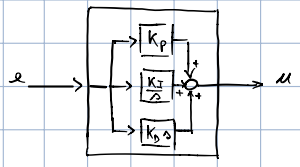
P ← PROPORZIONALE

I ← INTEGRALE

D ← DERIVATI



$$R_{PID}(s) = K_P + \frac{K_I}{s} + K_D s$$

$$R_{PID}(s) = K\left(1 + \frac{1}{s T_I} + s T_D\right)$$

T_D: Tempo derivativo (>0)

T_I: Tempo integrale (>0)

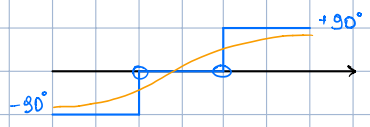
K: Guadagno proporzionale

P: $R_P(s) = K$

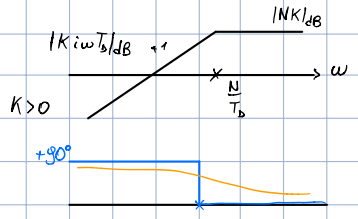
PI: $R_{PI}(s) = K\left(1 + \frac{1}{s T_I}\right)$

PD: $R_{PD}(s) = K(1 + s T_D)$

PID: $R_{PID}(s) = K\left(1 + \frac{1}{s T_I} + s T_D\right) = K\frac{s T_I + 1 + s^2 T_D T_I}{s T_I}$



$$R_D(s) = K s T_D$$



$$\frac{K s T_D}{1 + s\frac{T_D}{N}}$$

R_{PID}: Reale

$$R_{PID}(s) = K\left(1 + \frac{1}{s T_I} + \frac{s T_D}{1 + s\frac{T_D}{N}}\right) = K\frac{s T_I\left(1 + s\frac{T_D}{N}\right) + 1 + s\frac{T_D}{N} + s^2 T_D T_I}{s T_I\left(1 + s\frac{T_D}{N}\right)}$$

$$R(s) = \mu\frac{(1 + s T_1)(1 + s T_2)}{s(1 + s T_4)}$$