Examples 4

Q:

Solution $G_{ZOH} = \frac{1-e^{-sT}}{s}$ $G(s) = \frac{1}{s+1}$

$$G_{ZAS}(z) = Z\left\{\left[\frac{1-e^{-sT}}{s}\ \frac{1}{s+1}\right]\right\}$$

$$= (1-z^{-1})\, Z\left\{\left[\frac{1}{s(s+1)}\right]\right\}$$

$\because z = e^{sT}$ $\therefore z^{-1} = e^{-sT}$ $\therefore (1-e^{-sT}) = (1-z^{-1})$

$$G_{ZAS}(z) = \frac{(1-z^{-1})(1-e^{-T})z^{-1}}{(1-z^{-1})(1-e^{-T}z^{-1})}$$

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

$$= \frac{0.09516}{z-0.9048} \quad \text{when } T = 0.1$$

$T = 0.1s$ $z = \frac{1+\frac{wT}{2}}{1-\frac{wT}{2}} = \frac{1+0.05w}{1-0.05w}$

$$G_1(w) = \frac{0.09516}{\frac{1+0.05w}{1-0.05w} - 0.9048}$$

$$= \frac{0.09516}{\frac{1+0.05w - 0.9048(1-0.05w)}{1-0.05w}}$$

$$= \frac{-0.05w+1}{1.05w+1}$$

PPT直接四舍五入为1了

$T = 0.01$

$$G_{ZAS}(z) = \frac{1-e^{-T}}{z-e^{-T}} = \frac{0.00995}{z-0.99}$$

$$G_{zc}(w) = \frac{-0.05w+1}{w+1}$$