ECEN 620 HW4

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$f_u = 5\,MHz \Rightarrow \omega_u = 2\pi \cdot 5M\ rad/s \quad \phi_m = 60°$

$\Rightarrow \omega_z = \frac{\omega_u}{\tan(\phi_m)} = \frac{2\pi \cdot 5M}{\sqrt{3}} = 18.138M\ rad/s$

$I_{cp} = 640\mu A$

$R = \frac{2\pi N}{I_{cp}\frac{V_{FS}}{2^8}(V_{Hall})} \frac{\omega_u^2}{\sqrt{\omega_z^2+\omega_u^2}} = \frac{2\pi \cdot 16}{640 \cdot 2\pi \cdot 5M} \cdot \frac{(2\pi 5M)^2}{\sqrt{\omega_u^2+\omega_z^2}} = 0.136$

$C = \frac{1}{\omega_z \cdot R} = \frac{1}{\frac{\omega_u}{\sqrt{3}} \cdot 0.136} = 405.39\,nF$

$\alpha = R - \frac{T}{2C}, \quad \beta = \frac{T}{C} \Rightarrow \alpha = 0.128, \quad \beta = 1.58 \times 10^{-2}$

Figure 1 Calculation of Alpha and Beta

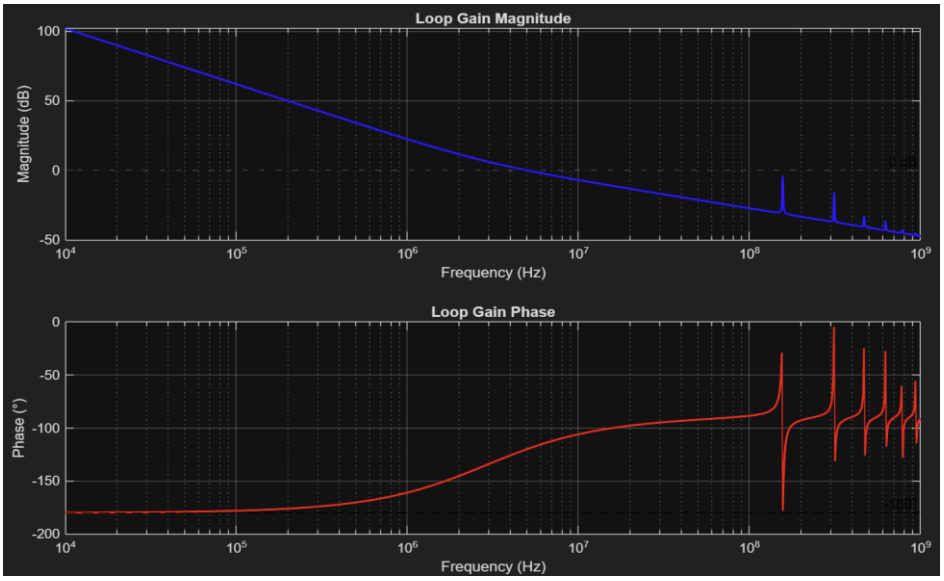

Figure 2 Open-loop Gain Magnitude and Phase

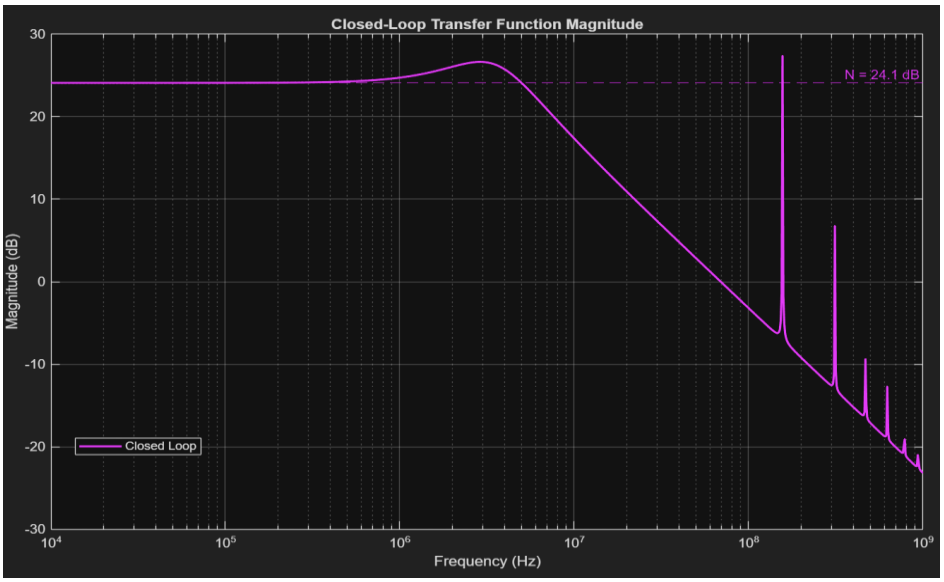

Figure 3 Output Phase Transfer Function