Model Documentation of the 'B767 aircraft at a flutter condition'

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:

$$x \in \mathbb{R}^1 0u \qquad \in \mathbb{R}^2 w \in \mathbb{R}^3 z \qquad \in \mathbb{R}^5 y \in \mathbb{R}^2$$

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	$\begin{bmatrix} -1.96218173 & 29.3478561 & 7.09938479 & -4.27052563 & -2.19720836 & 7.02022433 \\ -28.9729781 & -0.383047005 & -2.45254213 & 6.87681195 & 0.638239536 & -2.31607847 \\ -6.44710154 & 1.83216052 & -0.804826868 & 43.6597956 & 2.0128481 & -2.92931277 \\ -0.55360569 & -6.43547046 & -43.3013521 & -3.91559217 & -4.22367888 & 17.700582 \\ 1.52819246 & 0.187500302 & -1.61371325 & 2.75649933 & -0.799488823 & 36.5849001 \\ -4.79608198 & -0.172327607 & -1.95196537 & -17.1293232 & -34.2626087 & -9.67071839 \\ -0.118111938 & 0.690456628 & 1.60965467 & 1.74630944 & -2.04901942 & 20.0082173 \\ -0.649363841 & -0.428785767 & -1.22836446 & -0.982039173 & 0.432613018 & -9.07399499 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$
B	$\begin{bmatrix} 196.050016 & -248.625964 \\ 135.51942 & -108.092698 \\ 82.2820478 & 34.5059108 \\ 388.17347 & -81.6977915 \\ -86.4042347 & 80.9998941 \\ 411.45184 & 108.055257 \\ -211.799057 & -112.447245 \\ 16.2719831 & -80.3096928 \\ -6.75043395 & -5.13305891 \\ -0.380529228 & -0.198627271 \end{bmatrix}$
B_1	$\begin{bmatrix} 196.050016 & -248.625964 \\ 135.51942 & -108.092698 \\ 82.2820478 & 34.5059108 \\ 388.17347 & -81.6977915 \\ -86.4042347 & 80.9998941 \\ 411.45184 & 108.055257 \\ -211.799057 & -112.447245 \\ 16.2719831 & -80.3096928 \\ -6.75043395 & -5.13305891 \\ -0.380529228 & -0.198627271 \end{bmatrix}$
C_1	$\begin{bmatrix} -0.0517831065 & 0.00497408918 & 0.0305824415 & -0.00474937127 & -0.0340836085 & 0.00 \\ -0.0251959506 & 0.0846171194 & -0.0127201614 & -0.018876413 & -0.0273381391 & -0.0 \\ -0.0349186404 & -0.0137979567 & -0.00481092443 & 0.0139399957 & -0.000943321237 & -0.0 \\ 0 & 0 & 0 & 0 & 0 & \\ 0 & 0 & 0 & 0 & 0 & \end{bmatrix}$
C	$\begin{bmatrix} 0.00253925381 & -0.00116707666 & 0.000127739519 & -0.00418514541 & 6.3405198 \cdot 10^{-5} & 0.002 \\ 415.967367 & -179.554835 & -232.410488 & 494.159169 & 168.026991 & -558 \end{bmatrix}$
D_{11}	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
D_{12}	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0.13503703 & 0 \\ 0 & 0.02700926 \end{bmatrix}$
D_{21}	$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

3 Derivation and Explanation

This model is part of the "'COMPleib"' - library and wasautomatically imported into ACKREP.
The original description was:
AC18 B767 aircraft at a flutter condition Davison see AC10! reduced order system generated by /export/home/leibfr/bsp37/bsp37bal.m

4 Simulation

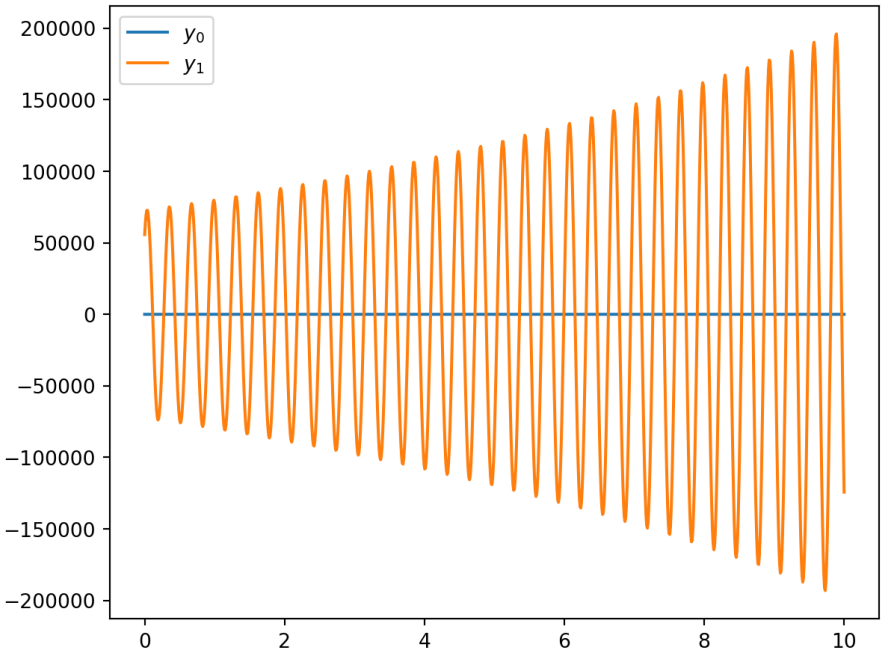

Figure 1: Simulation of the B767 aircraft at a flutter condition.

References

[1] . J. Davison, "Benchmark Problems for Control System Design", "Report of the IFAC Theory Comittee", 1990