

**PT0**

differenciálegyenlet:

$$x_{ki}(t) = A_p \cdot x_{be}(t)$$

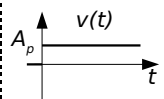
impulzusválasz:

$$h(t) = A_p \cdot \delta(t)$$



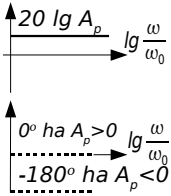
ugrásválasz:

$$v(t) = A_p \cdot 1(t)$$

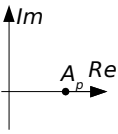


$$Y(j\omega) = A_p$$

Bode



Nyquist



BHM 2008

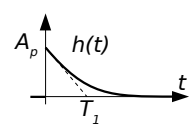
**PT1**

differenciálegyenlet:

$$T_1 \cdot \frac{dx_{ki}(t)}{dt} + x_{ki}(t) = A_p \cdot x_{be}(t)$$

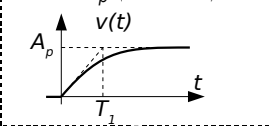
impulzusválasz:

$$h(t) = A_p \cdot e^{-\frac{t}{T_1}} \cdot 1(t)$$



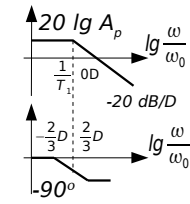
ugrásválasz:

$$v(t) = A_p \cdot \left(1 - e^{-\frac{t}{T_1}}\right) \cdot 1(t)$$

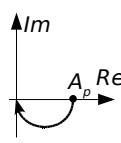


$$Y(j\omega) = \frac{A_p}{1 + j\omega T_1}$$

Bode



Nyquist



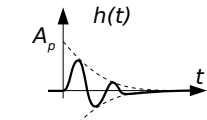
**PT2**

differenciálegyenlet:

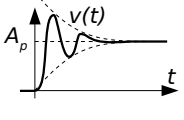
$$T_0^2 \frac{d^2 x_{ki}(t)}{dt^2} + 2\xi T_0 \frac{dx_{ki}(t)}{dt} + x_{ki}(t) = A_p \cdot x_{be}(t)$$

ha  $\xi > 1$ : aperiodikus, lsd két PT1 sorosan  
ha  $\xi < 1$ : lengő tag:

impulzusválasz:

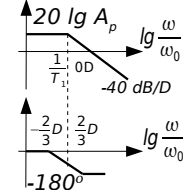


ugrásválasz:

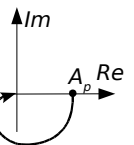


$$Y(j\omega) = \frac{A_p}{1 + j\omega 2\xi T_0 + (j\omega T_0)^2}$$

Bode



Nyquist



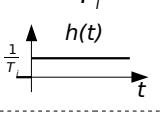
**IT0**

differenciálegyenlet:

$$T_i \cdot \frac{dx_{ki}(t)}{dt} = x_{be}(t)$$

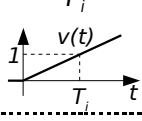
impulzusválasz:

$$h(t) = \frac{1}{T_i} \cdot 1(t)$$



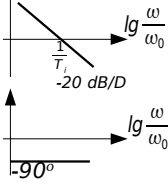
ugrásválasz:

$$v(t) = \frac{t}{T_i} \cdot 1(t)$$

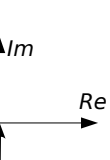


$$Y(j\omega) = \frac{1}{j\omega T_i}$$

Bode



Nyquist



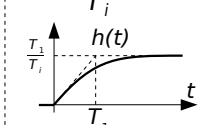
**IT1**

differenciálegyenlet:

$$T_1 T_i \cdot \frac{d^2 x_{ki}(t)}{dt^2} + T_i \cdot \frac{dx_{ki}(t)}{dt} = x_{be}(t)$$

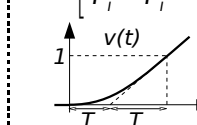
impulzusválasz:

$$h(t) = \frac{T_1}{T_i} \left(1 - e^{-\frac{t}{T_1}}\right) \cdot 1(t)$$



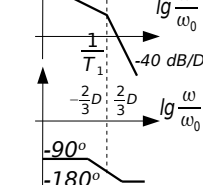
ugrásválasz:

$$v(t) = \left[\frac{t}{T_i} - \frac{T_1}{T_i} \left(1 - e^{-\frac{t}{T_1}}\right)\right] \cdot 1(t)$$

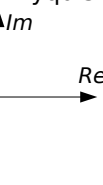


$$Y(j\omega) = \frac{1}{j\omega T_i} \cdot \frac{1}{1 + j\omega T_1}$$

Bode



Nyquist



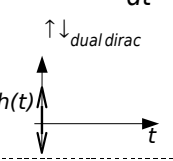
**DT0**

differenciálegyenlet:

$$x_{ki}(t) = T_D \cdot \frac{dx_{be}(t)}{dt}$$

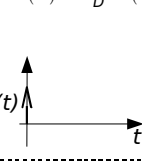
impulzusválasz:

$$h(t) = T_D \cdot \frac{d\delta(t)}{dt}$$



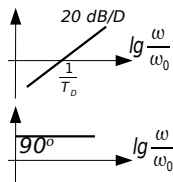
ugrásválasz:

$$v(t) = T_D \cdot \delta(t)$$

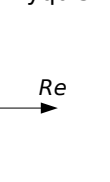


$$Y(j\omega) = j\omega T_D$$

Bode



Nyquist



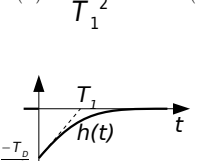
**DT1**

differenciálegyenlet:

$$T_1 \cdot \frac{dx_{ki}(t)}{dt} + x_{ki}(t) = T_D \cdot \frac{dx_{be}(t)}{dt}$$

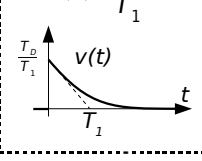
impulzusválasz:

$$h(t) = \frac{-T_D}{T_1^2} e^{-\frac{t}{T_1}} \cdot 1(t)$$



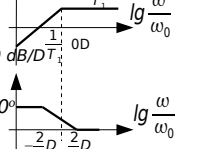
ugrásválasz:

$$v(t) = \frac{T_D}{T_1} e^{-\frac{t}{T_1}} \cdot 1(t)$$

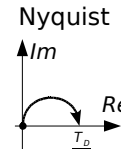


$$Y(j\omega) = \frac{j\omega T_D}{1 + j\omega T_1}$$

Bode



Nyquist



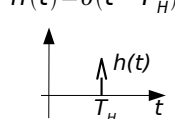
**Holdidős tag**

differenciálegyenlet:

$$x_{ki}(t) = x_{be}(t - T_H)$$

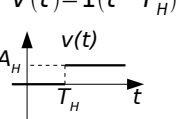
impulzusválasz:

$$h(t) = \delta(t - T_H)$$



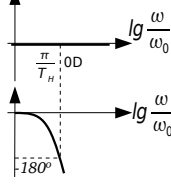
ugrásválasz:

$$v(t) = 1(t - T_H)$$



$$Y(j\omega) = e^{-j\omega T_H}$$

Bode



Nyquist

