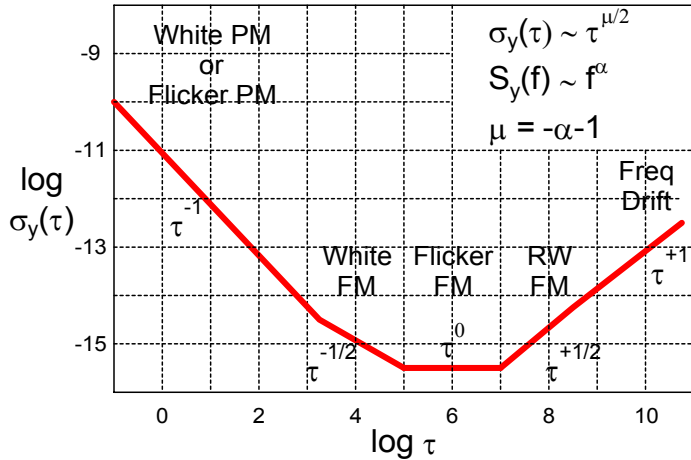
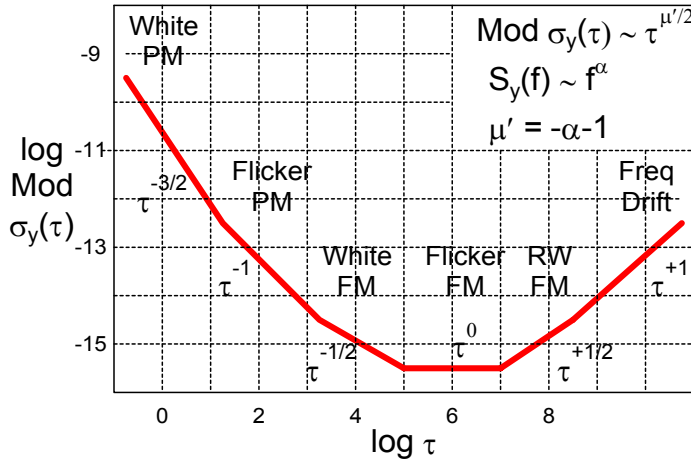


Chart of Frequency Stability Analysis

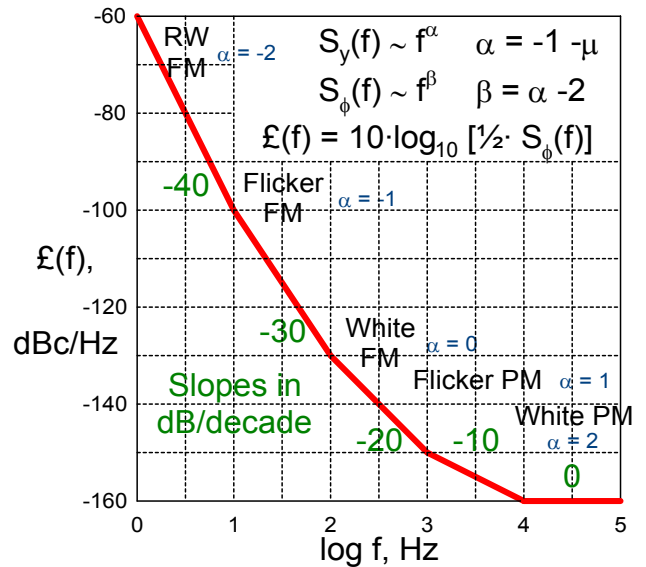
Sigma Tau Diagram



Mod Sigma Tau Diagram



SSB Phase Noise Diagram



Power Spectral Densities

$$S_y(f) = \left(\frac{f}{\nu_0}\right)^2 S_\phi(f) = h_\alpha f^\alpha$$

$$S_\phi(f) = \nu_0^2 h_\alpha f^{\alpha-2} = \nu^2 h_\alpha f^\beta$$

$$S_x(f) = \frac{1}{4\pi^2} \cdot h_\alpha f^{\alpha-2} = \frac{1}{4\pi^2} \cdot h_\alpha f^\beta$$

$$L(f) = 10 \log_{10} \left[\frac{1}{2} \cdot S_\phi(f) \right]$$

Power Law Noise Type	Slope of log-log plot				
	Frequency Domain		Time Domain		
	$S_y(f)$	$S_\phi(f)$ or $S_x(f)$	$\sigma_y^2(\tau)$	$\sigma_y(\tau)$	Mod $\sigma_y(\tau)$
	α	β	μ	$\mu/2$	$\mu'/2$
RW FM	-2	-4	1	1/2	1/2
F FM	-1	-3	0	0	0
W FM	0	-2	-1	-1/2	-1/2
F PM	1	-1	-2	-1	-1
W PM	2	0	-2	-1	-3/2

Power Law Noise Type	α	Domain Conversion Parameters		
		$A=2\pi^2/3 \quad B=2\ln 2 \quad C=1/2$		
		$D=[1.038+3\ln(2\pi h_1 \tau)]/4\pi^2 \quad E=3f_h/4\pi^2$		
		Frequency Domain	Time Domain	
	$S_y(f)$	$S_\phi(f)$	$\sigma_y^2(\tau)$	
RW FM	-2	$h_2 f^2$	$h_2 \nu^2 f^4$	$A h_2 \tau^{-1}$
F FM	-1	$h_1 f^1$	$h_1 \nu^2 f^3$	$B h_1 \tau^0$
W FM	0	$h_0 f^0$	$h_0 \nu^2 f^2$	$C h_0 \tau^{-1}$
F PM	1	$h_1 f^1$	$h_1 \nu^2 f^1$	$D h_1 \tau^{-2}$
W PM	2	$h_2 f^2$	$h_2 \nu^2 f^0$	$E h_2 \tau^{-2}$

Overlapping Allan and Hadamard Variances

$$\sigma_y^2(\tau) = \frac{1}{2(N-2m)\tau^2} \sum_{i=1}^{N-2m} [x_{i+2m} - 2x_{i+m} + x_i]^2$$

$$H\sigma_y^2(\tau) = \frac{1}{6(N-3m)\tau^2} \sum_{i=1}^{N-3m} [x_{i+3m} - 3x_{i+2m} + 3x_{i+m} - x_i]^2$$

Software for Frequency Stability Analysis



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