

Q.4

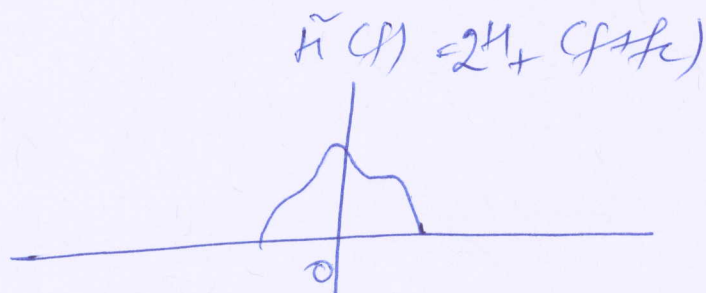
let

$$H(f) = H_+(f) + H_-(f)$$



Then, we know that.

$$\tilde{H}(f) = 2H_+(f+f_c)$$



Since filtering in base band is equivalent to filtering in passband, we have

$$\tilde{Z}(f) = \frac{1}{2} \tilde{H}(f) \tilde{Y}(f)$$

①

$$\begin{aligned} \text{let } \tilde{H}(f) &\triangleq |\tilde{H}(f)| e^{j\tilde{\theta}(f)} \\ &= 2|H_+(f+f_c)| e^{j\theta_+(f+f_c)} \end{aligned}$$

where $\theta_+(f) = \arg(H_+(f)/|H_+(f)|)$.

②