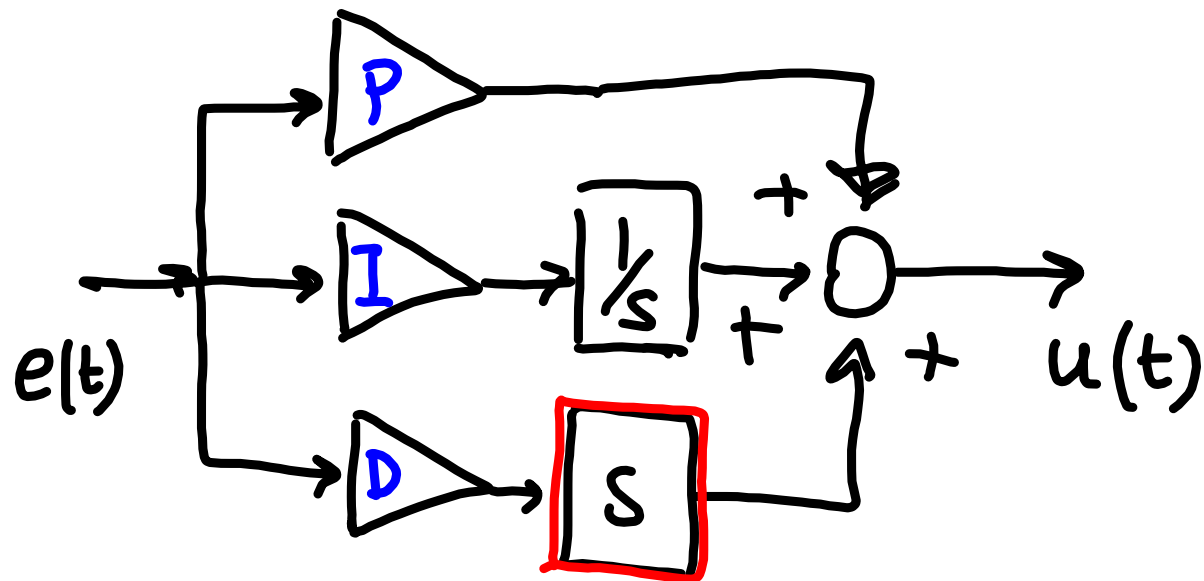


$$\begin{aligned}
 1) \text{ Ideale } U(s) &= K_p \left(1 + \frac{1}{T_i} \frac{1}{s} + T_d s \right) E(s) \\
 &= P \left(1 + I \frac{1}{s} + D \cdot s \right) E(s)
 \end{aligned}$$

$$2) \text{ Parallel } U(s) = P + I \cdot \frac{1}{s} + D \cdot s$$



s è non fisicamente realizzabile

Terimine derivativo

~~D.S~~

$$D \cdot \frac{N \cdot}{1 + N \cdot \frac{1}{s}} \xrightarrow{N \rightarrow \infty} D \cdot S$$

Termine derivativo

$$\frac{\bar{T}_d \cdot S}{1 + \bar{T}_d \cdot S / N} \xrightarrow{N \rightarrow \infty} \bar{T}_d \cdot S$$

Discretizzazione del PID

1) Parte integrale

$$\frac{I/s}{T_i \cdot s}$$

EA

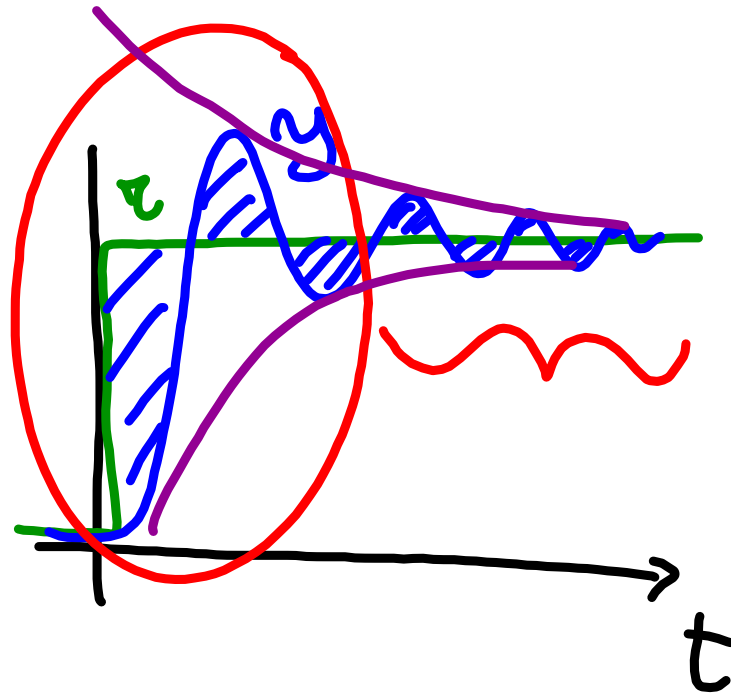
$$s = \frac{z-1}{T}$$

2) Parte derivativa

$$\frac{D \cdot s}{1 + D \frac{s}{N}}$$

FI

$$s = \frac{1-z^{-1}}{T}$$



$$e(t) = z(t) - y(t)$$

