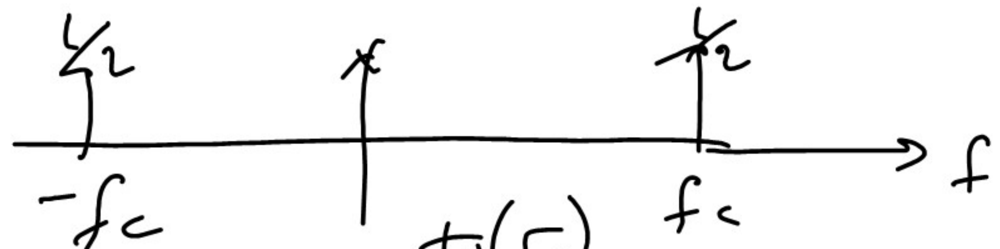
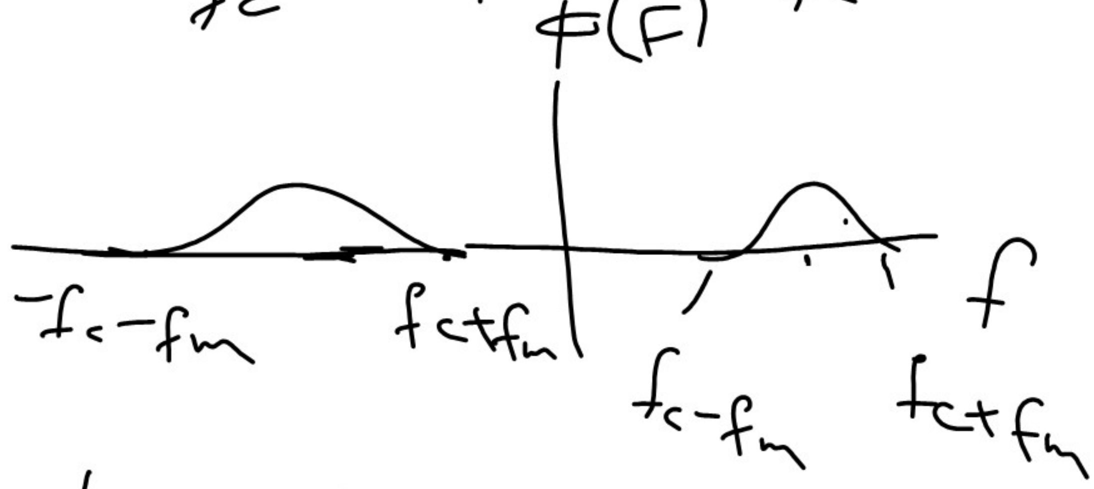




* Note that the previous amplitude modulation is called double side band because the bandwidth required for the transmission of the modulated signal is $BW = (f_c + f_m) - (f_c - f_m)$
$= 2f_m$ (doubled)

* Note also the carrier component which is located at f_c and $-f_c$ does not appear in the spectrum of the modulated signal, therefore we call this modulation as suppressed carrier.

∴ The first type of amplitude modulation is written mathematically by

$\phi(t) = f(t) \cos \omega_c t$

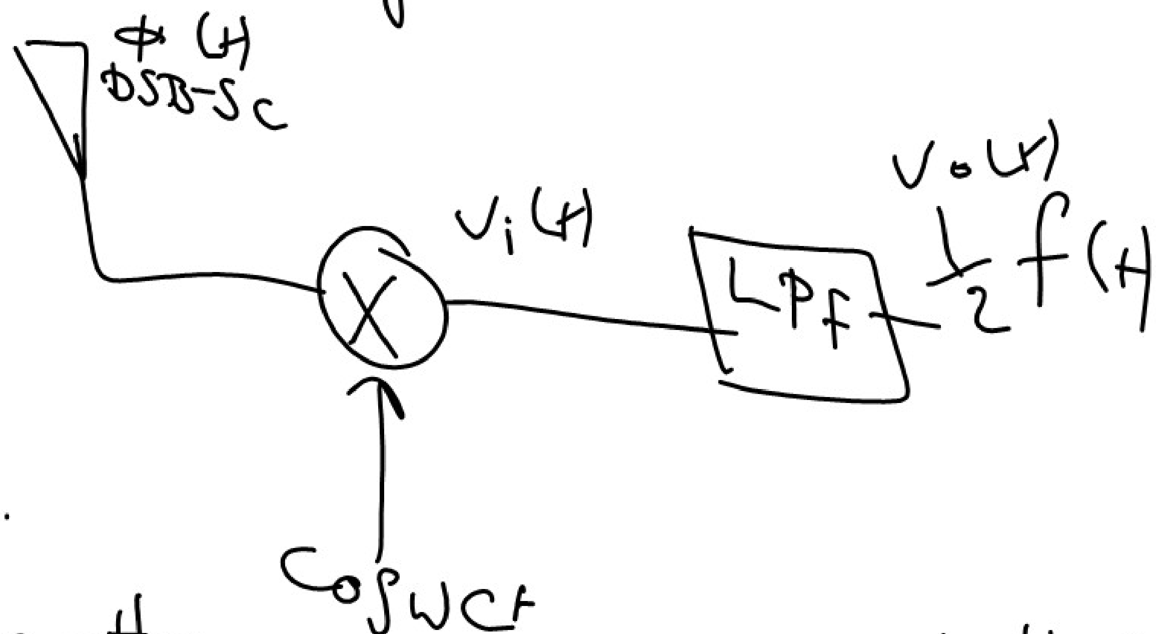
DSB-SC

Demodulation of DSB-SC signal

* In order to recover the information signal from the modulated signal

$$\phi_{DSB-SC}(t) = f(t)\cos w_c t$$

we simply multiply $\phi_{DSB-SC}(t)$ by the carrier again as illustrated by the following block diagram



mathematical representation of the demodulation process can be shown below

$$v_i(t) = \phi_{DSB-SC}(t)\cos w_c t$$

$$= f(t)\cos^2 w_c t$$

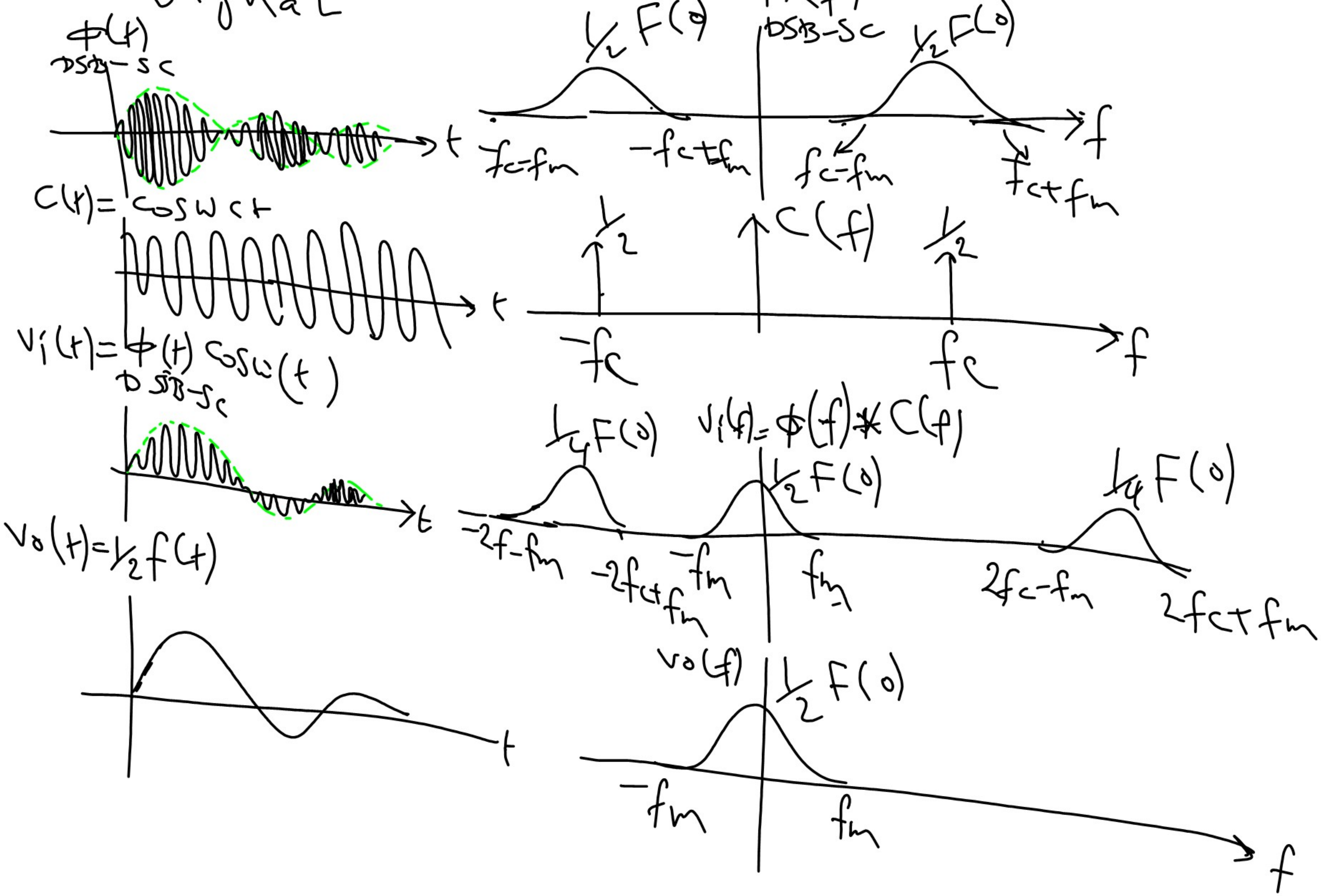
$$= f(t)\left[\frac{1}{2} + \frac{1}{2}\cos 2w_c t\right]$$

$$= \frac{1}{2}f(t) + \frac{1}{2}f(t)\cos 2w_c t$$

* The signal detected at the LPF output is

$$V_o(t) = \frac{1}{2}f(t)$$

time and frequency domain representation of the demodulated signal



—