lect3 Example. 3.3

Q: $u(0) = u(1) = 0$ → initial state

$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ $C = [0 \ 1]$ $\begin{bmatrix} y(0) \\ y(1) \end{bmatrix} = \begin{bmatrix} 1 \\ 1.2 \end{bmatrix}$

Solution $W_o = \begin{bmatrix} C \\ CA \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

$CA = [0 \ 1] \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} = [1 \ 1]$ $|W_o| = -1 \neq 0$ observable.

$W_o X(0) = \begin{bmatrix} y(0) \\ y(1) \end{bmatrix}$

$X(0) = W_o^{-1} \begin{bmatrix} y(0) \\ y(1) \end{bmatrix} = \frac{\begin{bmatrix} 1 & -1 \\ -1 & 0 \end{bmatrix}}{-1} \begin{bmatrix} 1 \\ 1.2 \end{bmatrix}$

$= \begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 1.2 \end{bmatrix}$ $-1 + 1.2 = 0.2$

$= \begin{bmatrix} 0.2 \\ 1 \end{bmatrix}$

$\Rightarrow x_1(0) = 0.2$ $x_2(0) = 1$