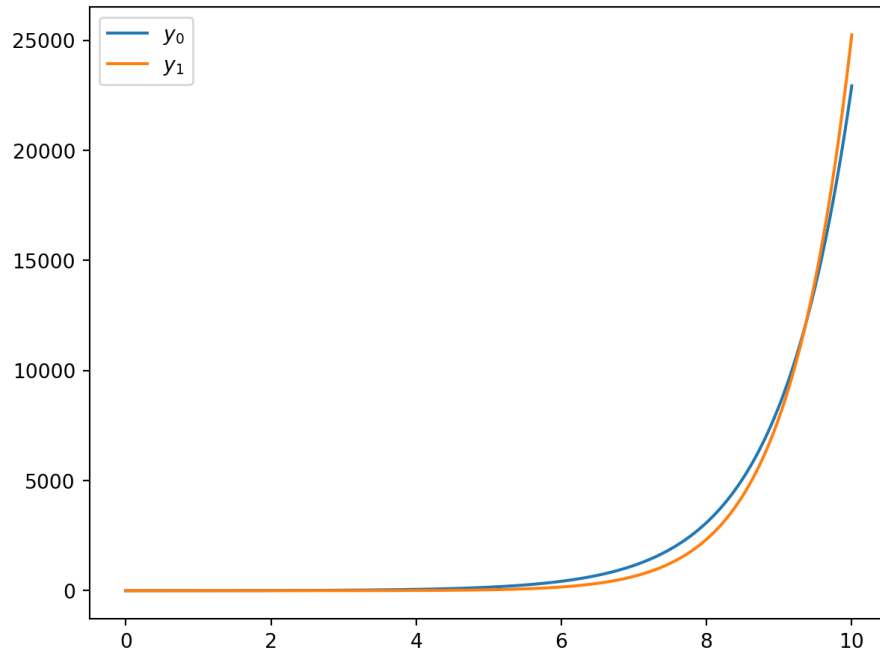


Figure 1: Simulation of the DIS5.

## References

- [1] . C. de Oliveira, J. F. Camino and R. E. Skelton, A Convexifying Algorithm of Structured Linear Controllers Tech. Report, FAPESP and CAPES, Brazil discrete model