Tratamiento Digital de la Señal

Tema 6

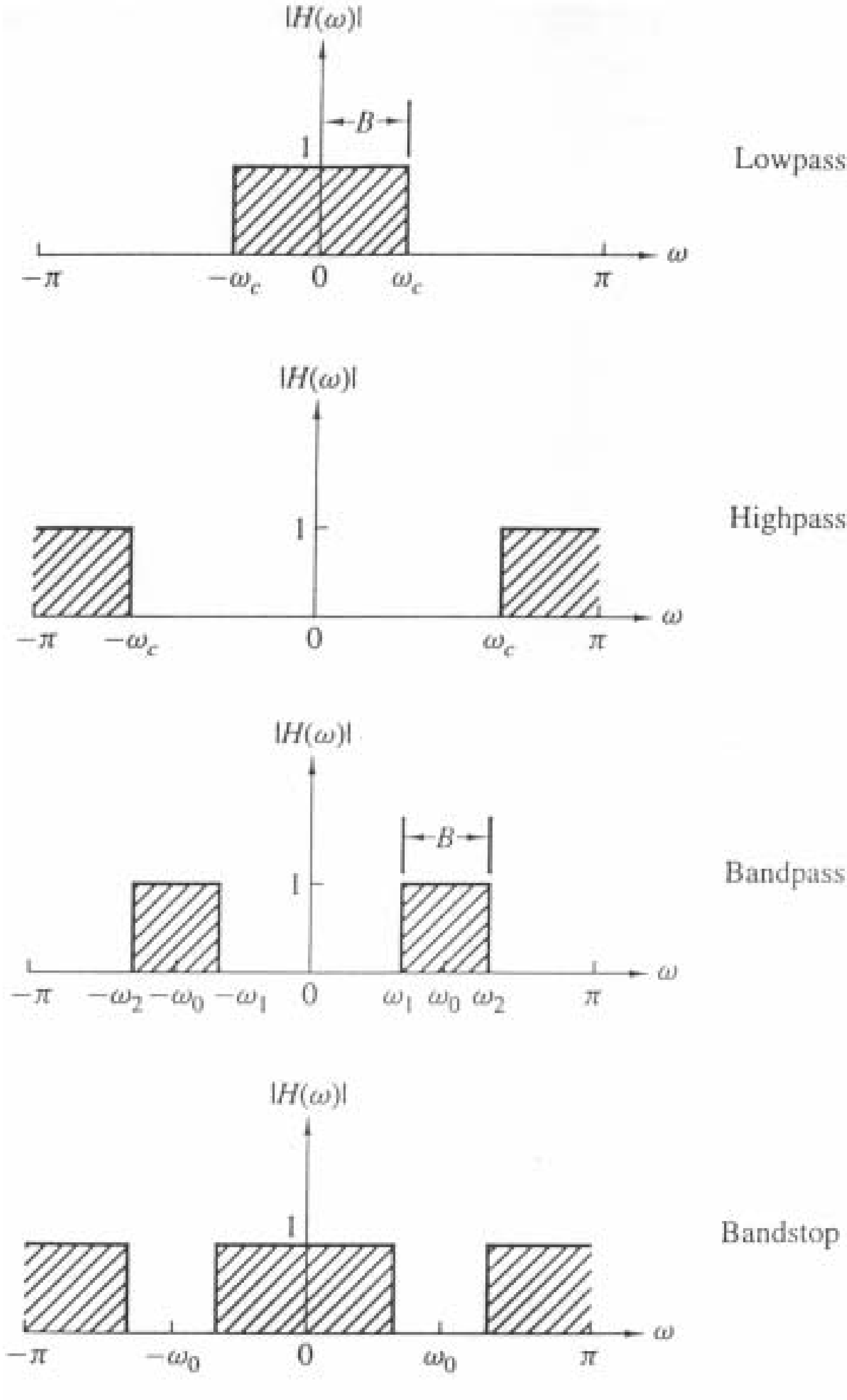


Figure 4.43 Magnitude responses for some ideal frequency-selective discrete-time filters.

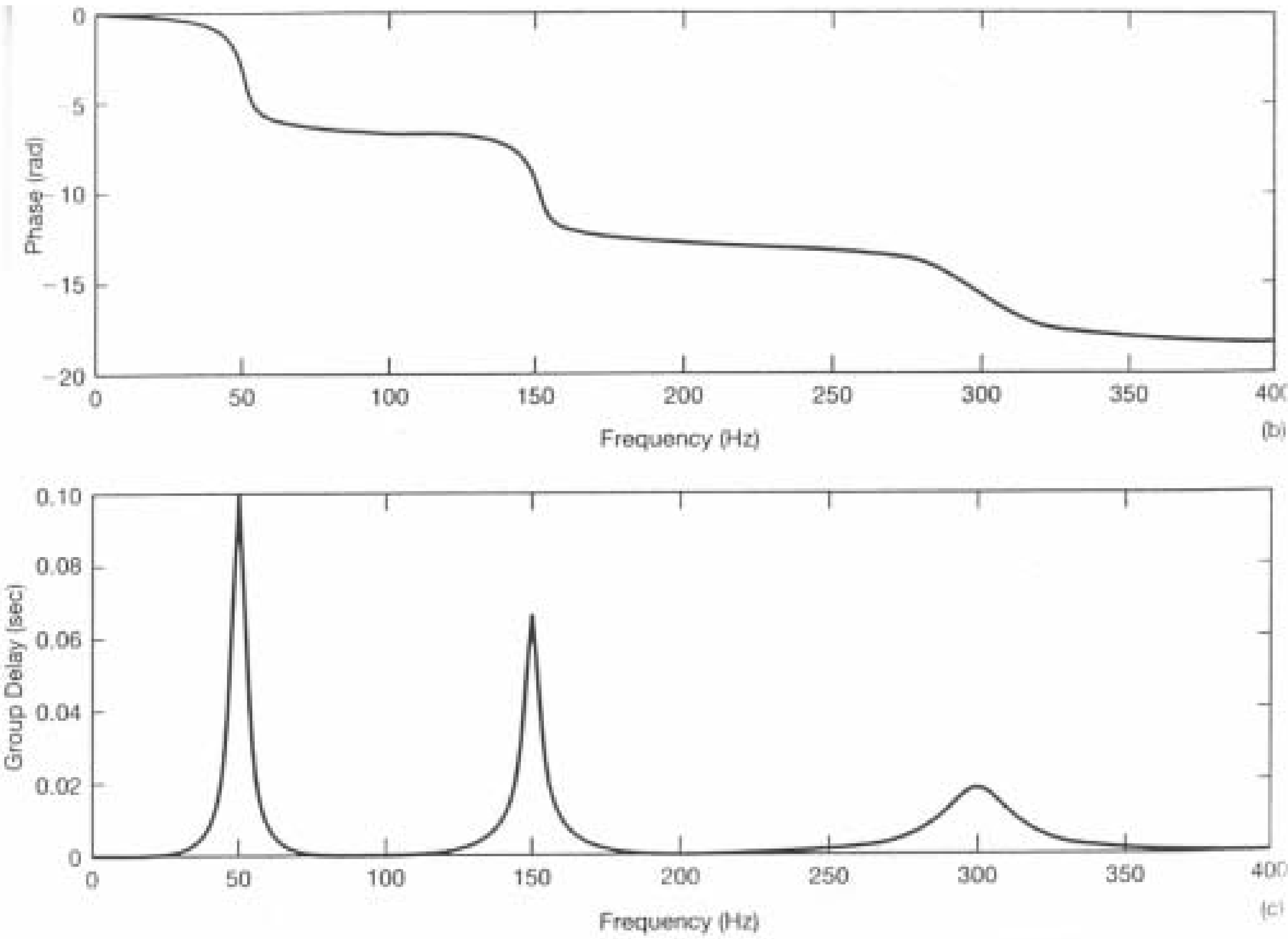


Figure 6.5 Phase, group delay, and impulse response for the all-pass system of Example : (a) principal phase; (b) unwrapped phase; (c) group delay; (d) impulse response. Each of these quantities is plotted versus frequency measured in Hertz.

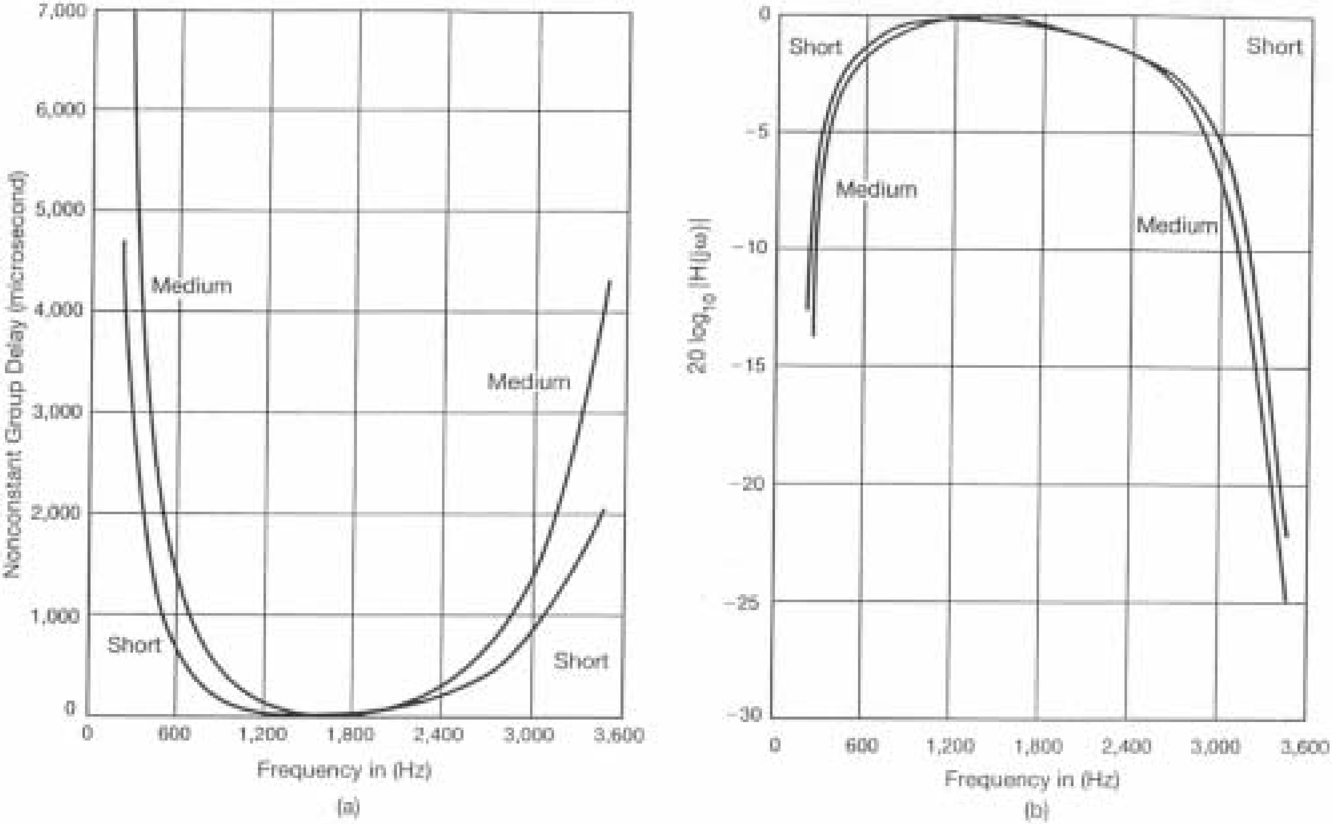
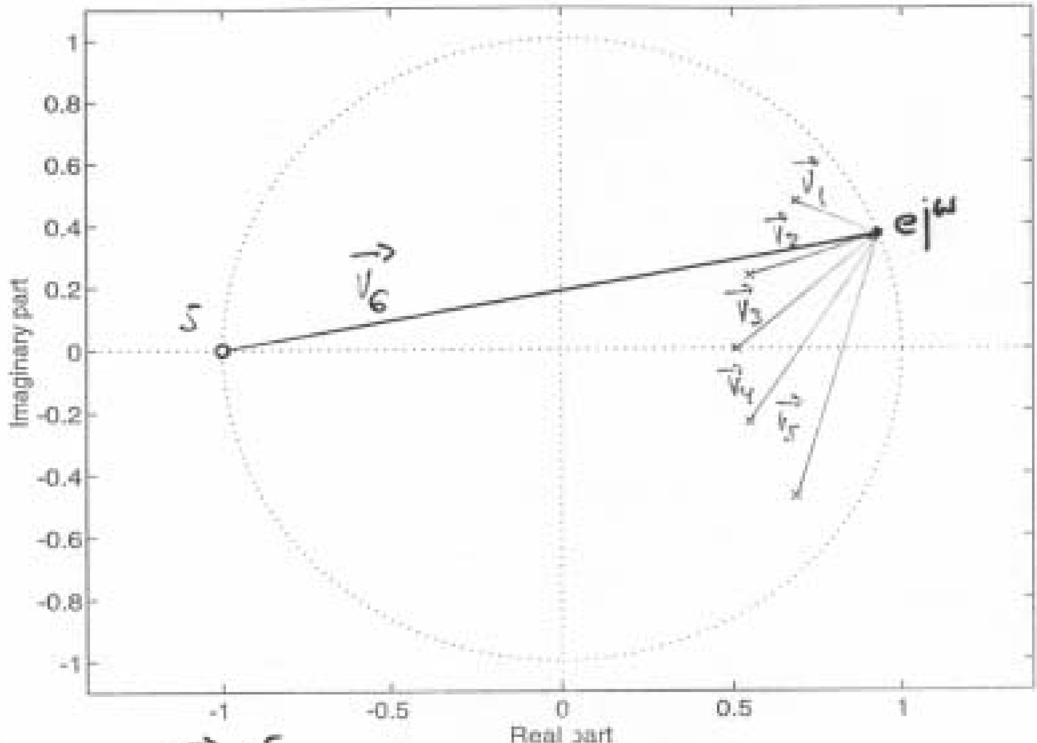
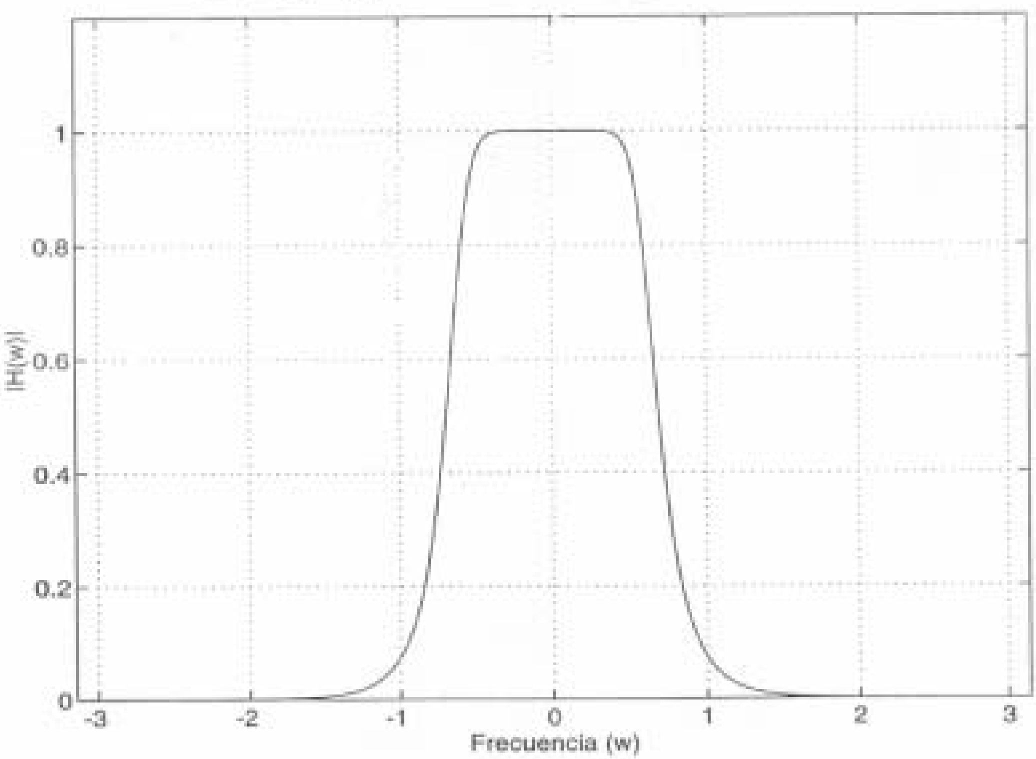
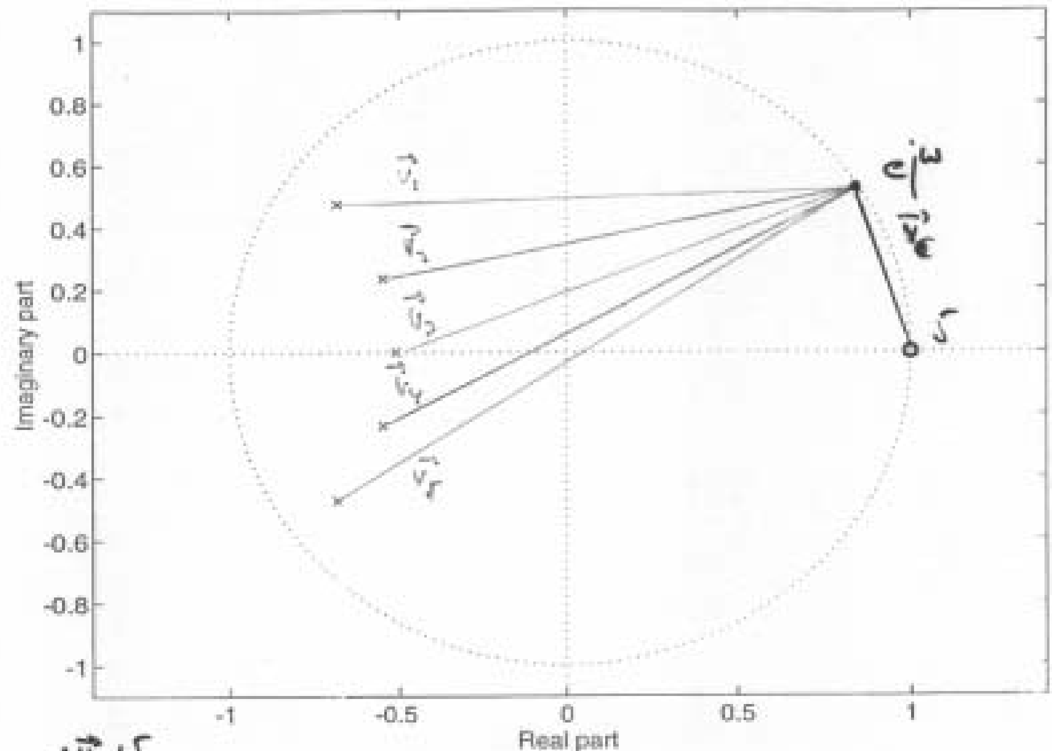


Figure 6.6 (a) Non-constant portion of the group delay; and (b) frequency response magnitude as functions of frequency for short- and medium-distance toll calls in switched telecommunications networks [after Duffy and Thatcher]. Each of these quantities is plotted versus frequency measured in Hertz. Also, as is commonly done in practice, the magnitudes of the frequency responses are plotted using a logarithmic scale in units of *decibels*. That is, what is plotted in (b) is $20\log_{10}|H(j\omega)|$ for the frequency responses corresponding to short- and medium-distance toll calls. The use of this logarithmic scale for the frequency-response magnitudes is discussed in detail in Section 6.2.3.

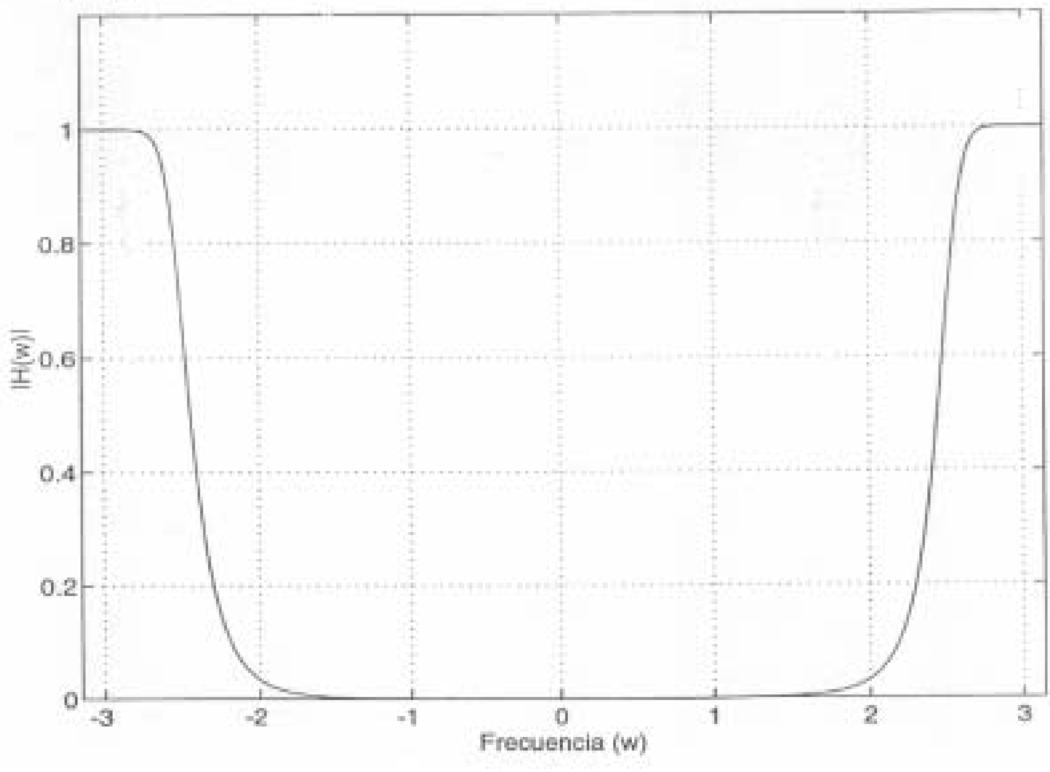


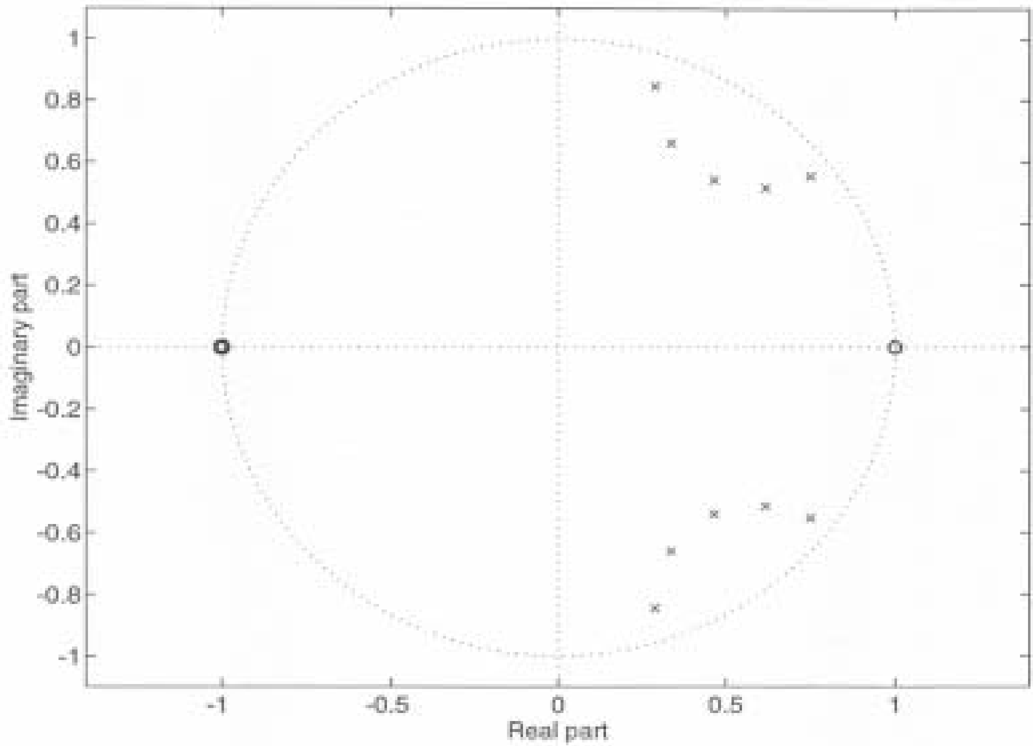
$$|H(e^{j\omega})| = \frac{|\vec{v}_6|^5}{|\vec{v}_1|\,|\vec{v}_2|\,|\vec{v}_3|\,|\vec{v}_4|\,|\vec{v}_5|}$$

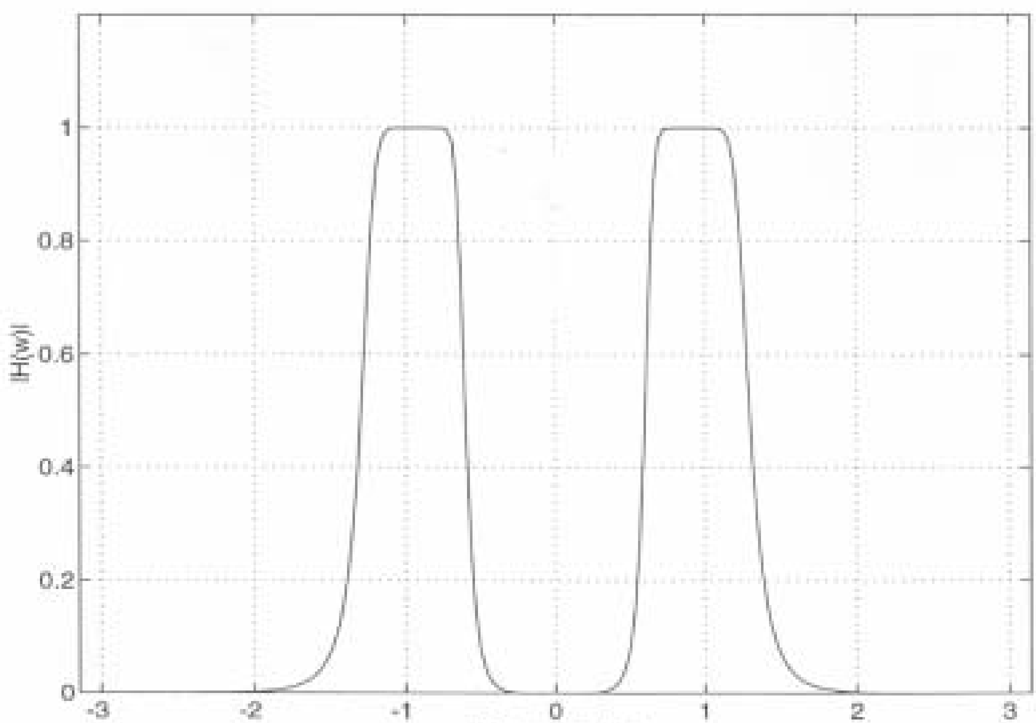




$$H(e^{j\omega}) = \frac{|\vec{V_6}|^5}{|\vec{V_1}|\,|\vec{V_2}|\,|\vec{V_3}|\,|\vec{V_4}|\,|\vec{V_5}|}$$




Imaginary part
Real part


|H(w)|
Frecuencia (w)

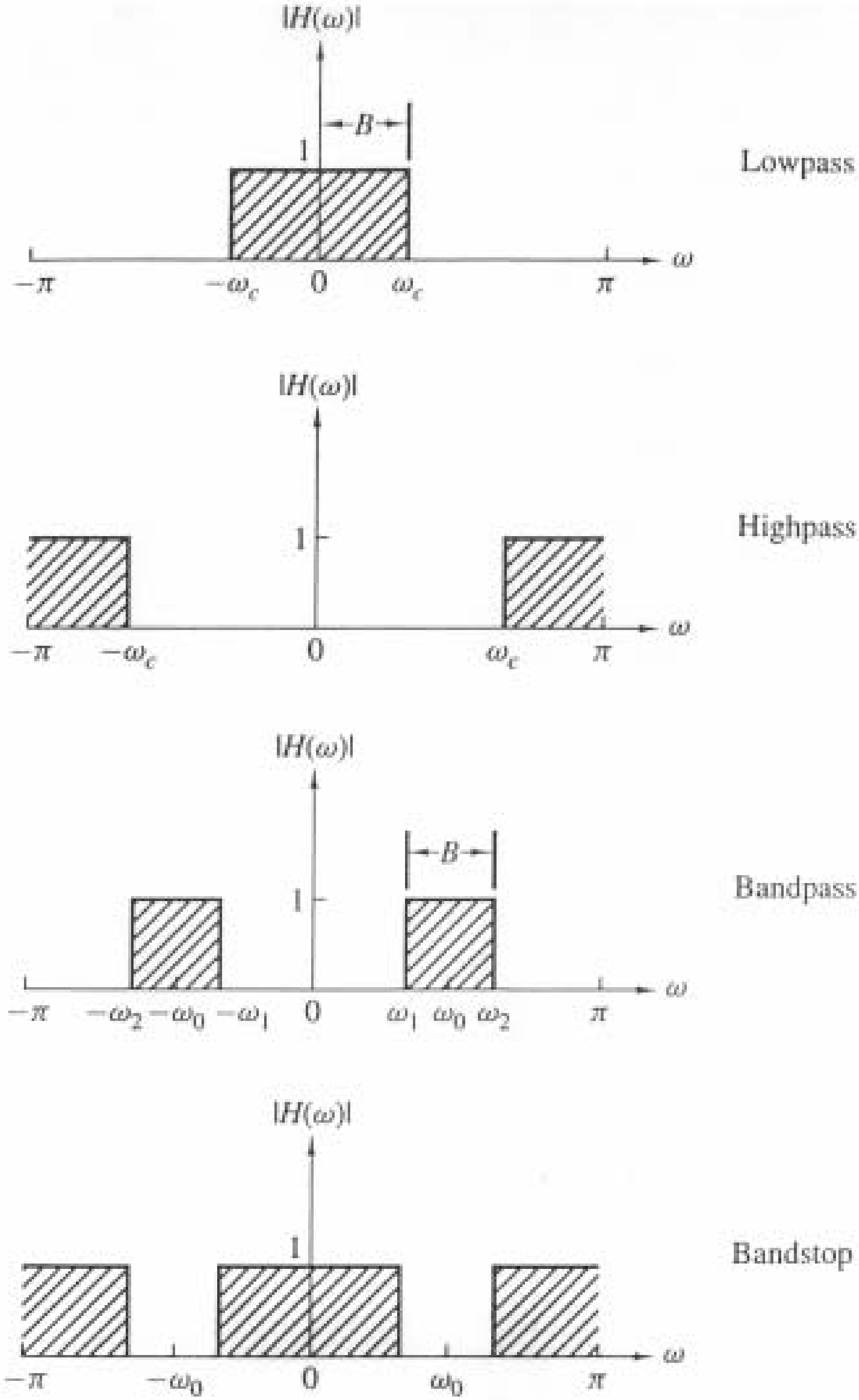
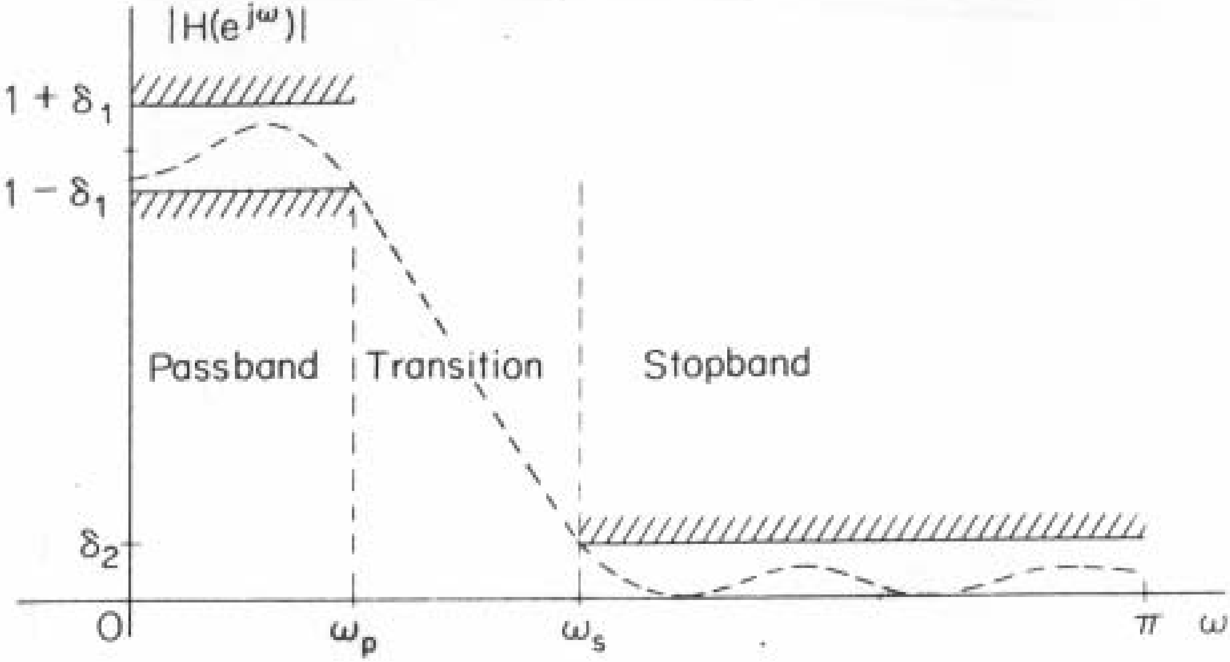


Figure 4.43 Magnitude responses for some ideal frequency-selective discrete-time filters.



(b)

Figure 7.2 (a) Specifications for effective frequency response of overall system in Fig. 7.1 for the case of lowpass filter. (b) Corresponding specifications for the discrete-time system in Fig. 7.1.

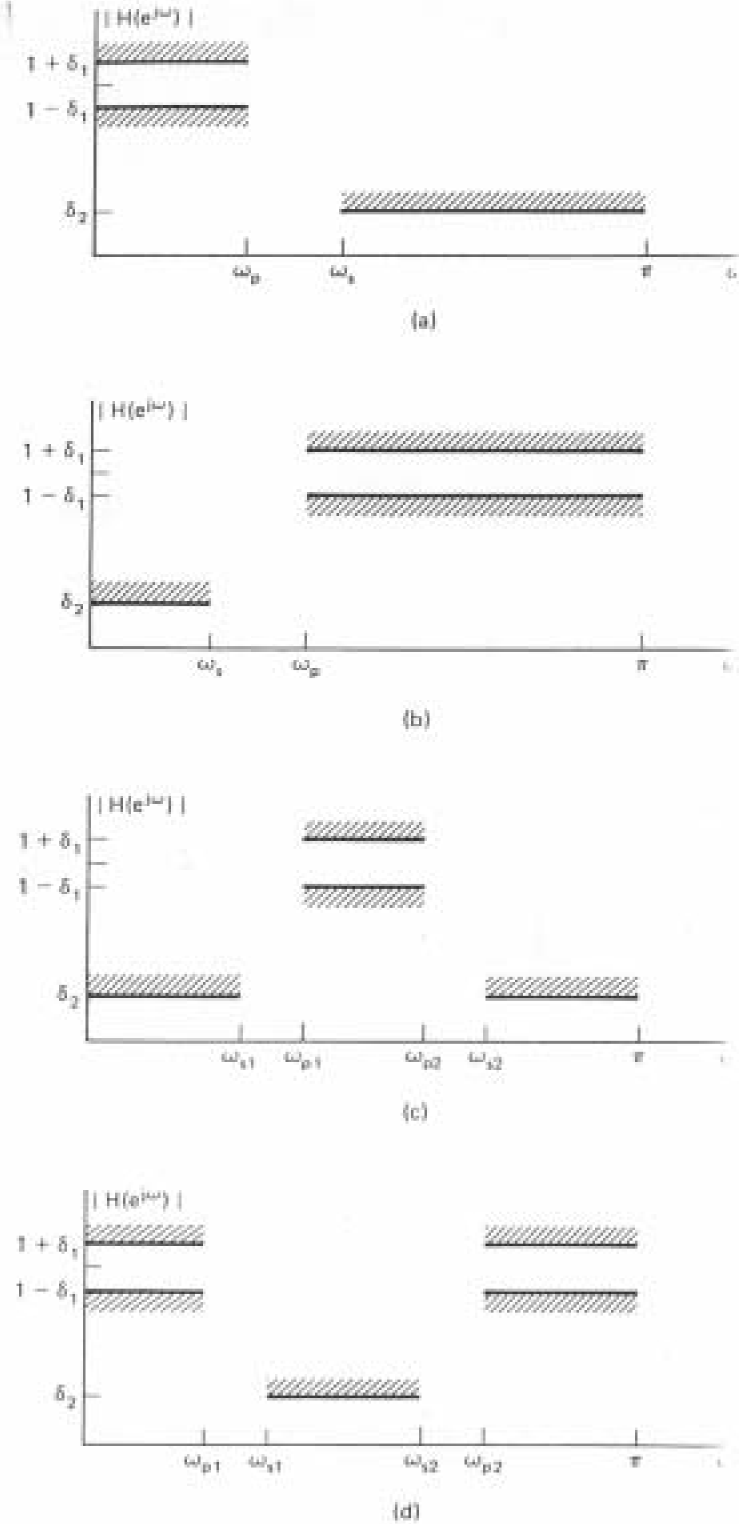
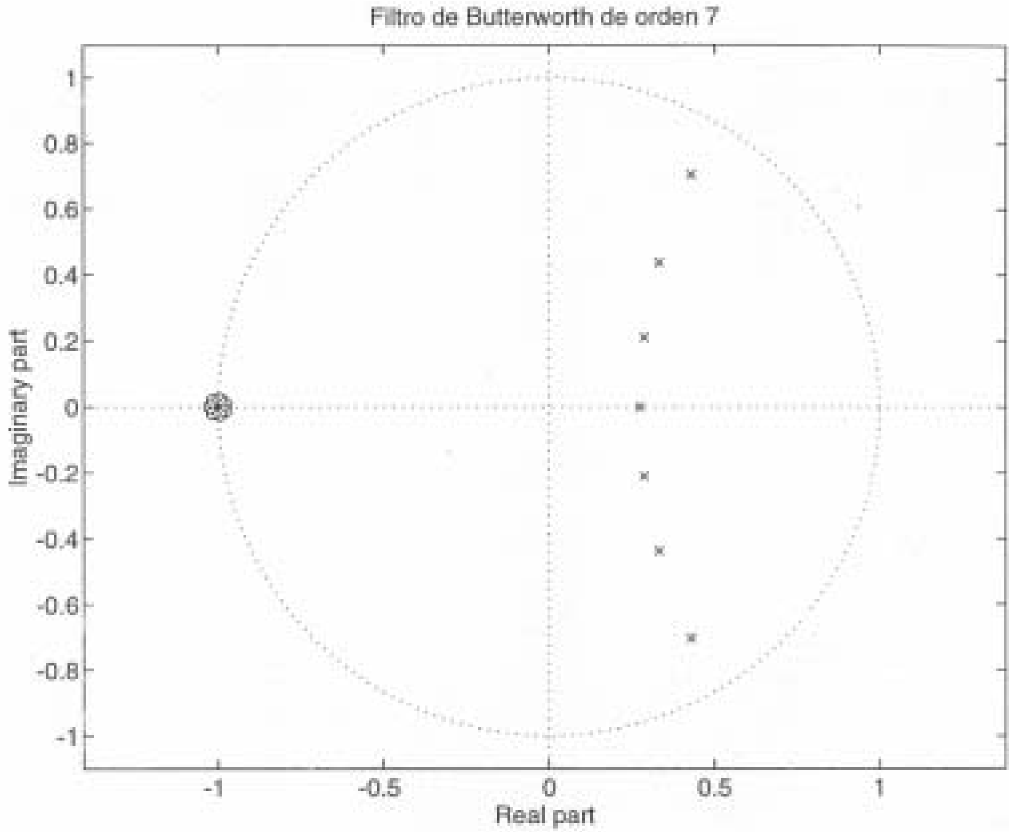


Figure 7.21 Tolerance schemes for frequency-selective digital filters. (a) Lowpass. (b) Highpass. (c) Bandpass. (d) Bandstop.

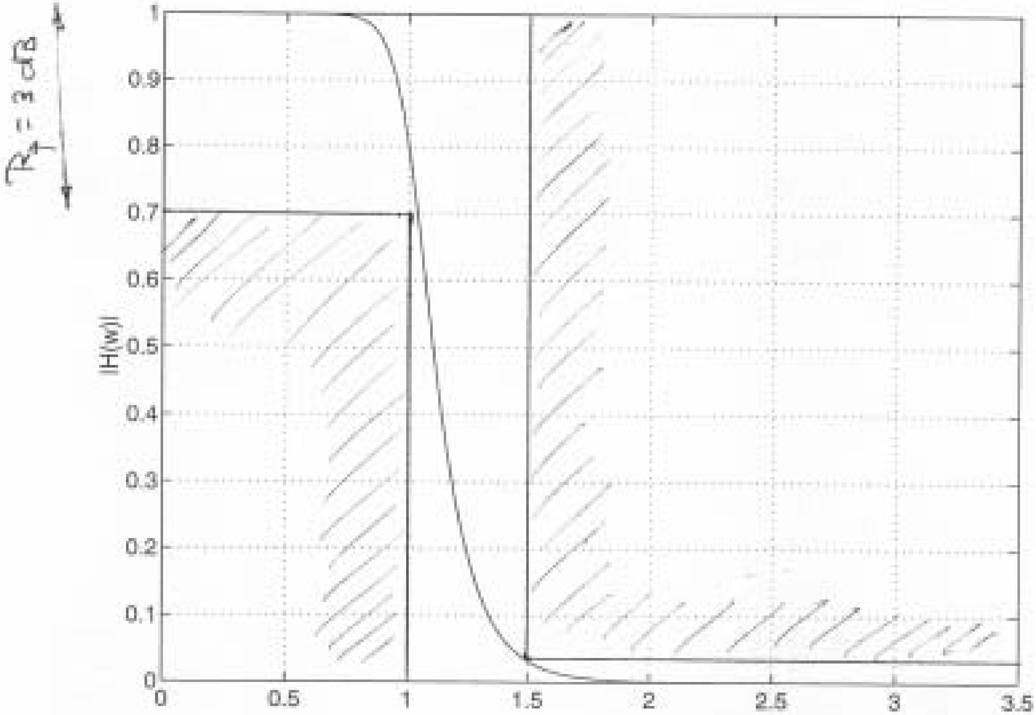


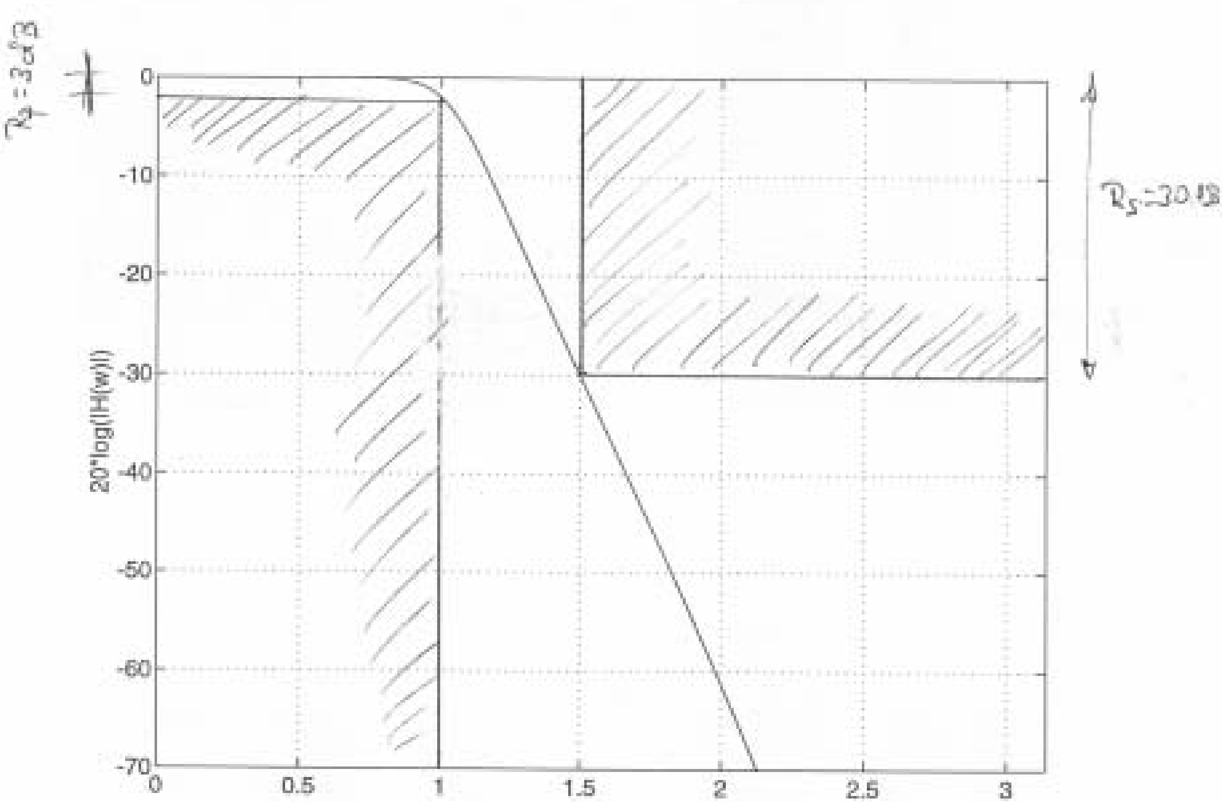
$W_p = 1$

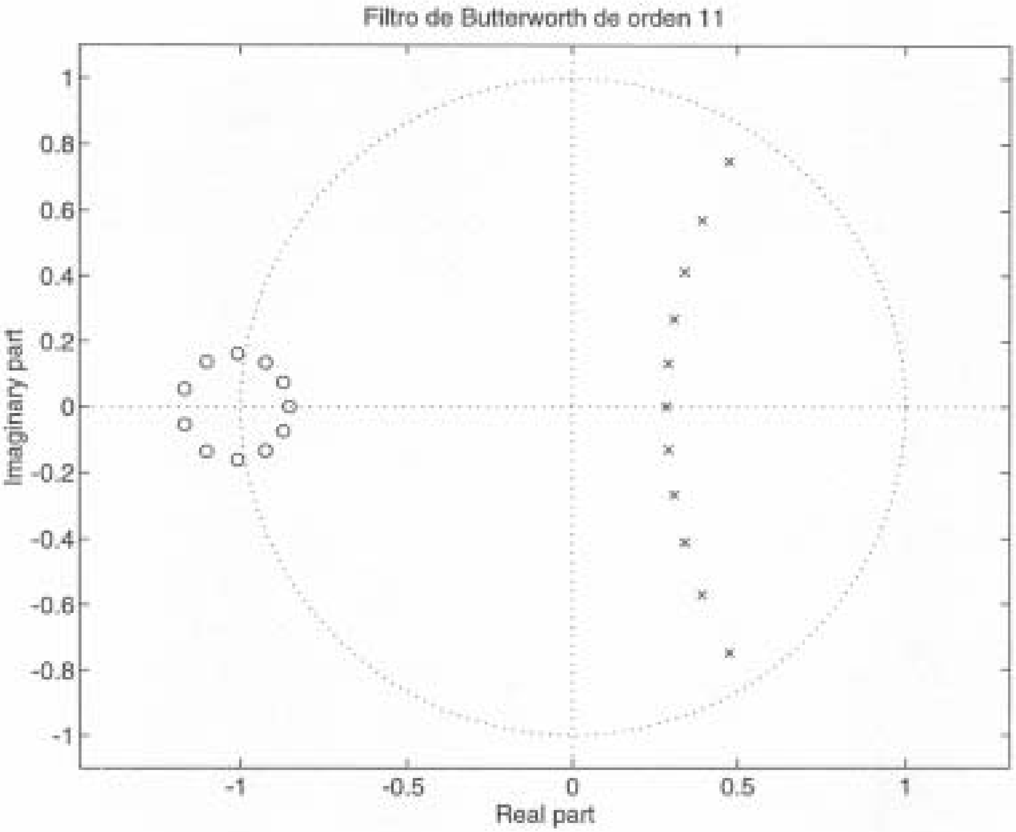
$R_p = 3$ dB

$W_s = 1.5$

$R_s = 30$ dB


Rp = 3 dB
|H(w)|
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
0 0.5 1 1.5 2 2.5 3 3.5


Rp = 3 dB
Rs=30dB
20*log(|H(w)|)
0 -10 -20 -30 -40 -50 -60 -70
0 0.5 1 1.5 2 2.5 3

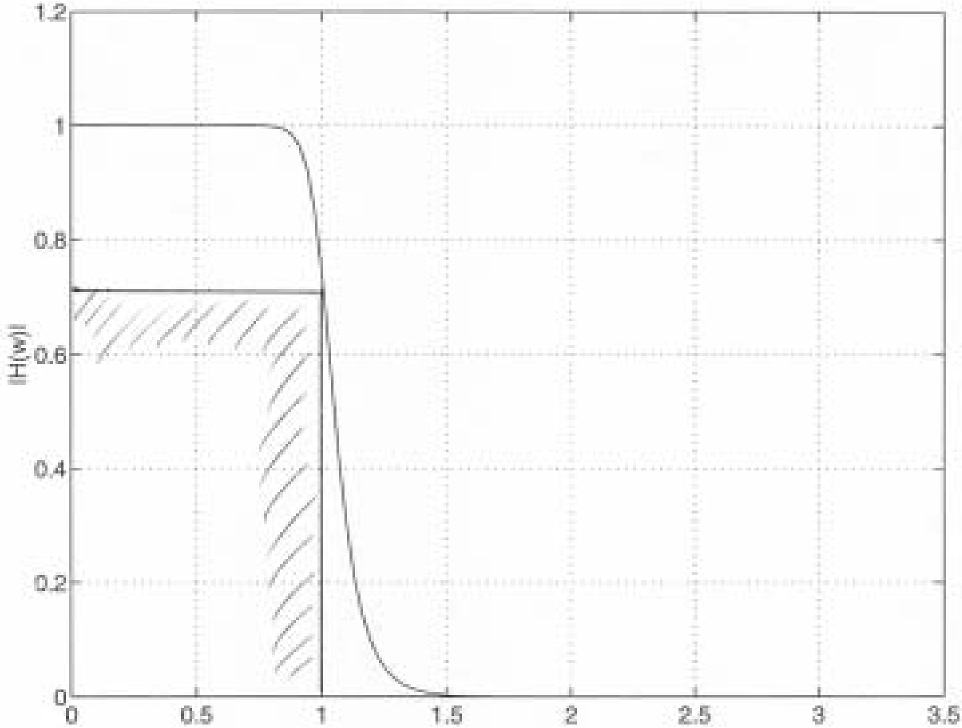


$w_p = 1$

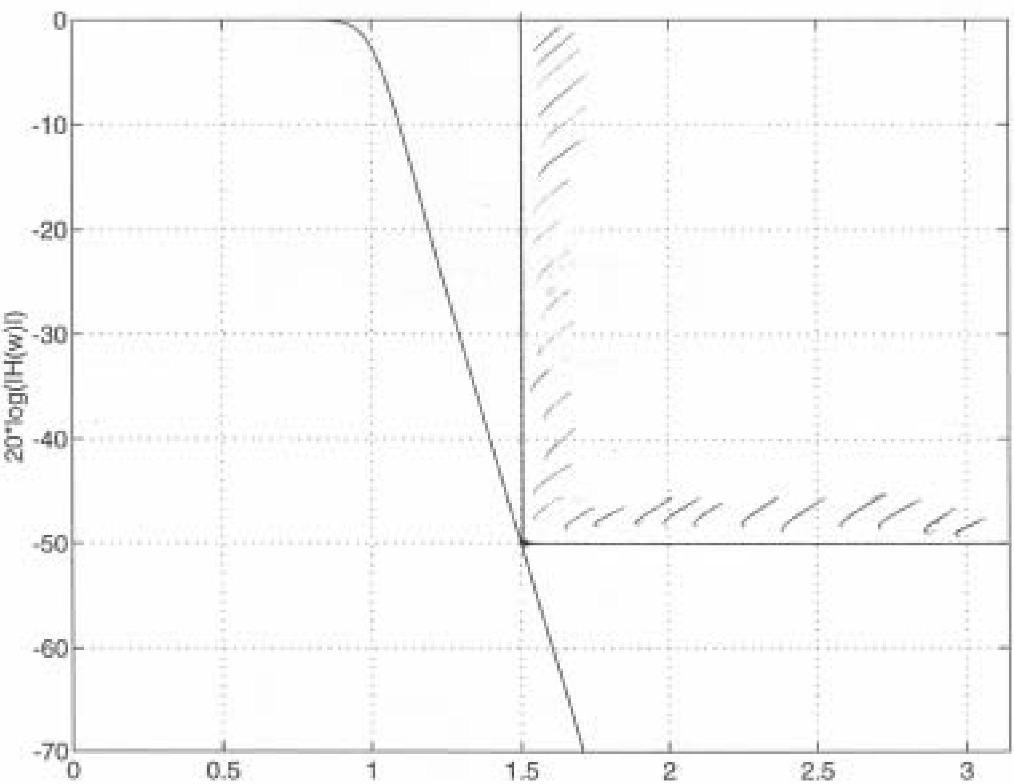
$R_p = 3$ dB

$w_s = 1.5$

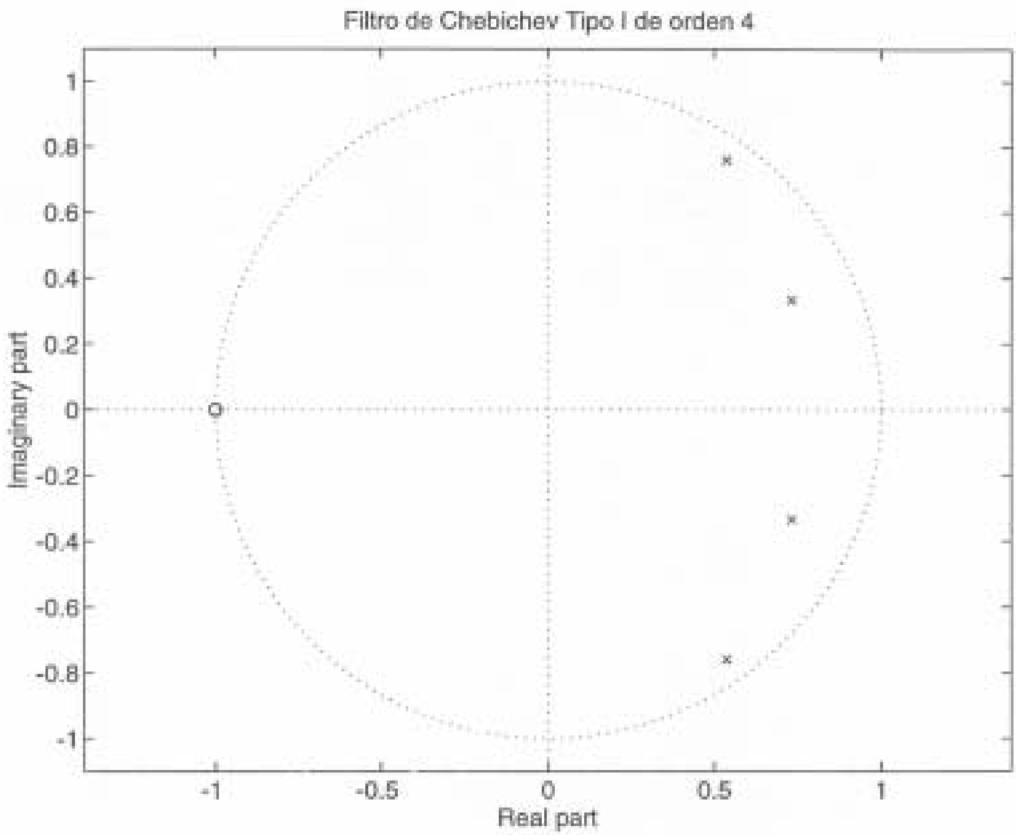
$R_s = 50$ dB



1.2
1
0.8
0.6
0.4
0.2
0
|H(w)|
0
0.5
1
1.5
2
2.5
3
3.5



0
-10
-20
-30
-40
-50
-60
-70
20*log(|H(w)|)
0
0.5
1
1.5
2
2.5
3

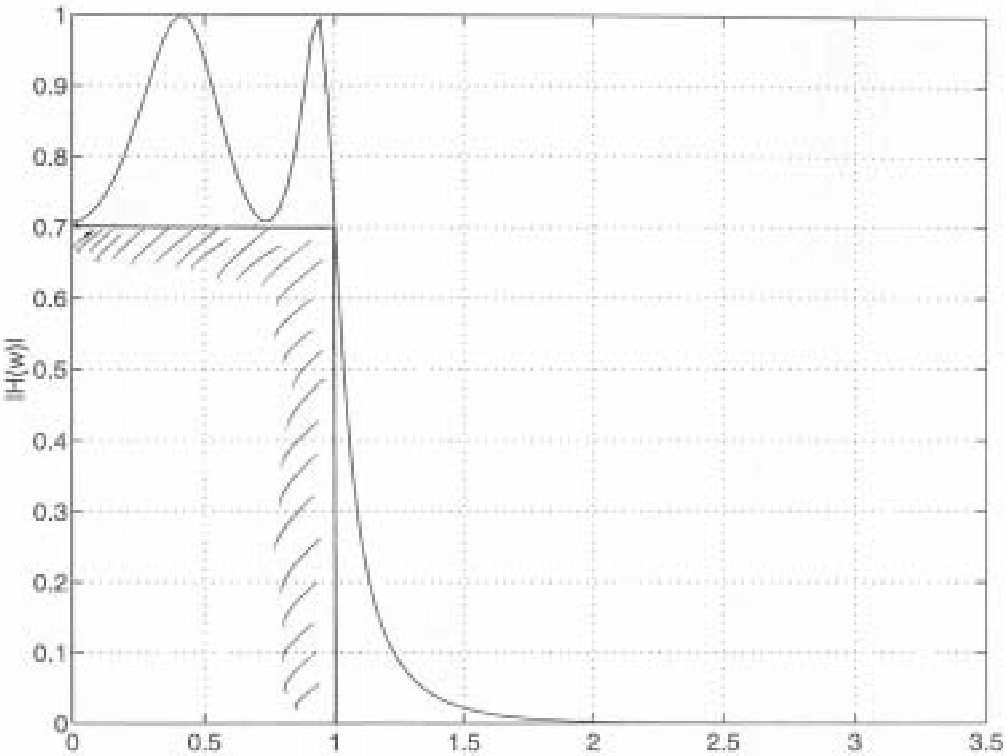


$W_p = 1$

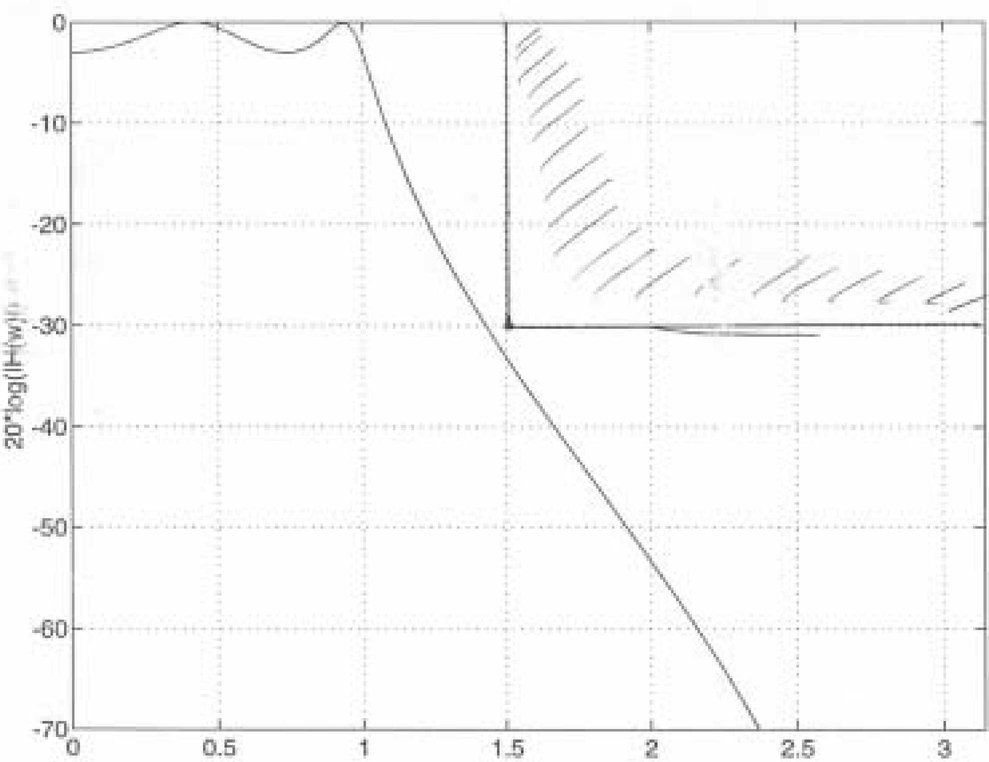
$R_p = 3$ dB

$W_s = 1.5$

$R_s = 30$ dB

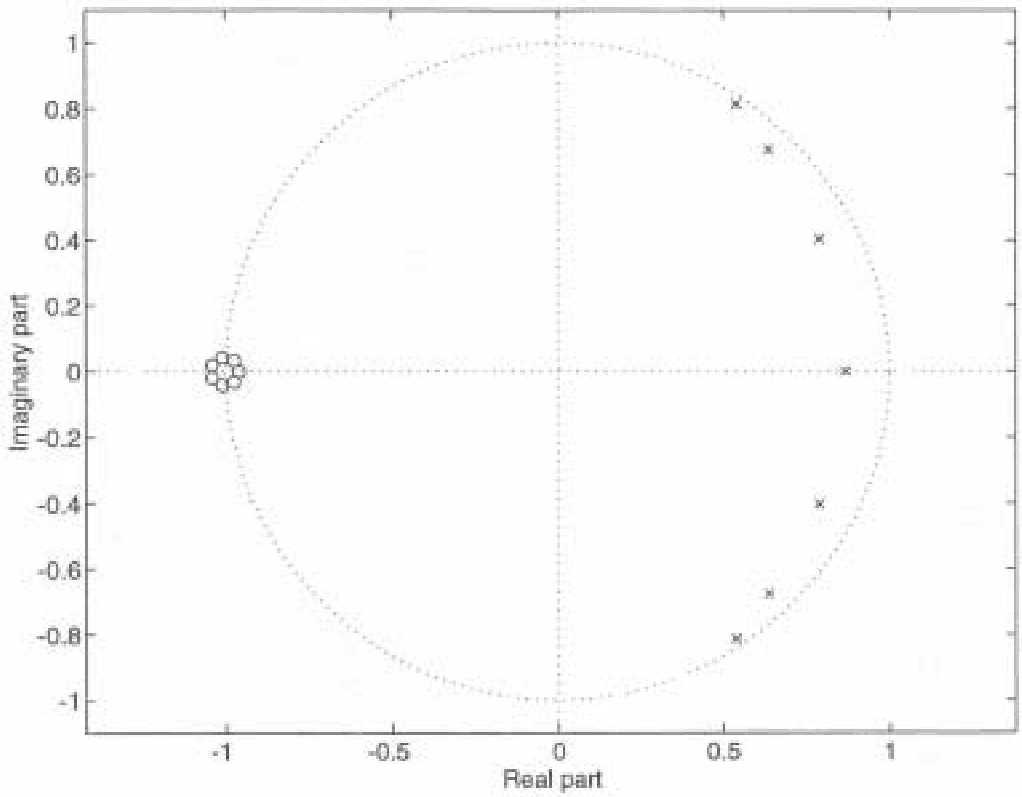


|H(w)|
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
0.5
1
1.5
2
2.5
3
3.5



20*log(|H(w)|)
0
-10
-20
-30
-40
-50
-60
-70
0
0.5
1
1.5
2
2.5
3

Filtro de Chebichev Tipo I de orden 7

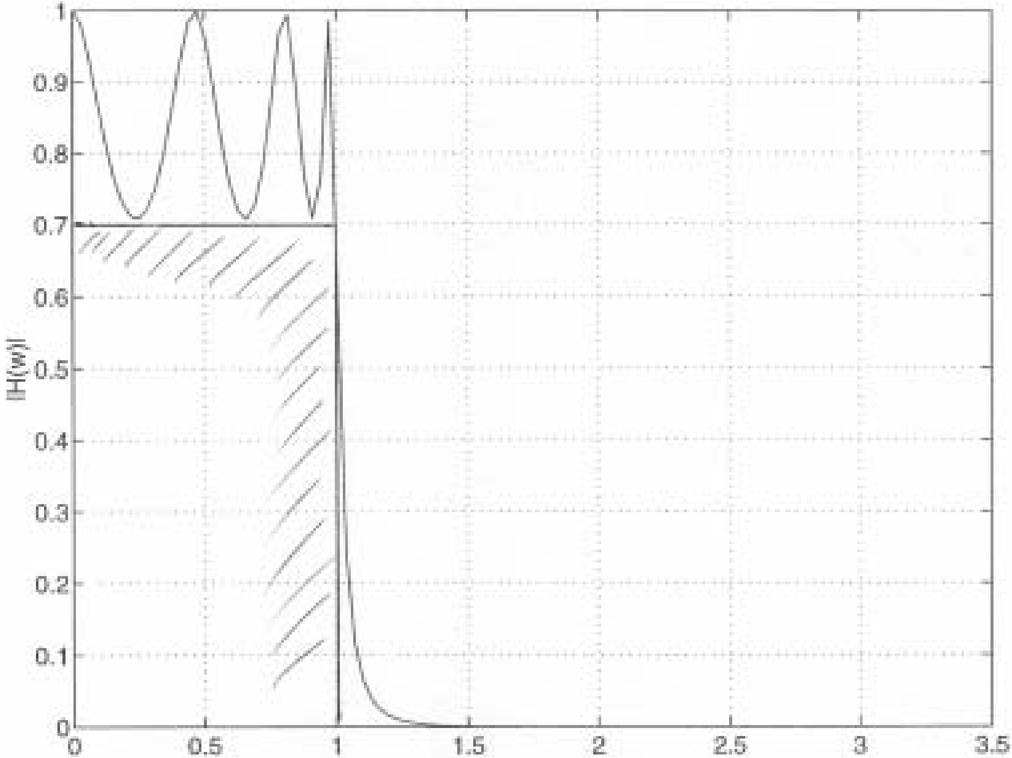


$\omega_p = 1$

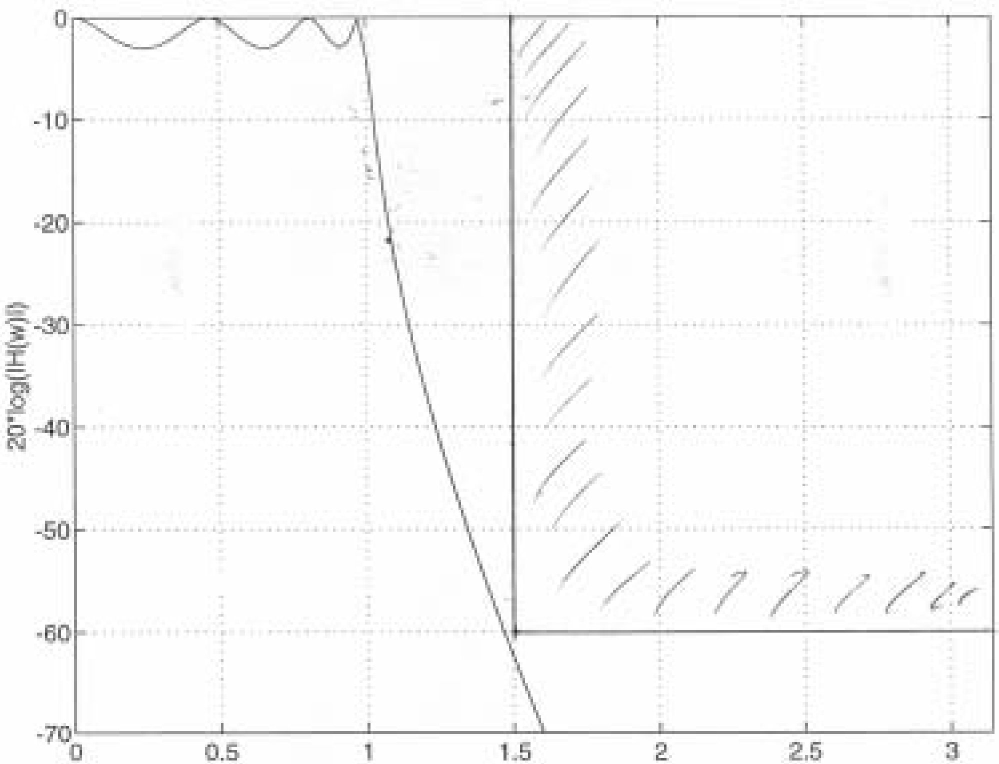
$R_p = 3$ dB

$\omega_s = 1.5$

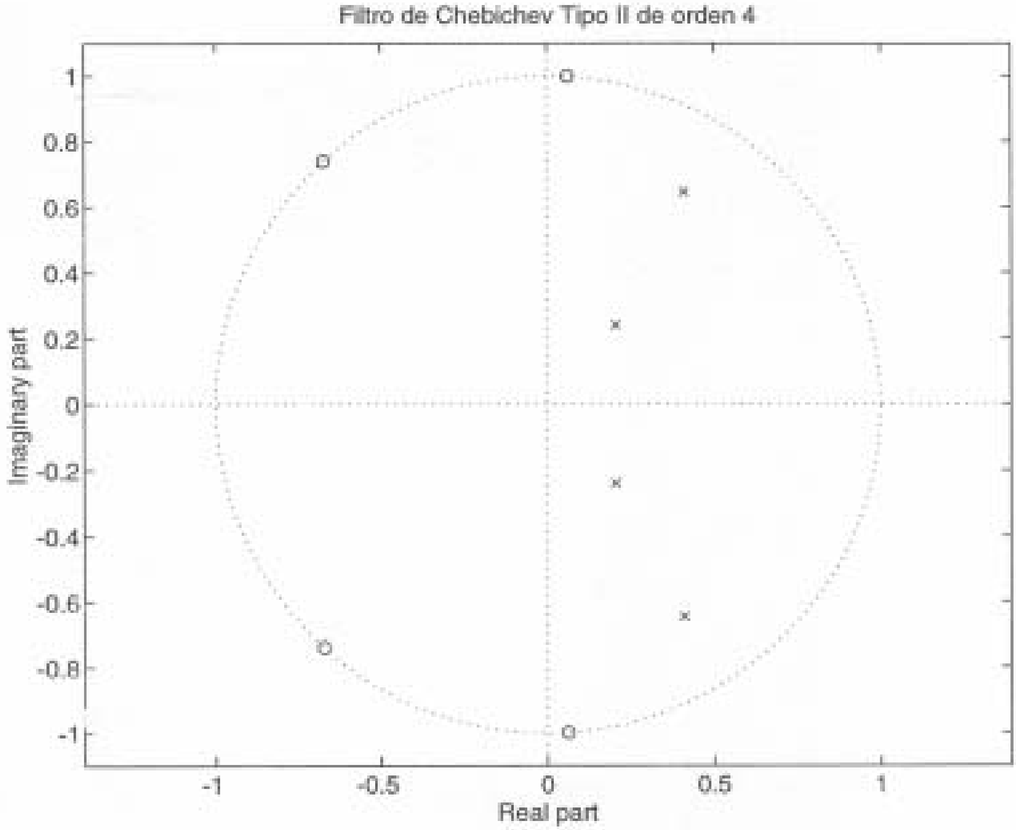
$R_s = 60$ dB



|H(w)|
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1.5
2
2.5
3
3.5



20*log(|H(w)|)
0
-10
-20
-30
-40
-50
-60
-70
0
0.5
1
1.5
2
2.5
3

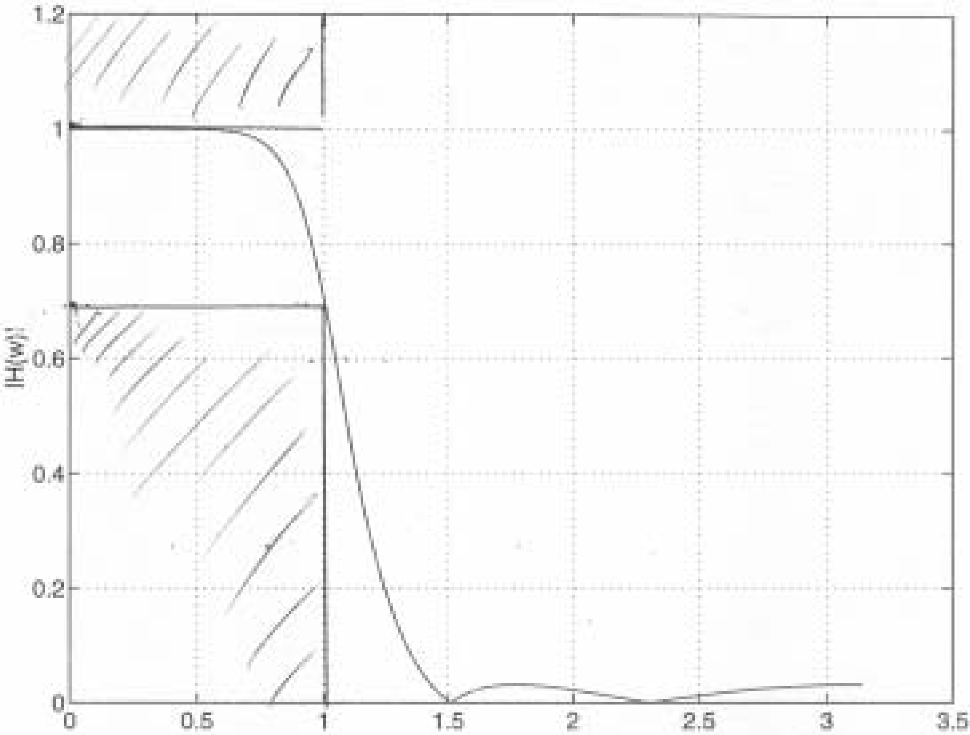


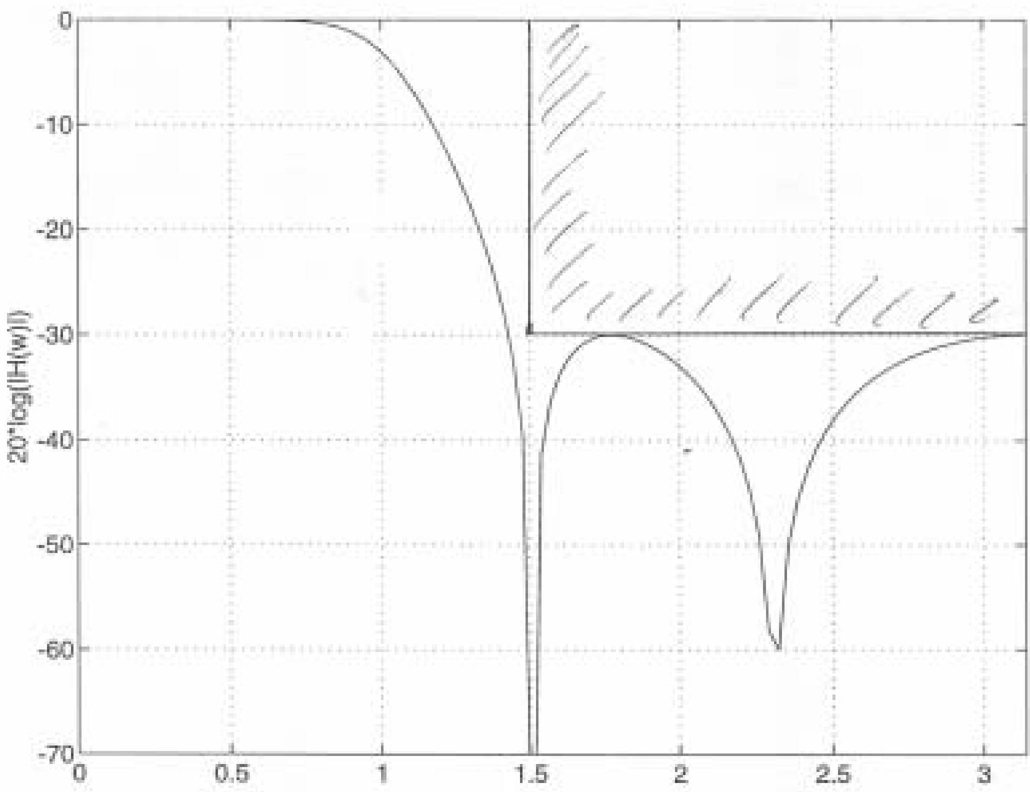
$W_p = 1$

$R_p = 3$ dB

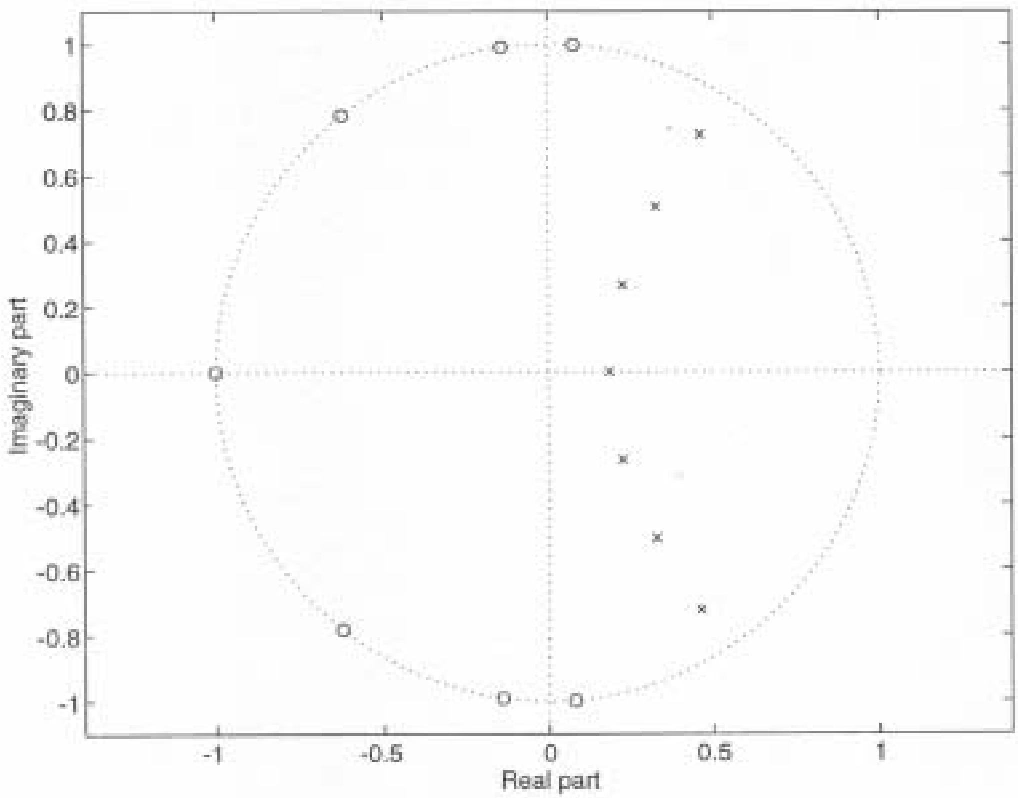
$W_s = 1.5$

$R_s = 30$ dB


|H(w)|
1.2
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
2
2.5
3
3.5


20*log(|H(w)|)
0
-10
-20
-30
-40
-50
-60
-70
0
0.5
1
1.5
2
2.5
3

Filtro de Chebichev Tipo II de orden 7

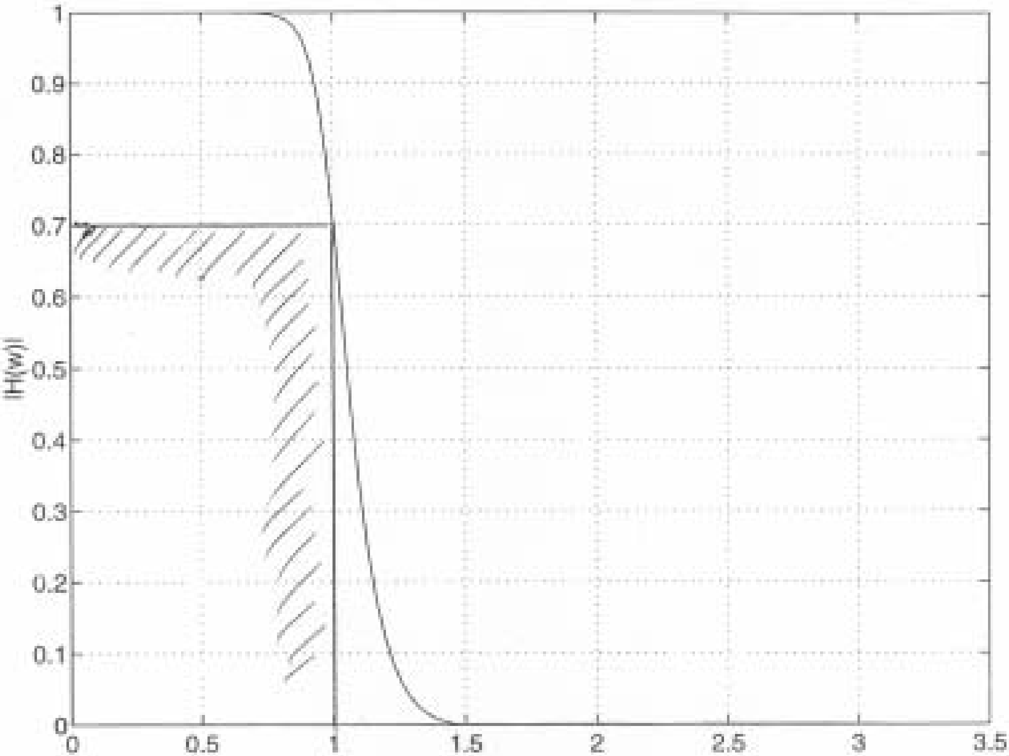


$\omega_p = 1$

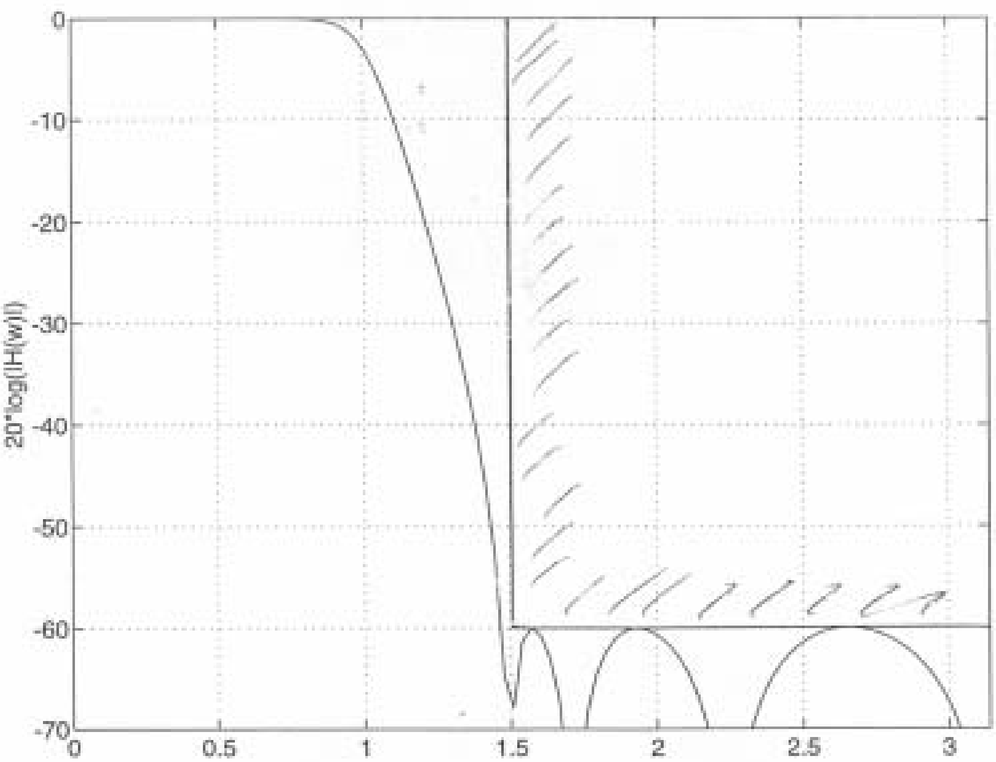
$R_p = 3$ dB

$\omega_s = 1.5$

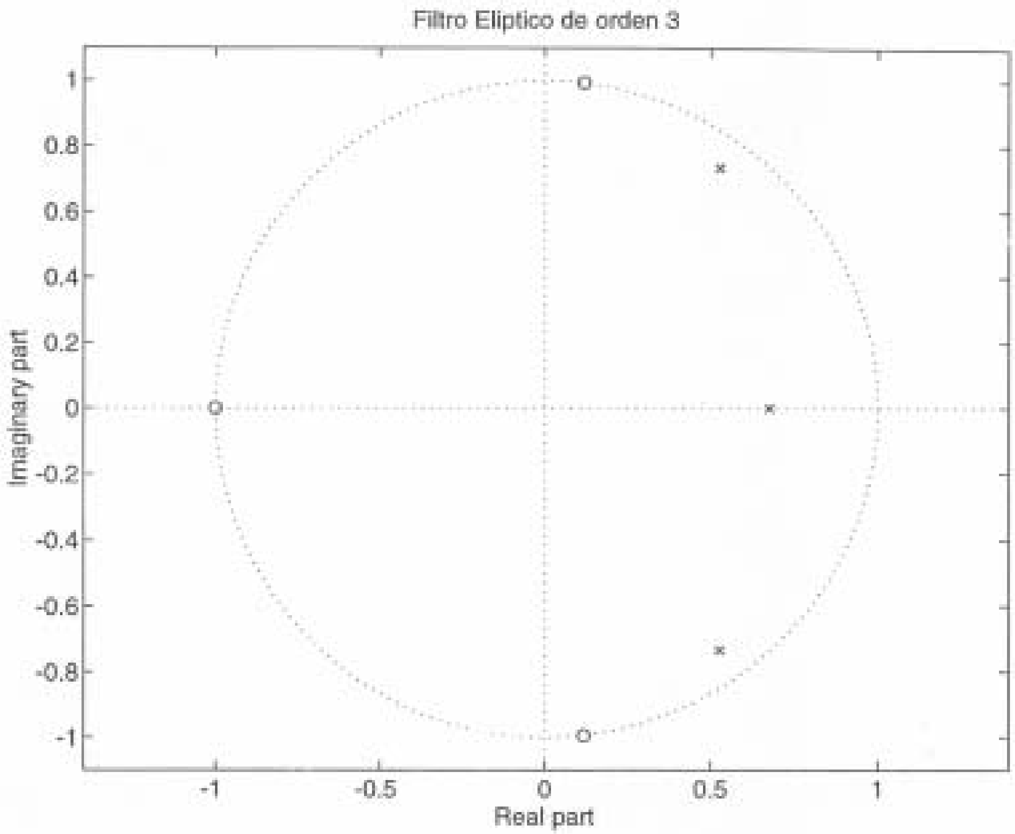
$R_s = 60$ dB



|H(w)|
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1.5
2
2.5
3
3.5



20*log(|H(w)|)
0
-10
-20
-30
-40
-50
-60
-70
0
0.5
1
1.5
2
2.5
3

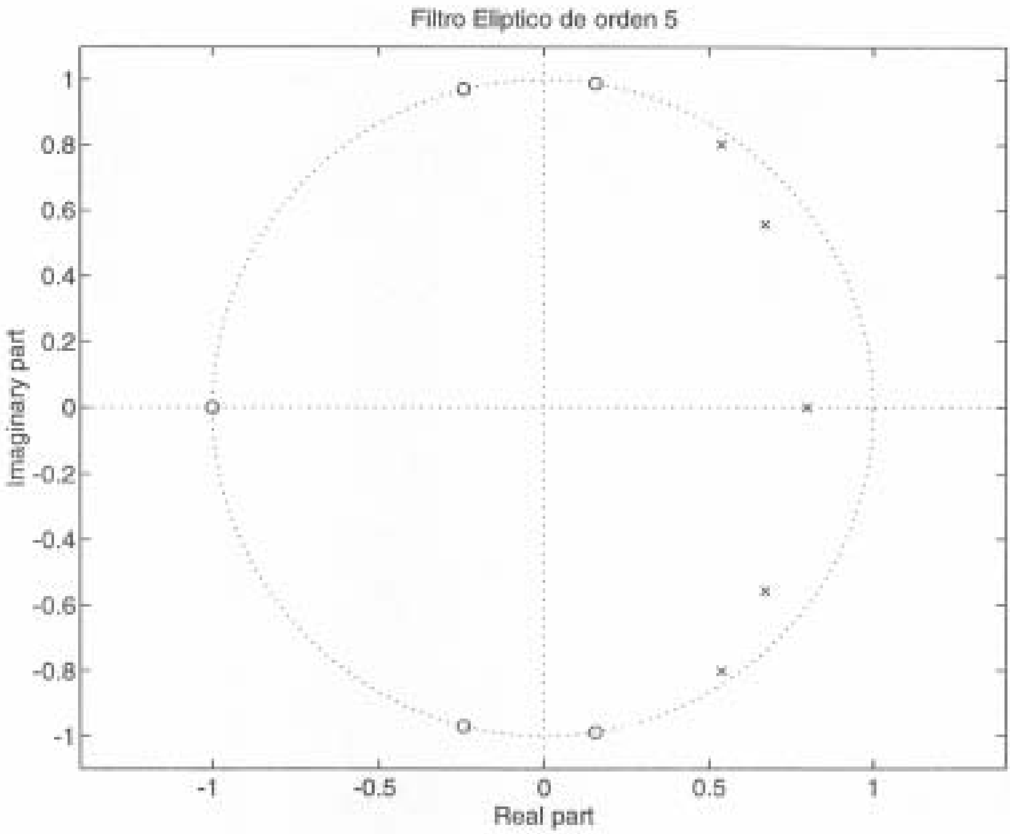


$\omega_p = 1$

$R_p = 3$ dB

$\omega_s = 1.5$

$R_s = 30$ dB

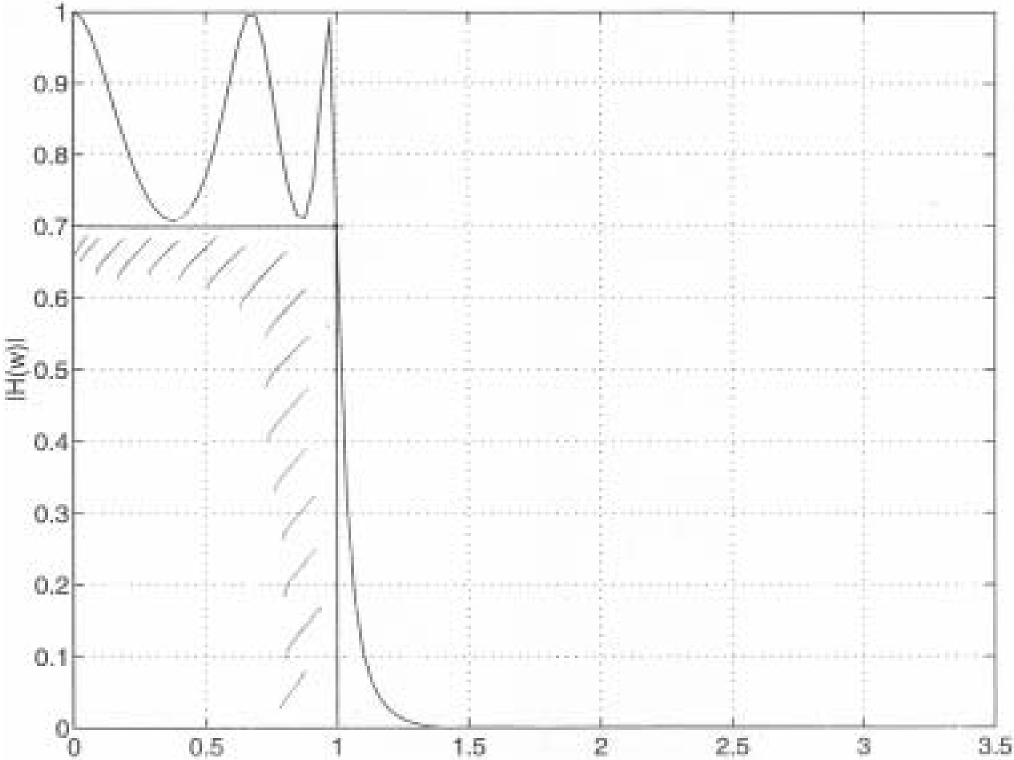


$W_p = 1$

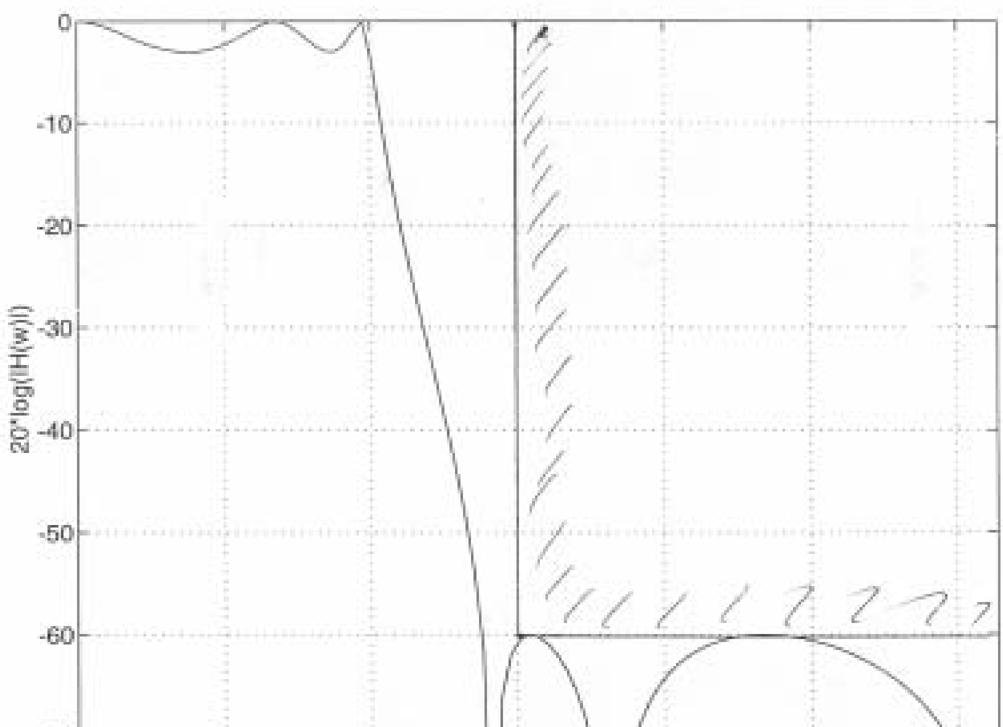
$R_p = 3$ dB

$W_s = 1.5$

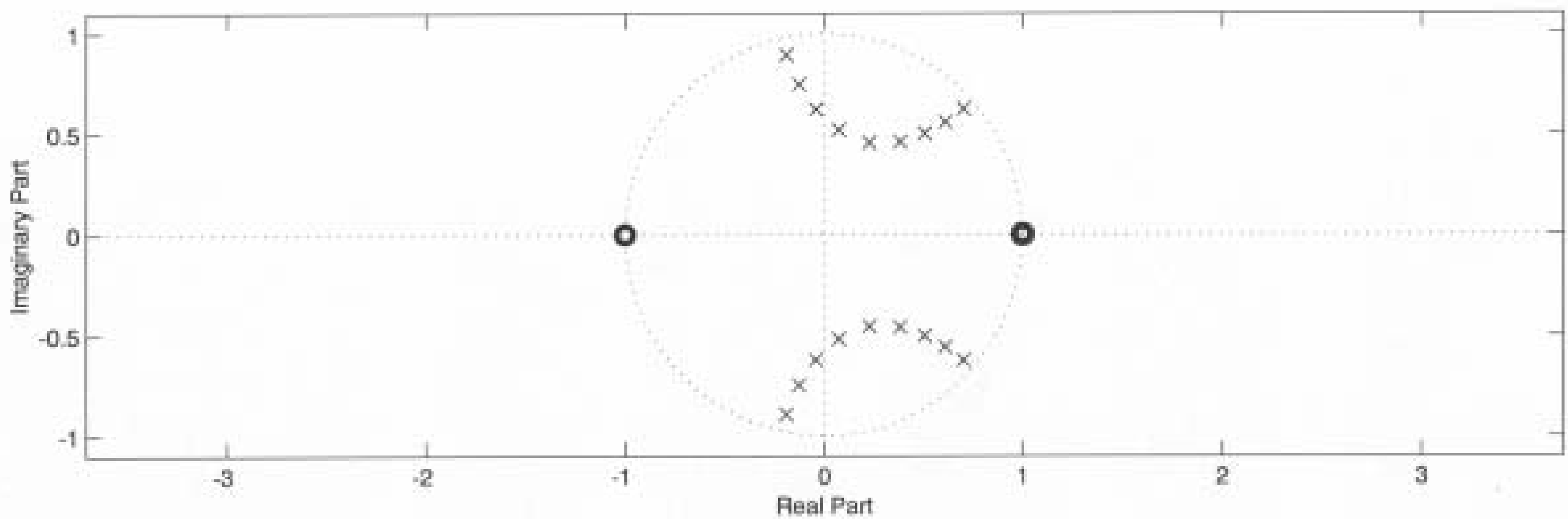
$R_s = 60$ dB



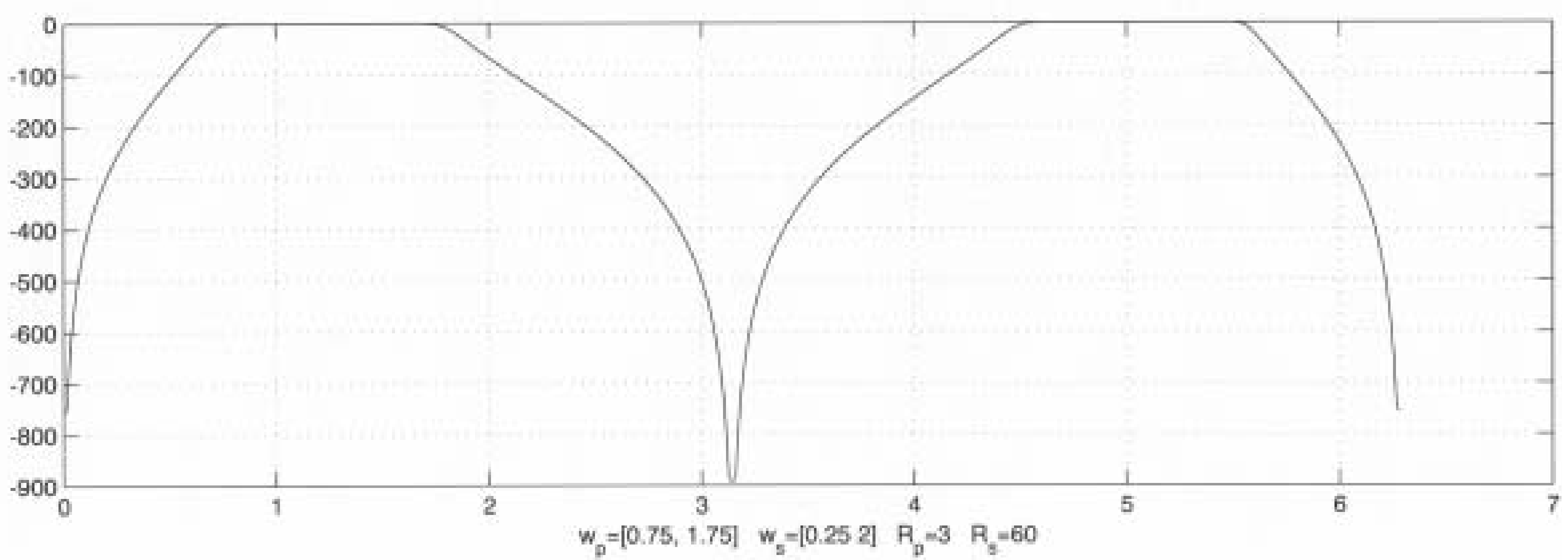
|H(w)|
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
0.5
1
1.5
2
2.5
3
3.5



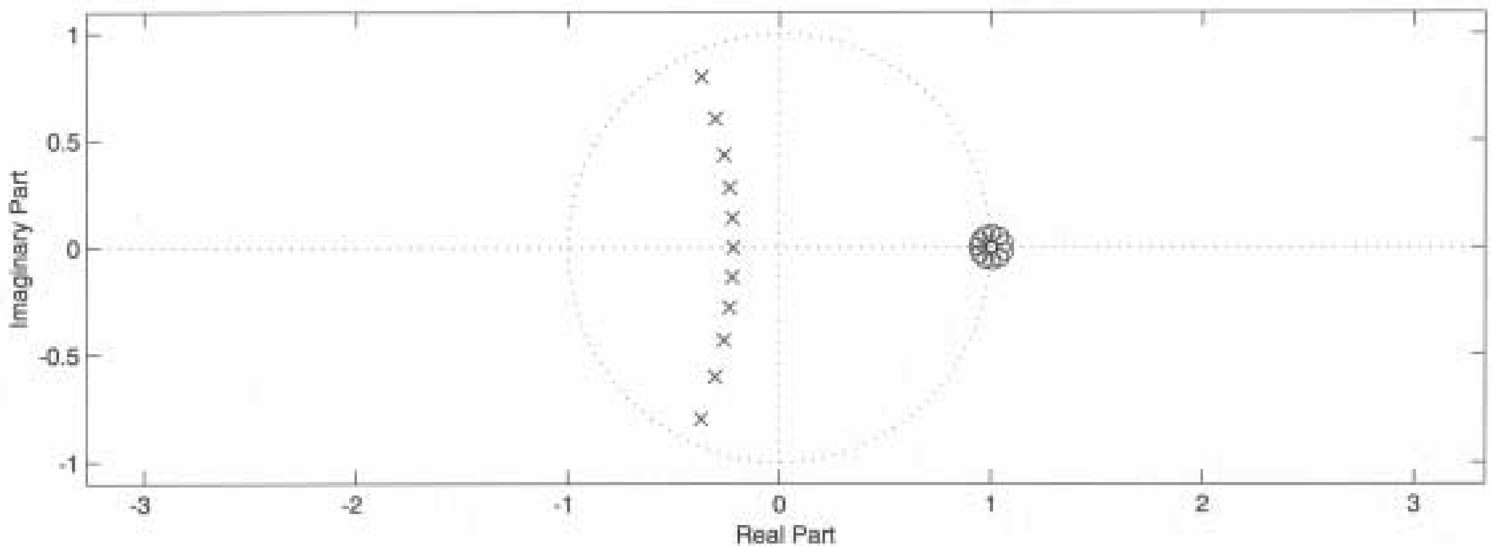
20*log(|H(w)|)
0
-10
-20
-30
-40
-50
-60
-70
0
0.5
1
1.5
2
2.5
3



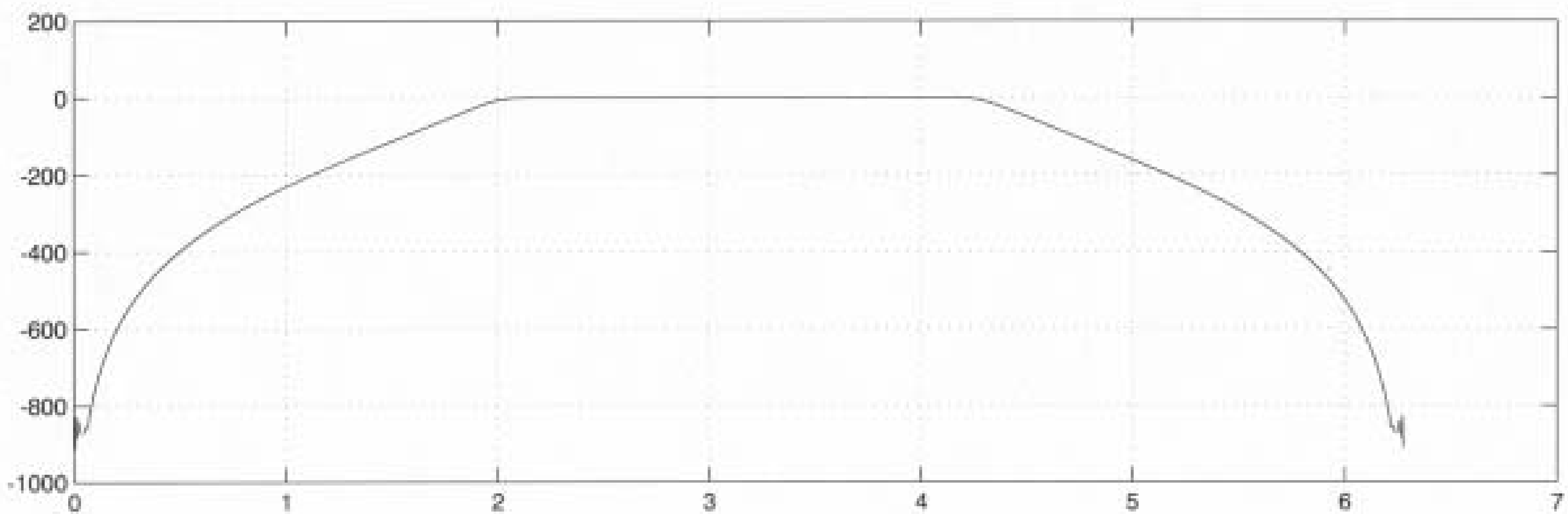
Imaginary Part
Real Part



w_p=[0.75, 1.75]   w_s=[0.25 2]   R_p=3   R_s=60



Imaginary Part
Real Part
1
0.5
0
-0.5
-1
-3
-2
-1
0
1
2
3



200
0
-200
-400
-600
-800
-1000
0
1
2
3
4
5
6
7