

# Model Documentation of the 'Aero engine control'

## 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:

$$x \in \mathbb{R}^{24} u \in \mathbb{R}^3 w \in \mathbb{R}^6 z \in \mathbb{R}^9 y \in \mathbb{R}^6$$

System Equations:

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

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

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

Outputs:  $z$

### 2.1 Exemplary parameter values

Parameters omitted due to large matrices. See Source code.

## 3 Derivation and Explanation

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

The original description was:

JE3 Aero engine control "Multivariable feedback control Analysis and design"  
S. Skogestad and I. Postlethwaite John Wiley and Sons, 1996, Section 12.3.3  
Note Matlab files <http://www.nt.ntnu.no/users/skoge/book/matlab.html> stored in /export/home/leibfr/Lipinski/matlab/...Examples\_Multi\_Feedback\_Control/matlab.m/  
F. Leibfritz, 16.09.2003 Data matrices generated by Sec12.33.m in directory above on Laptop save Aero\_Engine a b c d A\_Hinf B1 B2 C1 C2 D11 D12 D21 D22 A\_Hinf B1 B2 C1 C2 D11 D12 D21 D22 - data set G5 for H\_inf design  
==> A\_Hinf = A in Sec12.33.m

## 4 Simulation

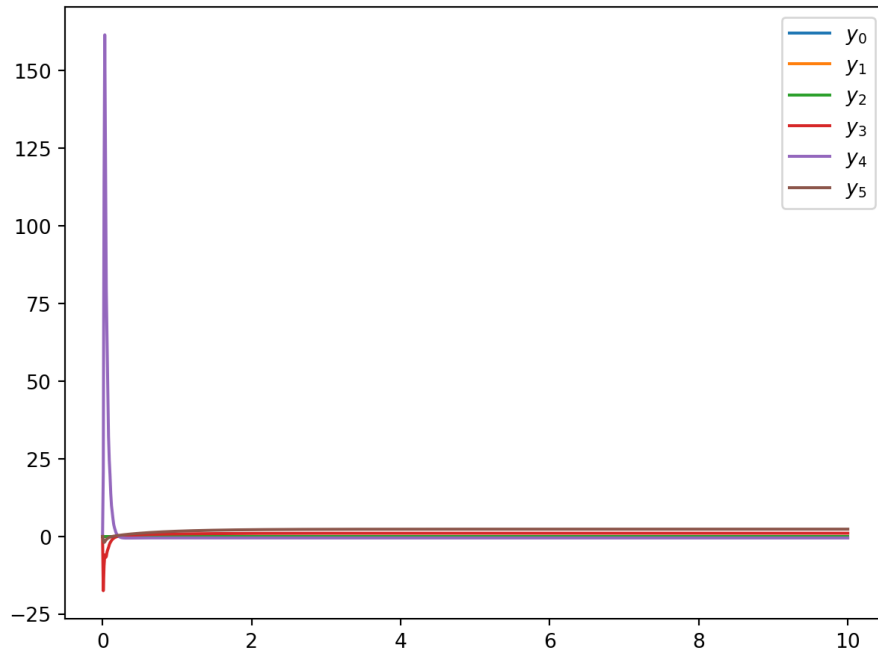


Figure 1: Simulation of the Aero engine control.

## References

- [1] Multivariable feedback control Analysis and design” S. Skogestad and I. Postlethwaite John Wiley and Sons, 1996, Section 12.3.3