



# Controle e Servomecanismo

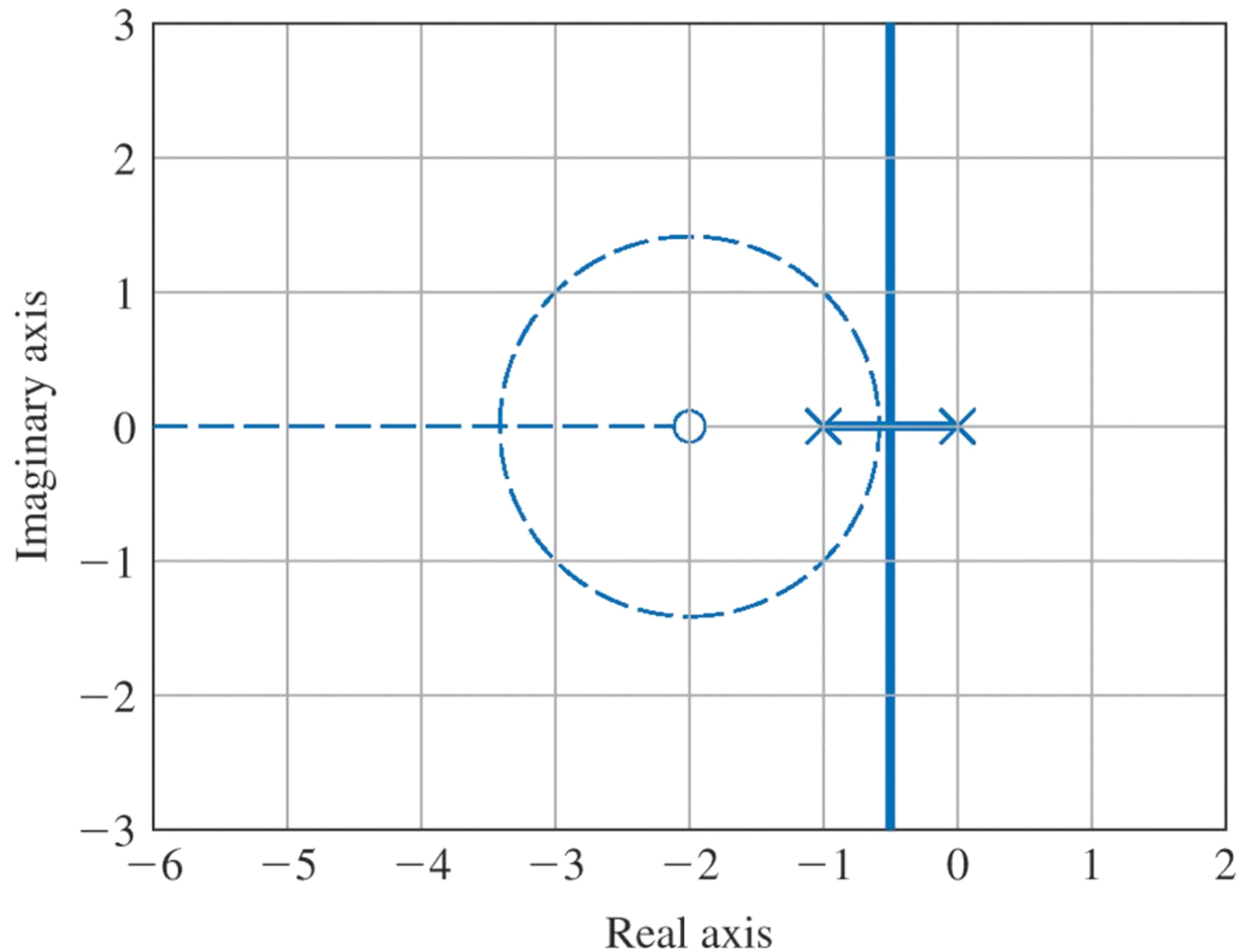
TE240

Projetos de controladores dinâmicos

Juliana L. M. lamamura

# Controlador avanço de fase

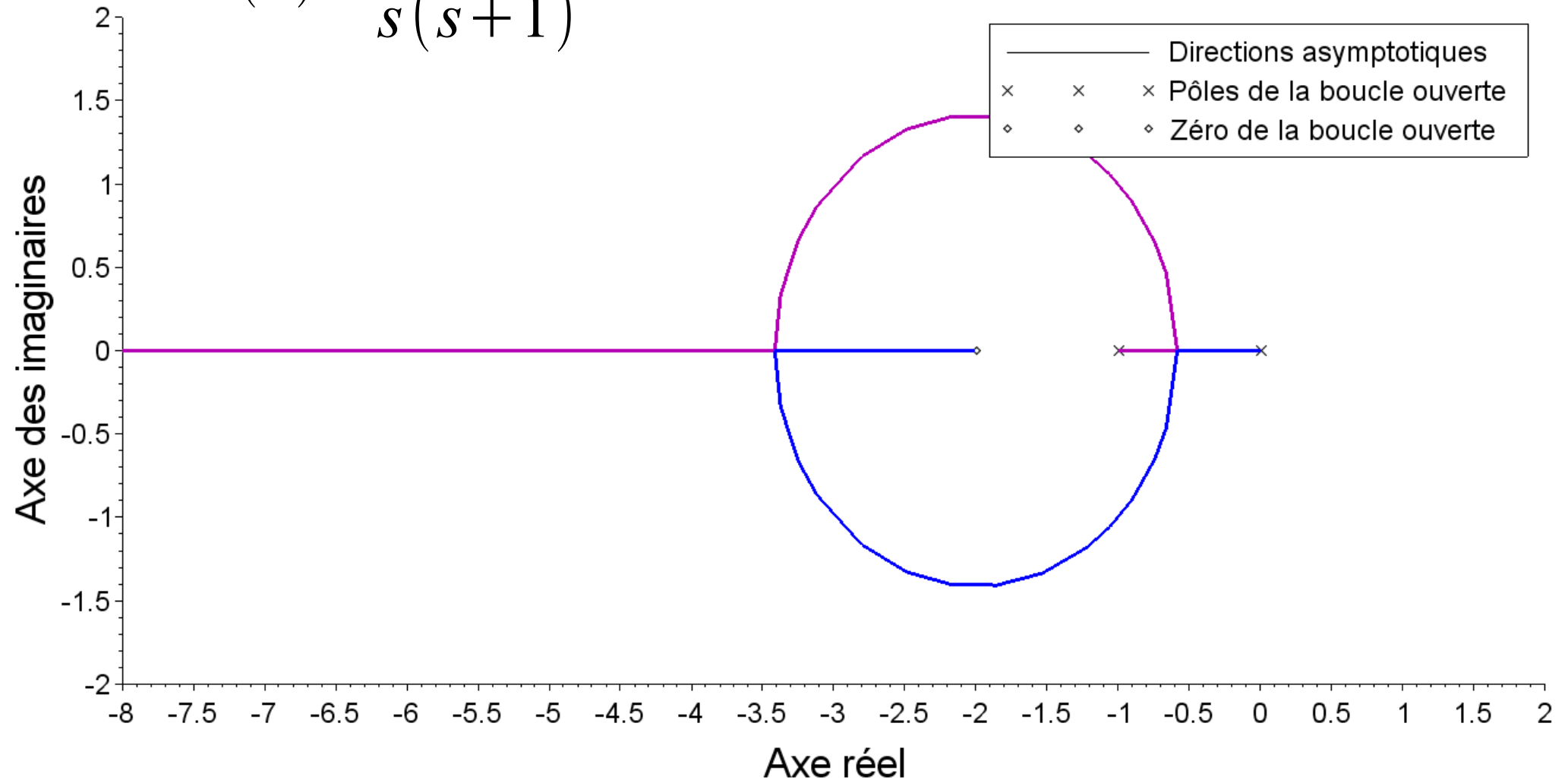
**Figure 5.22** Root loci for  $1 + D(s)G(s) = 0$ ,  $G(s) = \frac{1}{s(s+1)}$  with compensation  $D(s) = K$  (solid lines) and with  $D(s) = K(s+2)$  (dashed lines)



# Controlador avanço de fase

$$G(s) = \frac{s+2}{s(s+1)}$$

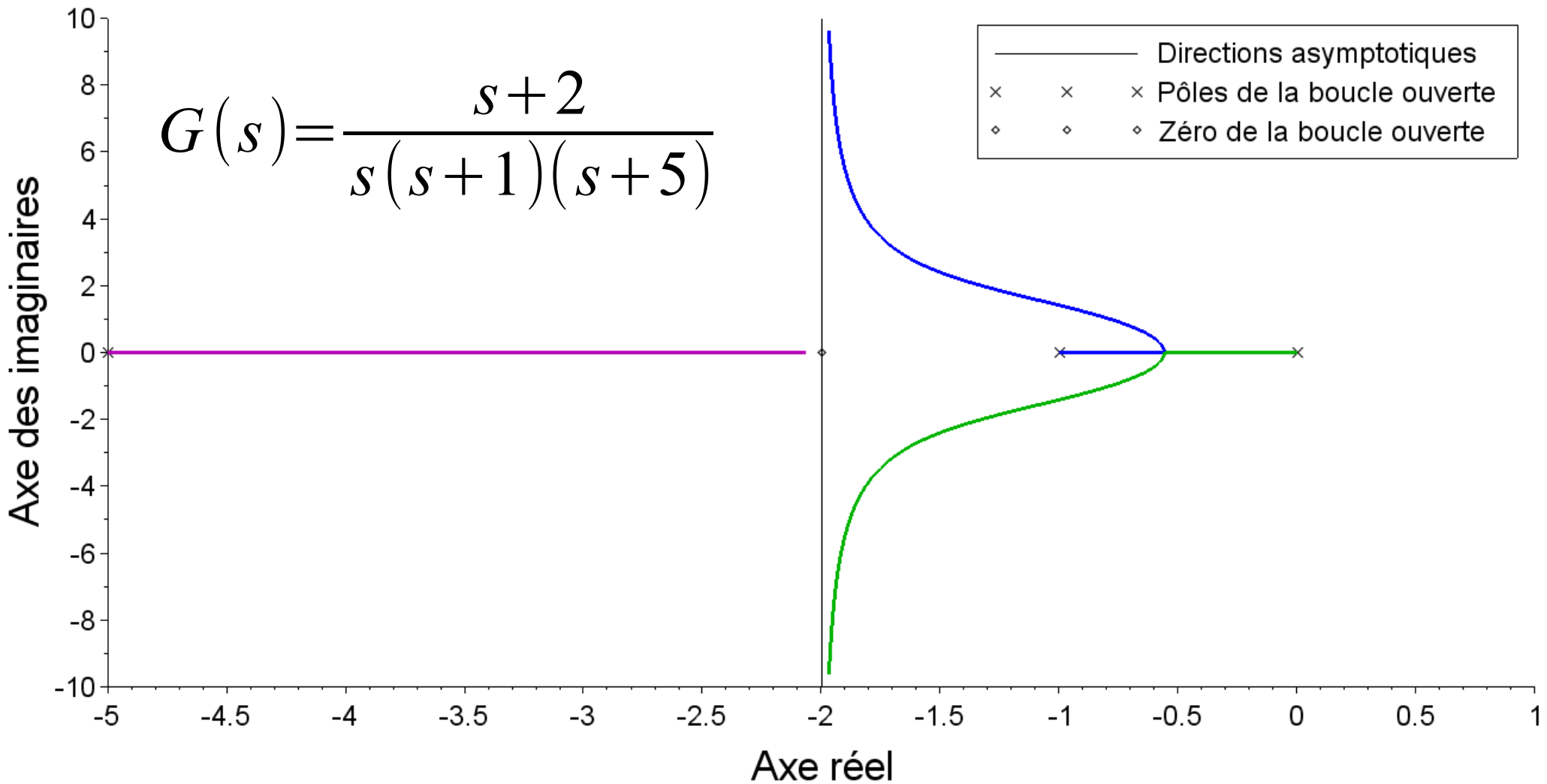
Lieu d'Evans des racines



# Controlador avanço de fase

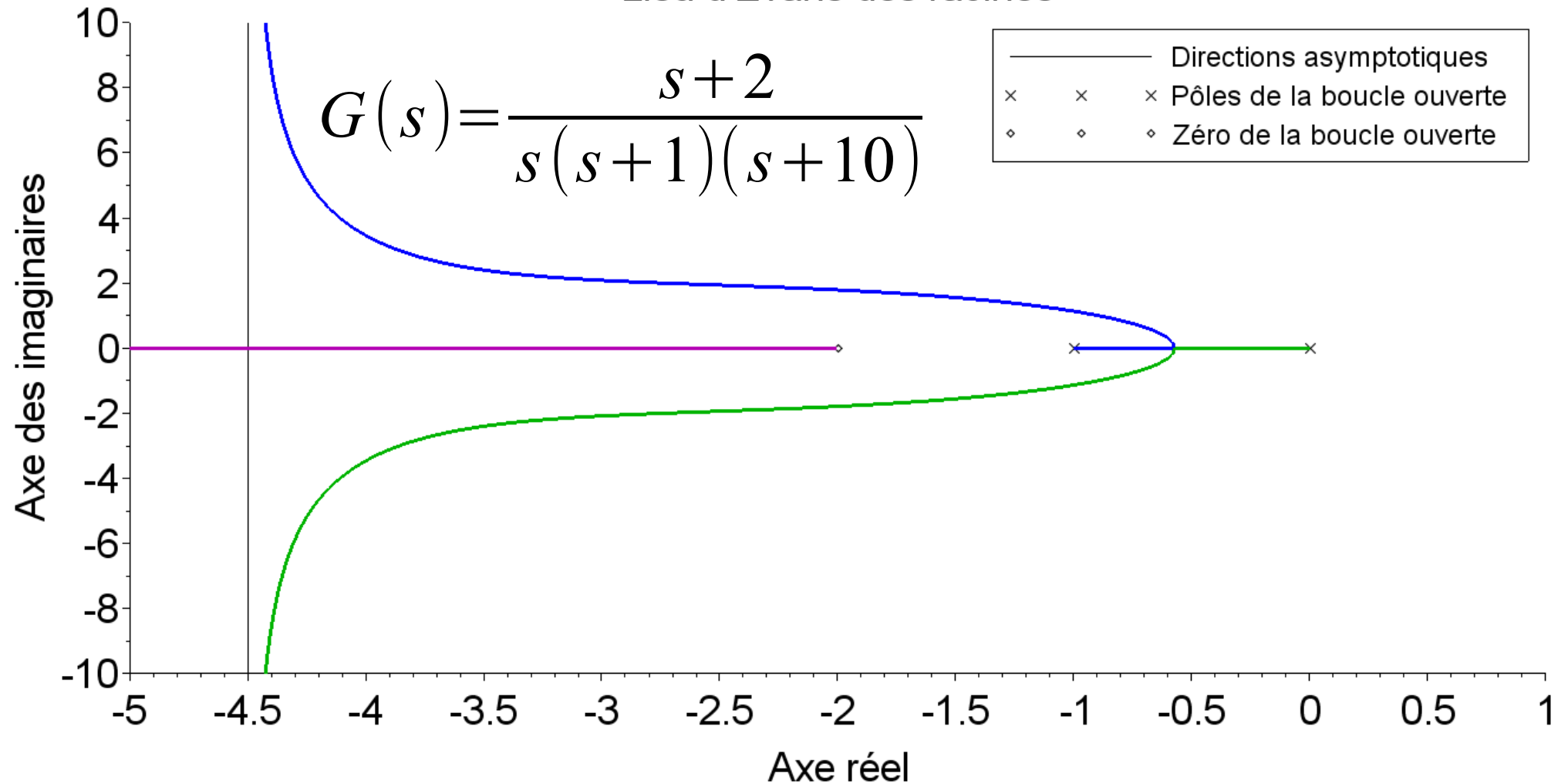
Lieu d'Evans des racines

$$G(s) = \frac{s+2}{s(s+1)(s+5)}$$



# Controlador avanço de fase

Lieu d'Evans des racines

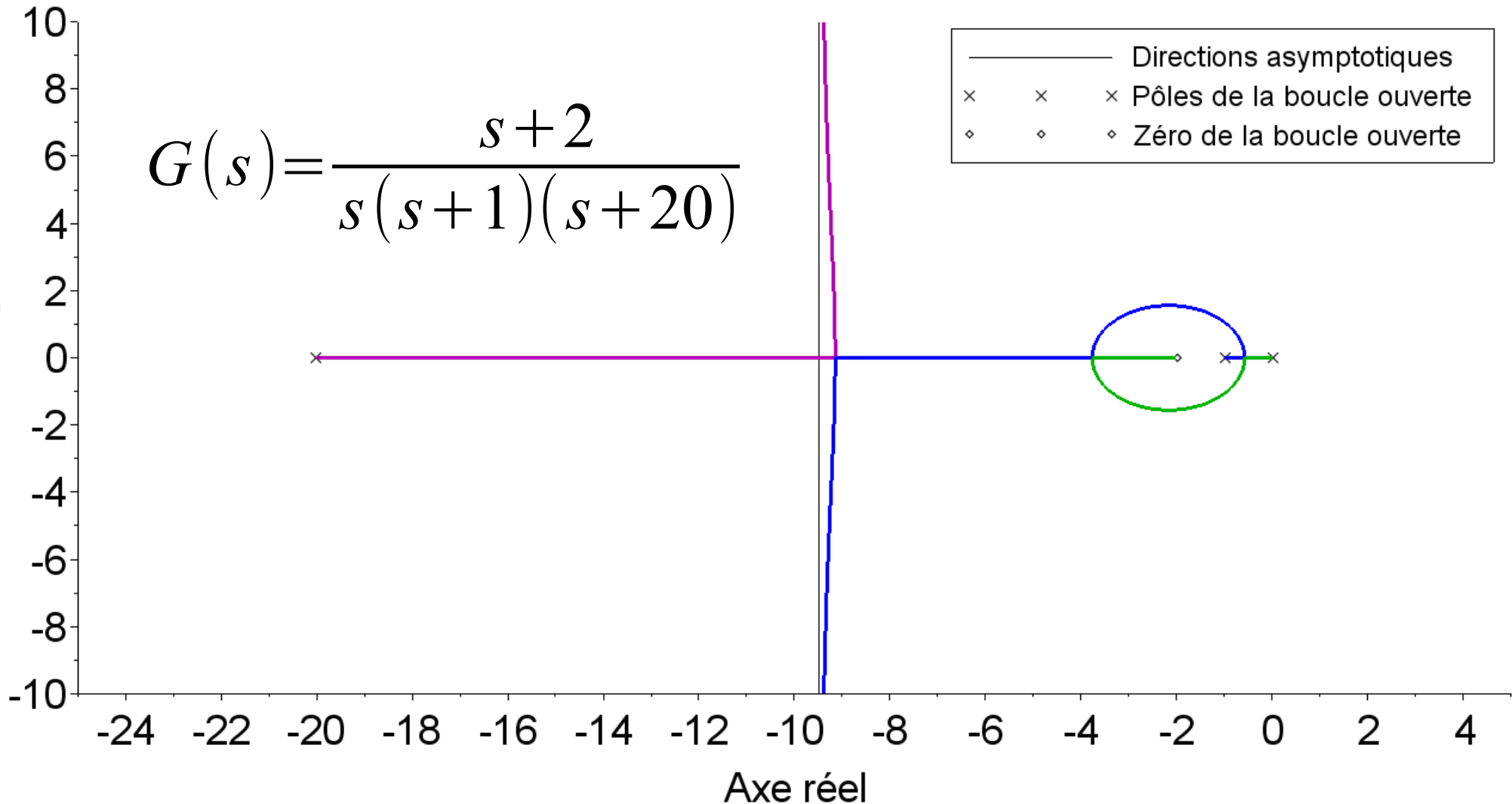


# Controlador avanço de fase

Lieu d'Evans des racines

$$G(s) = \frac{s + 2}{s(s + 1)(s + 20)}$$

- |   |   |   |                            |
|---|---|---|----------------------------|
| — | — | — | Directions asymptotiques   |
| × | × | × | Pôles de la boucle ouverte |
| ◇ | ◇ | ◇ | Zéro de la boucle ouverte  |

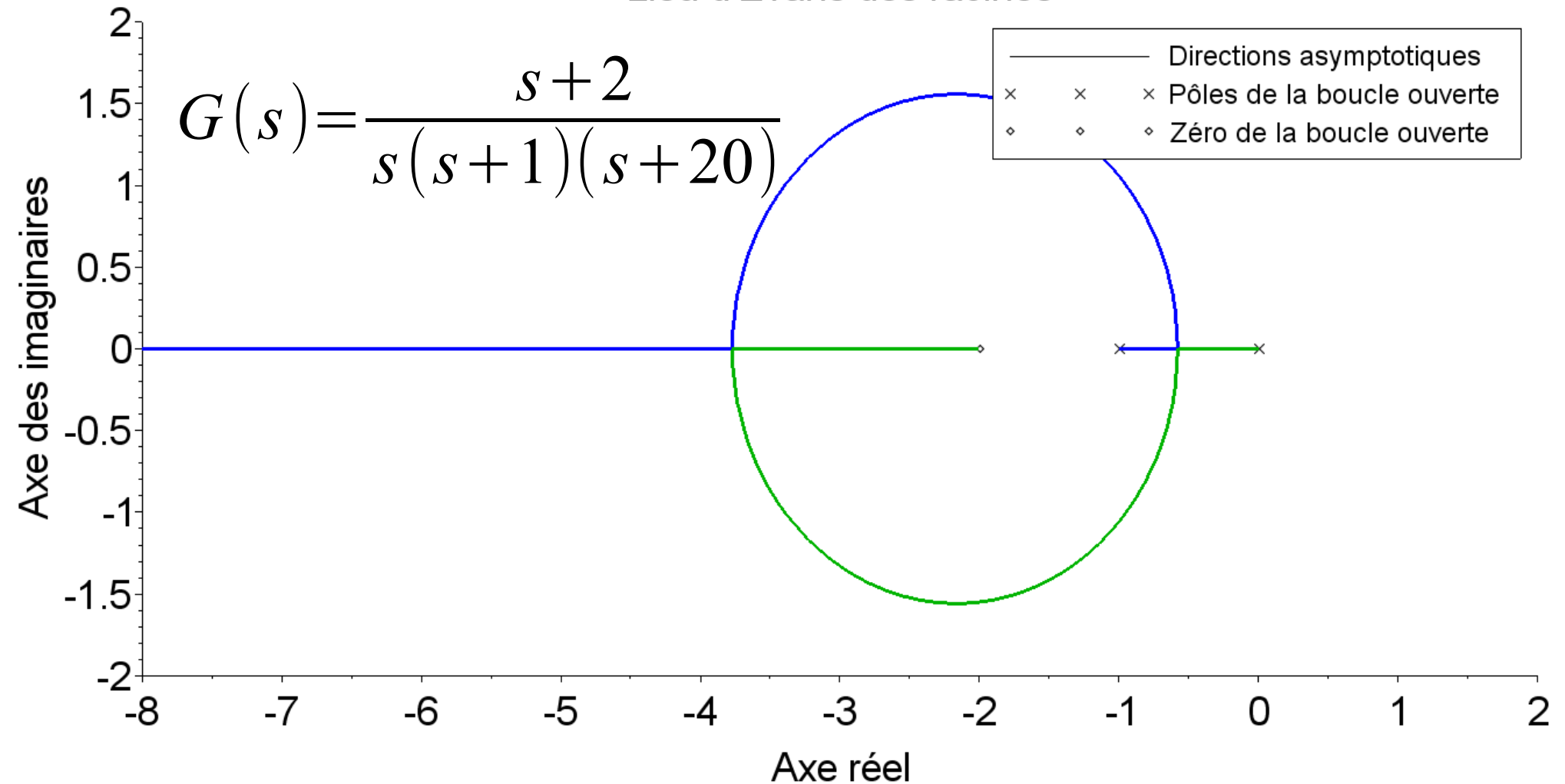


# Controlador avanço de fase

Lieu d'Evans des racines

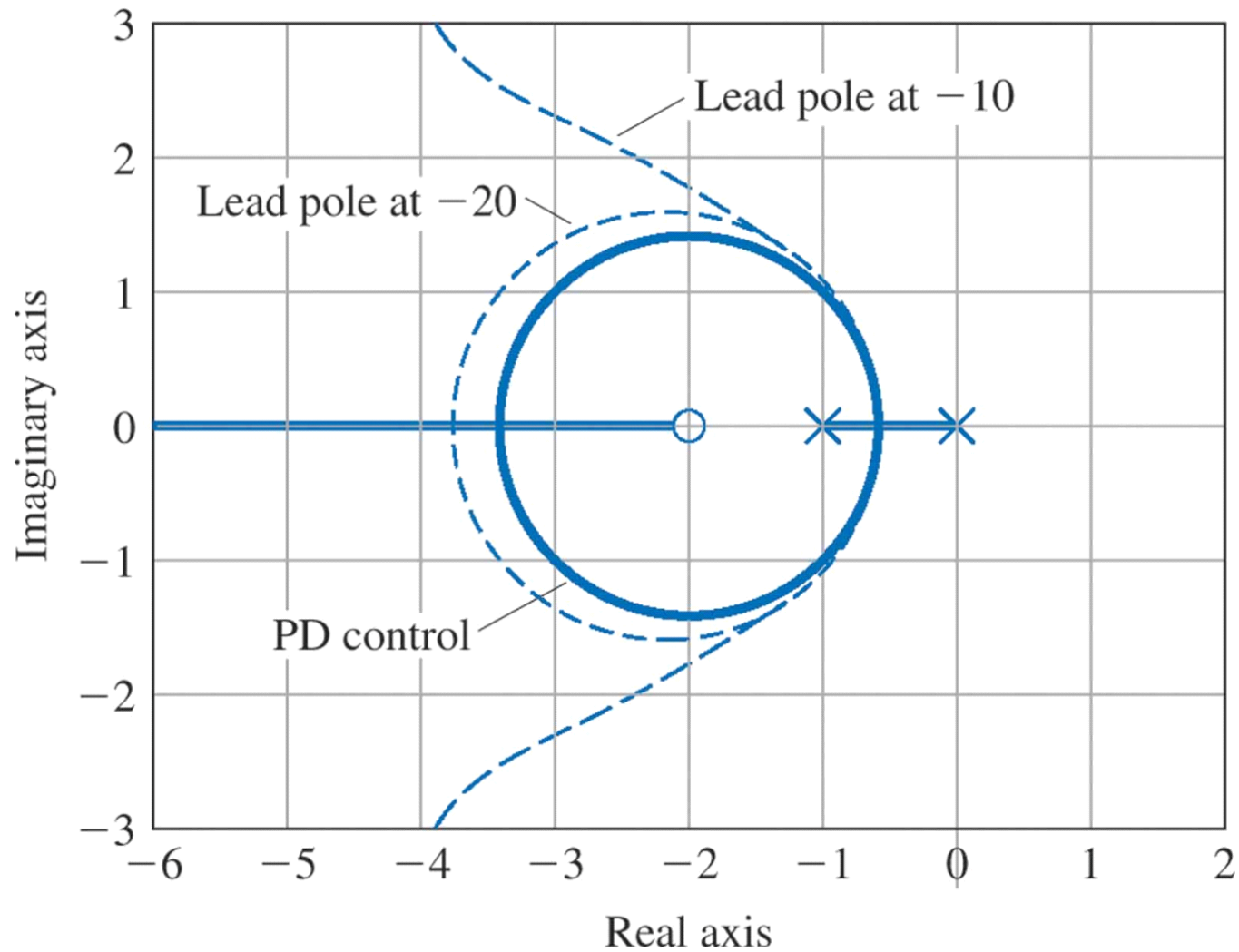
$$G(s) = \frac{s+2}{s(s+1)(s+20)}$$

—	Directions asymptotiques		
×	×	×	Pôles de la boucle ouverte
◇	◇	◇	Zéro de la boucle ouverte



# Controlador avanço de fase

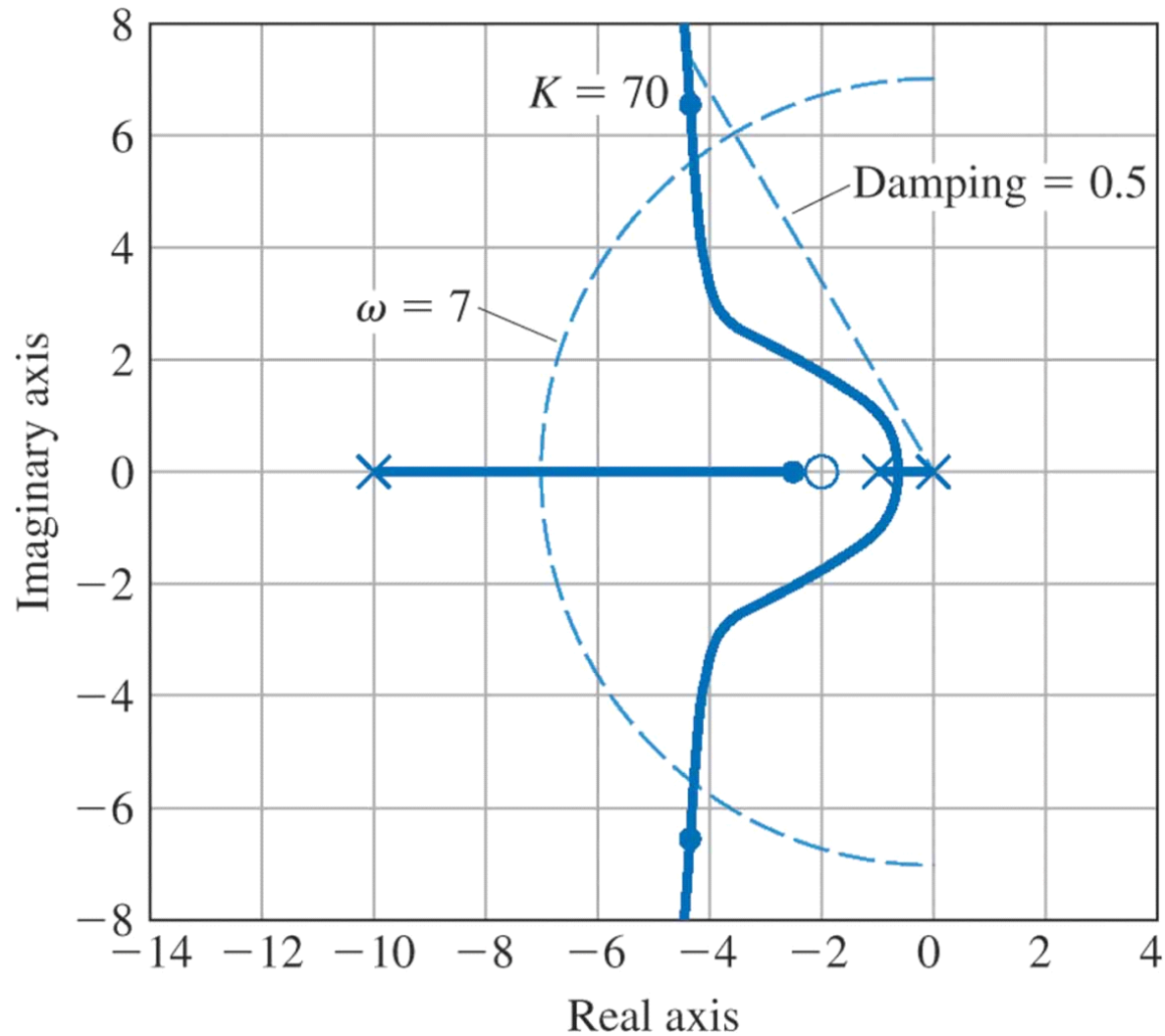
**Figure 5.23** Root loci for three cases with  $G(s) = \frac{1}{s(s+1)}$ : (a)  $D(s) = \frac{(s+2)}{(s+20)}$ ; (b)  $D(s) = \frac{(s+2)}{(s+10)}$ ; (c)  $D(s) = s + 2$  (solid lines)





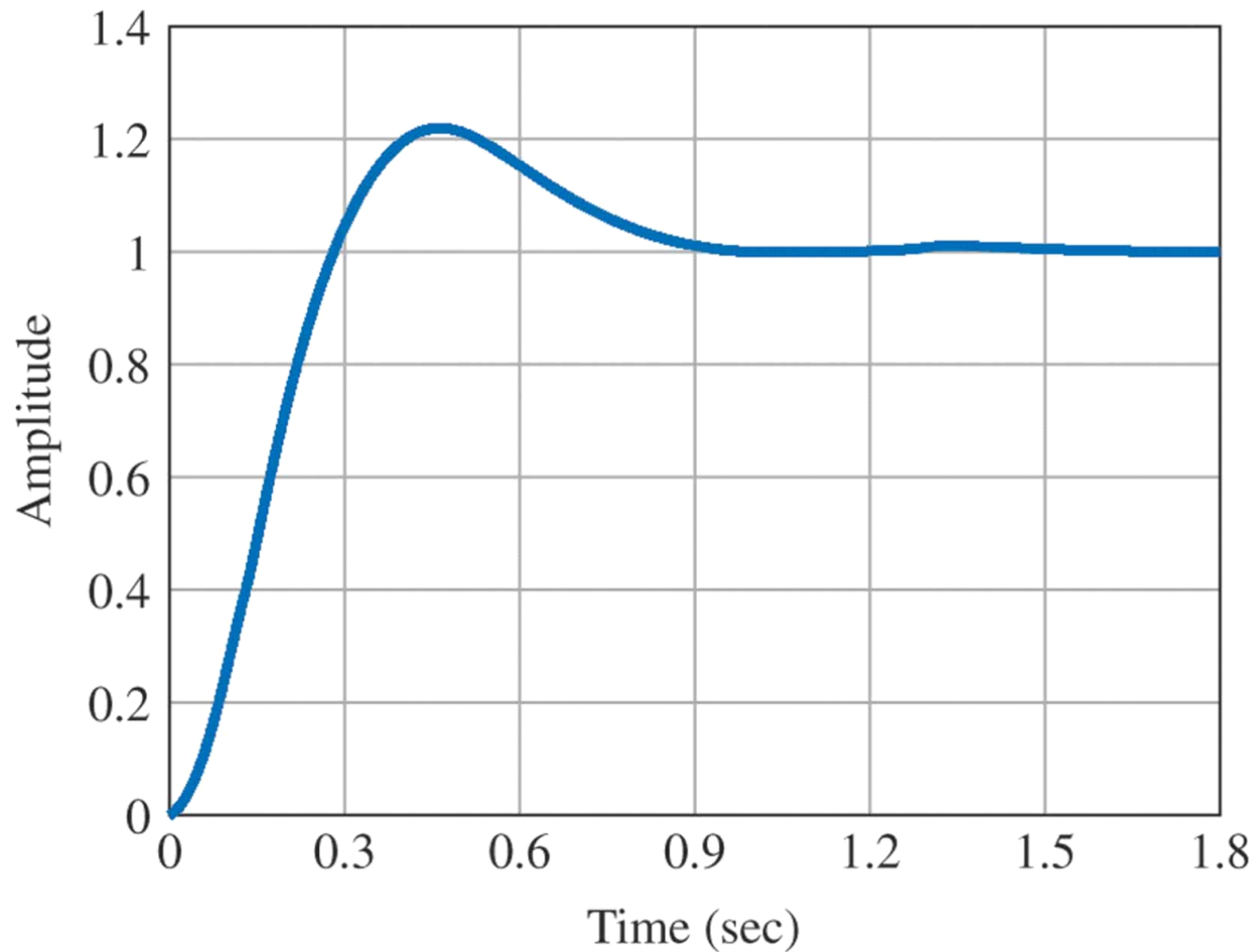
# Controlador avanço de fase

Figure 5.24 Root locus for lead design



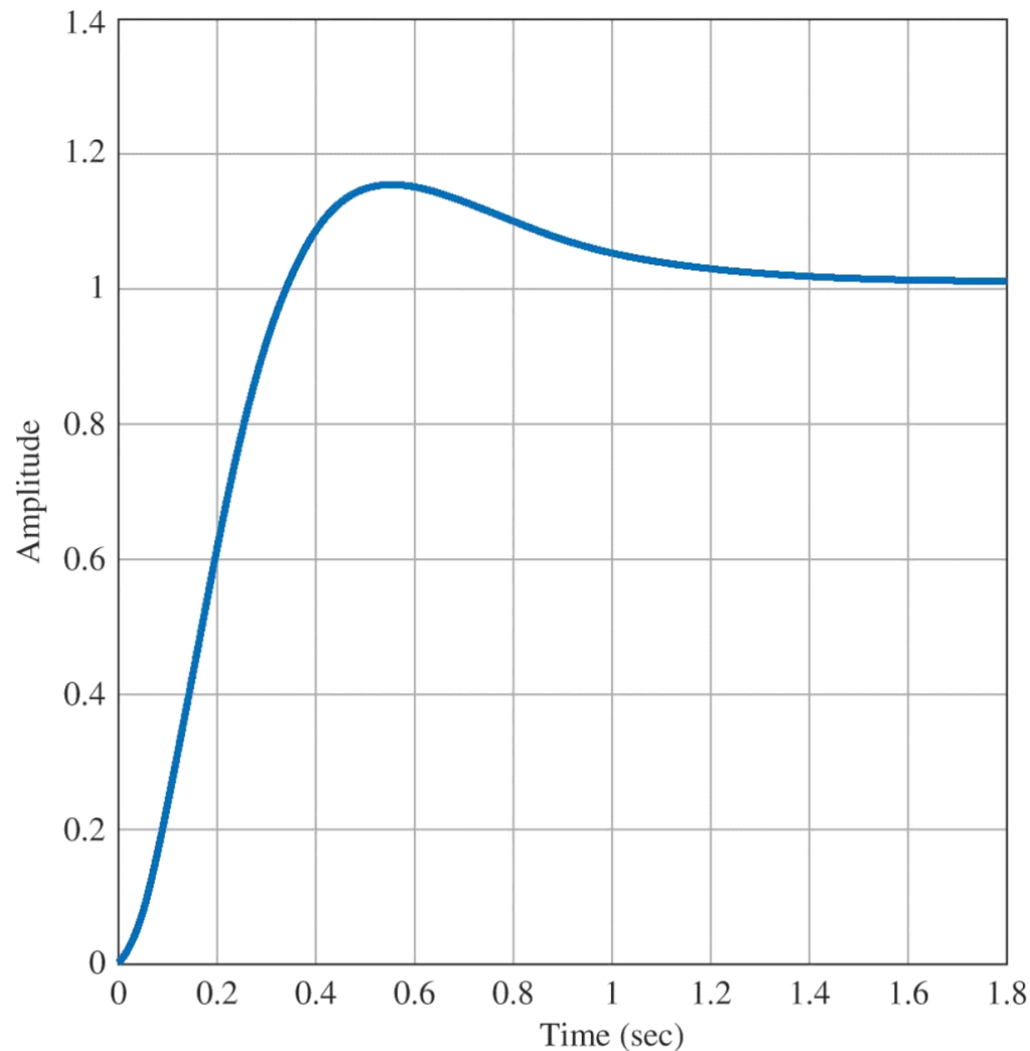
# Controlador avanço de fase

Figure 5.25 Step response for Example 5.11



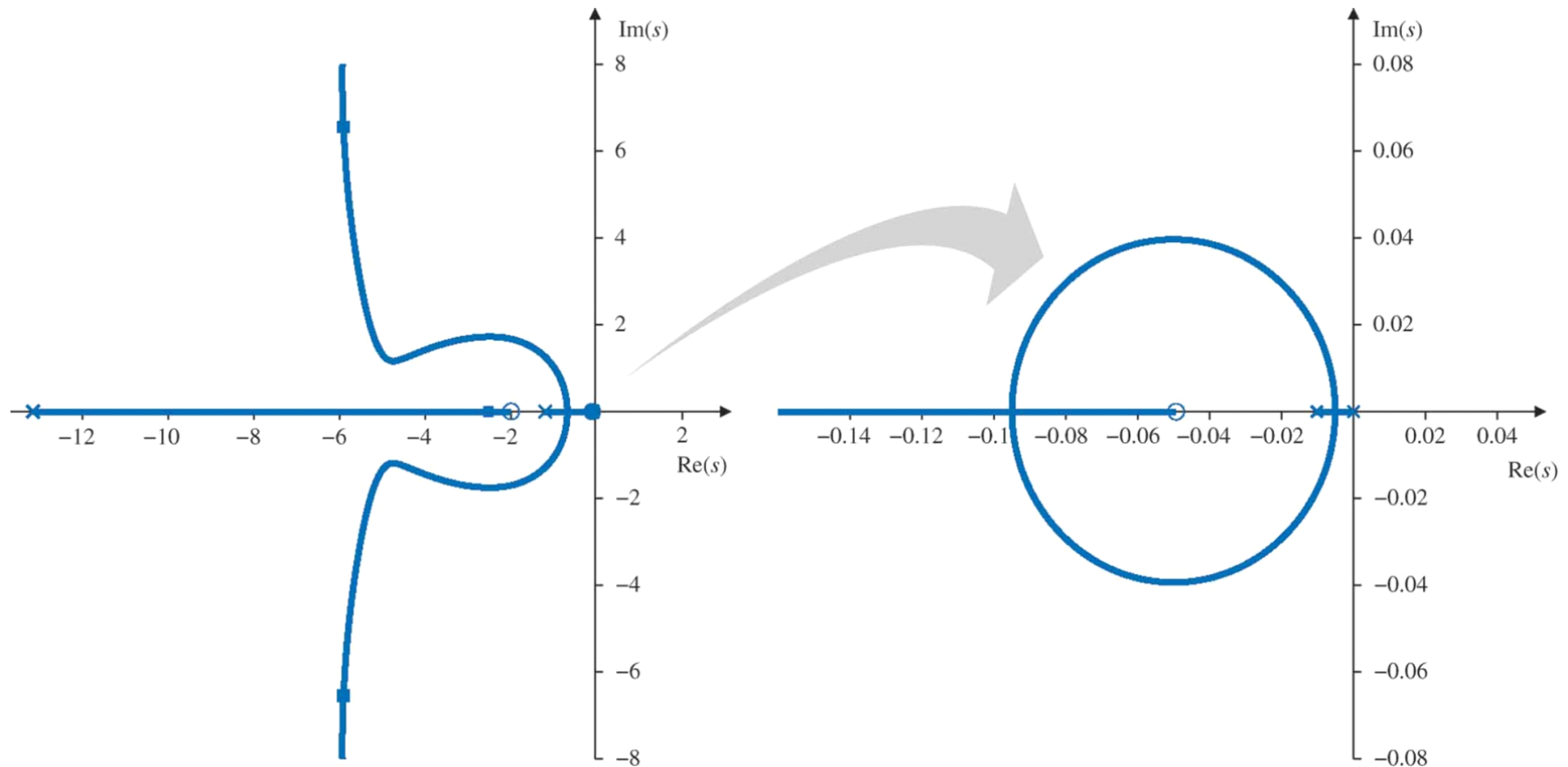
# Controlador avanço de fase

**Figure 5.27** Step response for  $K = 91$  and  $L(s) = \frac{(s+2)}{(s+13)} \frac{1}{s(s+1)}$



# Controlador avanço-atraso de fase

Figure 5.28 Root locus with both lead and lag compensations



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