

Model Documentation of the 'CCV-type aircraft'

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:

$$x \in \mathbb{R}^5 \quad u \in \mathbb{R}^2 \quad w \in \mathbb{R}^5 \quad z \in \mathbb{R}^5 \quad y \in \mathbb{R}^4$$

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	$\begin{bmatrix} -1.341 & 0.9933 & 0 & -0.1689 & -0.2518 \\ 43.223 & -0.8693 & 0 & -17.251 & -1.5766 \\ 1.341 & 0.0067 & 0 & 0.1689 & 0.2518 \\ 0 & 0 & 0 & -20.0 & 0 \\ 0 & 0 & 0 & 0 & -20.0 \end{bmatrix}$
B	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 20.0 & 0 \\ 0 & 20.0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 20.0 & 0 \\ 0 & 20.0 \end{bmatrix}$
C_1	$\begin{bmatrix} 1.0 & 0 & 0 & 0 & 0 \\ 0 & 1.0 & 0 & 0 & 0 \\ 0 & 0 & 1.0 & 0 & 0 \\ 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 \end{bmatrix}$
C	$\begin{bmatrix} 0 & 0 & 1.0 & 0 & 0 \\ 47.76 & -0.268 & 0 & -4.56 & 4.45 \\ 0 & 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 0 & 1.0 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 1.0 & 0 \\ 0 & 1.0 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

3 Derivation and Explanation

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

The original description was:

AC11 CCV-type aircraft A. T. Alexandridis and P. N. Paraskevopoulos, "A New Approach to Eigenstructure Assignment by Output Feedback", TOAC, Vol. 41, Nr. 7, pp. 1046-1050, 1996 Example 2

4 Simulation

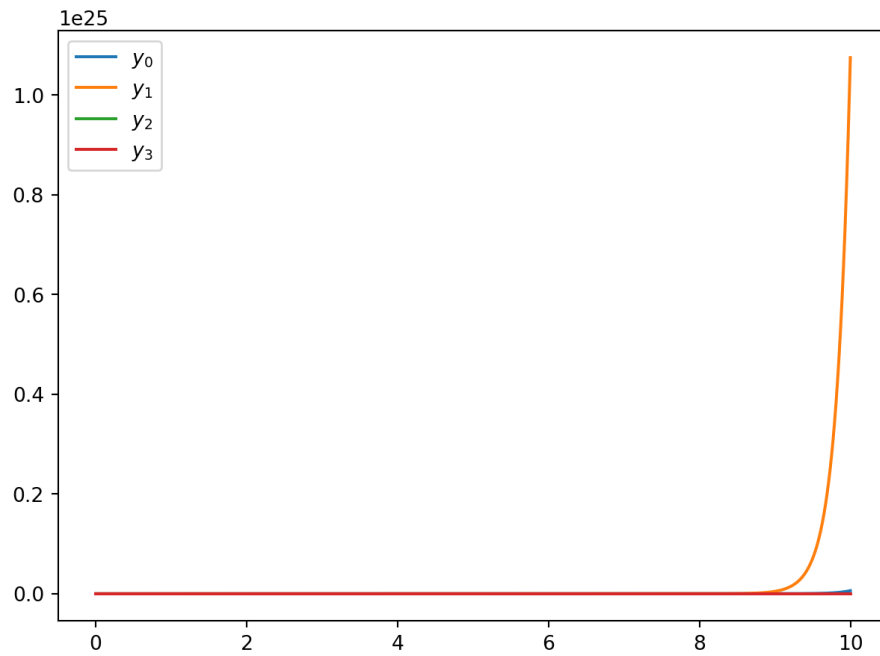


Figure 1: Simulation of the CCV-type aircraft.

References

- [1] . T. Alexandridis and P. N. Paraskevopoulos, "A New Approach to Eigenstructure Assignment by Output Feedback", TOAC, Vol. 41, Nr. 7, pp. 1046-1050, 1996 Example 2