$t = 0 : \frac{1}{1000} : \frac{5}{1000}$

$ft = \cos 2\pi\, 1000\, t$

$ct = \cos 2\pi\, 10000\, t$

$st = ft .* ct$

plot(t, st)   axis [0 1e-3 -1 +1]

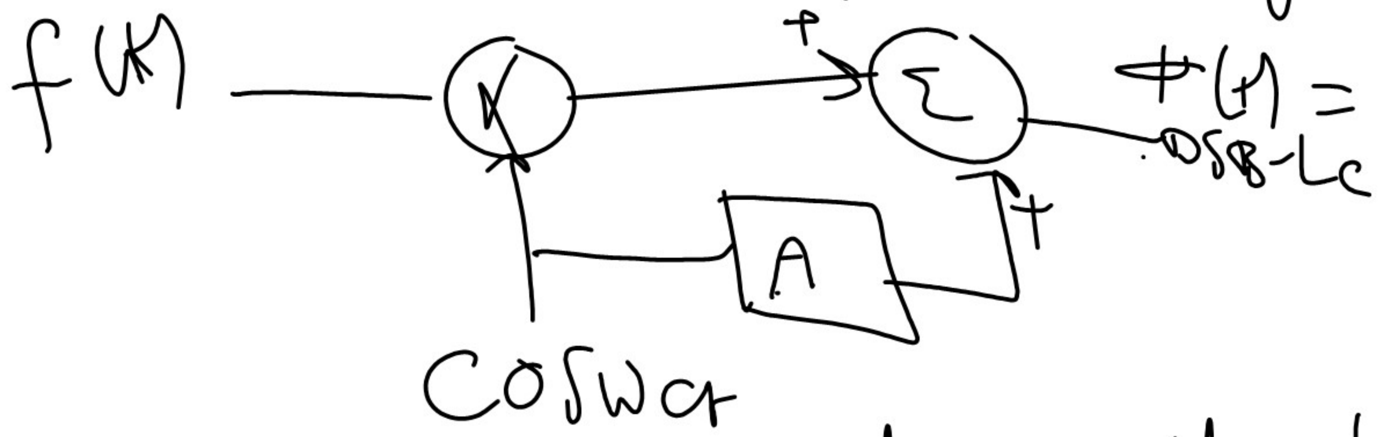
FTst = fft(st) / length(st)

... = fftshift length(st)

5.2 Amplitude modulation

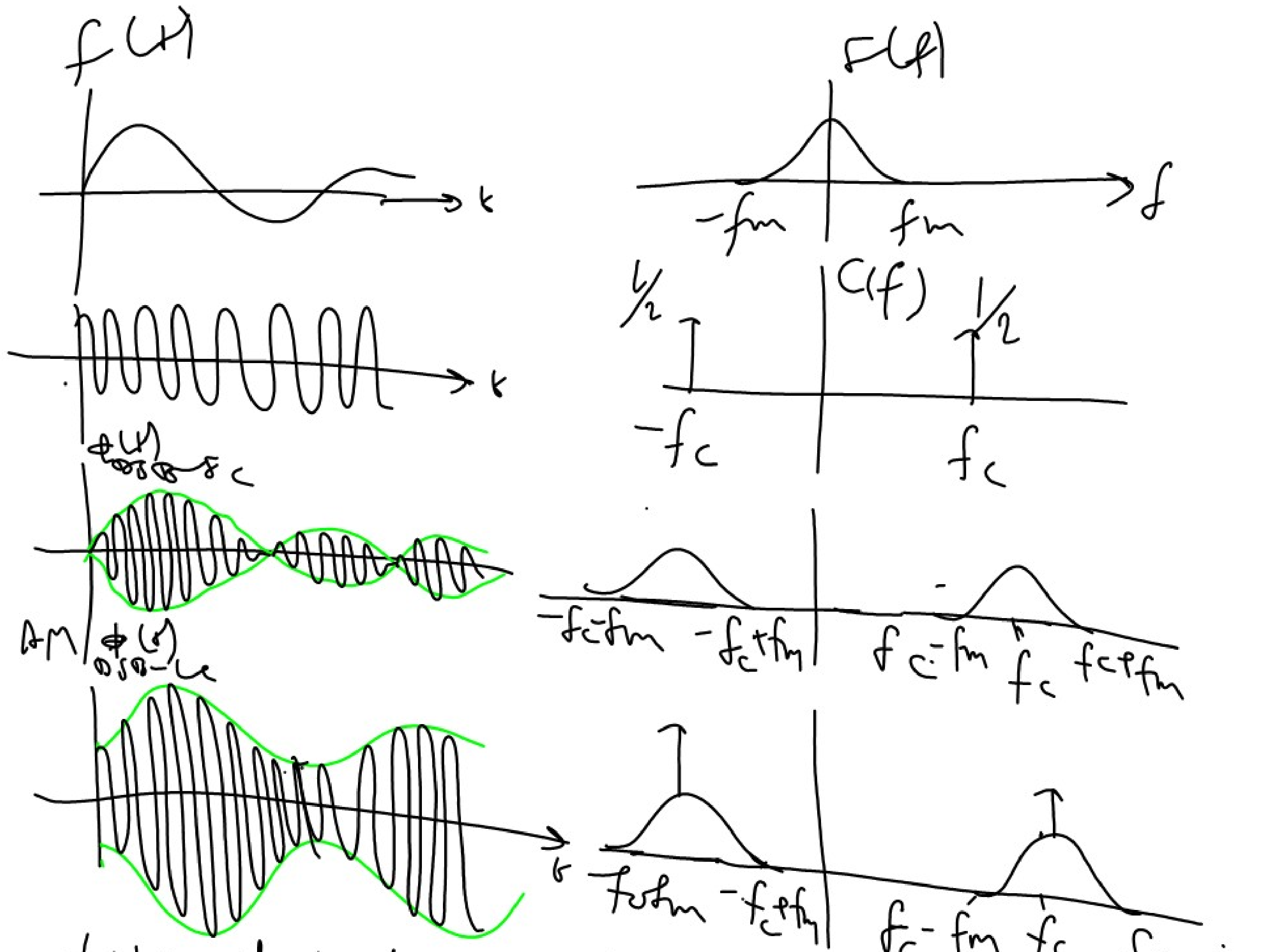
Large Carrier (AM)

* In Large Carrier modulation we simply multiply the message signal $f(t)$ by the carrier the we add the carrier to the modulated signal as shown by the following block diagram



$$\phi(t) = f(t)\cos w_c t + A\cos w_c t$$

* If we analyze the Large carrier modulated signal in both time and frequency domains we may have have the following diagrams



Note that the equation for the DSB-LC is given

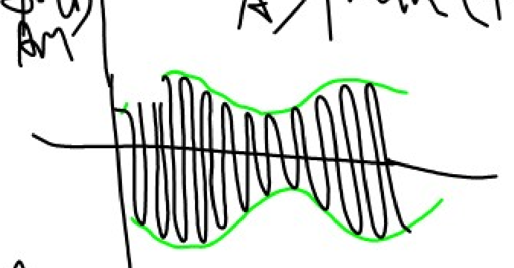
$$\phi_{DSB-LC}(t) = f(t)\cos w_c t + A\cos w_c t$$

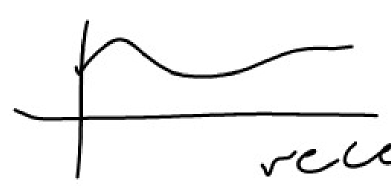
$$= A\left(1 + \frac{f(t)}{A}\right)\cos w_c t$$

* We have three for the AM modulation based on the ratio of $\frac{f(t)}{A}$

* The first case If
  $A > |\min(f(t))|$
  then the modulated signal is shown below

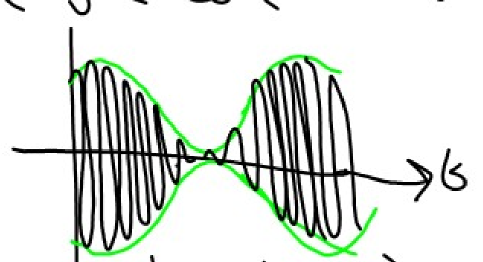
$A > |\min(f(t))|$



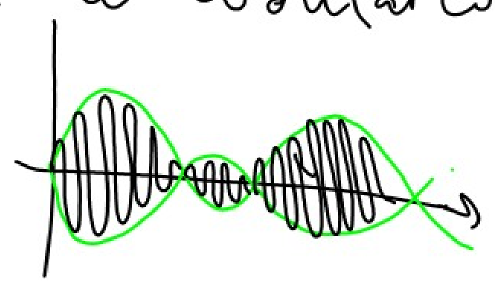


received signal

* The second case If $A = |\min(f(t))|$



* The Third case when $A < |\min(f(t))|$
  then the modulated signal is shown below



received signal