5.2 A bandpass filter has a sampling frequency of $f_s = 2000$ Hz and satisfies the following design specifications.

$$[F_{s1}, F_{p1}, F_{p2}, F_{s2}, \delta_p, \delta_s] \quad = \quad [200, 300, 600, 700, 0.15, 0.05]$$

(a) Find the logarithmic passband ripple, A_p.

(b) Find the logarithmic stopband attenuation, A_s.

(c) Using a logarithmic scale, sketch the shaded passband and stopband regions that $A(f)$ must lie within.
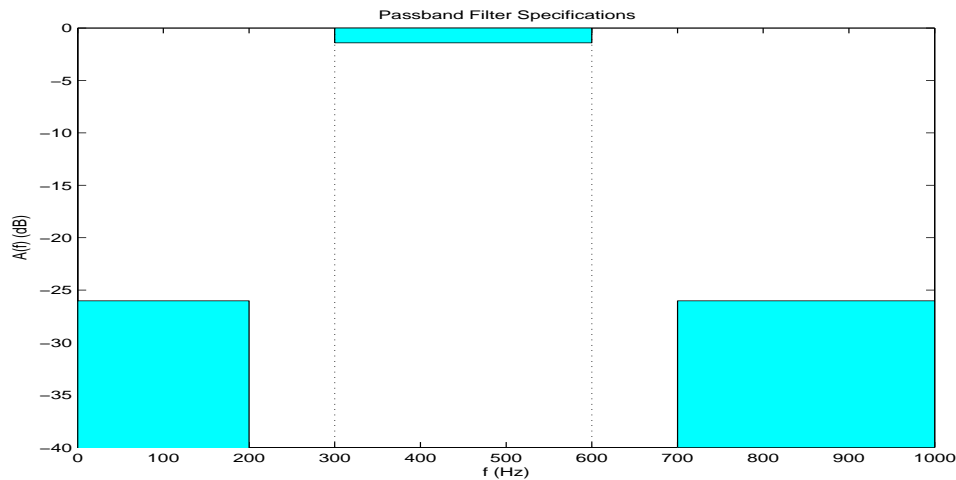
Solution

(a) Using (5.2.6a), the logarithmic passband ripple is

$$
\begin{aligned}
A_p &= -20 \log_{10}(1 - \delta_p) \\
&= -20 \log_{10}(0.85) \\
&= 1.4116 \text{ dB}
\end{aligned}
$$

(b) Using (5.2.6b), the logarithmic stopband attenuation is

$$
\begin{aligned}
A_s &= -20 \log_{10}(\delta_s) \\
&= -20 \log_{10}(0.05) \\
&= 26.0206 \text{ dB}
\end{aligned}
$$

(c)

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