The Logarithmic Filter

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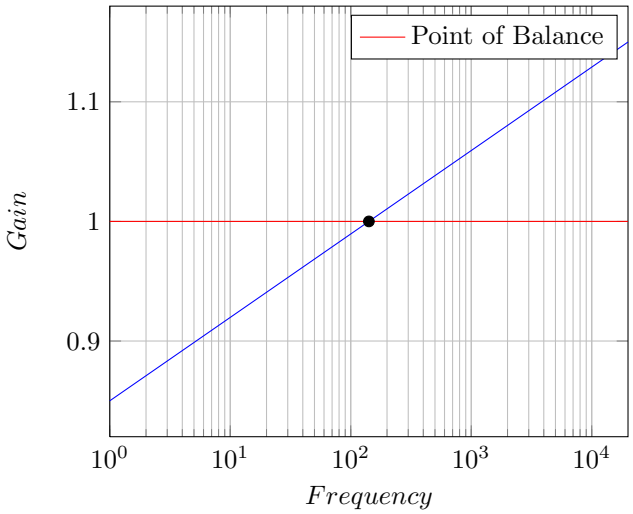
Abstract

This document explains the equations for building a logarithmic filter.



$Gain = 1$ Point of Balance

$$G = m \log_s f - \log_s B$$

G: Gain
s: Scale
f: Frequency
B: Point of Balance
m: slope

$$G = m\frac{\ln f}{\ln s} - \frac{\ln B}{\ln s}$$

If G is defined as $1 \pm \delta$ we get, some useful equations.

$$2\delta = \frac{m}{\ln s} \ln \frac{F_{MAX}}{F_{MIN}} \quad (1)$$

$$m = \frac{-\delta}{1-\delta} = \frac{\delta}{\delta - 1} \quad (2)$$

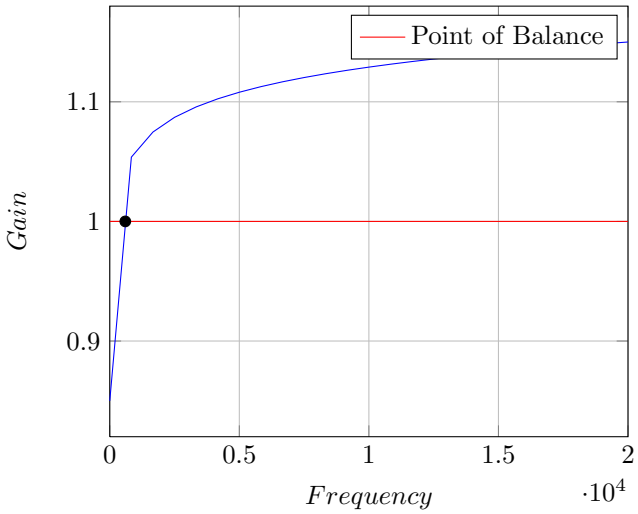
$$\ln s = \frac{m}{2\delta} \ln \frac{F_{MAX}}{F_{MIN}} \quad (3)$$

$$\ln s = \frac{1}{2(\delta - 1)} \ln \frac{F_{MAX}}{F_{MIN}} \quad (4)$$

$$\ln B = \frac{\ln s}{m - 1} \quad (5)$$

$$\ln B = \frac{1}{2} \ln \frac{F_{MAX}}{F_{MIN}} \quad (6)$$

A non logarithmic representation:


Point of Balance
1.1
1
0.9
Gain
0
0.5
1
1.5
2
Frequency
·10^4