Secondo test di autovalutazione di FONDAMENTI DI AUTOMATICA A.A. 2020/21

Data: 21 Ottobre 2020

1. Si traccino i diagrammi di Bode (reali e asintotici) delle seguenti funzioni di trasferimento:

   (a) $W(s) = \dfrac{s+1}{s(s+100)}$;

   (b) $W(s) = \dfrac{s}{s^2-10}$;

   (c) $W(s) = \dfrac{(10-s)s}{(s+1)^2}$;

   (d) $W(s) = 10^3 \ \dfrac{s+10}{(s-10)(s-100)}$;

   (e) $W(s) = -\ \dfrac{s-100}{s(s+1)^2}$;

   (f) $W(s) = \dfrac{s^2}{(s-10)(s+10)}$;

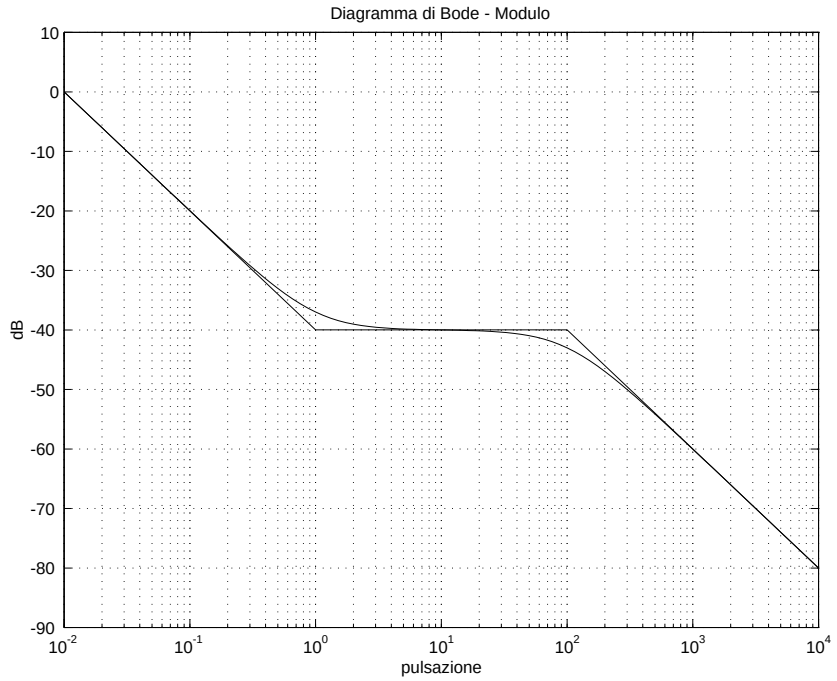
   (g) $W(s) = \dfrac{(s+0.1)^2(s+1)}{s^2(s-10)}$;

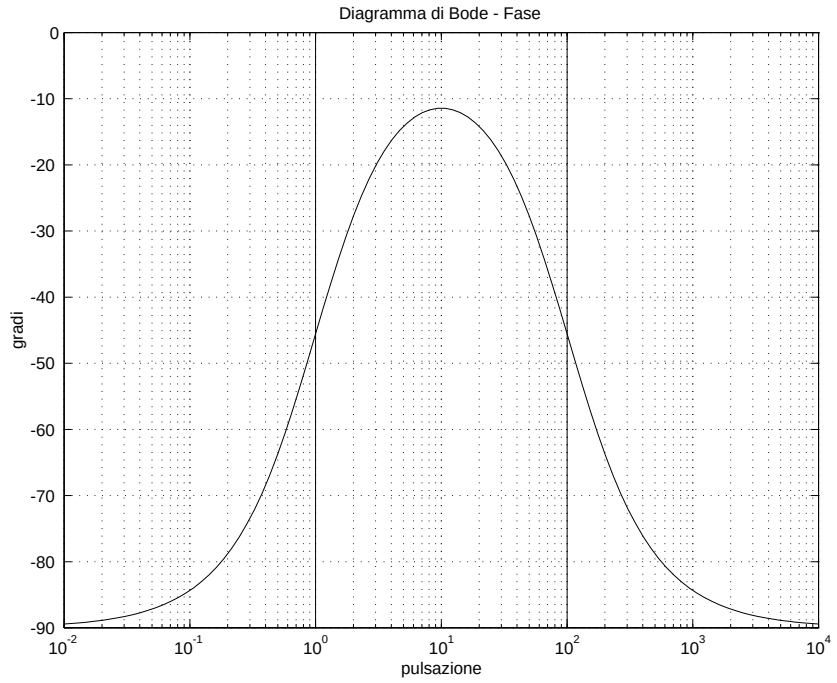
   (h) $W(s) = \dfrac{s+100}{s^2(s-10)}$;

RISPOSTE

1. Diagrammi di Bode:

   (a)





(b)

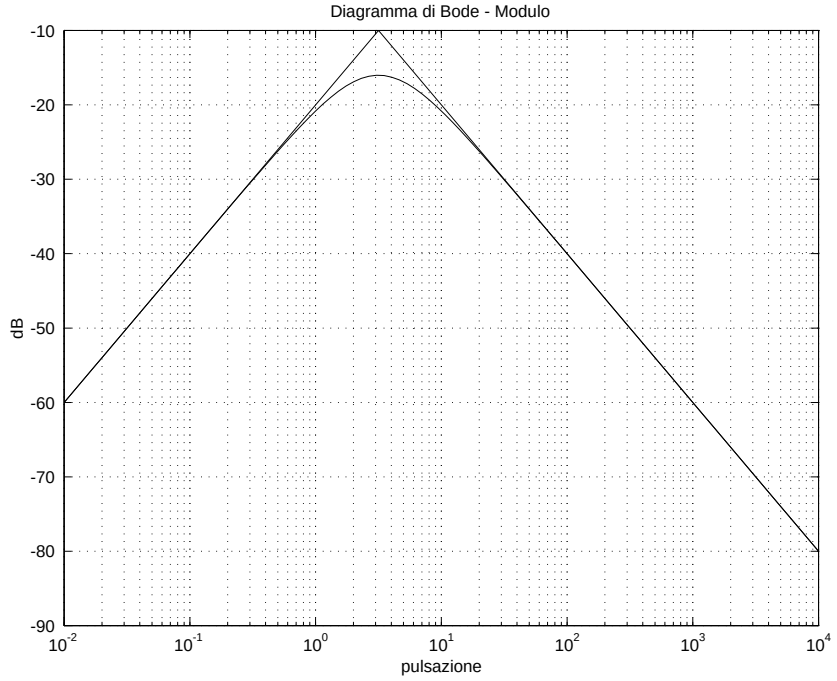


Diagramma di Bode - Modulo
dB
pulsazione

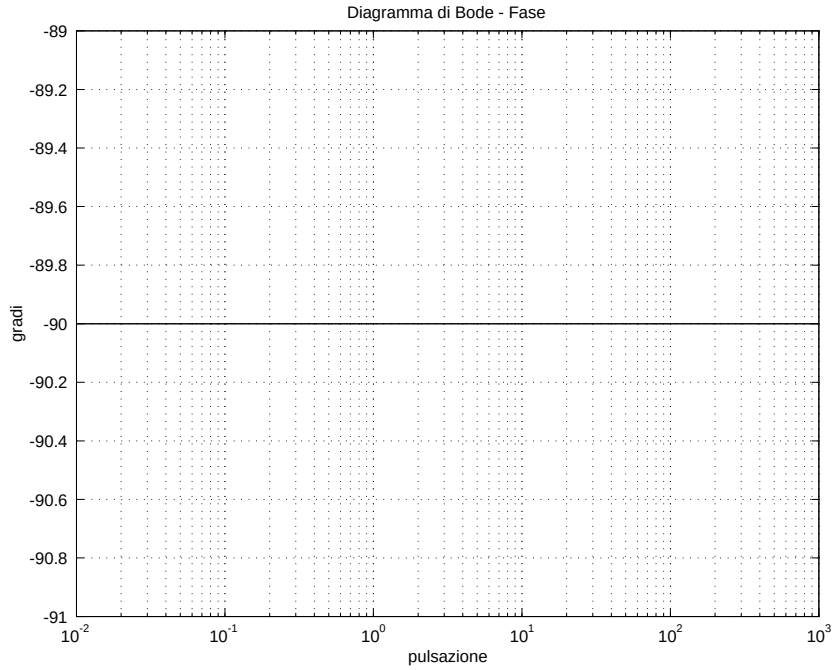


Diagramma di Bode - Fase
gradi
pulsazione

(c)

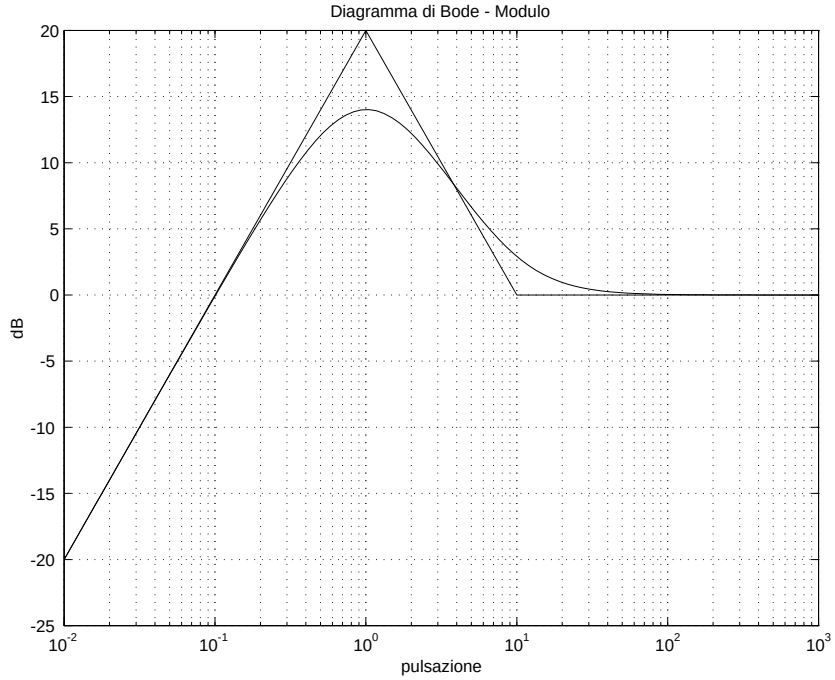


Diagramma di Bode - Modulo
dB
pulsazione
20
15
10
5
0
-5
-10
-15
-20
-25
10^-2
10^-1
10^0
10^1
10^2
10^3

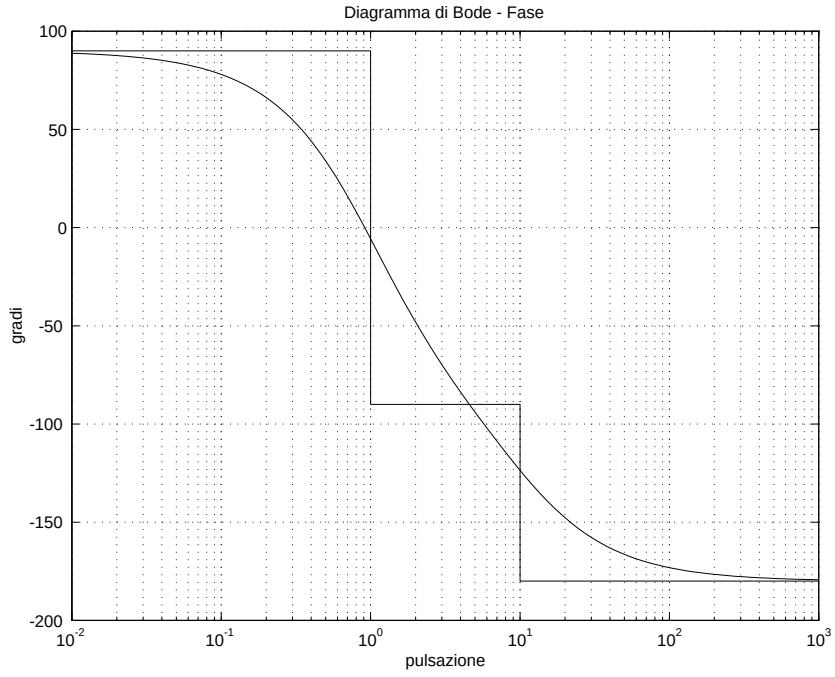


Diagramma di Bode - Fase
gradi
pulsazione
100
50
0
-50
-100
-150
-200
10^-2
10^-1
10^0
10^1
10^2
10^3

(d)

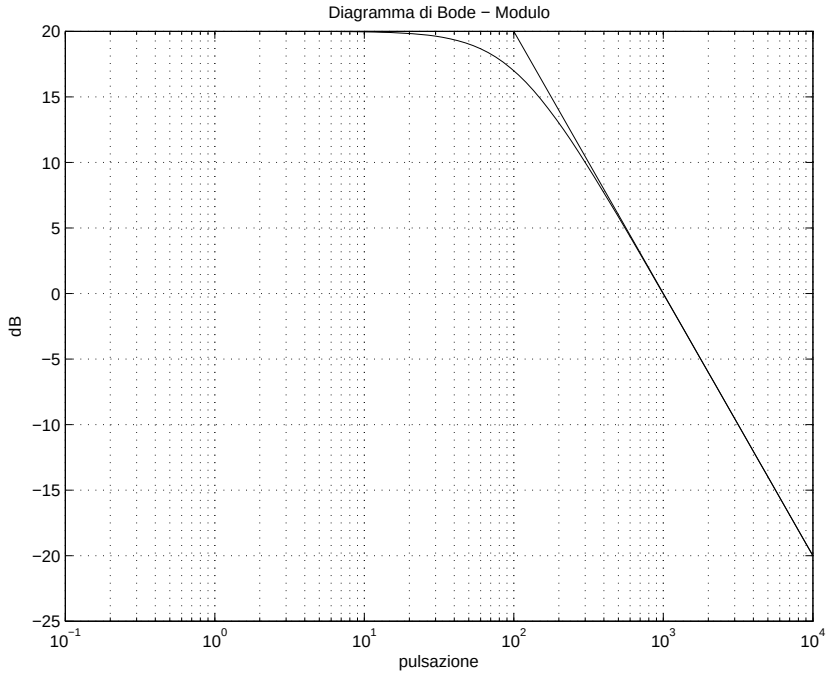


Diagramma di Bode − Modulo
dB
pulsazione
20
15
10
5
0
−5
−10
−15
−20
−25
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}

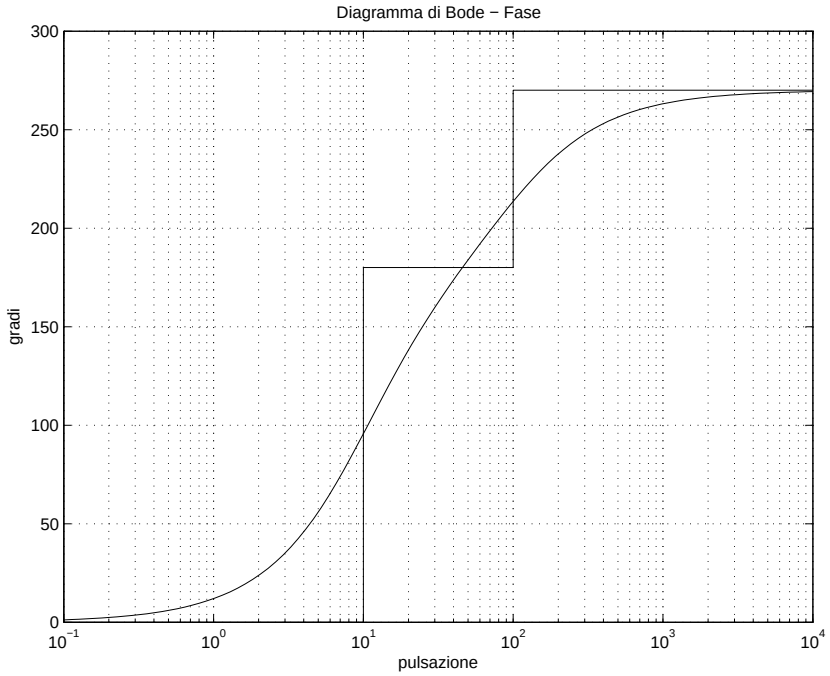


Diagramma di Bode − Fase
gradi
pulsazione
300
250
200
150
100
50
0
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}

(e)

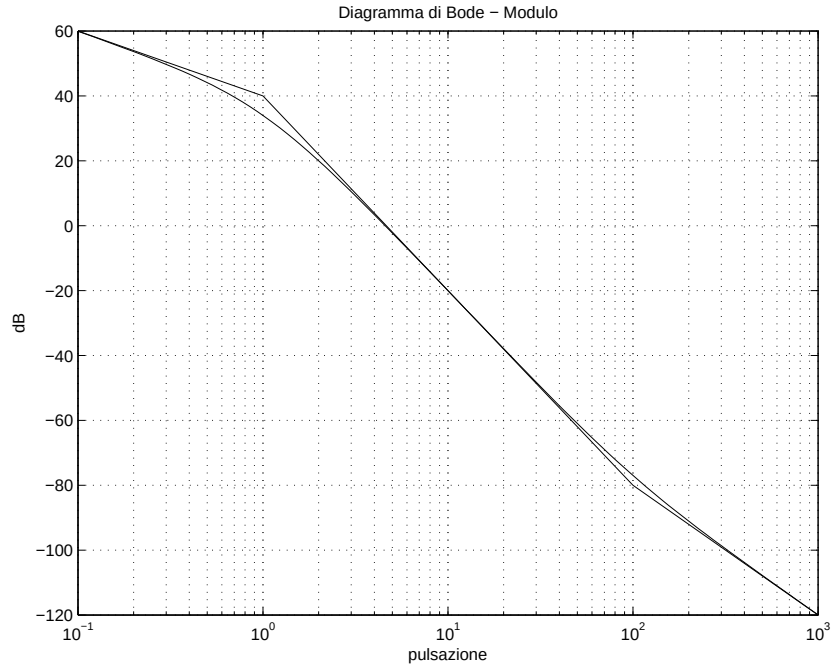


Diagramma di Bode − Modulo
dB
pulsazione
60
40
20
0
−20
−40
−60
−80
−100
−120
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}

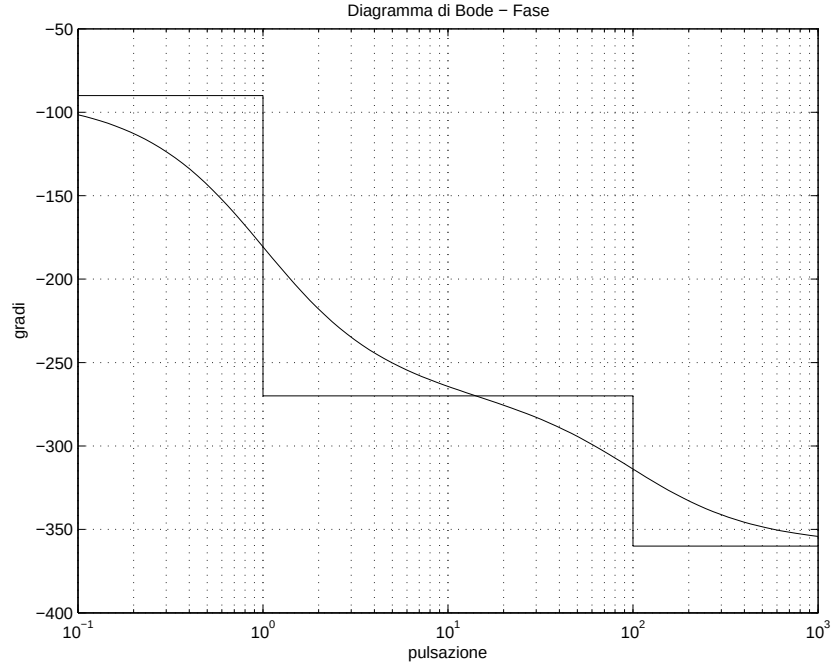
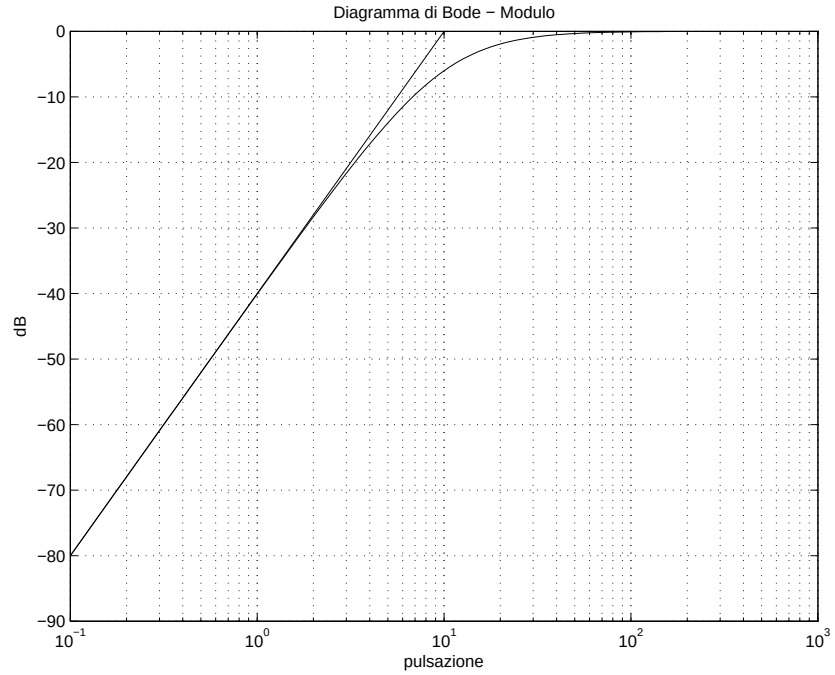
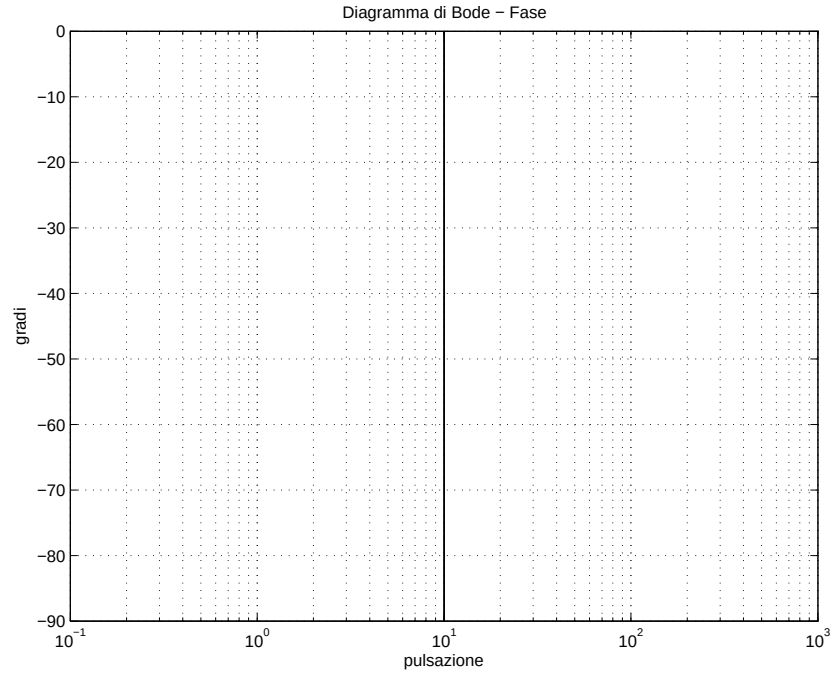


Diagramma di Bode − Fase
gradi
pulsazione
−50
−100
−150
−200
−250
−300
−350
−400
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}

(f)





Nota: in realtà il diagramma delle fasi è la linea costante di valore 0°.

(g)

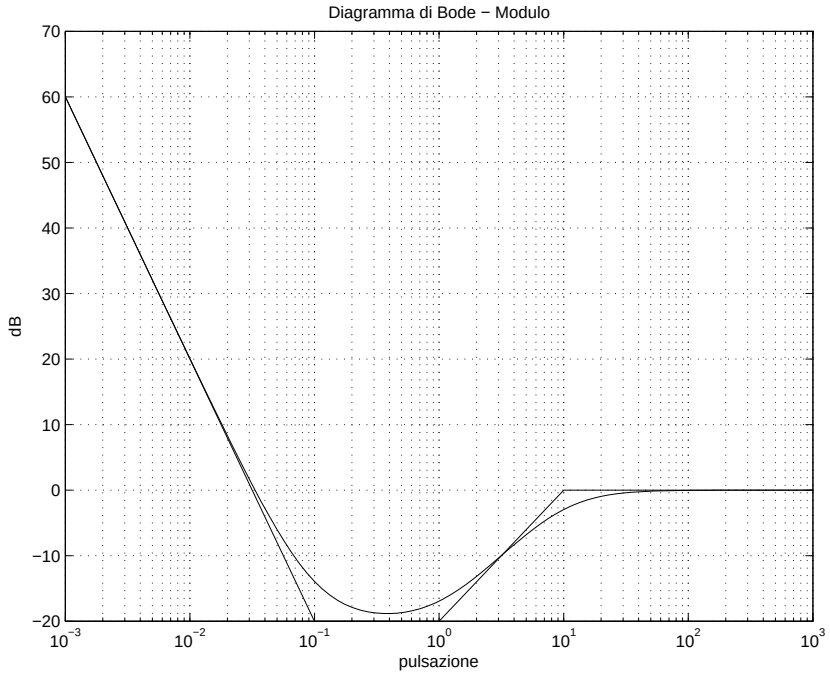


Diagramma di Bode − Modulo
dB
pulsazione
70
60
50
40
30
20
10
0
−10
−20
10^{-3}
10^{-2}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}

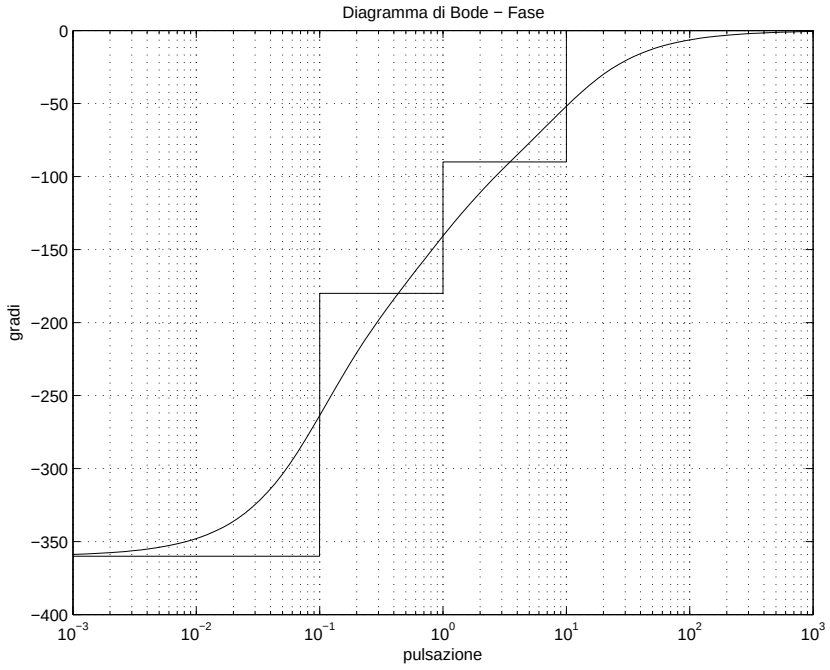


Diagramma di Bode − Fase
gradi
pulsazione
0
−50
−100
−150
−200
−250
−300
−350
−400
10^{-3}
10^{-2}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}

(h)

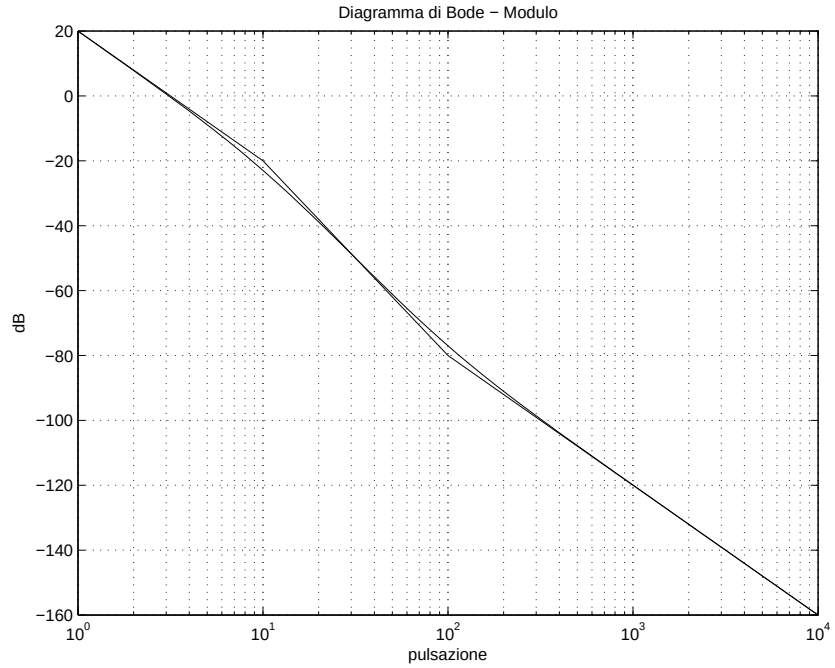


Diagramma di Bode − Modulo
dB
pulsazione
20
0
−20
−40
−60
−80
−100
−120
−140
−160
10^0
10^1
10^2
10^3
10^4

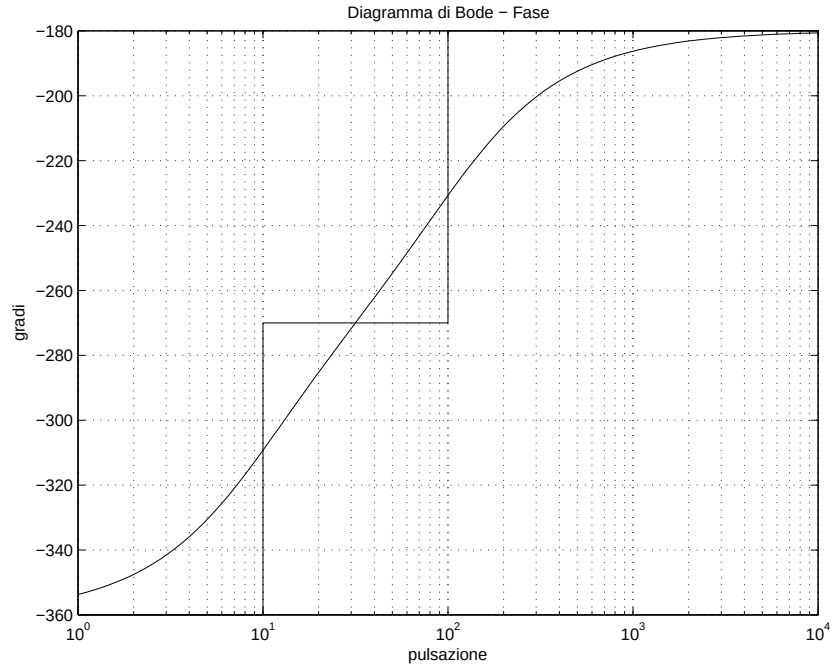


Diagramma di Bode − Fase
gradi
pulsazione
−180
−200
−220
−240
−260
−280
−300
−320
−340
−360
10^0
10^1
10^2
10^3
10^4