Model Documentation of the 'Missile autopilot'

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:

$$x \in \mathbb{R}^4 u \qquad \in \mathbb{R}^1 w \in \mathbb{R}^2 z \qquad \in \mathbb{R}^2 y \in \mathbb{R}^2$$

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	$\begin{bmatrix} -0.876 & 1.0 & -0.1209 & 0 \\ 8.9117 & 0 & -130.75 & 0 \\ 0 & 0 & -150.0 & 0 \\ -1.0 & 0 & 0 & -0.05 \end{bmatrix}$
B	$\begin{bmatrix} 0 \\ 0 \\ 150.0 \\ 0 \end{bmatrix}$
B_1	$\begin{bmatrix} 0 \\ 0 \\ 150.0 \\ 0 \end{bmatrix}$
C_1	$\begin{bmatrix} -0.25 & 0 & 0 & 3.487 \\ 0 & 0 & -3.0 & 0 \end{bmatrix}$
C	$\begin{bmatrix} -1.0 & 0 & 0 & 0 \\ 0 & -1.0 & 0 & 0 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0.25 \\ 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 \\ 3.0 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 0 & 1.0 \\ 0.01 & 0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.
The original description was:
AC4 Missile autopilot ehemals MA1 B. Fares, P. Apkarian and D. Noll, "An Augmented Lagrangian Method for a Class of LMI-Constrained Problems in Robust Control Theory", 2000, IJOC, Vol. 74, Nr. 4, pp. 348-360

4 Simulation

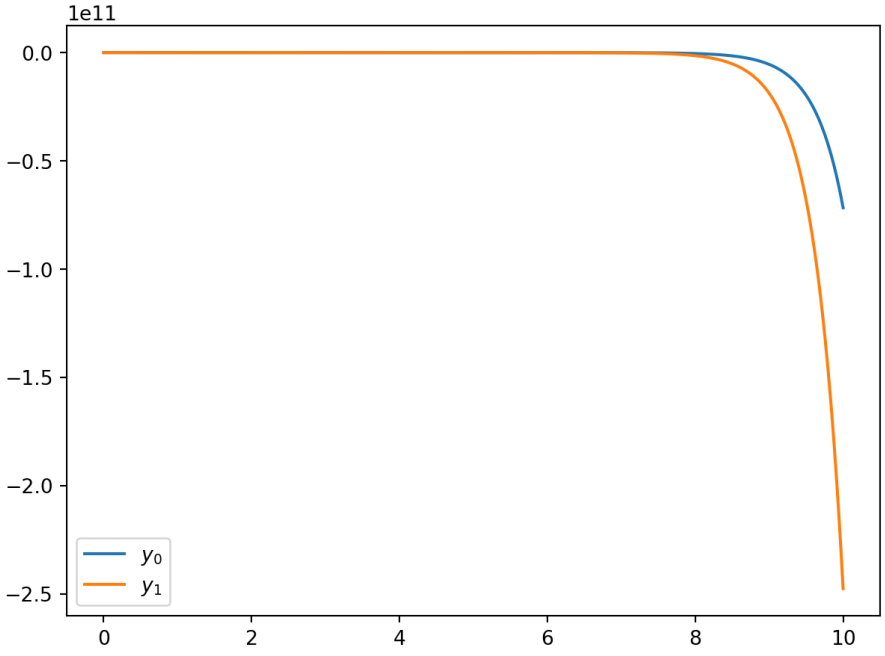

Figure 1: Simulation of the Missile autopilot.

References

[1] . Fares, P. Apkarian and D. Noll, "An Augmented Lagrangian Method for a Class of LMI-Constrained Problems in Robust Control Theory", 2000, IJOC, Vol. 74, Nr. 4, pp. 348-360