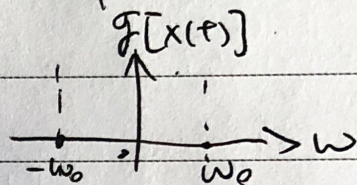由 $X(t) = \cos(\omega_0 t + \varphi) = \cos(\omega_0 t)\cos\varphi - \sin(\omega_0 t)\sin\varphi$.
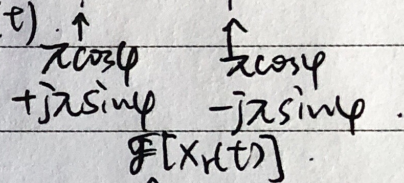
$\mathscr{F}[X(t)] = \pi(\delta(\omega+\omega_0) + \delta(\omega-\omega_0))\cos\varphi$

$\qquad + j\pi(\delta(\omega+\omega_0) - \delta(\omega-\omega_0))\sin\varphi$.

当 $\omega_0 < \omega_s < 2\omega_0$ 时为欠采样. 记采样后恢复出的信号为 $X_r(t)$.

$\mathscr{F}[X_r(t)] = \pi(\delta(\omega-\omega_s+\omega_0) + \delta(\omega+\omega_s-\omega_0))\cos\varphi$.

$\qquad + j\pi(\delta(\omega-\omega_s+\omega_0) - \delta(\omega+\omega_s-\omega_0))\sin\varphi$.

$\therefore X_r(t) = \cos((\omega_s-\omega_0)t - \varphi)$ 相位为 $X(t)$ 相反数

$\because \omega_0 < \omega_s < 2\omega_0$ $\therefore \omega_s - \omega_0 < \omega_0$. 频率下降.