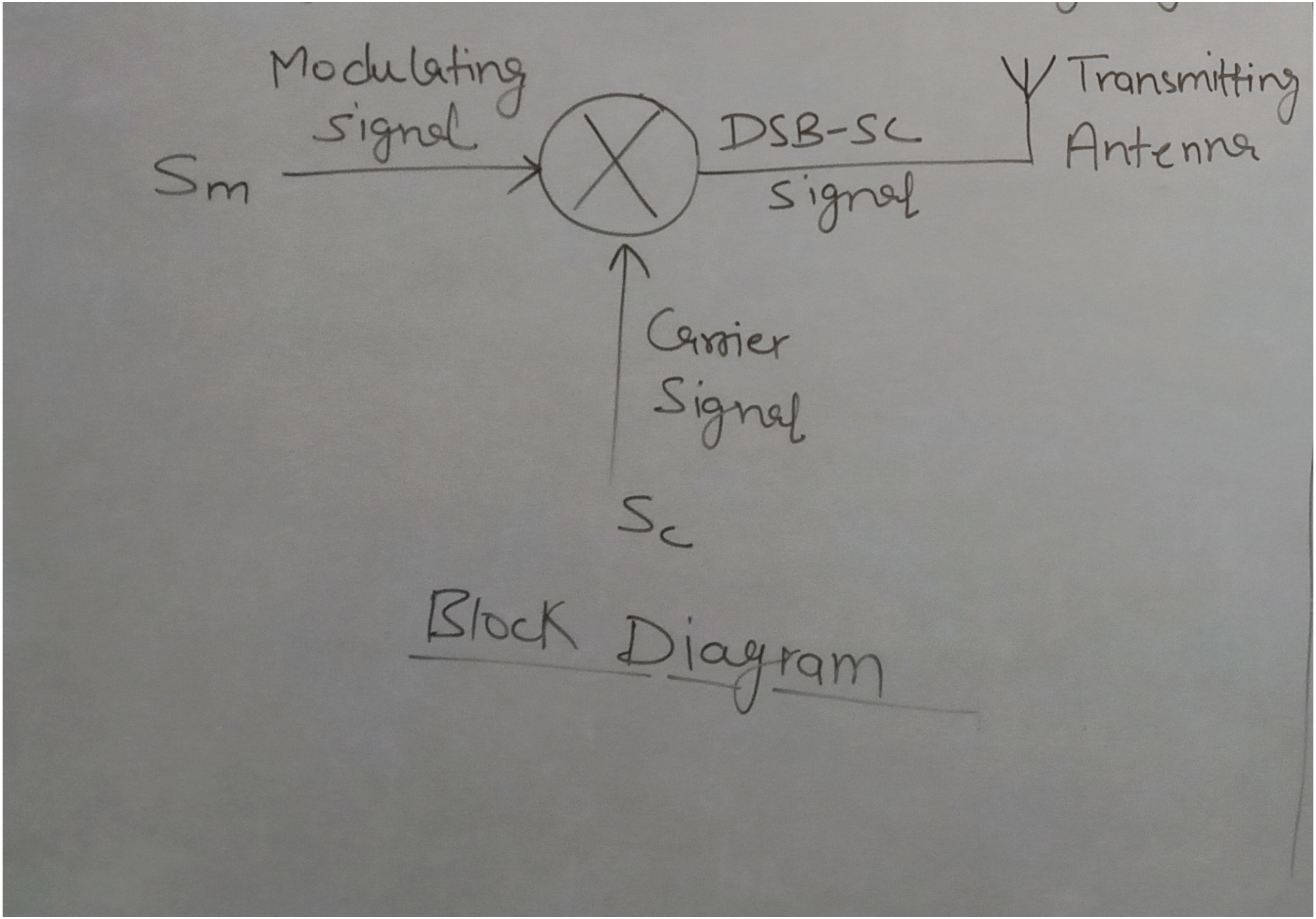
DSB-SC (Double S

The carrier in AM contains no information. Thus the carrier is unwanted.

→ Moreover, a lot of power is saved when carrier is suppressed.

→ The double side band (DSB-SC) signal $x(t)$ can be obtained by multiplying the carrier & modulating signal.



Block Diagram

→ Consider the carrier —

$$s_c(t) = A_c \cos(\omega_c t)$$

→ Consider the modulating signal —

$$s_m(t) = A_m \cos(\omega_m t)$$

→ The modulated signal is simply the product of these two

$$s(t) = A_c \cos(\omega_c t)\, A_m \cos(\omega_m t)$$

$$= A_c A_m \cos(\omega_c t) \cos(\omega_m t)$$

[Multiply & Divide by 2]

$$= \frac{A_c A_m}{2} \cdot 2\cos(\omega_c t)\cos(\omega_m t)$$

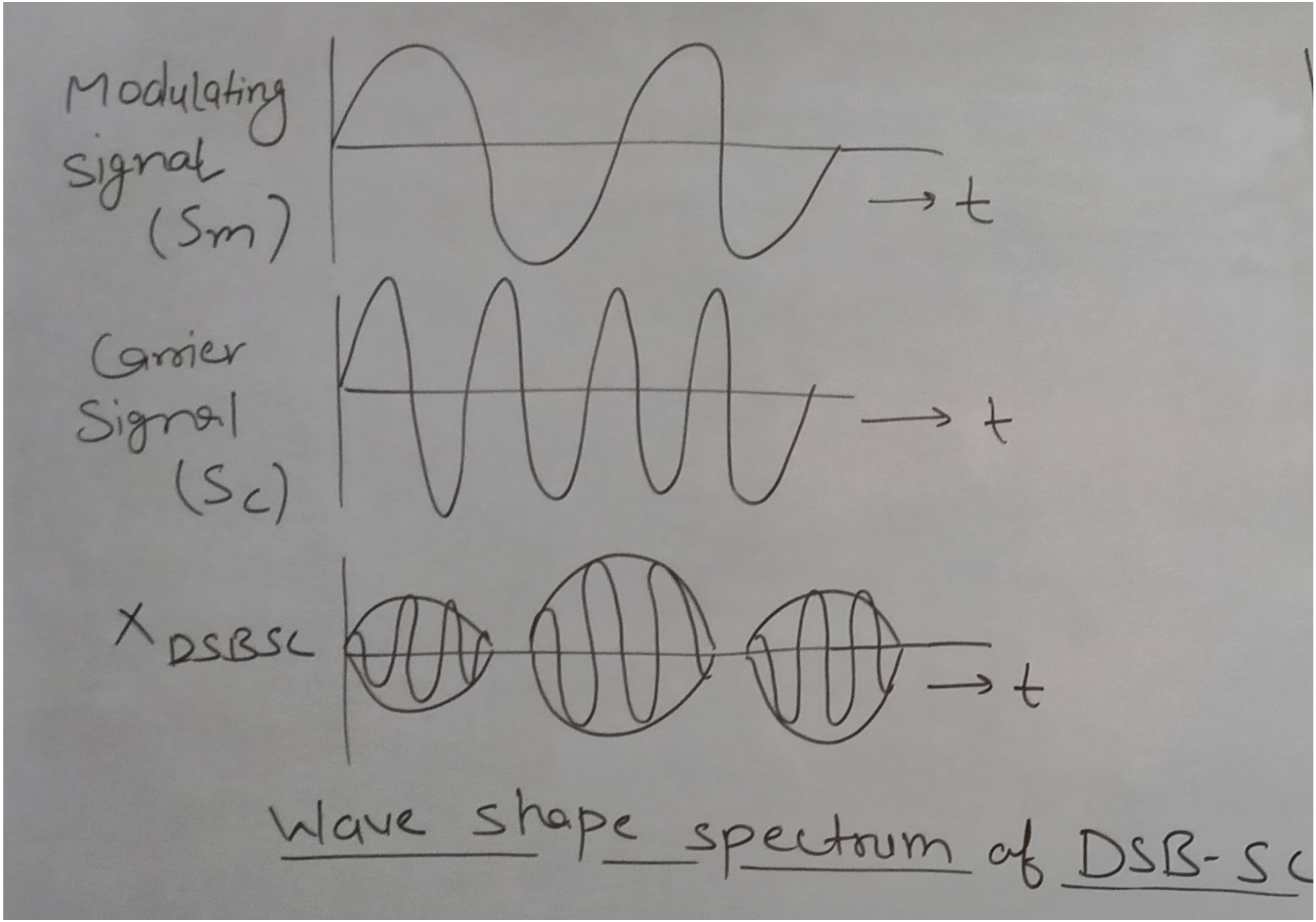
Since, $2\cos A \cos B = \cos(A+B) + \cos(A-B)$

$$= \frac{A_c A_m}{2} \cdot \left[\cos(\omega_c + \omega_m)t + \cos(\omega_c - \omega_m)t\right]$$

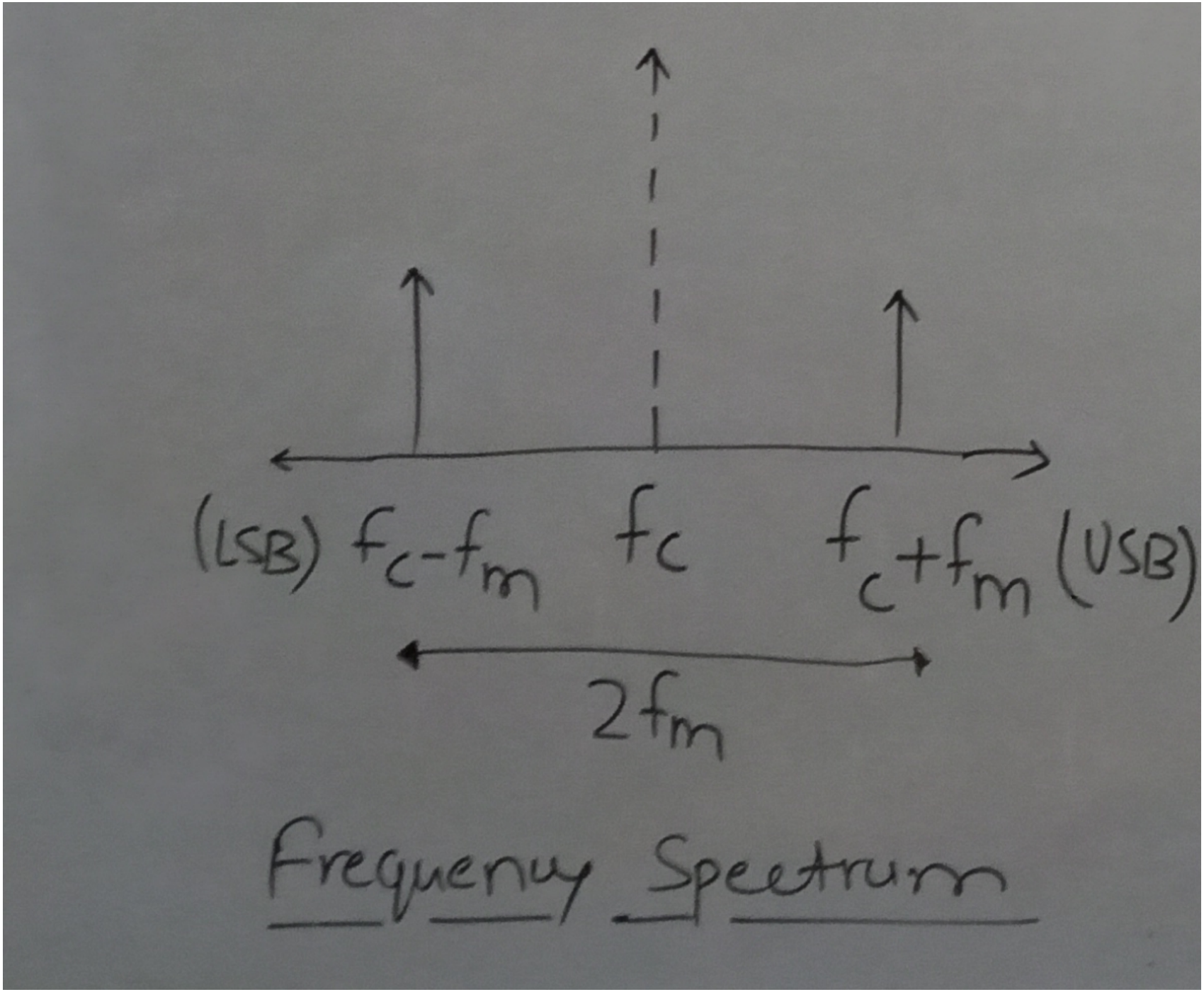
$$= \underbrace{\frac{A_c A_m}{2}\cos(\omega_c + \omega_m)t}_{\text{USB}} + \underbrace{\frac{A_c A_m}{2}\cos(\omega_c - \omega_m)t}_{\text{LSB}}$$

USB (Upper Side Band)

LSB (Lower Side Band)



Wave shape spectrum of DSB-SC



Frequency Spectrum

ADVANTAGES

1. Efficiencet in terms of power usage
2. Low power consumption as carrier is suppressed
3. Good modulation efficiency
4. Large Bandwidth