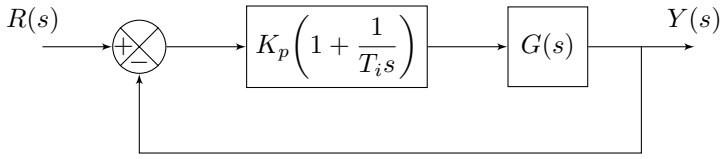
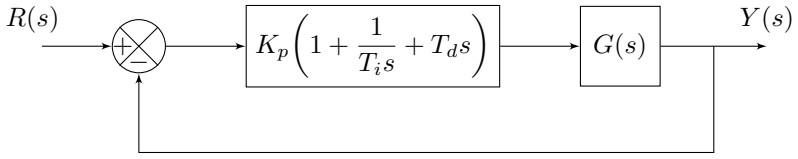
Controladores PID

1. Controlador PI ideal



Regla	K_p	T_i
Ziegler & Nichols (1942)	$0.45K_u$	$0.83T_u$
Parr (1989)	$0.5K_u$	$0.43T_u$
	$0.33K_u$	$2T_u$
Hang et al. (1993)	$0.25K_u$	$0.25T_u$
Pessen (1994)	$0.25K_u$	$0.167T_u$
McMillan (1994)	$0.3571K_u$	T_u
Åström & Hägglund (1995)	$0.4698K_u$	$0.4373T_u$
	$0.1988K_u$	$0.0882T_u$
	$0.2015K_u$	$0.1537T_u$
Calcev & Gorez (1995)	$0.3536K_u$	$0.1592T_u$
Edgar et al. (1997)	$0.59K_u$	$0.81T_u$
ABB (2001)	$0.5K_u$	$0.8T_u$

2. Controlador PID ideal



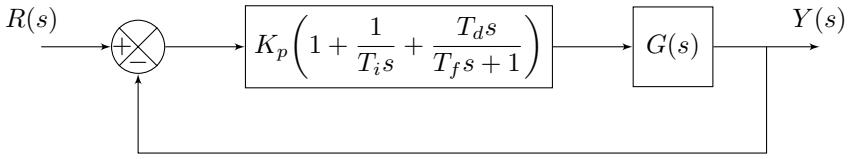
Regla	K_p	T_i	T_d
Ziegler & Nichols (1942)	$[0.6K_u,\ K_u]$	$0.5T_u$	$0.125T_u$
Farrington (1950)	$[0.33K_u,\ 0.5K_u]$	T_u	$[0.1T_u,\ 0.25T_u]$
McAvoy & Johnson (1967)	$0.54K_u$	T_u	$0.2T_u$
Atkinson & Davey (1968)	$0.25K_u$	$0.75T_u$	$0.25T_u$
Åström (1982)	$0.87K_u$	$0.55T_u$	$0.14T_u$
	$0.71K_u$	$0.77T_u$	$0.19T_u$
	$0.50K_u$	$1.19T_u$	$0.30T_u$
Carr (1986); Pettit and Carr (1987)	K_u	$0.5T_u$	$0.125T_u$
	$0.6667K_u$	T_u	$0.167T_u$
	$0.5K_u$	$1.5T_u$	$0.167T_u$
Åström & Hägglund (1988)	$0.35K_u$	$0.77T_u$	$0.19T_u$
Parr (1989)	$0.5K_u$	T_u	$0.2T_u$
	$0.5K_u$	T_u	$0.25T_u$
	$0.5K_u$	$0.34T_u$	$0.08T_u$
Tinham (1989)	$0.4444K_u$	$0.6T_u$	$0.19T_u$
Blickley (1990)	$0.5K_u$	T_u	$[0.125T_u,\ 0.167T_u]$
Corripio (1990)	$0.75K_u$	$0.63T_u$	$0.1T_u$
De Paor (1993)	$0.906K_u$	$0.5T_u$	$0.125T_u$
	$0.866K_u$	$0.5T_u$	$0.125T_u$
McMillan (1994)	$0.5K_u$	$0.5T_u$	$0.125T_u$
Calcev & Gorez (1995)	$0.3536K_u$	$0.1592T_u$	$0.0398T_u$

Regla	K_p	T_i	T_d
Åström & Hägglund (1995)	$0.4698K_u$	$0.4546T_u$	$0.1136T_u$
	$0.1988K_u$	$1.2308T_u$	$0.3077T_u$
	$0.2015K_u$	$0.7878T_u$	$0.11970T_u$
ABB (1996)	$0.625K_u$	$0.5T_u$	$0.083T_u$
Luo et al. (1996)	$0.48K_u$	$0.5T_u$	$0.125T_u$
Karaboga & Kalinli (1996)	$[0.32K_u, 0.6K_u]$	$[0.213T_u, 1.406T_u]$	$[0.133T_u, 0.469T_u]$
Luyben & Luyben (1997)	$0.46K_u$	$2.20T_u$	$0.16T_u$
Tan et al. (1999)	$0.4K_u$	$0.5T_u$	$0.125T_u$
	$0.5K_u$	T_u	$0.125T_u$
Wojsznis et al. (1999)	$0.4K_u$	$0.333T_u$	$0.083T_u$
Yu (1999)	$0.33K_u$	$0.5T_u$	$0.125T_u$
	$0.2K_u$	$0.5T_u$	$0.125T_u$
Chau (2002)	$0.33K_u$	$0.5T_u$	$0.333T_u$
	$0.2K_u$	$0.5T_u$	$0.333T_u$
Smith (2003)	$0.75K_u$	$0.625T_u$	$0.1T_u$

3. Controladores PID prácticos

$$T_f = \frac{T_d}{N},\ N \in [5,\ 20]$$

3.1 Filtro derivativo



3.2 Prefiltro de segundo orden