Tabelle der Regelkreisglieder

Symbol	*Frequenzgang*	*Zeitverhalten*	*Sprungantwort*	*Bode-Diagramm*
P Xe → Xa	$\underline{F} = K_P$	$x_a = x_e \cdot K_P$	Xa, Kp, t	F/[dB], Kp, log ω, φ, 0°, log ω
I Xe → Xa	$\underline{F} = \frac{K_I}{j\omega}$	$\Delta x_a = x_e \cdot K_I \cdot \Delta t$	Xa, Ki*Δ t, t, Δ t	F/[dB], -20dB/Dekade, 0, Ki, log ω, φ, -90°, log ω
D Xe → Xa	$\underline{F} = j\omega \cdot K_D$	$x_a = K_D \cdot \frac{\Delta x_e}{\Delta t}$	Xa, t	F/[dB], 20dB/Dekade, 0, 1/Kd, log ω, φ, 90°, log ω

Tabelle der Regelkreisglieder

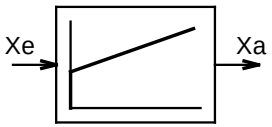
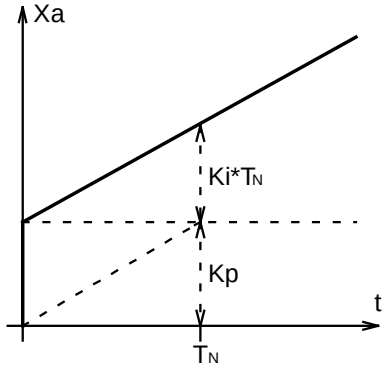
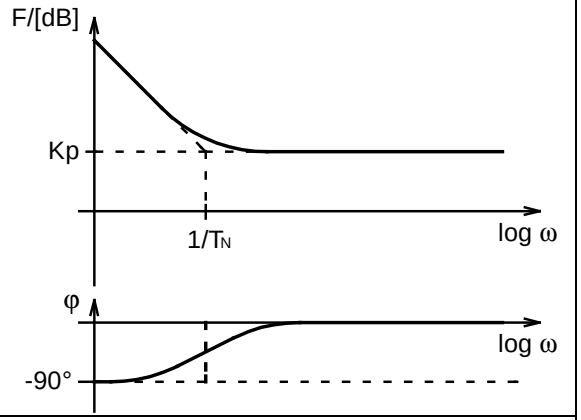
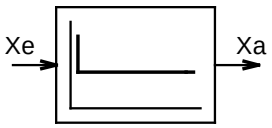
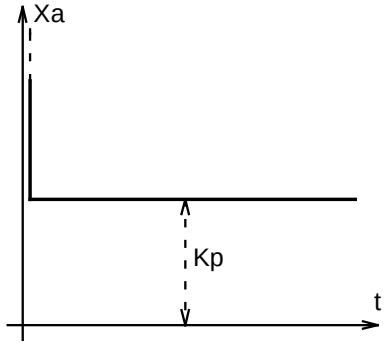
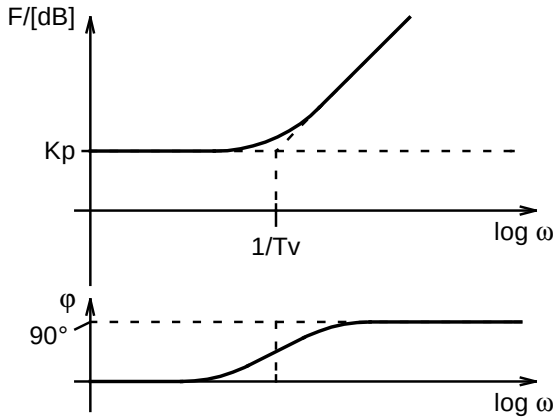
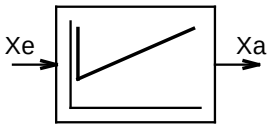
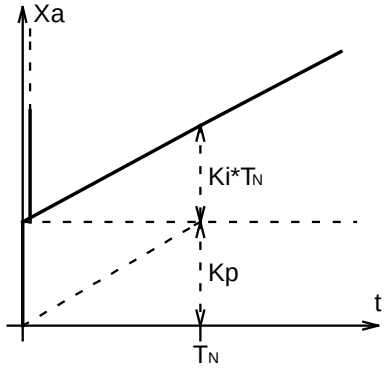
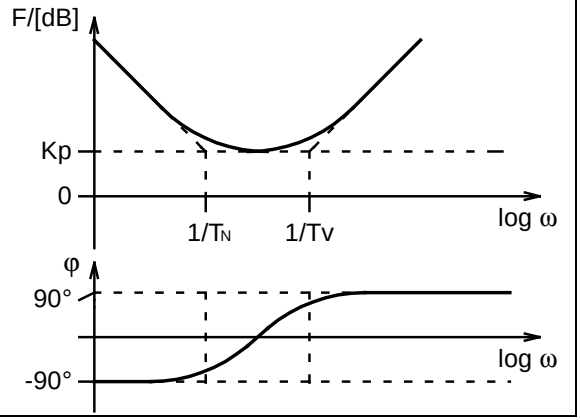
Symbol	*Frequenzgang*	*Zeitverhalten*	*Sprungantwort*	*Bode-Diagramm*
PI 	$\underline{F} = K_P + \frac{K_I}{j\omega}$ $\underline{F} = K_P(1+\frac{1}{j\omega T_N})$ mit $T_N = \frac{K_P}{K_I}$	$x_a = x_e(K_P + K_I \cdot t)$ $x_a = x_e \cdot K_P(1+\frac{t}{T_N})$ für $x_{a(t=0)} = 0$ und x_e = konstant		
PD 	$\underline{F} = K_P + j\omega K_D$ $\underline{F} = K_P(1+ j\omega T_V)$ mit $T_V = \frac{K_D}{K_P}$	$x_a = x_e K_P + K_D \cdot \frac{\Delta x_e}{\Delta t}$ $x_a = K_P(x_e + T_V \cdot \frac{\Delta x_e}{\Delta t})$		
PID 	$\underline{F} = K_P + j\omega \cdot K_D + \frac{K_I}{j\omega}$ $\underline{F} = K_P(1+ j\omega T_V + \frac{1}{j\omega T_N})$ mit $T_V = \frac{K_D}{K_P}$; $T_N = \frac{K_P}{K_I}$	$x_{a(t=0)} = \infty$ $x_{a(t>0)} = x_e \cdot (K_P + K_I \cdot t)$ für $x_{a(t=0)} = 0$ und x_e = konstant		

Tabelle der Regelkreisglieder

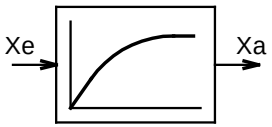
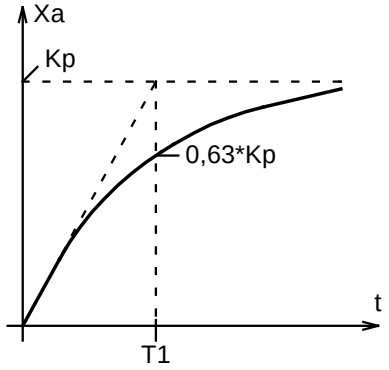
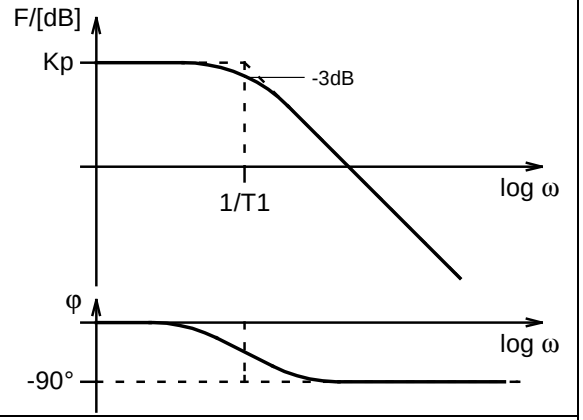
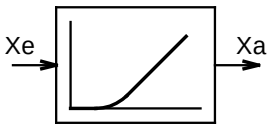
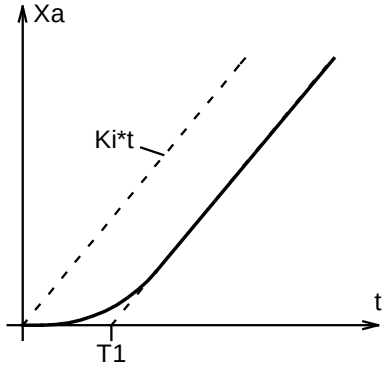
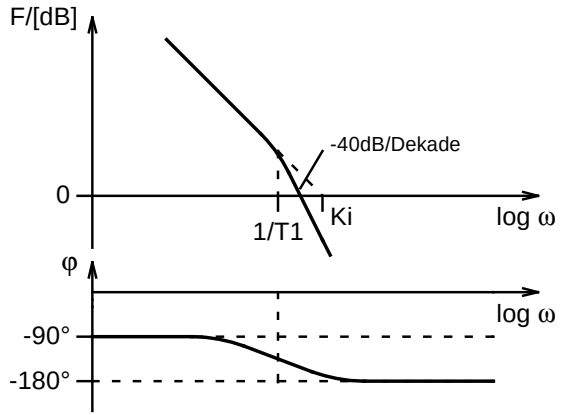
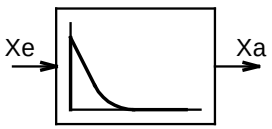
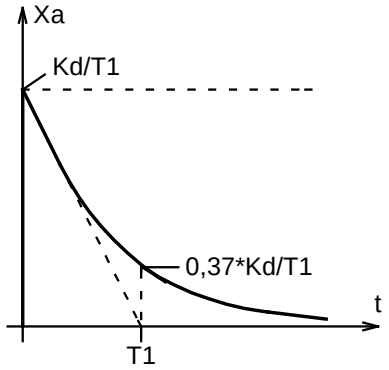
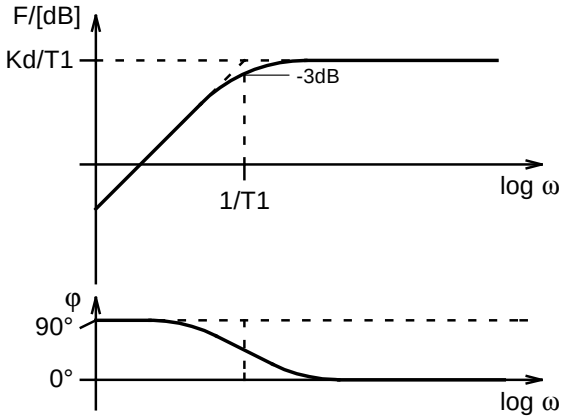
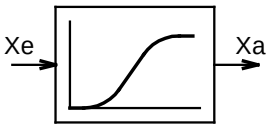
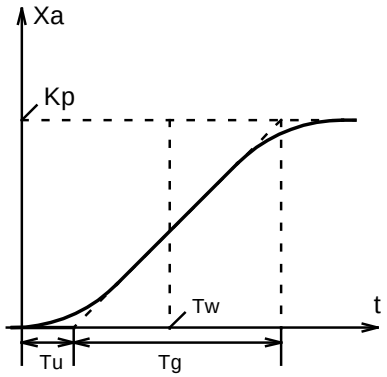
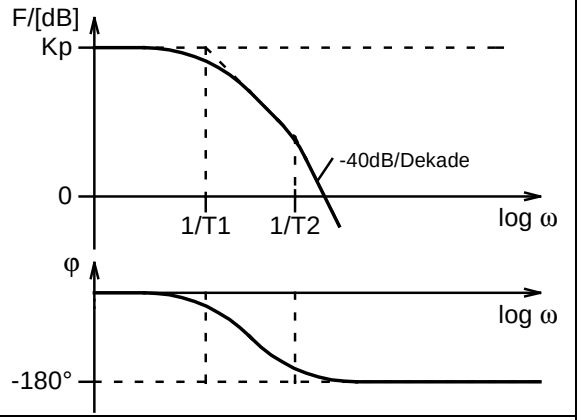
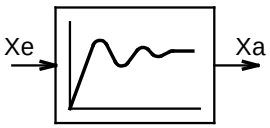
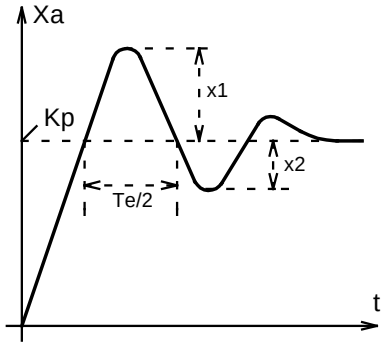
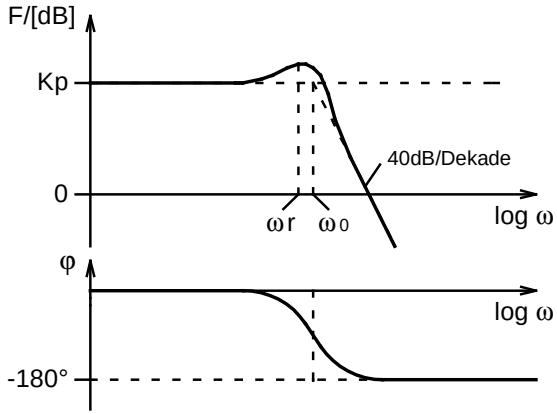
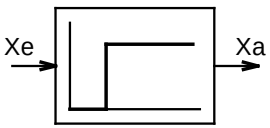
Symbol	*Frequenzgang*	*Zeitverhalten*	*Sprungantwort*	*Bode-Diagramm*
P-T1 	$\underline{F} = \frac{K_P}{1 + j\omega T1}$	$x_a = x_e \cdot Kp(1 - e^{-\frac{t}{T1}})$		
I-T1 	$\underline{F} = \frac{K_I}{j\omega(1 + j\omega T1)}$	$x_a = x_e K_I [t - T1(1 - e^{-\frac{t}{T1}})]$ für $x_{a(t=0)} = 0$ und x_e = konstant		
D-T1 	$\underline{F} = \frac{j\omega K_D}{1 + j\omega T1}$	$x_a = x_e \frac{K_D}{T1} \cdot e^{-\frac{t}{T1}}$		

Tabelle der Regelkreisglieder

Symbol	*Frequenzgang*	*Zeitverhalten*	*Sprungantwort*	*Bode-Diagramm*
P-T2 	$\underline{F} = \frac{K_P}{(1+j\omega T1)(1+j\omega T2)}$ $\omega_0 = \frac{1}{\sqrt{T1 \cdot T2}}$ $D = \frac{T1+T2}{2 \cdot \sqrt{T1 \cdot T2}} \geq 1$	$x_a = x_e \cdot Kp(1 - \frac{T1}{T1-T2} \cdot e^{-\frac{t}{T1}} + \frac{T2}{T1-T2} \cdot e^{-\frac{t}{T2}})$ $T_w = \frac{T1 \cdot T2}{T1-T2} \cdot \ln\frac{T1}{T2}$		
P-T2s 	$\underline{F} = \frac{K_P}{1+j\omega T1+(j\omega)^2 \cdot T2^2}$ $\underline{F} = \frac{K_P}{1-(\frac{\omega}{\omega_0})^2 + j\frac{\omega}{\omega_0} \cdot 2 \cdot D}$ $\omega_0 = \frac{1}{T2} \quad ; \quad D = \frac{T1}{2 \cdot T2} < 1$	$x_a = x_e \cdot K_P[1-(\cos\omega_e t + \frac{\alpha}{\omega_e} \cdot \sin\omega_e t)e^{-\alpha t}]$ $\omega_e = \omega_0\sqrt{1-D^2}$ $\alpha = \frac{T1}{2 \cdot T2^2}$	 $D = \frac{1}{\sqrt{1+(\frac{\pi}{\ln(x1/x2)})^2}}$ $T_e = \frac{2\pi}{\omega_e}$	 $\omega_r = \omega_0 \cdot \sqrt{1-2 \cdot D^2}$
Tt 	$\underline{F} = K_P \cdot e^{-j\omega T_t}$	$x_{a(t<T_t)} = 0$ $x_{a(t \geq T_t)} = x_e \cdot K_P$