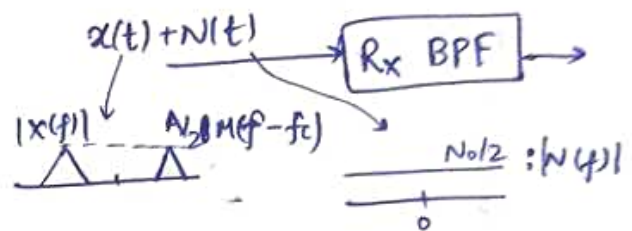


Exercise: ① Compare SSB, DSB SNR if Tx powers are same.

② SNR for LCAM, assuming Tx power is same as DSB.

[Submit by 23rd Oct.]

Sol: ① DSB Tx power = $\frac{A^2}{2} P_m$



$$\text{SSB Tx power} = \frac{A'^2}{4} P_m$$

$$\therefore \frac{A^2}{2} P_m = \frac{A'^2}{4} P_m \Rightarrow A'^2 = 2A^2 \Rightarrow A' = \sqrt{2}A$$

$$\text{SNR of DSB} = \frac{\frac{A^2}{2} P_m}{\frac{N_0(B_m \times 2)}{2}} = \frac{A^2 P_m}{2 N_0 B_m} \quad [BW = B_m \times 2]$$

$$\text{SNR of SSB} = \frac{\frac{A'^2}{4} P_m}{\frac{N_0(B_m)}{2}} = \frac{2A^2 P_m}{2 B_m N_0} = \frac{A^2 P_m}{N_0 B_m} \quad [BW = B_m]$$

$$\therefore \boxed{\text{SNR (SSB)} = 2 \text{SNR (DSB)}}$$

$$\text{② DSB Tx power} = \frac{A^2 P_m}{2}$$

$$\text{LCAM Tx power} = \frac{A'^2}{2} + \frac{\alpha A'^2 P_m}{2} = \frac{A'^2}{2} (1 + \alpha P_m)$$

$$\text{SNR of LCAM} = \frac{\frac{A'^2}{2} (1 + \alpha P_m)}{\frac{N_0 \times (2B_m)}{2}} = \frac{A^2 P_m}{2 N_0 B_m} = \text{SNR (DSB)}$$

$$\text{Also, } P(\text{DSB}) = P(\text{LCAM}) \Rightarrow \frac{A^2 P_m}{2} = \frac{A'^2}{2} (1 + \alpha P_m)$$

$$\therefore \boxed{\text{SNR (LCAM)} = \text{SNR (DSB)}}$$