

Lec 14.

Ex. 1

State feedback $u = Fx = (-2 \ 2)x$

$$\dot{x} = \begin{pmatrix} 7 & -9 \\ 6 & -8 \end{pmatrix} x + \begin{pmatrix} 4 \\ 3 \end{pmatrix} u$$

$$y = (1 \ 1)x$$

compute: $\begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} = T^{-1}AT$, $\begin{pmatrix} B_1 \\ B_2 \end{pmatrix} = T^{-1}B$, $(F_1 \ F_2) = FT$

$$T = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}, T^{-1} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$$

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$$\begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 7 & -9 \\ 6 & -8 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 13 & -30 \\ 6 & -14 \end{pmatrix}$$

$$\begin{pmatrix} B_1 \\ B_2 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} 7 \\ 3 \end{pmatrix}, (F_1 \ F_2) = (-2 \ 2) \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix} = (-2 \ 4)$$

Ex. 2

Design reduced order observer having characteristic polynomial $s+4$ find L such that eigenvalues of $A_{22} + LA_{12}$ so $\lambda = -4$

$$A_{22} + LA_{12} = -14 - 30L = -4 \Rightarrow L = \frac{-1}{3}$$

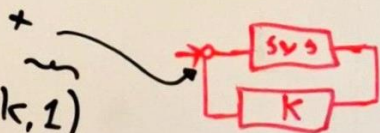
Ex. 3

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Ex. 4

$$\text{syscl} = \text{feedback}(\text{sys}, k, 1)$$

$$\text{pole}(\text{syscl}) = \begin{matrix} -1 \\ -2 \\ -4 \end{matrix}$$



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