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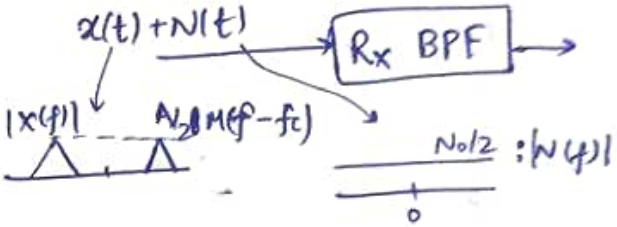
Exercise: ① Compare SSB, DSB SNR if Tx powers are same.
② SNR for LCAM, assuming Tx power is same as DSB.
[Submit by 23rd Oct.]

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



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

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

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

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

$\therefore$ **SNR (SSB) = 2 SNR (DSB)**

② DSB Tx power $= \frac{A^2 P_m}{2}$

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

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

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

$\therefore$ **SNR (LCAM) = SNR (DSB)**