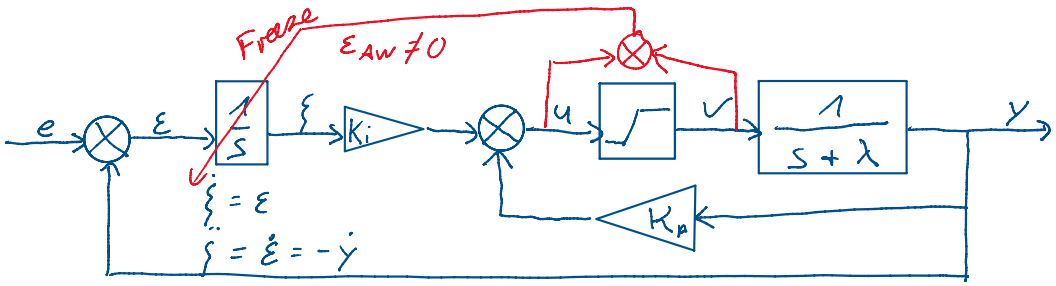
# Anti-Windup Design

Dienstag, 14. Februar 2023 09:17




$u = K_i \xi - K_p y$ $\qquad u = K_i \int \varepsilon - K_p y \qquad \left(\frac{K_i}{s} + K_p\right)\varepsilon$

$x_1 = \xi$

$x_2 = \dot{\xi}$

$\dot{x}_1 = x_2 \rightarrow \dot{x}_1 = 0$

$\dot{x}_2 = \dot{\varepsilon} = -\dot{y} = \lambda y - v$

$= -\lambda x_2 - v$

$\frac{Y}{V} = \frac{1}{s+\lambda}$

$\dot{y} + \lambda y = v \Rightarrow \dot{y} = -\lambda y + v$

$\dot{x}_1 = x_2$

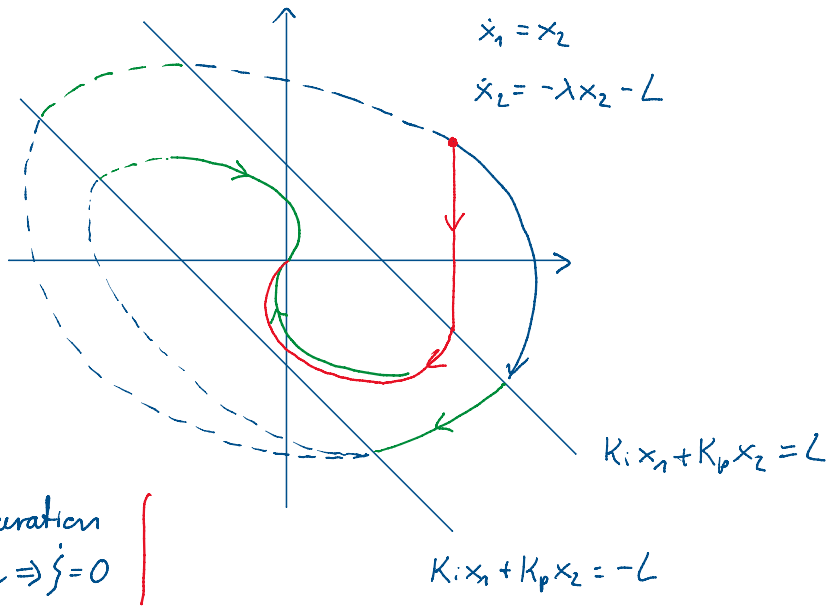
$\dot{x}_2 = -\lambda x_2 - v$

$A = \begin{bmatrix} 0 & 1 \\ -K_i & -(\lambda + K_p) \end{bmatrix}$

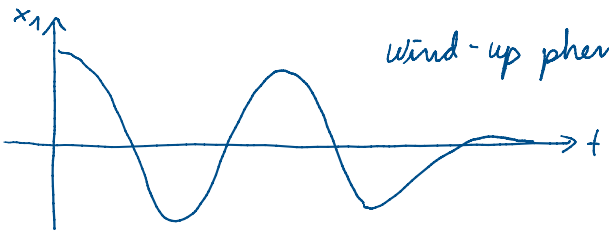
$= \begin{bmatrix} 0 & 1 \\ -\omega^2 & -2\xi\omega \end{bmatrix}$

$K_i = \omega^2$

$\lambda + K_p = 2\xi\omega$

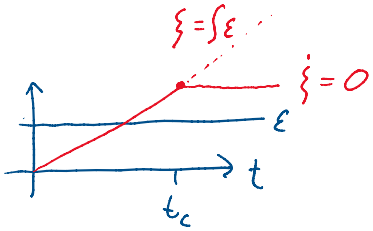



if saturation active $\Rightarrow \dot{\xi} = 0$

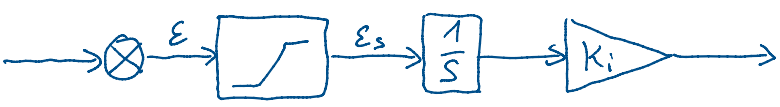



wind-up phenomenon

$\Rightarrow$ KRINKELIS




Other approach:



$\omega = \sqrt{K_i} = 0,7329$

$\xi = \frac{\lambda + K_p}{2\omega} =$

$u = x_0 \cdot \sin \omega t$

$\downarrow$

$x_0 \approx 0,72$ from scope block

$T = \frac{2\pi}{\omega} = 8,5726 \rightarrow$ plausible