Example 2.14

Q: $Z^{-1}\{X(z)\} = ?$ PFE

$$X(z) = \frac{(1-e^{-aT})z}{(z-1)(z-e^{-aT})}$$

Solution ① 化简分子

② 同除 z !!!

② 拆 $$\frac{A}{z-1} + \frac{B}{z-e^{-aT}}$$

$$= \frac{Az - Ae^{-aT} + Bz - B}{(z-1)(z-e^{-aT})} \quad \begin{cases} A+B = 1-e^{-aT} \\ -Ae^{-aT} - B = 0 \end{cases}$$

$$\Rightarrow B = -Ae^{-aT}$$

$$A = 1-e^{-aT} + Ae^{-aT}$$

$$A(1-e^{-aT}) = 1-e^{-aT} \Rightarrow \begin{cases} A = 1 \\ B = -e^{-aT} \end{cases}$$

③ $$X(z) = \frac{1}{z-1} + \frac{-e^{-aT}}{z-e^{-aT}}$$

$$= \frac{z^{-1}}{1-z^{-1}} - \frac{e^{-aT}z^{-1}}{1-e^{-aT}z^{-1}}$$

$$= \underbrace{\frac{z^{-1}}{1-z^{-1}}}_{\text{Table19}} - \frac{z^{-1}}{e^{aT}-z^{-1}}$$

$$= 1 - \boxed{}$$ 找不到对应

Solution2: $$\frac{X(z)}{z} = \frac{A}{z-1} + \frac{B}{z-e^{-aT}}$$

$$A(z-e^{-aT}) + B(z-1) = 1-e^{-aT}$$

$$\begin{cases} A+B=0 \\ -Ae^{-aT} - B = 1-e^{-aT} \end{cases} \Rightarrow \begin{cases} A=1 \\ B=-1 \end{cases}$$

$$\frac{X(z)}{z} = \frac{1}{z-1} - \frac{1}{z-e^{-aT}}$$

$$X(z) = \frac{1}{1-z^{-1}} - \frac{1}{1-e^{-aT}z^{-1}}$$

$$= 1 - e^{-akT}, k = 0, 1, 2 \cdots$$