

通信原理第 10 章作业

10-2 解: (1) 最高频率 $f_H = 2000 \text{ Hz}$.

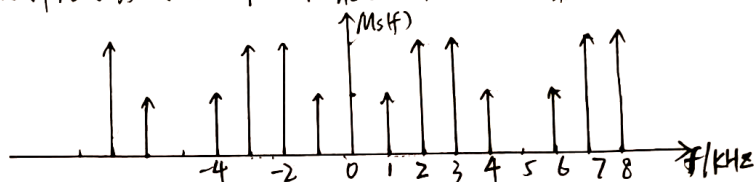
抽样频率 $f_s > 2f_H = 4000 \text{ Hz}$

抽样间隔: $T_s = \frac{1}{f_s} < 0.25 \text{ ms}$

(2) m(t) 频谱: $M(f) = \frac{1}{2}[\delta(f-1) + \delta(f+1)] + [\delta(f-2) + \delta(f+2)]$

$T_s = 0.2 \text{ ms}$ 时 $f_s = \frac{1}{T_s} = 5000 \text{ Hz} = 5 \text{ kHz}$

已抽样信号频谱: $M_s(f) = f_s \sum_{n=-\infty}^{\infty} M(f - nf_s) = 5 \sum_{n=-\infty}^{\infty} M(f - 5n)$



10-9 解: $y = \frac{\ln(1+ux)}{\ln(1+u)}$ $0 \leq x \leq 1$ $M=100$

输入 x	0	0.1	1	2.5	5	7.5	10
归一化 x	0	0.01	0.1	0.25	0.5	0.75	1
归一化 y	0	0.15	0.52	0.706	0.852	0.938	1
输出 y	0	15	52	706	852	938	10

10-16 解: (1) 128 级量化需要 7 位二进制编码.

单路 PCM 信息速率: $R_{b1} = f_s \cdot N = 8000 \times 7 = 56 \text{ kbps}$

10 路复用信号信息速率: $R_b = 10R_{b1} = 560 \text{ kbps}$

(2) 谱零点带宽 $B = \frac{1}{T} = R_b = 560 \text{ kHz}$.

传输带宽 $B_{mm} = \frac{B}{2} = 280 \text{ kHz}$

(3) 占空比为 $\frac{1}{2}$ 时 $B = 2R_b = 1120 \text{ kHz}$

$B_{mm} = \frac{B}{2} = 560 \text{ kHz}$