Sensitivity and the Root Locus

$$S_k^T = \frac{d \ln T}{d \ln k} = \frac{\partial T/T}{\partial k/k},$$

$$S_k^{r_i} = \frac{\partial r_i}{\partial \ln k} = \frac{\partial r_i}{\partial k/k}$$

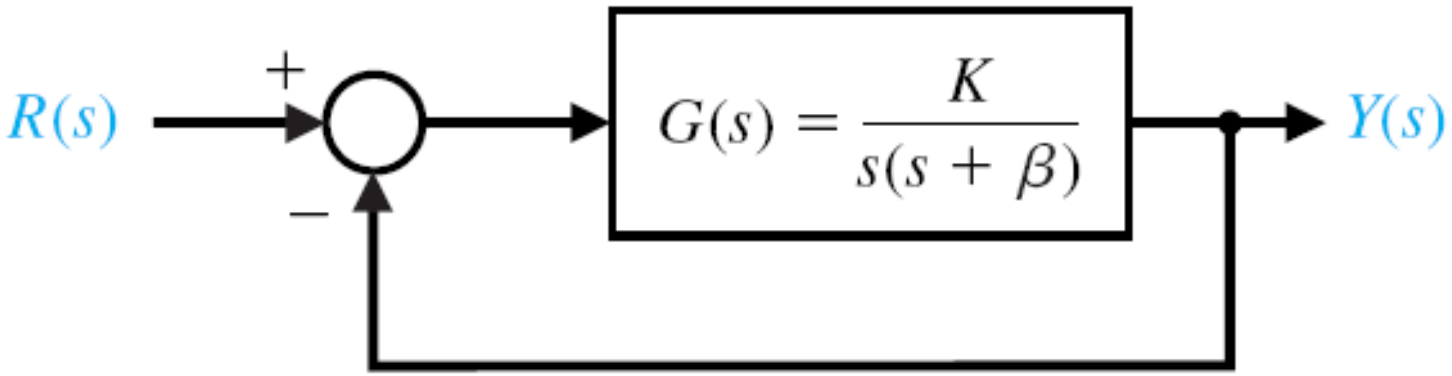
$$T(s) = \frac{K_1 \prod_{j=1}^{m} (s + Z_j)}{\prod_{i=1}^{n} (s + r_i)}$$

$$S_k^T = \frac{\partial \ln K_1}{\partial \ln k} - \sum_{i=1}^{n} \frac{\partial r_i}{\partial \ln k} \cdot \frac{1}{(s + r_i)}$$

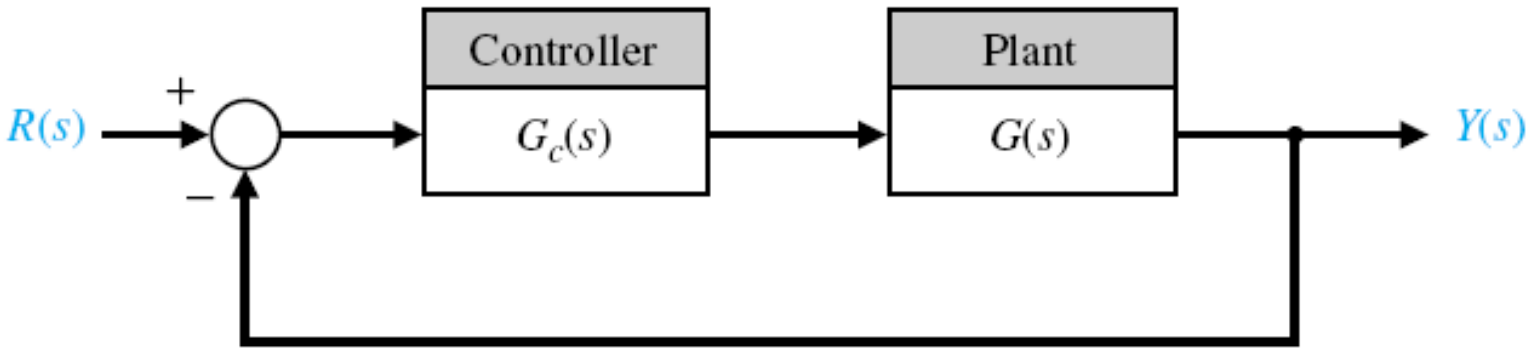
$$\frac{\partial Z_j}{\partial \ln k} = 0.$$

$$S_k^T = -\sum_{i=1}^{n} S_k^{r_i} \cdot \frac{1}{(s + r_i)}$$

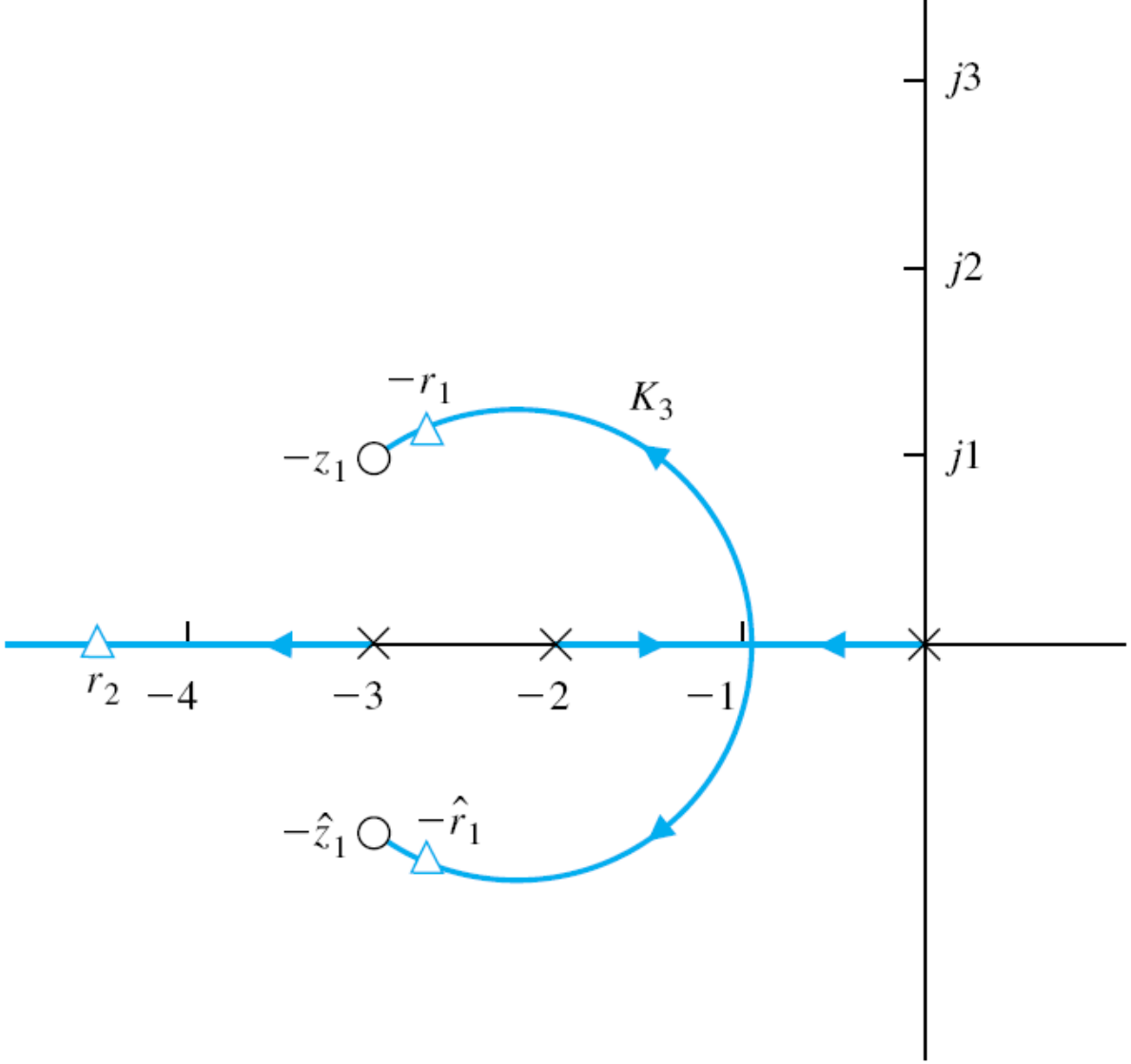
$$S_k^{r_i} = \frac{\Delta r_i}{\Delta k/k}$$



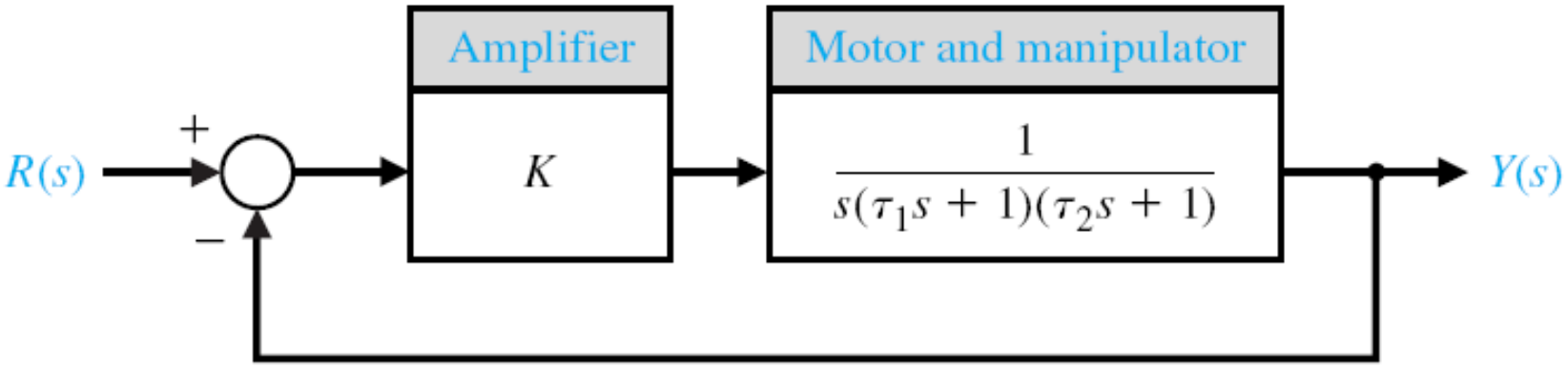
A feedback control system.



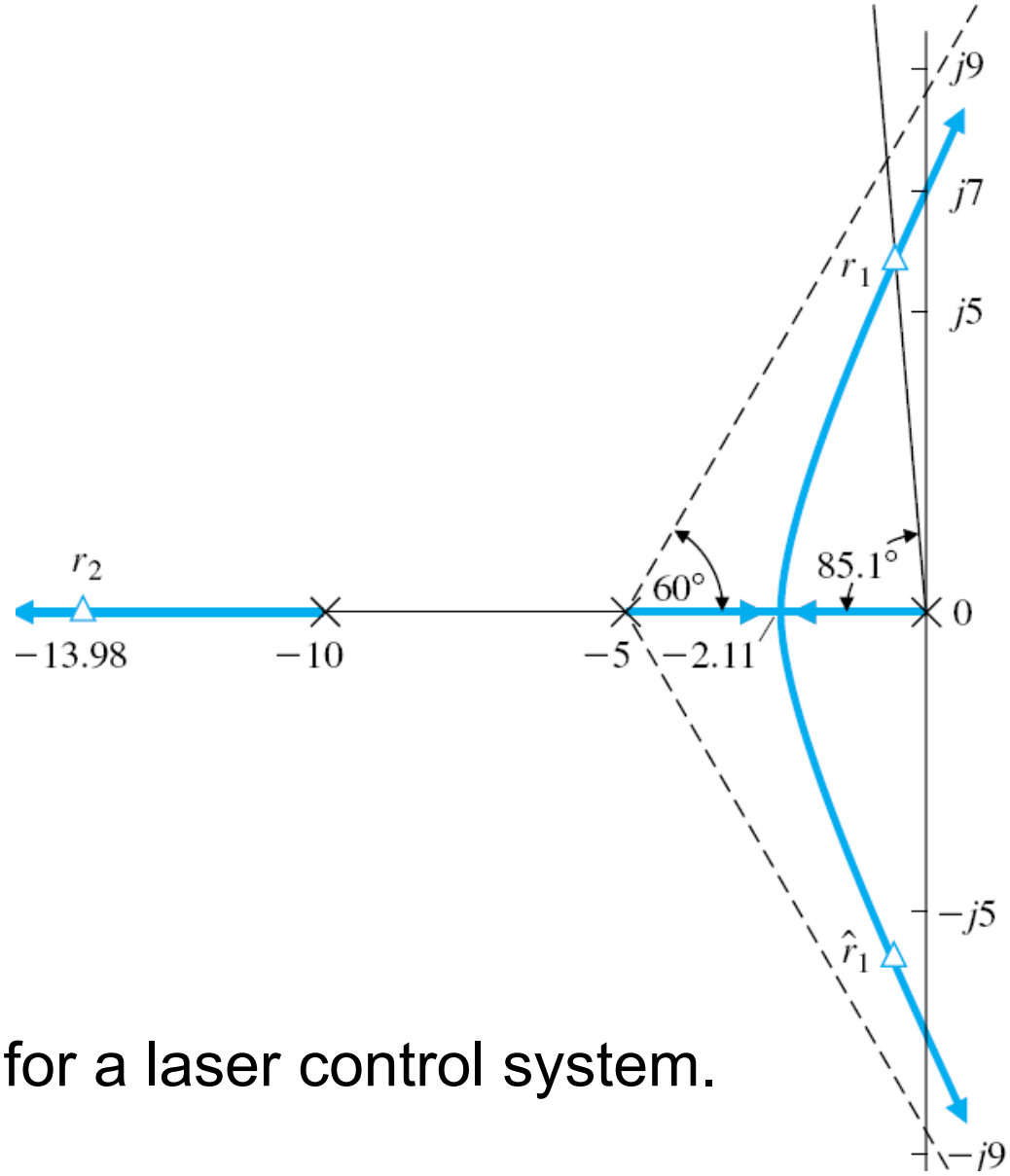
Closed-loop system with a controller.



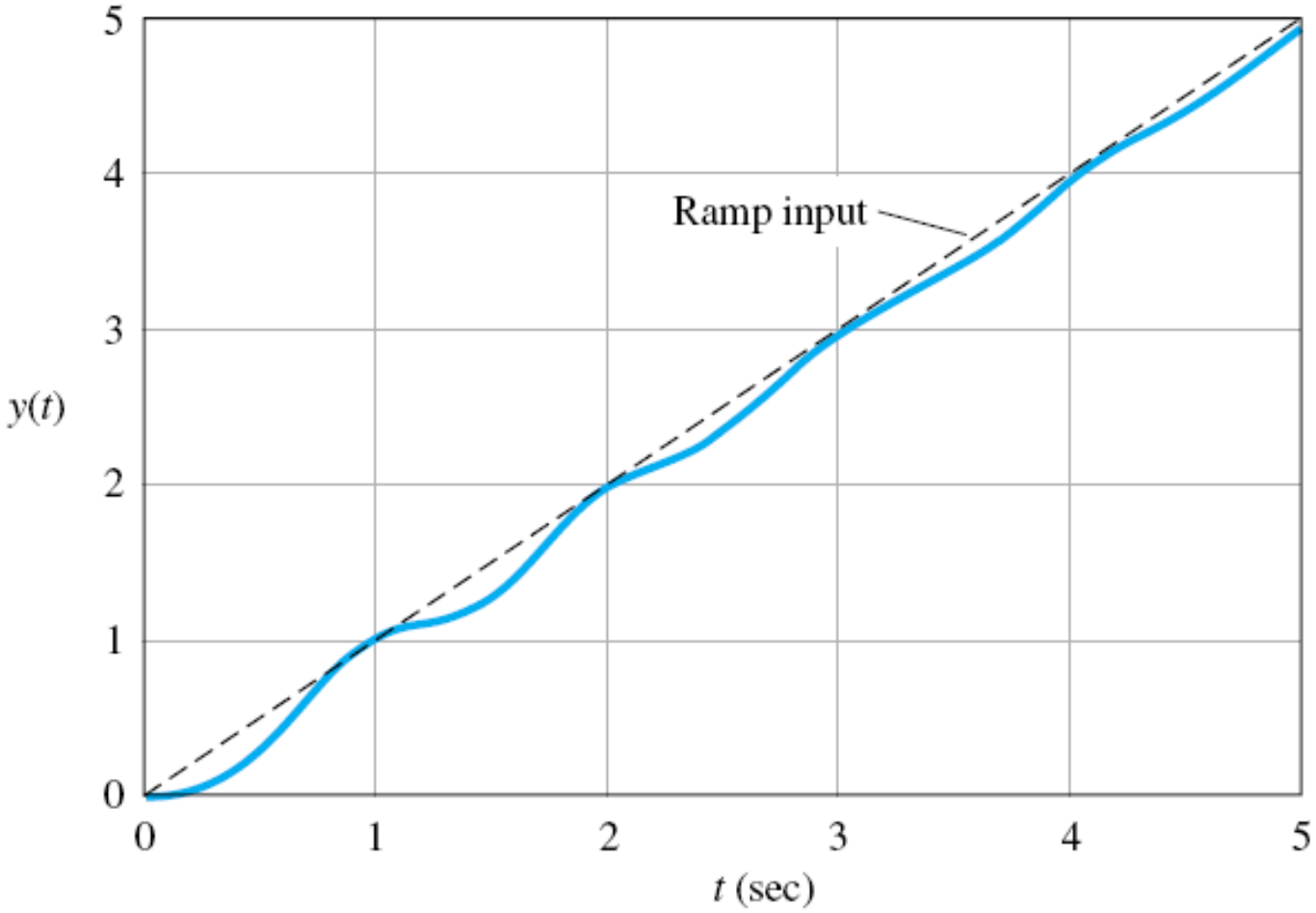
Root locus for plant with a PID controller with complex zeros.



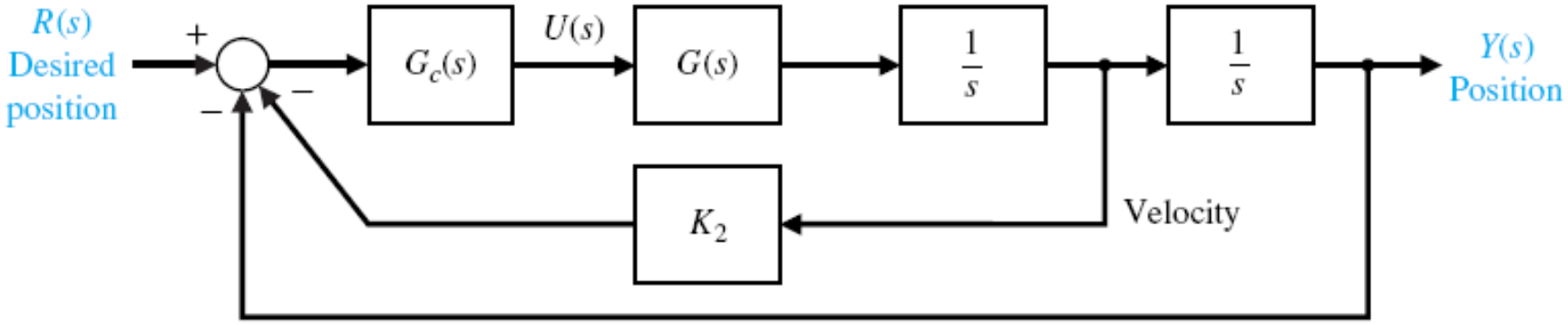
Laser manipulator control system.



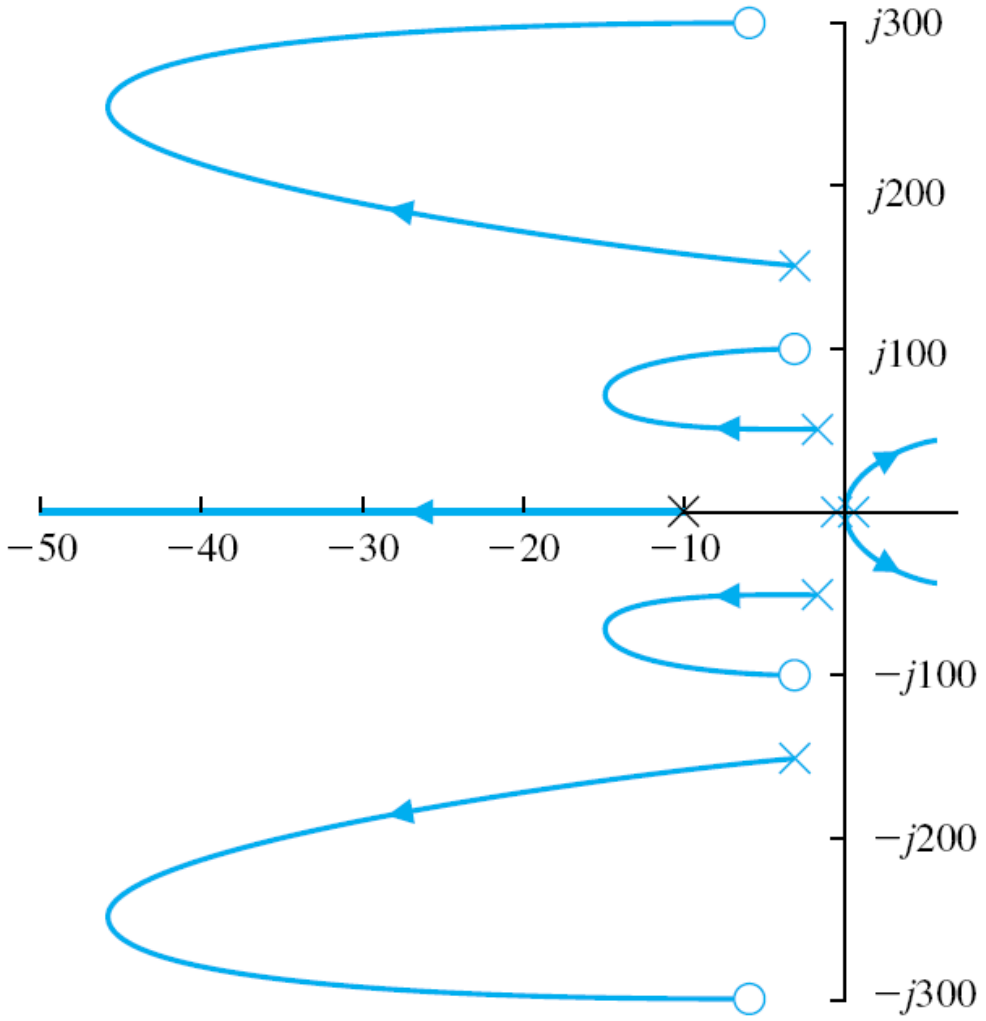
Root locus for a laser control system.



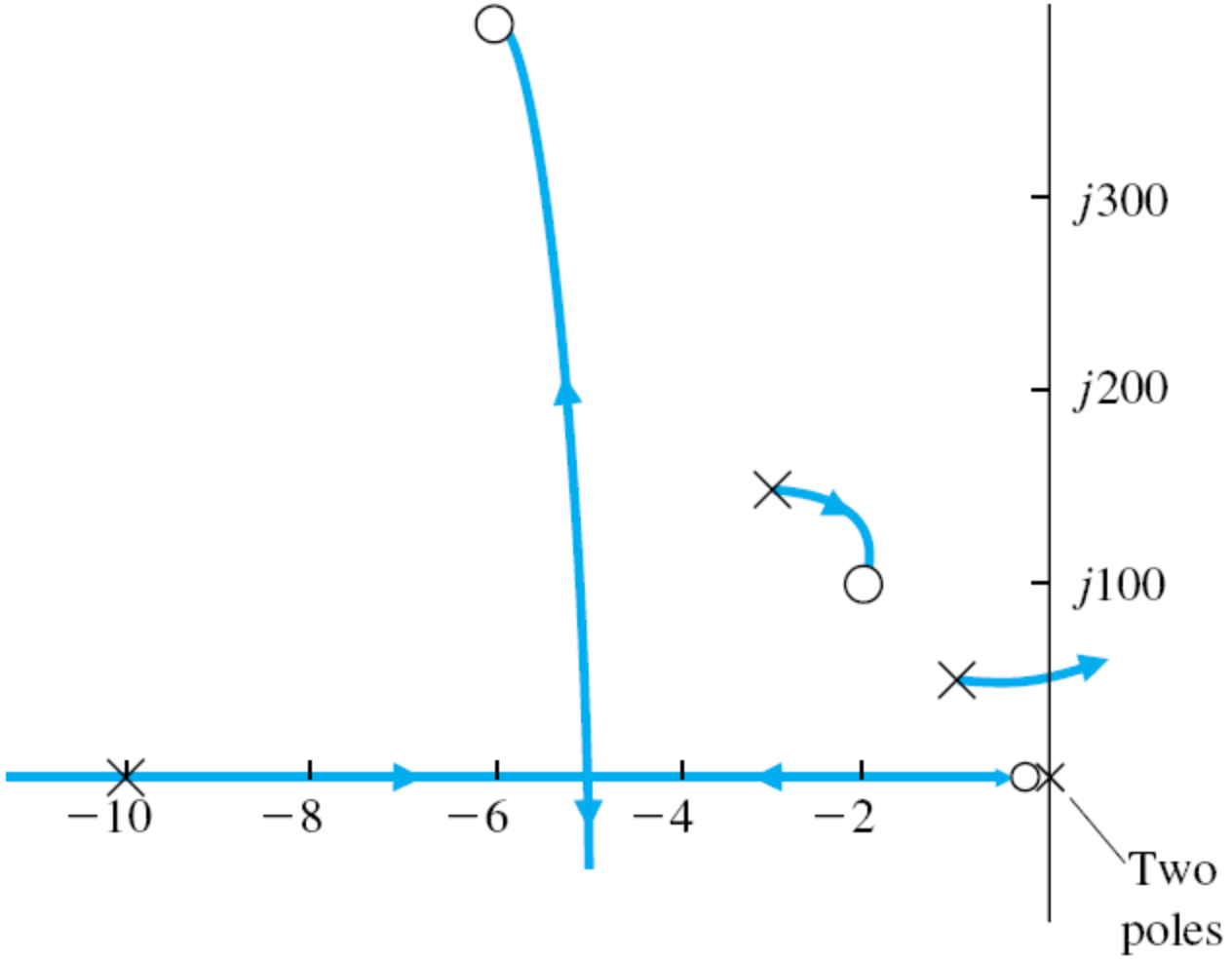
The response to a ramp input for a laser control system.



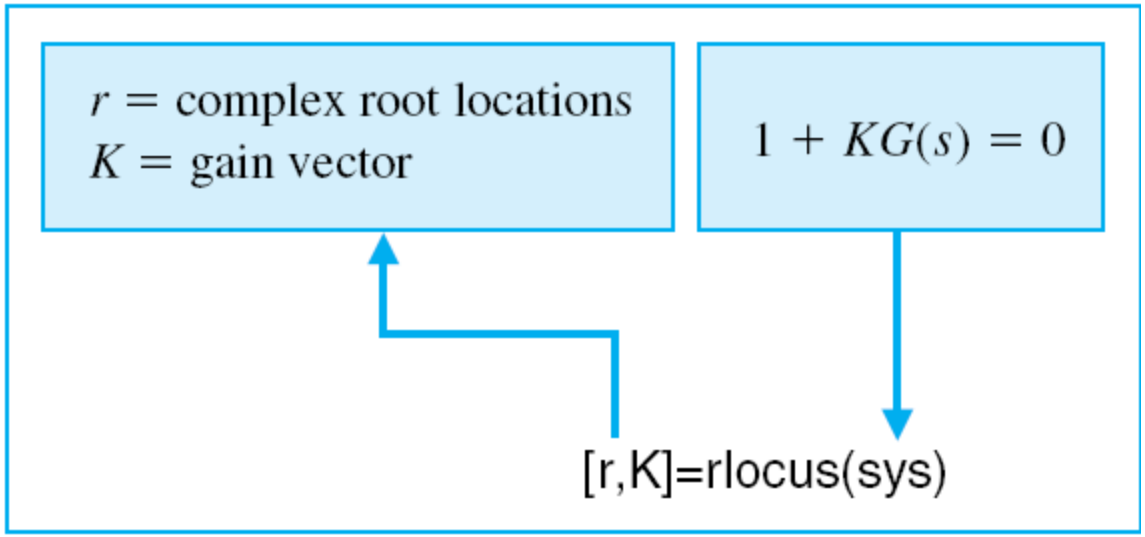
Proposed configuration for control of the lightweight robot arm.



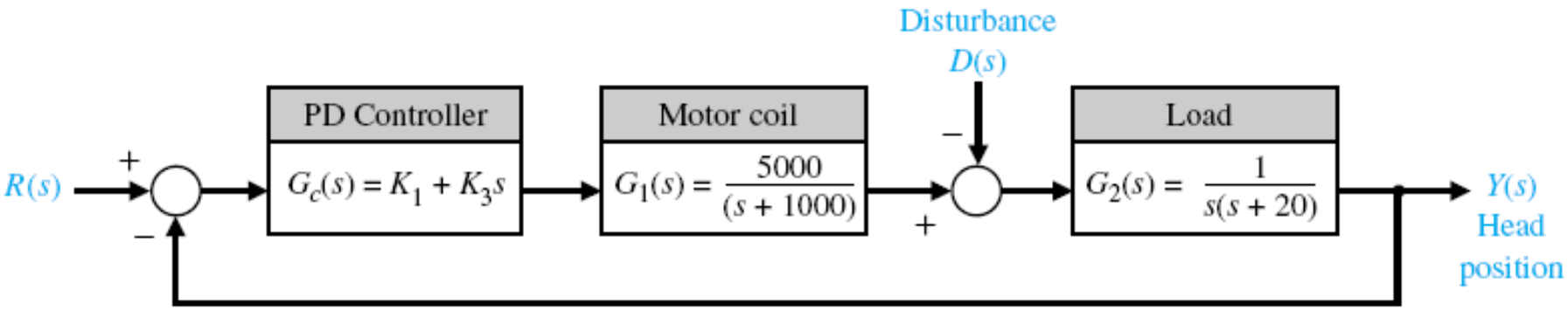
Root locus of the system if K_2=0,and K1 is variedfrom K_1=0 to K_1=∞,and $G_c(s)=K_1$.



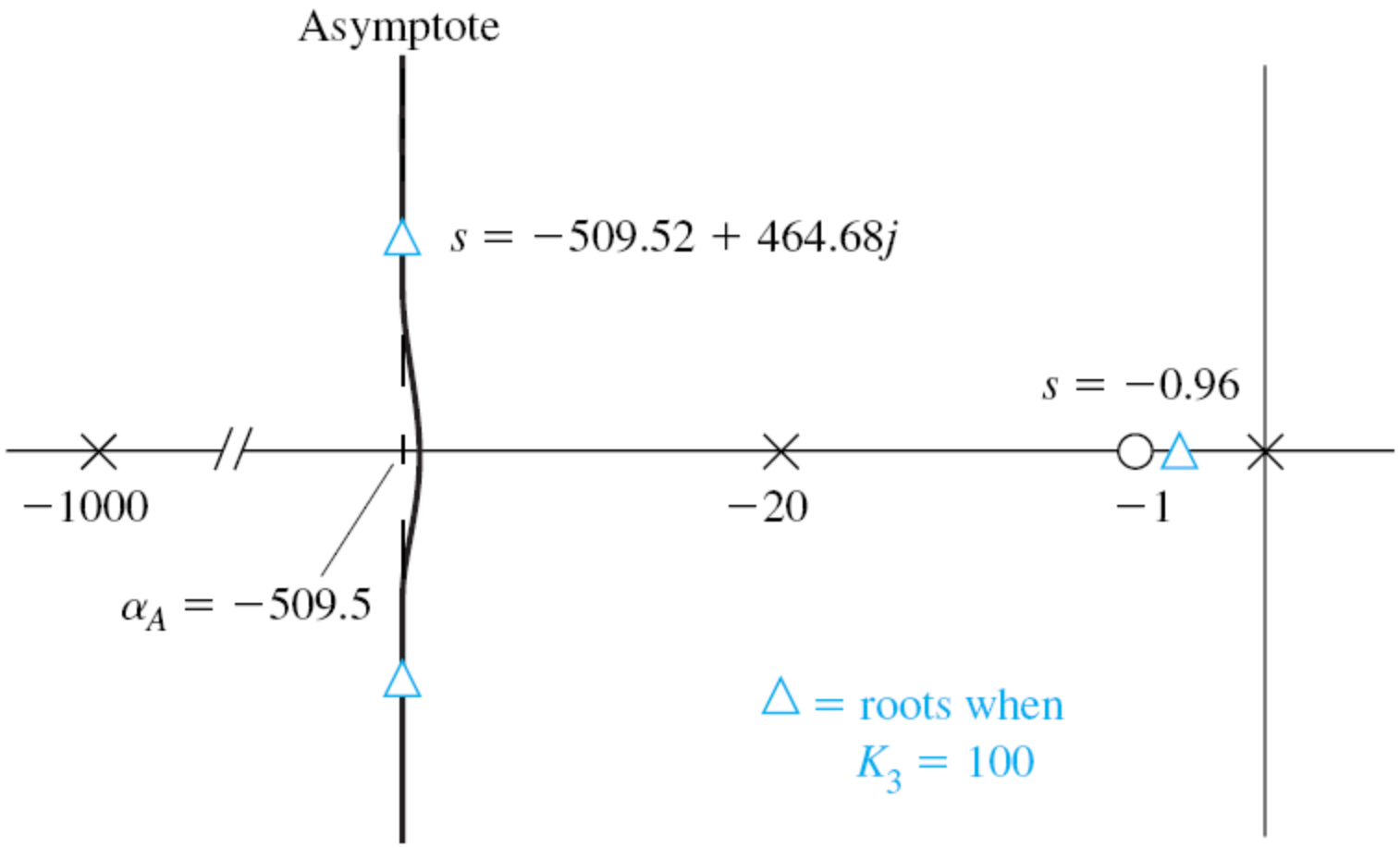
Root locus for the robot controller with a zero inserted at s=-0.2 with $G_c(s) = K1$.



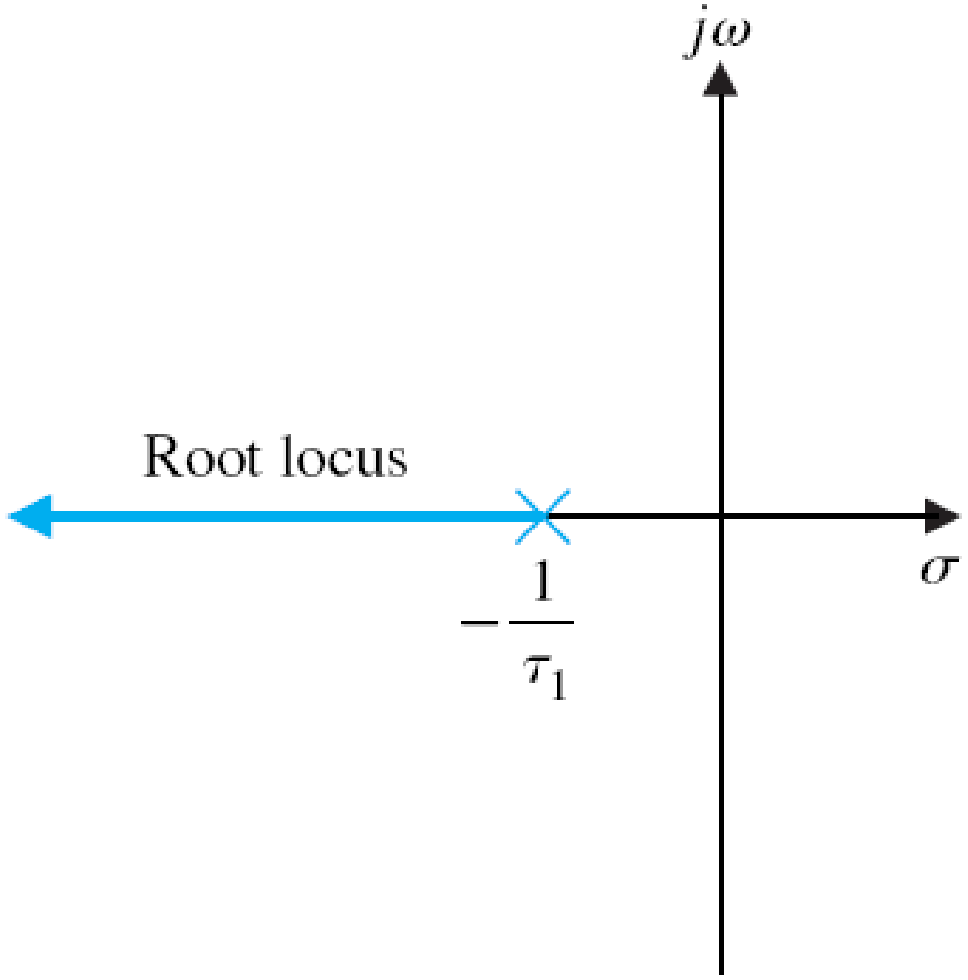
Using the rlocus function.



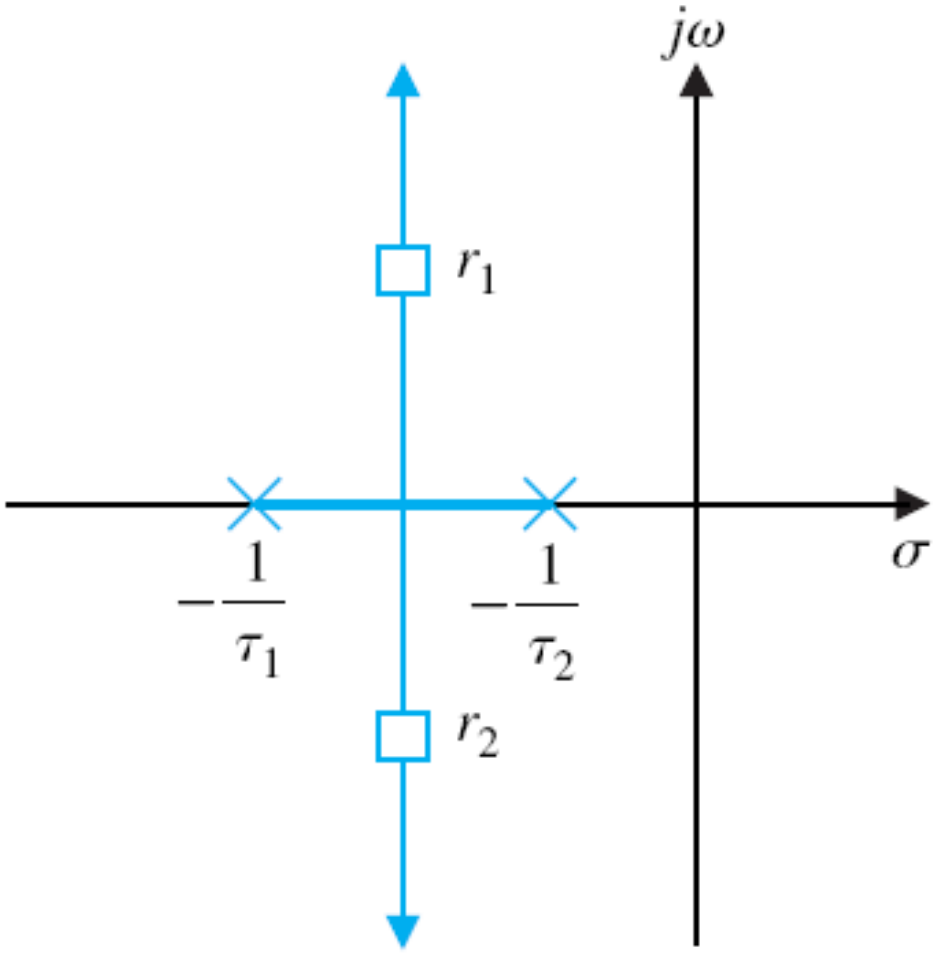
Disk drive control system with a PD controller.



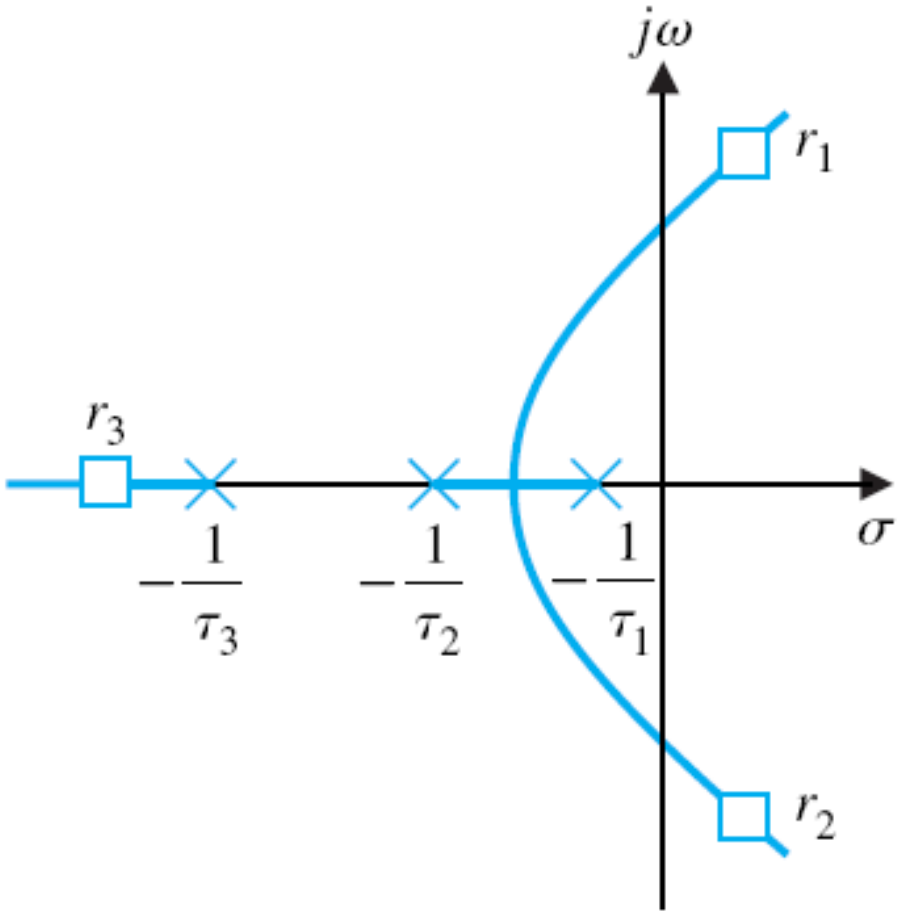
Sketch of the root locus.



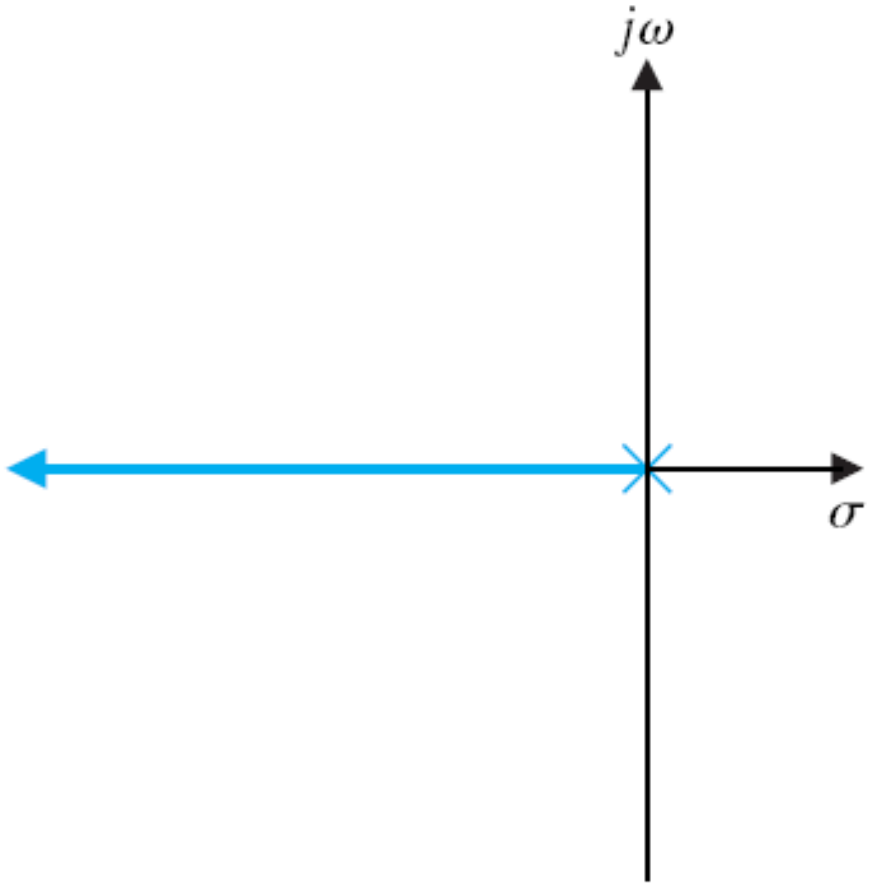
Root Locus Plots for Typical Transfer Functions (continued).



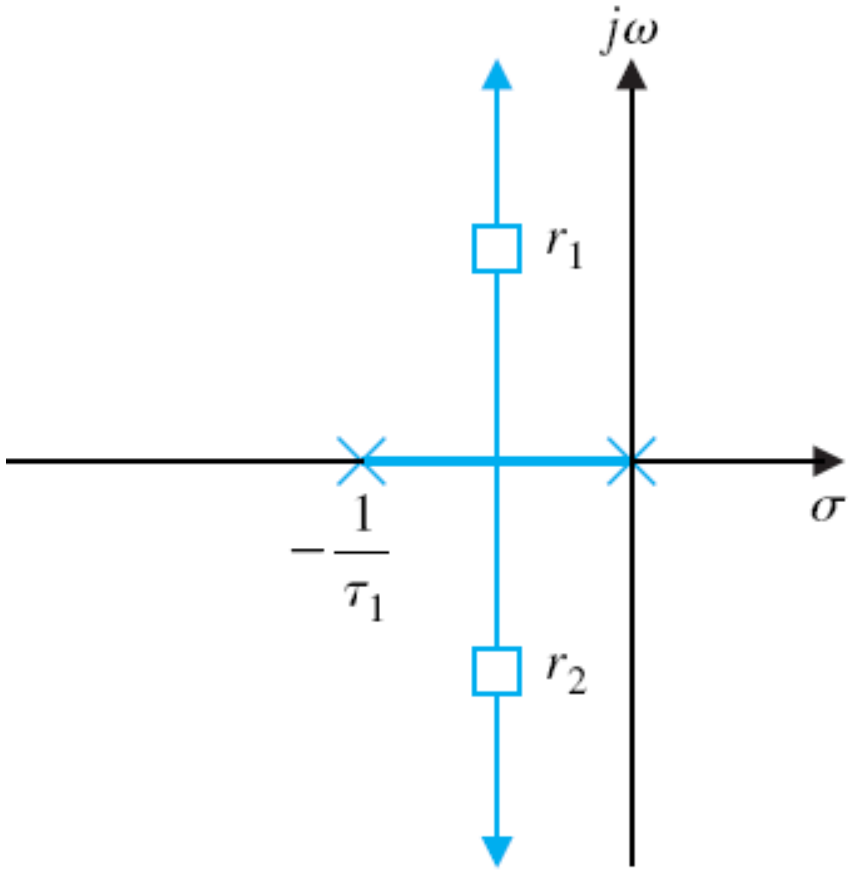
Root Locus Plots for Typical Transfer Functions (continued).



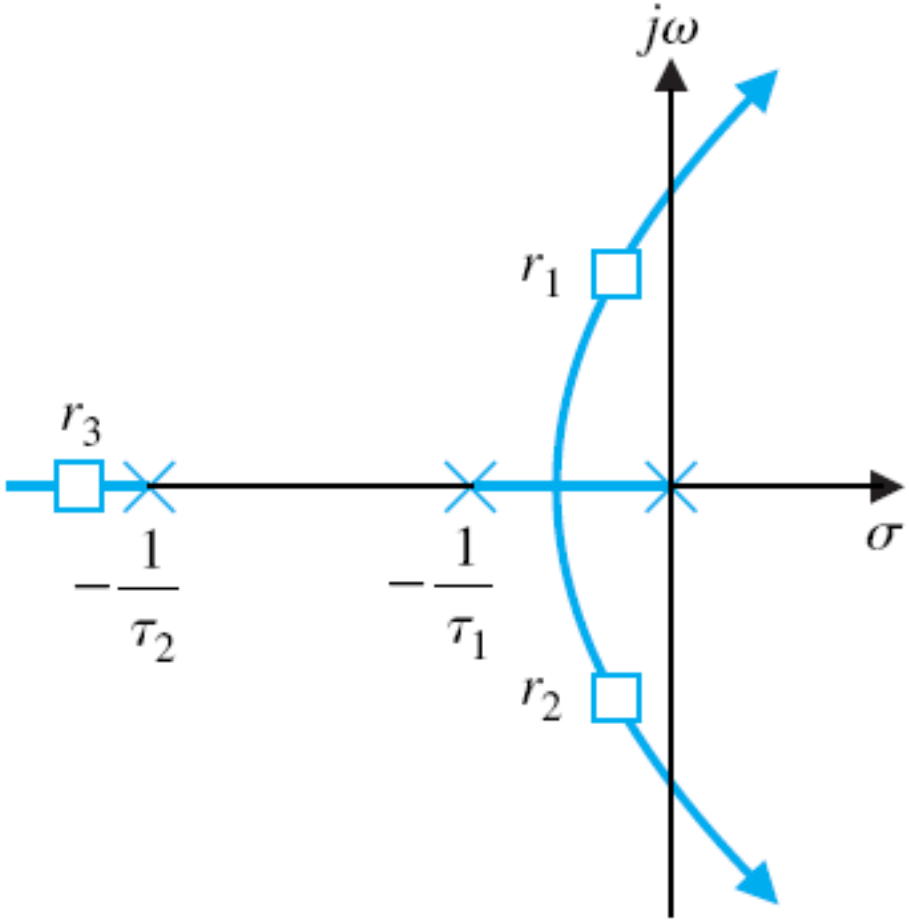
Root Locus Plots for Typical Transfer Functions (continued).



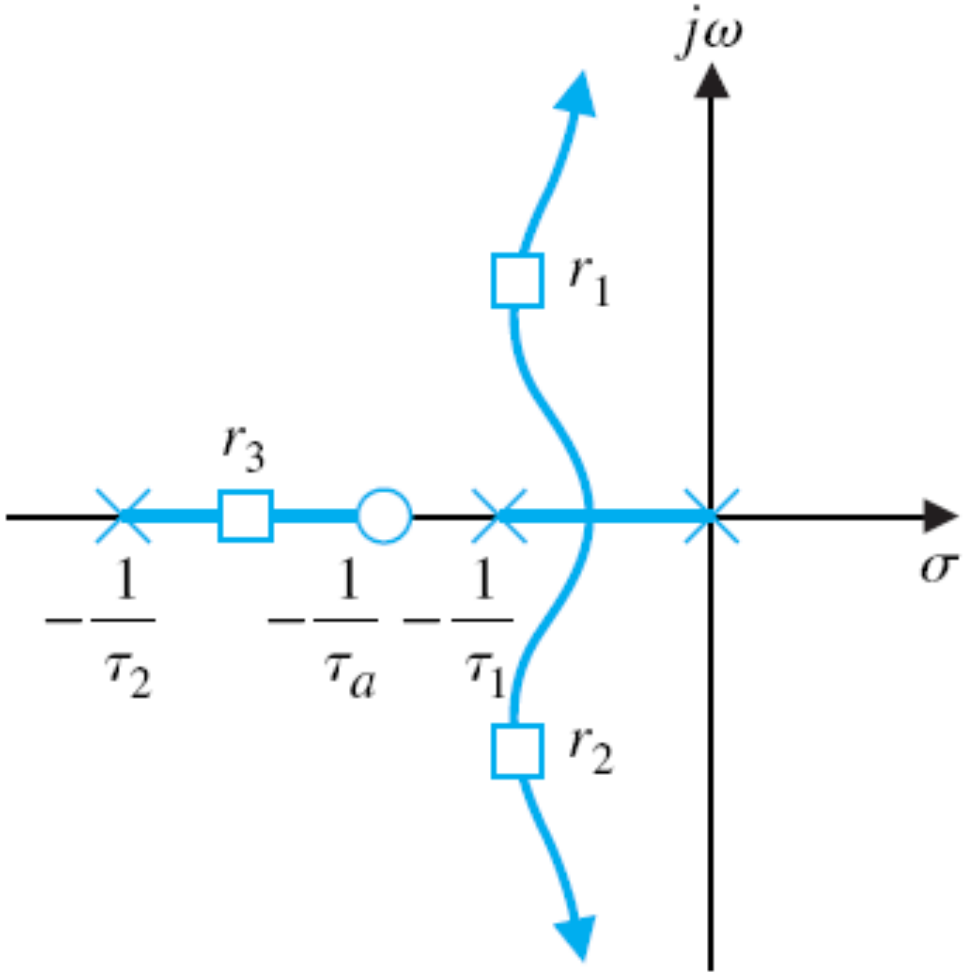
Root Locus Plots for Typical Transfer Functions (continued).



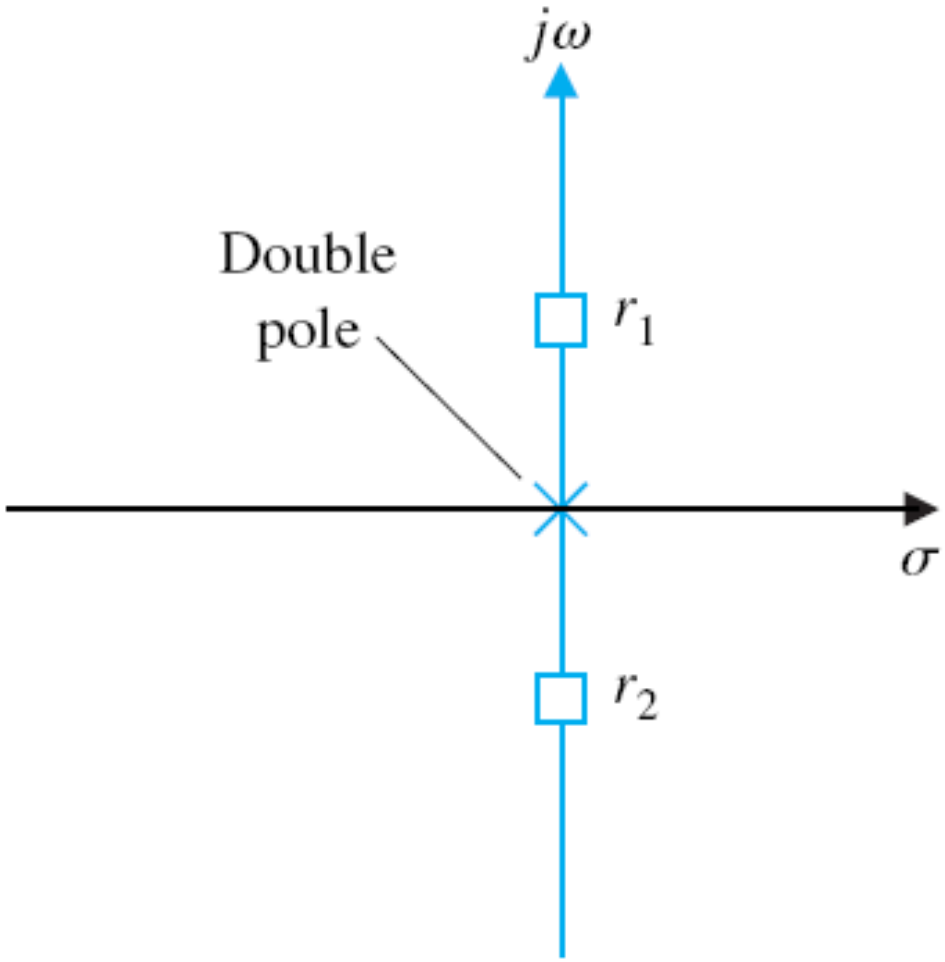
Root Locus Plots for Typical Transfer Functions (continued).



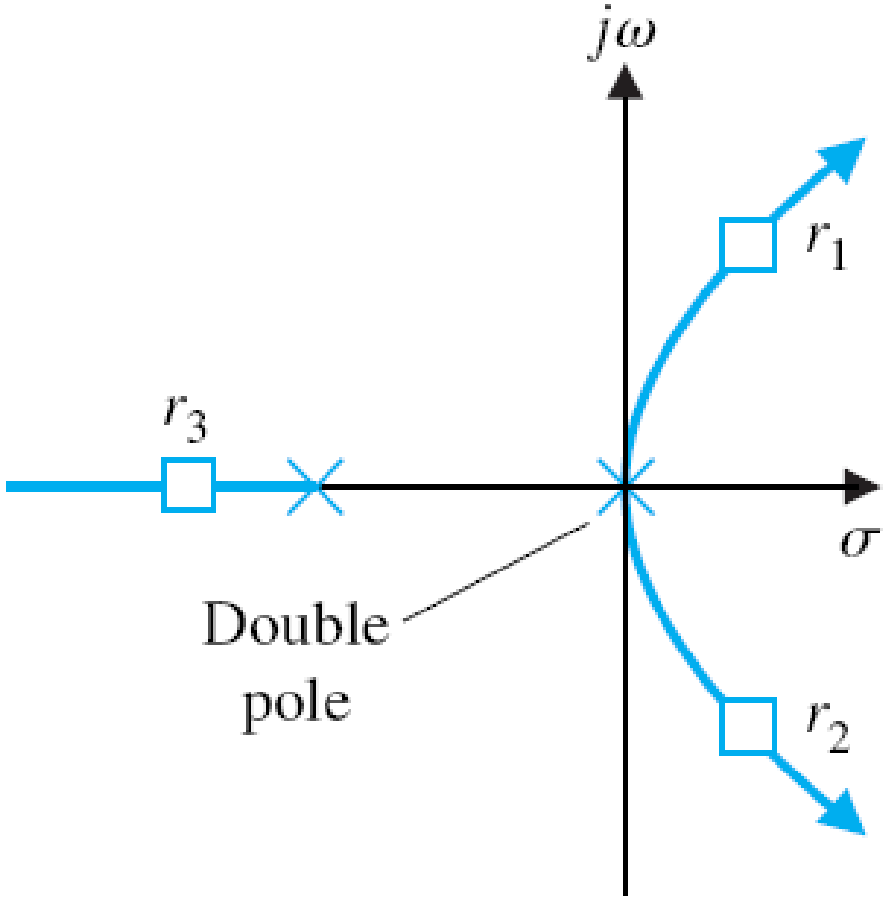
Root Locus Plots for Typical Transfer Functions (continued).



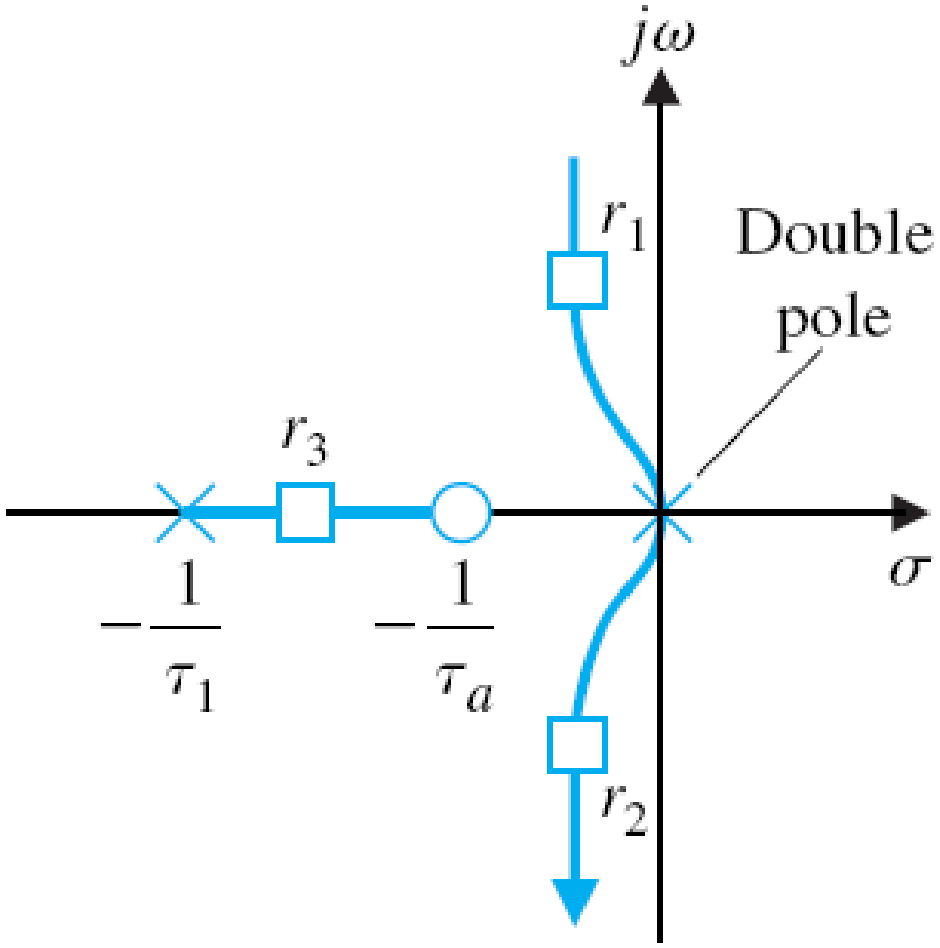
Root Locus Plots for Typical Transfer Functions (continued).



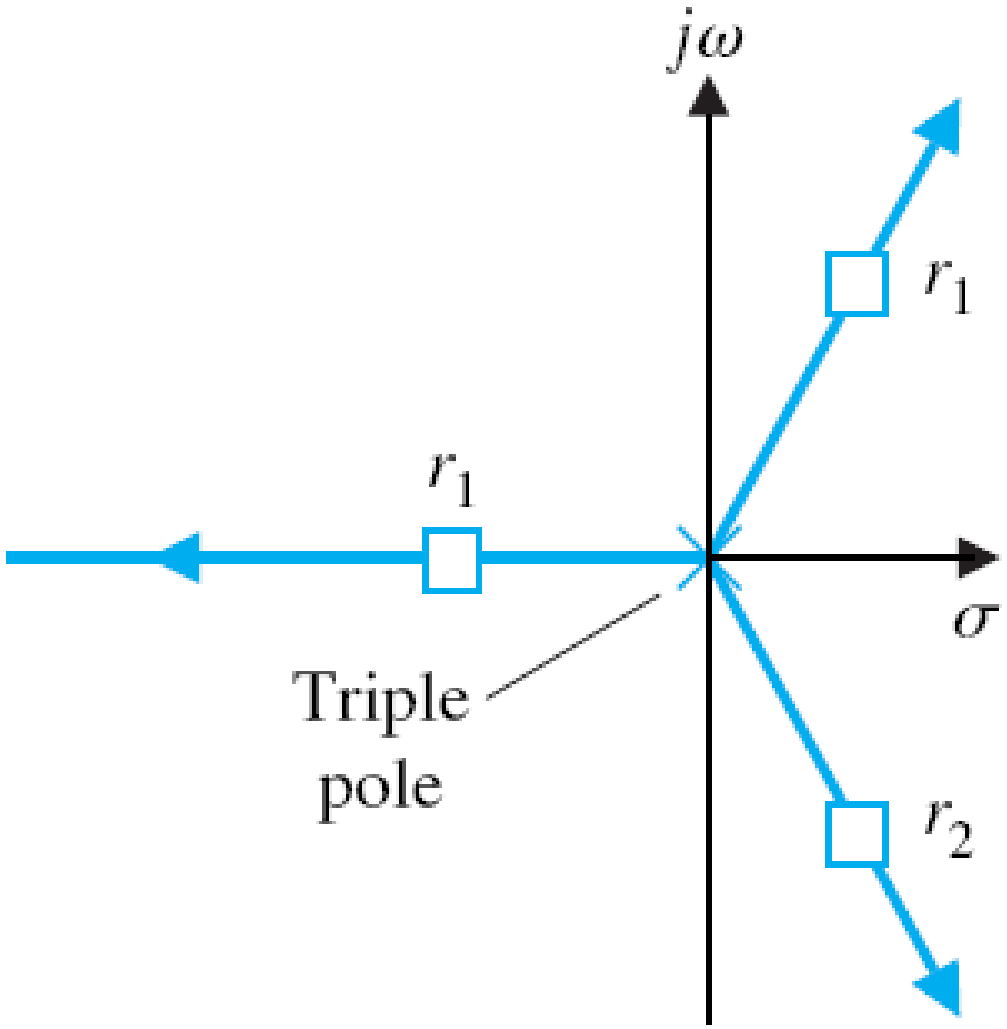
Root Locus Plots for Typical Transfer Functions (continued).



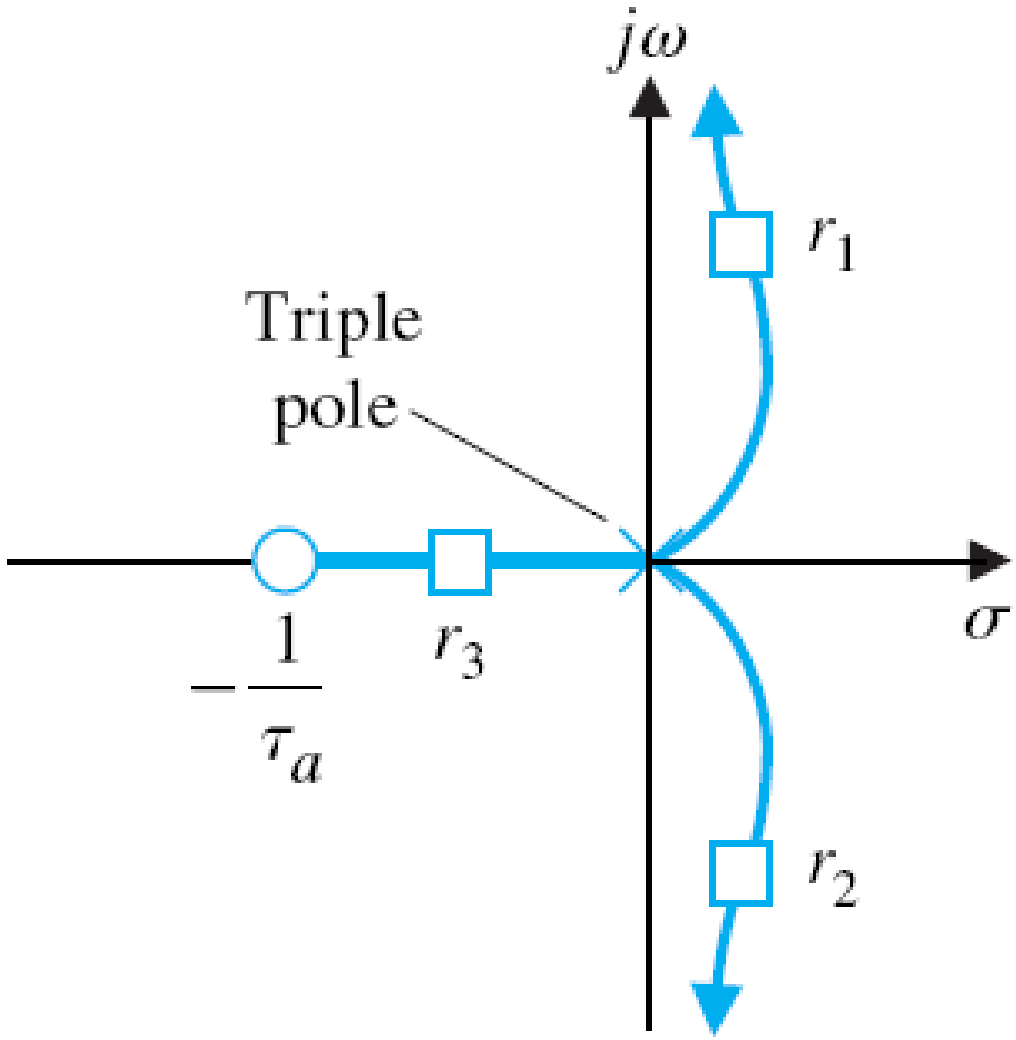
Root Locus Plots for Typical Transfer Functions (continued).



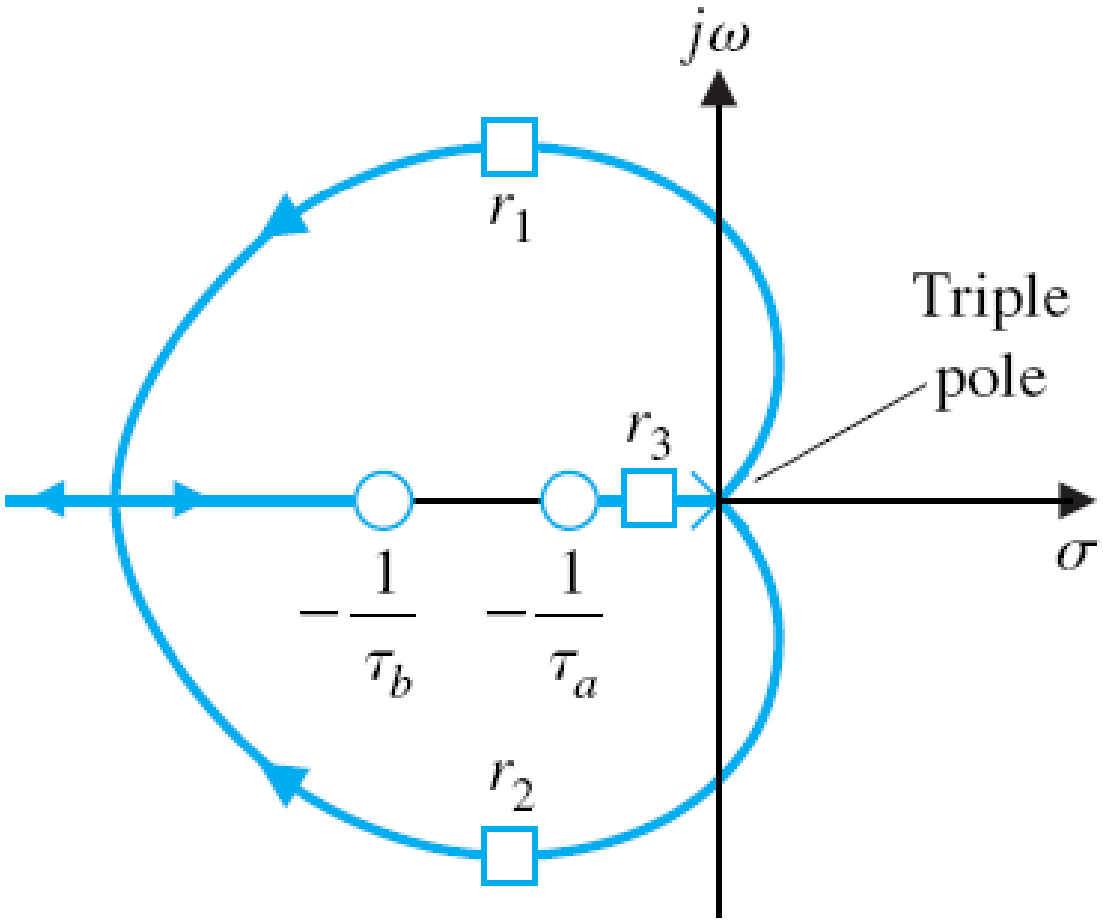
Root Locus Plots for Typical Transfer Functions (continued).



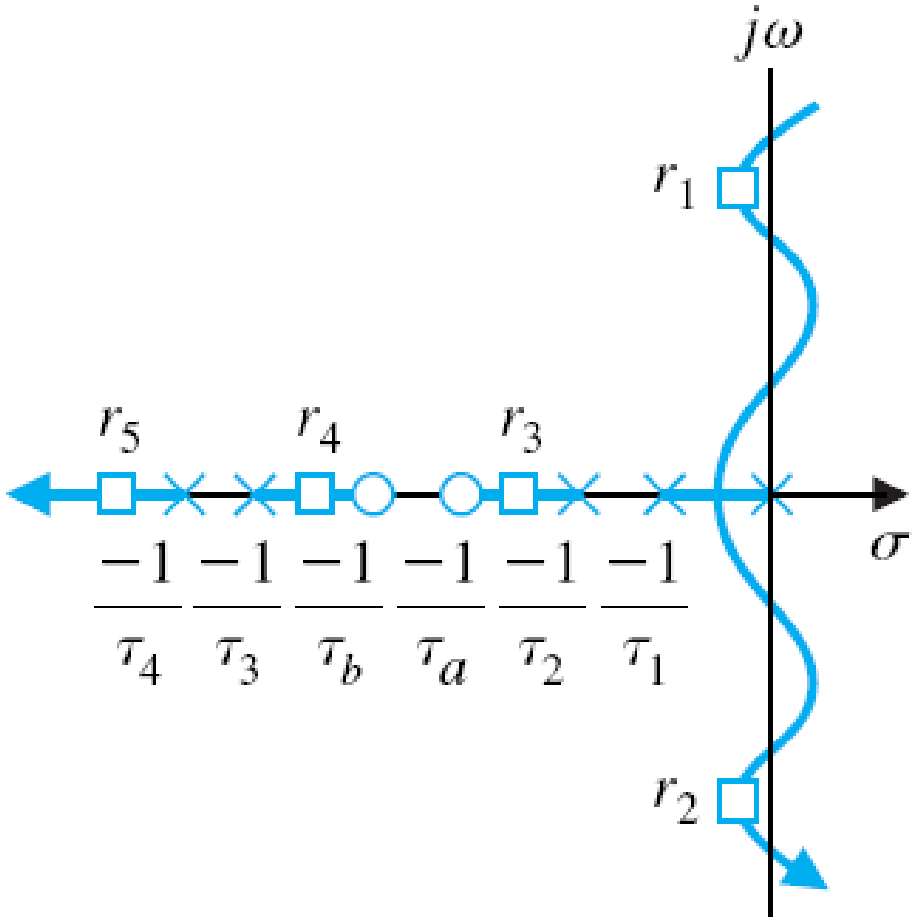
Root Locus Plots for Typical Transfer Functions (continued).



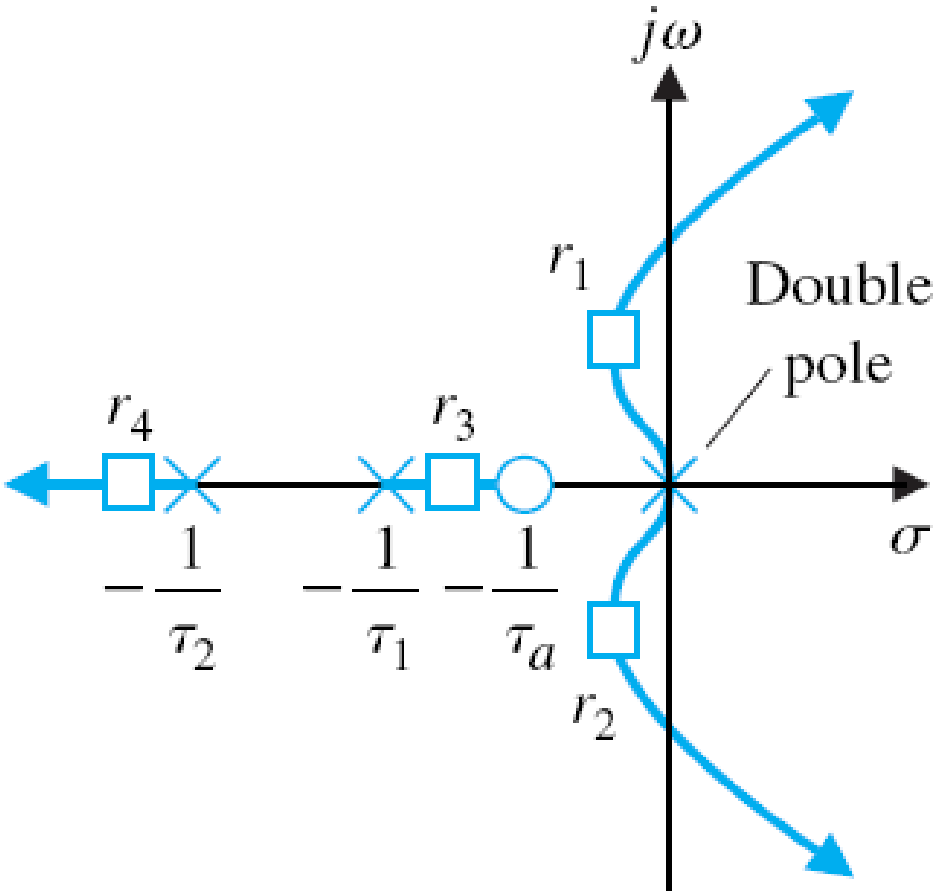
Root Locus Plots for Typical Transfer Functions (continued).



Root Locus Plots for Typical Transfer Functions (continued).



Root Locus Plots for Typical Transfer Functions (continued).



Root Locus Plots for Typical Transfer Functions (continued).