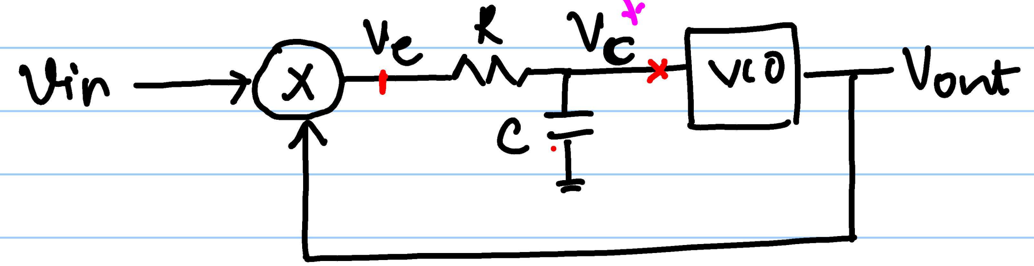
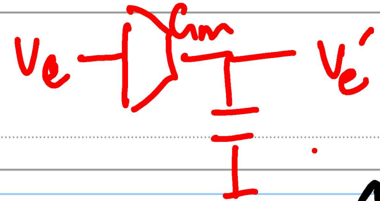
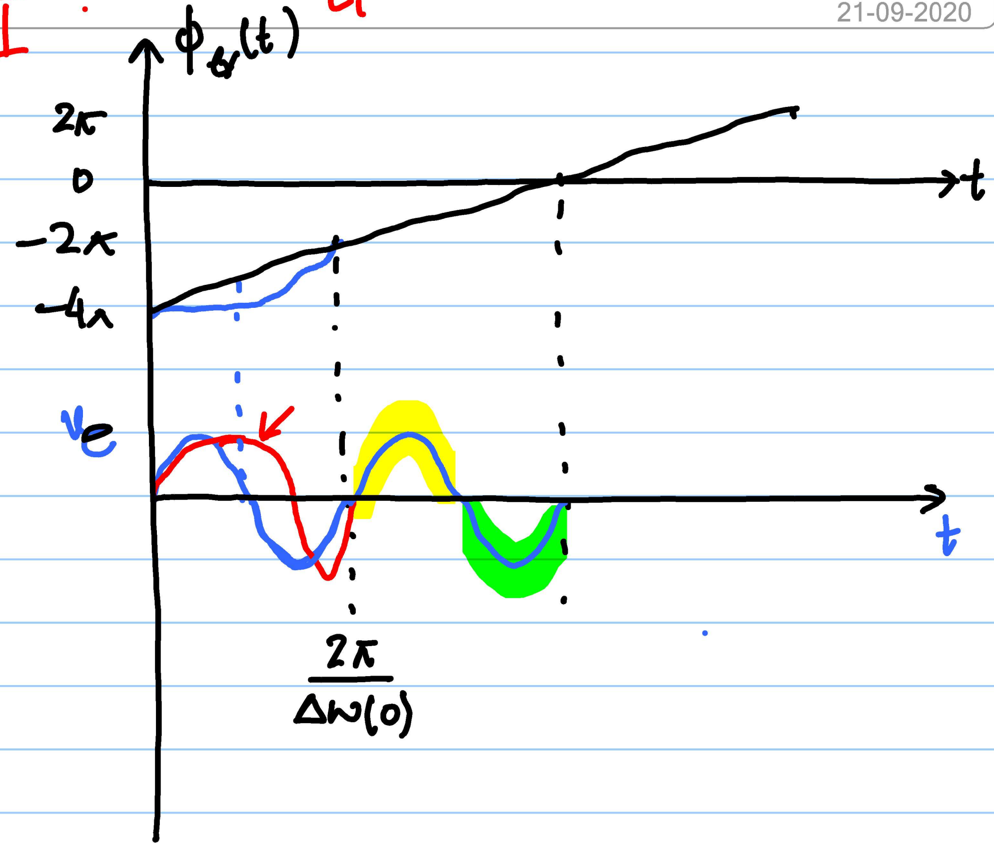
Note Title 21-09-2020

lecture # 8





$\equiv \frac{1}{\tau_i} \int dt$



at $t=0$ $\quad \Delta\omega(0) = \omega_{in} - \omega_{free} \quad ; V_c = 0$

if $\quad \Delta\omega(0) > K_{PD} K_{VCO}$

$$\frac{\Delta\omega(0)}{K_{PD} K_{VCO}} > 1$$

$$V_e = \frac{1}{2} \sin(\Delta\omega(0) \cdot t)$$

$$\phi_{er}(t) = \Delta\omega(0) \cdot t$$

$$\omega_{out} = \omega_{free} + K_{VCO} \cdot V_c$$

$$\dot{\phi}_{er} = \Delta\omega(0) - K_{VCO} \cdot V_c$$

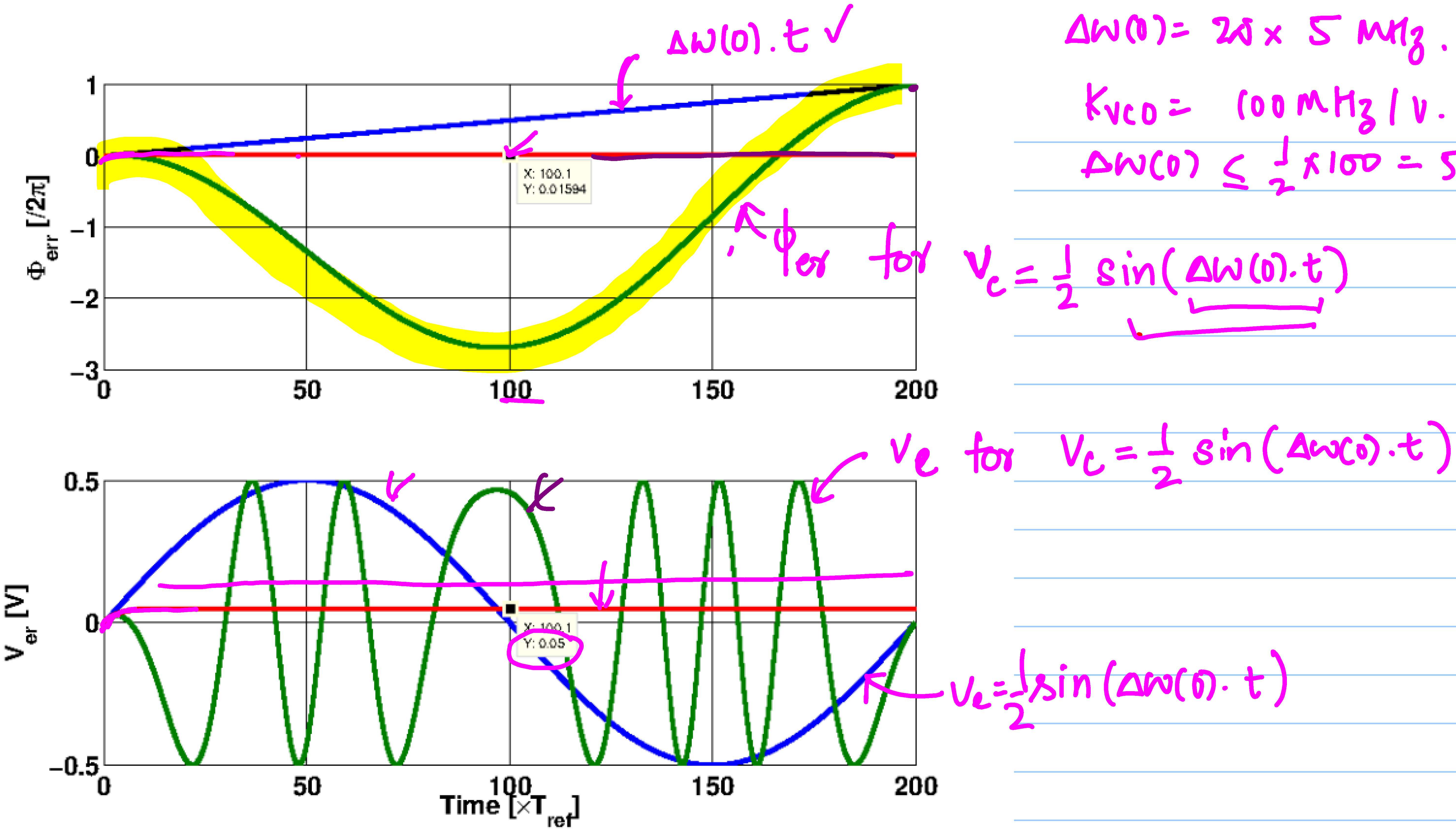
V_c is +ve $\Rightarrow \frac{d\phi_{er}}{dt}$ is small

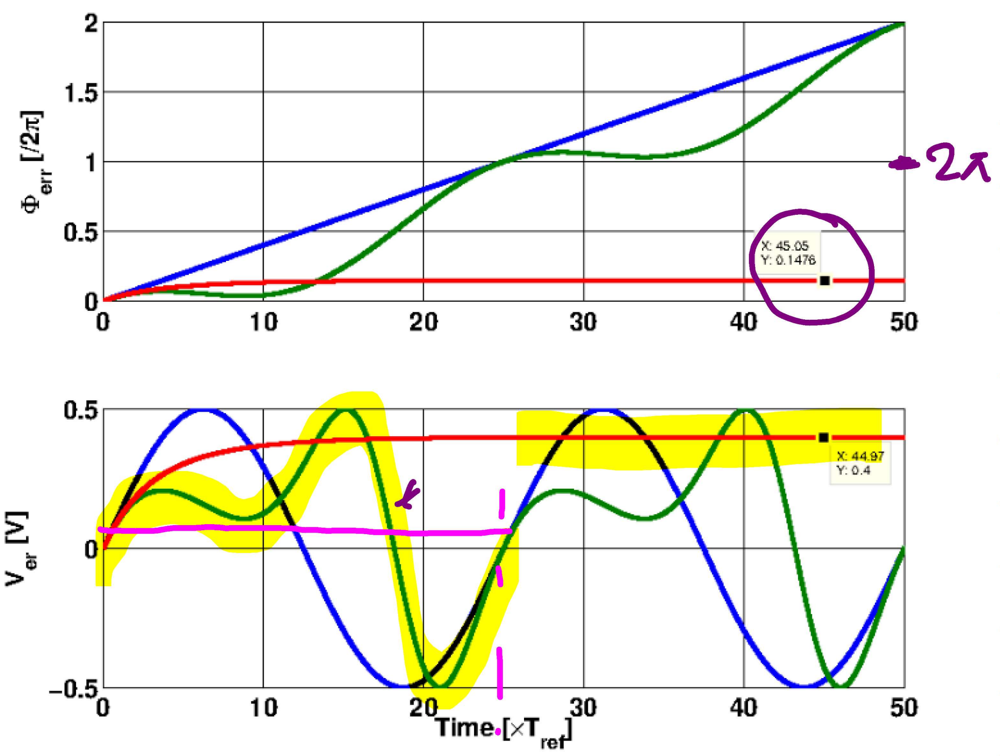
V_c is -ve $\Rightarrow \frac{d\phi_{er}}{dt}$ is large.

$\Delta\omega(0) = 2\pi \times 5\ MHz.$

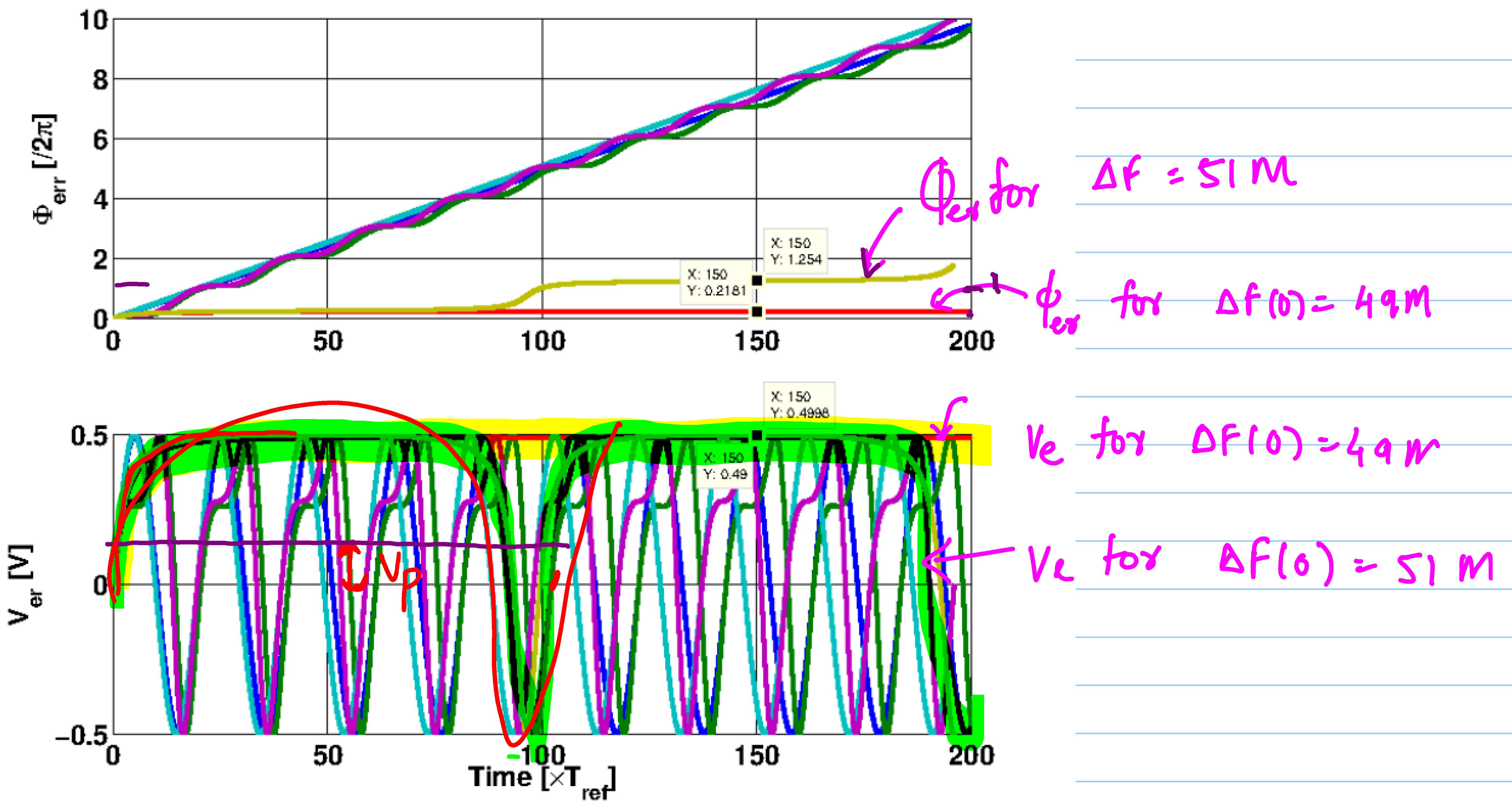
$K_{VCO} = 100\ MHz/V.$

$\Delta\omega(0) \leq \frac{1}{2} \times 100 = 50\ MHz.$

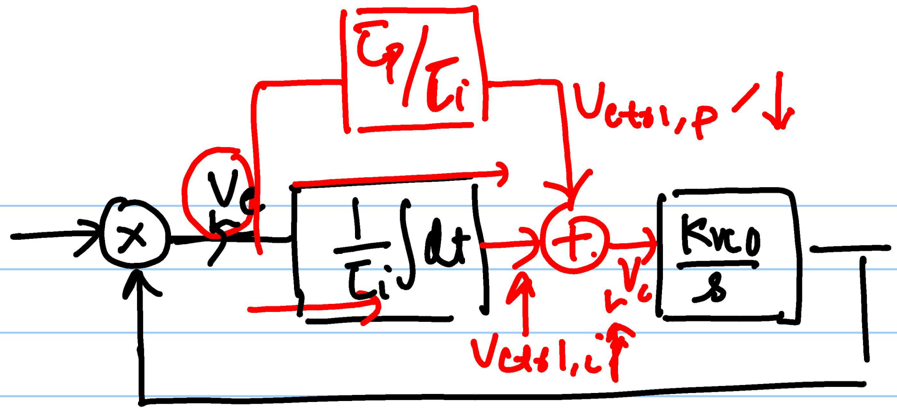




Φerr [/2π]
X: 45.05
Y: 0.1476
2π
Ver [V]
X: 44.97
Y: 0.4
Time [×Tref]



Φerr [/2π]
10
8
6
4
2
0
0
50
100
150
200
X: 150
Y: 1.254
X: 150
Y: 0.2181
Φer for Δf = 51M
φer for Δf(0) = 49M
Ver [V]
0.5
0
−0.5
X: 150
Y: 0.4998
X: 150
Y: 0.49
Vp
Ve for ΔF(0) = 49M
Ve for ΔF(0) = 51M
Time [×Tref]

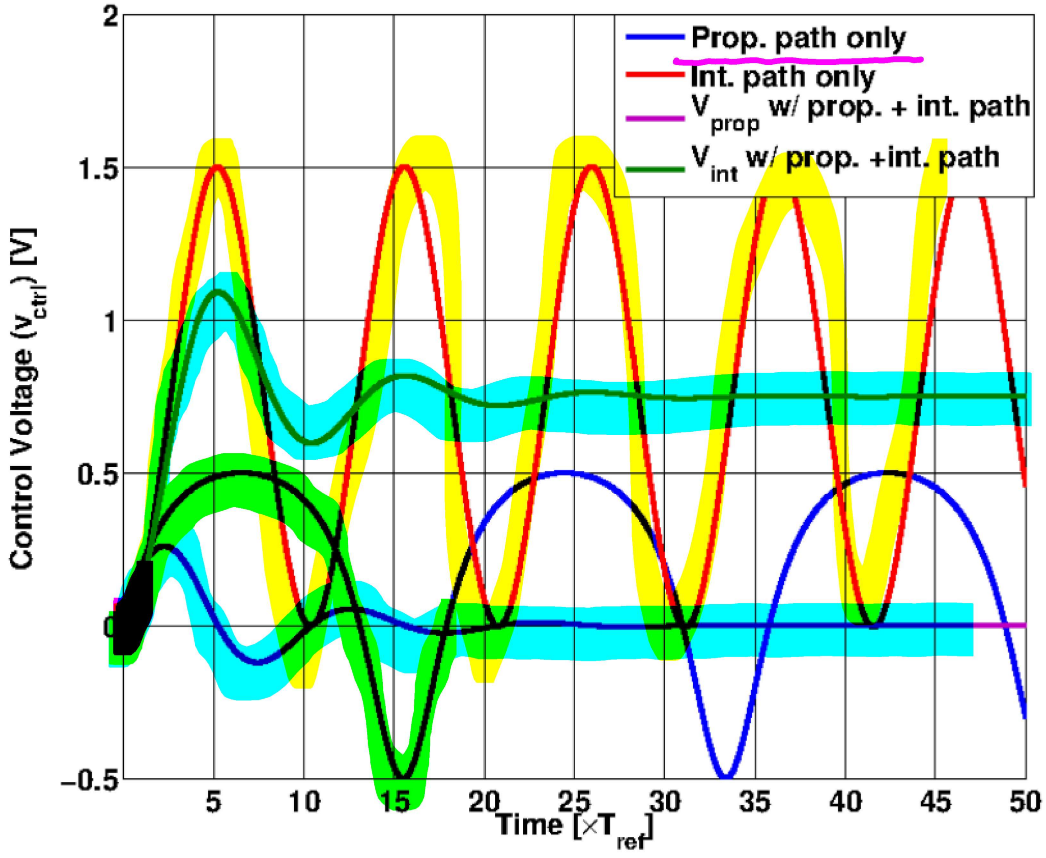


$$V_c = \frac{1}{\tau_i}\int V_e \, dt$$

at $t=0$, $$V_c = \frac{1}{\tau_i}\int_0^t \frac{1}{2}\sin(\Delta\omega(0)\cdot t)\, dt$$

$$\bar{V}_c = 0$$

$$\omega_0 = \omega_{free} + K_{VCO}\cdot \bar{V}_c$$



$V_c = V_{ctrl,p} + V_{ctrl,i}$