

Spm 7 mm 14

ROO = (Reduced order observer)

$$1) \dot{X} = \begin{bmatrix} 7 & -9 \\ 6 & -8 \end{bmatrix} X + \begin{bmatrix} 4 \\ 3 \end{bmatrix} u \quad Y = [1 \ 1] X \quad F_x = [-2 \ 2] \quad \lambda + 4$$

Compute $\begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} = T^{-1} \cdot A \cdot T$, $\begin{bmatrix} B_1 \\ B_2 \end{bmatrix} = T^{-1} B$, $(F_1, F_2) = F T$

$$T = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}, T^{-1} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} B_1 \\ B_2 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} 7 \\ 3 \end{pmatrix}$$

$$\begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 7 & -9 \\ 6 & -8 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 13 & -30 \\ 6 & -14 \end{pmatrix}, (F_1, F_2) = (-2 \ 2) \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix} = (-2 \ 4)$$

2) Design ROO having characteristic poly $s^2 + 4s + 4$ find L such that eigenvalues of $A_{22} + L A_{12}$ so $1 = -4 : A_{22} + L A_{12} = -14 - 30L = -4 \Rightarrow L = \frac{1}{3}$

3) Matlab™

Je opg beschrijfs

4) Close the loop in Matlab by using feedback() function and then pole() function and poles are: $\begin{bmatrix} -4 \\ -1 \\ -2 \end{bmatrix} \checkmark$