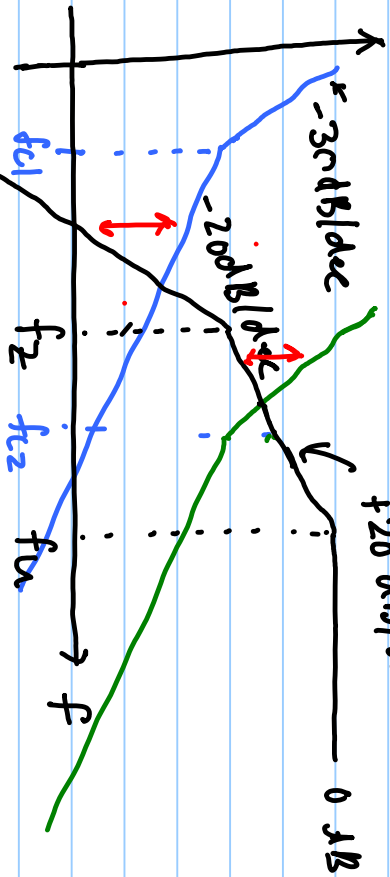


Lecture #46



$(NTF)^2 \propto f^2$

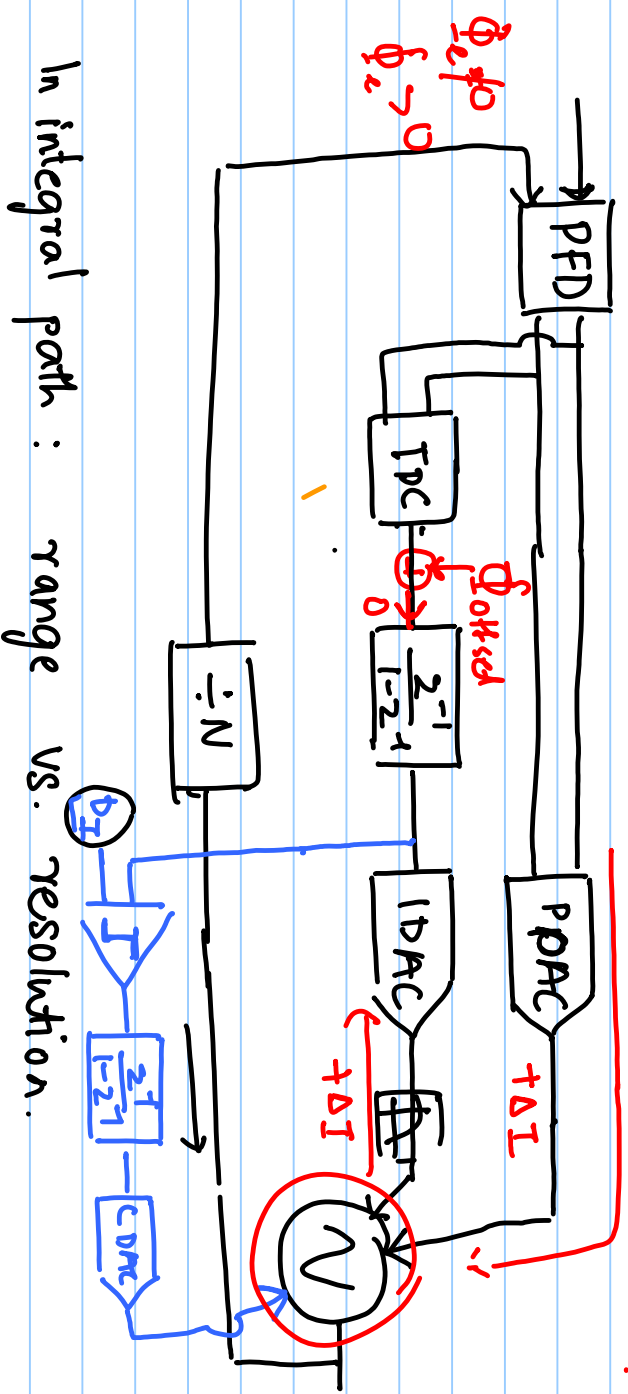
$S_{vco, out} = S_{vco} \times |NTF|^2$

$20 \log_{10} |NTF|$

$|NTF|^2 \propto f^4$

$\propto f^3 \times f^4$

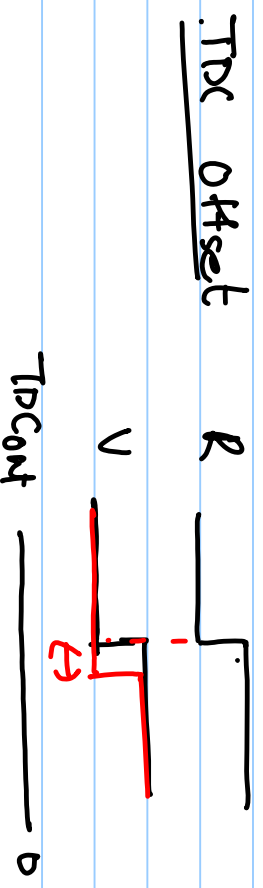
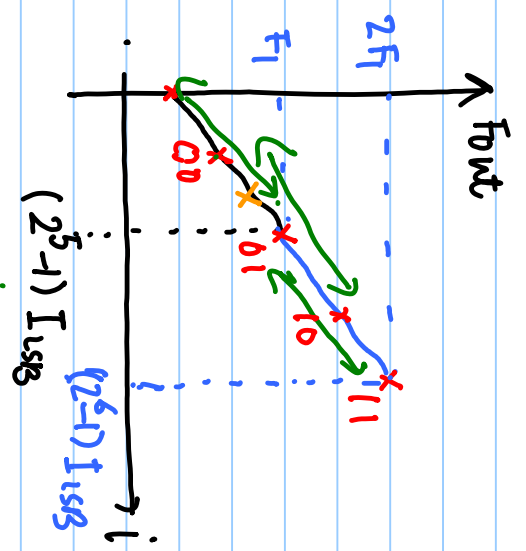
$\propto I_{prop}$



In integral path : range vs. resolution.

^{1D}AC
xxxxxx

^{1D}AC
xxxxxx
x00000



Wide-band Hybrid (Analog/Digital PLL)

$$f_{out} = N f_{ref} \quad \checkmark$$

$$f_{BW} = \alpha f_{ref}$$

$$L_u(s) = \frac{1}{2s} \left(K_p + \frac{K_I \cdot f_{ref}}{s} \right) \frac{2N K_{CIC0}}{s N}$$

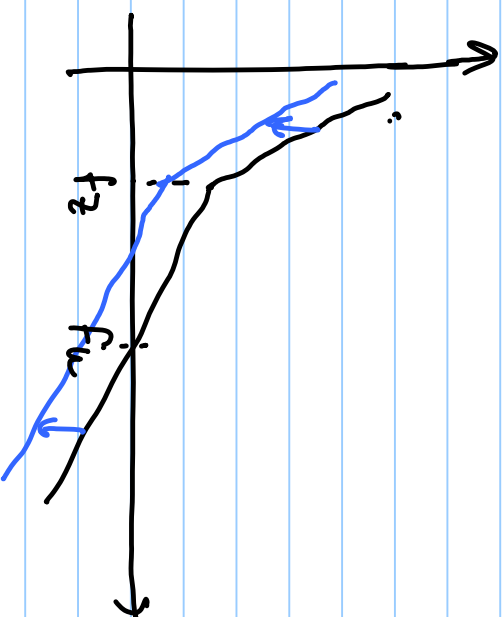
$$= \frac{K_{CIC0}}{s^2 N} \left(s K_p + K_I f_{ref} \right)$$

$$= \frac{K_{CIC0}}{s^2 N} K_I f_{ref} \left(s \frac{K_p}{K_I f_{ref}} + 1 \right)$$

$$\omega_n = \frac{K_{CIC0} \cdot K_p}{N}$$

$$1. \quad N \rightarrow 2N \quad ; \quad K_{CIC0} \rightarrow 2 K_{CIC0} \quad f_u, f_z \quad \text{same}$$

$$2. \quad f_{ref} \rightarrow 2 f_{ref} \quad ; \quad K_I \rightarrow K_I/2 \quad f_u, f_z \quad \text{same}$$



$$W_u = W_{rd}/10$$

$f_{out} \rightarrow 2f_{out}$

$I_{bias} \rightarrow 2I_{bias}$

$K_p \rightarrow 2K_p$

$K_I \rightarrow 2K_I$

✓

$N \rightarrow 2N$

W_u same.

f_z same

$$W_u = \frac{W_{rd}}{10}$$

freq $\rightarrow 2f_{rd}$

$W_u \rightarrow 2W_u$

$f_z \rightarrow 2f_z$

$$W_u' = 2W_u = \frac{2W_{rd}}{10}$$

$$W_z' = 2W_z$$

