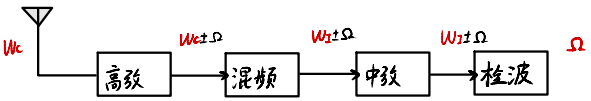
Chap 6 混频

概念：在不改变调制信号的前提下，改变已调信号的载波频率

6.1 混频信号



1. 表达式

$$u_s = U_{sm}(1 + m_a \cos\Omega t)\cos\omega_c t$$

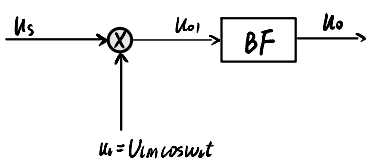
中频 $u_I = U_{sm}(1 + m_a \cos\Omega t)\cos\omega_I t$

DSB：$u_s = U_{sm}\cos\Omega t + \cos\omega_c t$

$$u_I = U_{sm}\cos\Omega t + \cos\omega_I t$$

$\omega_c - \omega_l = \omega_I$

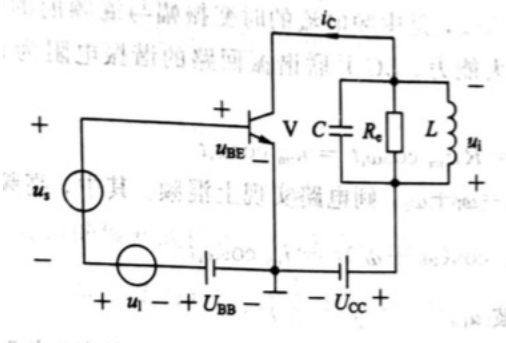
2. 实现方法 ——乘法（频域加减，时域相乘）



上混频 $\cos(\omega_c + \omega_l)t$，下混频 $\cos(\omega_c - \omega_l)t$

6.2 混频原理——乘法 与调幅乘法原理一致

1. 晶体管放大器混频

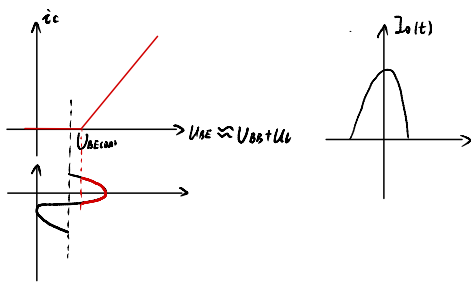


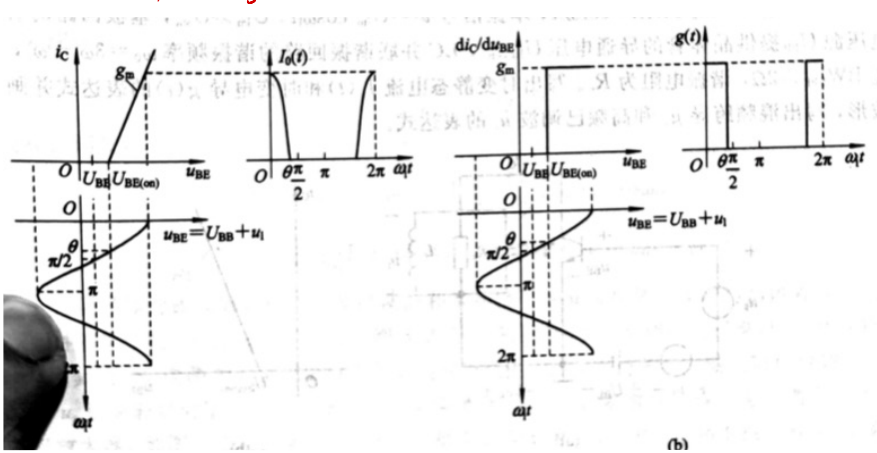
条件：$U_{lm} >> U_{sm}$

$$i_C = f(u_{BE}) = f(U_{BB} + u_L + u_s)$$

$$= f(U_{BB} + u_L) + f'(U_{BB} + u_L)\, u_s + \cdots\cdots$$

$$\approx \underbrace{f(U_{BB} + u_L)}_{I_0(t)} + \underbrace{f'(U_{BB} + u_L)}_{g(t)}\, u_s$$





$g(t) = g_0 + g_{1m}\cos\omega_1 t + g_{2m}\cos\omega_1 t + \cdots$

$g_{1m}\cos\omega_1 t \cdot U_{sm}\cos\omega_c t$

$i_1 = \frac{1}{2} g_{1m} U_{sm} \cos(\omega_c - \omega_1)t$

定义：混频跨导 $g_c = \frac{I_{1m}}{U_{sm}} = \frac{1}{2} g_{1m}$

以后内容与振幅调制类似，略。

[例] P217 6.2.4

[例] P218 6.2.5